

STOCKHOLM ECONOMIC STUDIES

Published by writers connected with the Institute for Social Sciences
of Stockholm University.

No. 3 a.

Dhananjayrao Gadgil Library



GIPE-PUNE-081869

WAGES IN SWEDEN

1860—1930

IN TWO PARTS

WAGES, COST OF LIVING
AND NATIONAL INCOME
IN SWEDEN 1860—1930

BY THE STAFF OF
THE INSTITUTE FOR SOCIAL SCIENCES,
UNIVERSITY OF STOCKHOLM



VOLUME II
WAGES IN SWEDEN
1860—1930
PART ONE
MANUFACTURING AND MINING

LONDON
P. S. KING & SON, LTD.
ORCHARD HOUSE, 14 GREAT SMITH STREET
WESTMINSTER

COPYRIGHT 1933
BY THE INSTITUTE FOR SOCIAL
SCIENCES, UNIVERSITY OF
STOCKHOLM

X:946.571.N3

G3.2.1

81869

PRINTED IN STOCKHOLM 1933
P. A. NORSTEDT & SÖNER
311489

WAGES IN SWEDEN

1860—1930

BY

GÖSTA BAGGE

ERIK LUNDBERG

INGVAR SVENNILSON

COPYRIGHT 1933
BY THE INSTITUTE FOR SOCIAL
SCIENCES, UNIVERSITY OF
STOCKHOLM

X:946.571.N3
G3.2.1
81869

PRINTED IN STOCKHOLM 1933
P. A. NORSTEDT & SÖNER
311489

WAGES IN SWEDEN

1860—1930

BY

GÖSTA BAGGE

ERIK LUNDBERG

INGVAR SVENNILSON

PREFACE

In Volume II of the series of studies on *Wages, Cost of Living and National Income in Sweden 1860—1930* are published the results of the investigations on *Wages in Sweden 1860—1930*, carried on at the Institute for Social Sciences in the University of Stockholm. The volume is published in two parts of which Part One is contained in the present publication.

As is true of all the studies of this series, *Wages in Sweden 1860—1930* is a joint product of the Staff of the Institute, and it is not possible to ascribe to each member of the Staff a definite part in the results. Among the authors of Volume II, I am responsible for the planning and management of the investigations as well as for the final shape and content of the publications, Mr Lundberg and Mr Svenilsson for the preparation of text and tables.

As regards Part One of the study, published in the present volume, Professor Erik Lindahl and Dr Bertil Nyström, the head of the Social Board's department of wage statistics, have taken an active part in the planning of the investigations. Professor Lindahl was for some time in charge of the collection and compilation of the primary material. Mr Nils Lagerström has assisted in preparing Chapter IV and the monographs on wages and labour conditions in the iron, steel and mining industries; Mr Sven Bouvin has composed the summary of the official wage statistics regarding manufacturing and mining for the years 1913—1930 and the combination of these statistics with the wage series of the Institute in Chapter XIII. The exacting task of checking figures and seeing the book through the press was accomplished by Miss Maj Ahlberg. Professor Dorothy Thomas has kindly read the whole book in proof.

The study could not have been undertaken without

PREFACE

the cooperation of many persons in the different concerns and institutions which have opened their records to us. They have answered innumerable questions, given advice at all stages of the investigation and, as experts, checked different parts of the final text. Their number is, in fact, so large that an enumeration is impossible, and only a general acknowledgement of the value of their contributions and the indebtedness of the Staff of the Institute can here be expressed.

As already mentioned in Volume I, all the studies on Wages, Cost of Living and National Income at the Institute have been financed by the Laura Spelman Rockefeller Memorial.

Lastly, it may be mentioned here (although it is more fully explained in the Introduction) that this volume consists mainly of material compiled with a view to constituting a beginning and a basis for further detailed and analytical studies of the movement of wages in Sweden during the period under consideration. Even from this point of view, however, certain important complements to a statistical study of wages, such as e.g. measures of changes in the volume of unemployment and in the efficiency of labour, are lacking.

For the convenience of the reader it may be pointed out, that the principal results and generalizations are published in Chapters III and XIII (p. 255—267) and that the main wage series are to be found in the beginning of each of the chapters on the different industries (viz. chapters IV—XII). The details regarding the material and the wage series are in approximately the same order in all chapters. Still further details are to be found in the monographs on special concerns, which form the last part of the volume. Through this arrangement it is hoped that the reader will be able rapidly to acquaint himself with the contents of the publication and to find the desired information without having to go through the whole, not very readable volume.

Stockholm, September 1933.

Gösta Bagge.

CONTENTS OF VOLUME II

PART ONE.

INTRODUCTION.

Scope, General Object and Methods.

BOOK I.

Manufacturing and Mining.

PART TWO.

BOOK II.

Government and Municipal Service.

BOOK III.

Agriculture and Forestry.

BOOK IV.

The General Movement of Wages in Sweden 1860—1930.

CONTENTS OF PART ONE.

	Page.
PREFACE	VII
LIST OF TABLES	XV
LIST OF CHARTS	XXV
LIST OF MAPS	XXVI

INTRODUCTION.

CHAPTER I.

SCOPE, GENERAL OBJECT AND METHODS	I
General object, p. 1. Sources and methods, p. 4.	

BOOK I.

CHAPTER II.

SCOURCES AND METHODS	15
Extensive or intensive methods, p. 15. The kinetic point of view, p. 19. The concerns' wage records, p. 22. The collection of primary material, p. 24. Selection of occupations, p. 26. Selection of workers, p. 27. "Crossections" for special years, p. 30. Approximations and estimates, p. 32. Benefits in kind, p. 33. The construction of averages of several series, p. 37. The chain index method, p. 39. Monographs, p. 45. Wage statistics for the period 1913—1930, p. 45.	

CHAPTER III.

GENERAL TREND OF WAGES IN MANUFACTURING AND MINING	47
The calculation of Averages, p. 47. Annual earnings of male workers, p. 55. Hourly earnings of male workers, p. 59. Earnings of female workers, p. 59. Real earnings, p. 60.	

CHAPTER IV.

IRON, STEEL AND MINING	66
1. <i>Iron and steel</i> , p. 66. Selection of concerns, p. 67. Selection of occupations, p. 69. Annual and hourly earnings, p. 73. Wage	

CONTENTS

	Page.
data at the ironworks, p. 80. Benefits in kind, p. 85. Value of the free housing benefit, p. 88. Hours of work, p. 90. The calculation of the averages, p. 96.	
2. <i>Mining</i> , p. 102. Selection of concerns, p. 103. Wages at mines in Central Sweden, p. 103. Wages at mines in Norrland, p. 107. Quality of the wage data, p. 108. The calculation of averages, p. 109.	
CHAPTER V.	
METAL MANUFACTURING AND ENGINEERING	111
Selection of concerns, p. 113. Selection of occupations, p. 114. Annual and hourly earnings, p. 115. Hours of work, p. 117. The calculation of averages, components and weights, p. 120. Kinetic dispersion, p. 123. Comparisons with other wage data, p. 131.	
CHAPTER VI.	
STONE, CLAY AND GLASS	134
CHAPTER VII.	
WOOD PRODUCTS	136
The water-driven sawmills, p. 136. The steam-sawmills, p. 137. Selection of concerns, p. 139. Selection of occupations, p. 140. Annual, daily and hourly earnings at the sawmills, p. 142. Seasonal variation in the sawmill industry, p. 148. Hours of work, p. 151. Wage systems, p. 154. Benefits in kind, p. 156. The calculation of averages, components and weights, p. 157. The kinetic dispersion, p. 160. Averages for concerns F, I, and K, p. 163.	
CHAPTER VIII.	
WOOD-PULP	168
Selection of concerns, p. 170. The occupational groups, p. 170. The general trend of wages, p. 171. Hours of work, p. 173. Wage systems, p. 174. Benefits in kind, p. 175. The calculation of averages, components and weights, p. 175. Absolute and kinetic dispersion, p. 177.	
CHAPTER IX.	
PAPER; BOOK-PRINTING AND BOOK-BINDING.	184
1. <i>The Paper industry</i> , p. 184. Selection of concerns, p. 185. Selection of occupations, p. 186. Hours of work, p. 187. Benefits in kind, p. 189.	

CONTENTS

	Page
Wage systems, p. 189. The calculation of averages, components and weights, p. 189.	
2. <i>Book-Printing and Book-Binding</i> , p. 191.	
CHAPTER X.	
FOOD PRODUCTS	193
<p>Selection of concerns, p. 193. Selection of occupations, p. 194. The general trend of wages in the food products industry, p. 195. Hours of work, p. 196. Benefits in kind, p. 199. The construction of averages, components and weights, p. 199. Kinetic and absolute dispersion, p. 202. The trend of wages in the sugar industry, p. 207. The raw-sugar "kampanj" and its influence on wage conditions and working hours, p. 212.</p>	
CHAPTER XI.	
THE TEXTILE INDUSTRY	215
<p>Selection of concerns, p. 216. Selection of occupations, p. 219. General trend of wages and kinetic dispersion, p. 220. Hours of work, p. 229. Wage systems, p. 230. Benefits in kind, p. 231. The wage material, p. 231. The computation of averages, components and weights, p. 232. The absolute dispersion of the wage series p. 234.</p>	
CHAPTER XII.	
LEATHER AND RUBBER; CHEMICAL INDUSTRY	237
<p>Selection of concerns, p. 237. The general trend and kinetic dispersion of wages, p. 238. The computation of averages, components and weights, p. 241. Absolute dispersion, p. 242.</p>	
CHAPTER XIII.	
TREND OF WAGES IN MANUFACTURING AND MINING 1913—1930	243
<p>The official wage statistics 1913—1930; sources and methods of compilation, p. 243. Trend of wages 1913—1930, p. 247. Combining the wage series of the institute and the official statistics, p. 255.</p> <p>Supplementary studies, based on the wage statistics of employers' associations, p. 268.</p> <p>I. Ironworks, p. 268. II. Engineering works, p. 269. III. The textile industry, p. 274.</p>	
MONOGRAPHS.	
IRON, STEEL AND MINING (CHAPT. IV)	281
<p>i. <i>Iron and Steel</i>, p. 281.</p> <p>A. Bofors Ironworks, p. 281. B. Domnarfvet Ironworks, p. 285. C. Elfsjöhyttan, p. 290. D. Hellefors</p>	

CONTENTS

	Page.
Ironworks, p. 291. E. Långshyttan Ironworks, p. 296. F. Näs Ironworks, p. 304. G. Sandviken Ironworks, p. 306. H. Smedjebacken Rolling Mills, p. 309. I. Stjernfors-Stålldalen Ironworks, p. 315. J. Stjärnsund Ironworks, p. 316. Q. Boxholm Ironworks, p. 321. R. Edsbro Blast-Furnace, p. 340. S. Finspong Ironworks, p. 342. T. Gimo Ironworks, p. 347. U. Söderfors Ironworks, p. 351.	
2. <i>Mining</i> , p. 376.	
A. Blötberget Minefield, p. 376. B. Nora Bergslag's Joint Mining Administration, p. 378. C. Norberg Minefield, p. 381. D. Rällingsberg Mine, p. 384. I. Falu Copper Mine, p. 385. J. Ammeberg Zinc-Mine, p. 389.	
METAL MANUFACTURING AND ENGINEERING (CHAPT. V)	393
A. Carl Gustavs Stad's Small Arms Factory, p. 393. B. Eskilstuna Ironware Manufacturing Company, p. 395. C. A File Works, p. 397. I. Bolinder's Engineering Works, p. 397. L. Motala Engineering Works, p. 401. M. An Engineering Works in the County of Värmland, p. 403. R. The Bolt Manufacturing Company, Hallstahammar, p. 404. S. Gunnebo Foundry and Manufacturing Company, p. 405.	
STONE, CLAY AND GLASS INDUSTRIES (CHAPT. VI)	407
A. Höganäs-Billesholm, p. 407. B. Annetorp Limestone Quarries, p. 412. C. Limhamn Cement Works, p. 414. B-C-D. The Common trend of wages at the works of the Scania Cement Company (Annetorp Limestone Quarries and the Limhamn and Lomma Cement and Brick Works), p. 416. E. Klagstorp Limestone Quarries and Cement Works, p. 418. F. Gustavsberg China Factory, p. 419. G. Kosta Glass Works, p. 427. H. Eda Glass Works, p. 434.	
WOOD PRODUCTS (CHAPT. VII)	436
A. Hellefors Sawmill, p. 436. B. Mo Sawmill, p. 438. C. Robertsfors Sawmill, p. 440. E. Domsjö Sawmill, p. 442. F. Lugnvik Sawmill, p. 447. G. Skönvik Sawmill, p. 450. H. Sund Sawmill, p. 453. I. A medium-sized sawmill, situated on the river Ångermanälven in the shipping district of Härnösand, p. 457. K. A medium-sized sawmill in the Härnösand shipping district, p. 466.	
WOOD-PULP (CHAPT. VIII)	469
A. Delary Sulphate Mill, p. 469. B. Ed Sulphate Mill, p. 471. C. A medium-sized sulphite mill, p. 474.	
PAPER; BOOK-PRINTING AND BOOK-BINDING (CHAPT. IX)	480
1. <i>The Paper Industry</i> , p. 480.	
A. Klippan Papermill, p. 480. B. Lessebo Papermill, p. 490. C. Munkedal Papermill, p. 494.	

CONTENTS

	Page.
2. <i>Book-Printing and Book-Binding</i> , p. 498. A. Bonnier's Book-Printing Office in Stockholm, p. 498. B. Hæggeström's Book-Printing Office in Stockholm, p. 500. C. Åkerdahl's Book-Bindery in Stockholm, p. 501.	
FOOD PRODUCTS (CHAPT. X)	503
A. Arlöf Sugar Factory, p. 503. B. Hasslarp Sugar Factory, p. 505. C. Hälsingborg Sugar Factory, p. 513. D. Landskrona Sugar Factory, p. 518. F. Hälsingborg Grinding- Mills, p. 521. H. Örebro Biscuit Factory, p. 523. I—K. Hamburger Brewery in Stockholm and Pripp Brewery in Gothenburg, p. 525. L. Ljunglöf Snuff Factory, p. 529.	
THE TEXTILE INDUSTRY (CHAPT. XI)	533
A. Drufvefors Weaving Mills, p. 533. B. Rydboholm Mills, p. 534. C. Stigen Woollen-Spinning and Woollen-Weaving Mills, p. 535. D. Uddebo Knitting Mills, p. 537. F. Gamle- staden Cotton-Spinning and Cotton-Weaving Mills, Gothen- burg, p. 538. G. Claes Johansson & Co.'s Weaving Mills, p. 540. H. A Cotton-Spinning Mill near Gothenburg, p. 541. M. Drag Woollen-Spinning and Woollen-Weaving Mills, Norrköping, p. 543. N. Gävle Cotton-Spinning and Cotton- Weaving Mills, Strömsbro, p. 545. O. Holma-Helsingland Linen-Spinning and Linen-Weaving Mills, Forsa, p. 550. P. A. Ferd. Sjöberg & Company, Gävle, p. 551.	
LEATHER AND RUBBER; CHEMICAL INDUSTRY (CHAPT. XII)	552
A. Ehrnberg Leather Factory, Simrishamn, p. 552. B. Lilljedahl Leather Factory, Sölvesborg, p. 553. C. L. A. Matton Leather Factory, Gävle, p. 555. F. Hälsingborg Rubber Factory, p. 556. G. Liljeholmen Stearine Factory, Stockholm, p. 560. H. Zadig Soap Factory, Malmö, p. 563. K. Reymersholm Superphosphate Factory, Hälsingborg, p. 564. L. Reymersholm Copper Works, Hälsingborg, p. 565. M. Stockholm Superphosphate Factory at Gäddviken, near Stockholm, p. 567. N. The Nitroglycerine Factory, Stock- holm p. 569. O. Jönköping Match Factory, Jönköping, p. 570. P. The Scanian Vinegar Works, Perstorp, p. 571.	
APPENDIX.	
LIST OF OCCUPATIONAL TERMS USED IN THIS VOLUME, WITH SWEDISH EQUIVALENTS	573

LIST OF TABLES.

		Page.
Table 1.	Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in Manufacturing and Mining as a whole 1860—1914 .	48
Table 2.	Index of Annual Earnings in Specified Branches of Industry 1860—1914 (1910—1913 = 100). Male Workers	50
Table 3.	Index of Hourly Earnings in Specified Branches of Industry 1860—1914 (1910—1913 = 100). Male Workers	53
Table 4.	Index of Annual Earnings and Hourly Earnings in Specified Branches of Industry 1865—1914 (1910—1913 = 100). Female Workers	54
Table 5.	Index of Nominal and Real Annual and Hourly Earnings of Male Workers in Manufacturing and Mining as a whole 1861—1913 (1861—1870 = 100)	62
Table 6.	Average Annual Earnings (in kronor) and Hourly Earnings (in öre) at the Iron Works 1860—1914. Grouped According to Technical Units and the Workers' Qualifications	74
Table 7.	Number of Blast-Furnaces in Blast, Average Blowing-Period and Production in 1860—1914	93
Table 8.	Annual Earnings (in kronor) at Iron-Ore Mines and all Mines in Central Sweden	104
Table 9.	Daily Earnings at the MalMBERGET Mines (in öre)	107
Table 10.	Annual Earnings (in kronor) and Hourly Earnings (in öre) at Metal Manufacturing and Engineering Works; Skilled Workers 1860—1914 . .	115
Table 11.	Standard Hours of Work per Week at Metal Manufacturing and Engineering Works 1860—1914	119
Table 12.	Annual (in kronor), Daily (in kronor) and Hourly (in öre) Earnings of Workers in the Sawmill Industry 1867—1914	143
Table 13.	Estimated Number of Hours of Work at the Sawmills 1865—1920	154

LIST OF TABLES

	Page.
Table 14. Annual and Daily Earnings (in kronor) of Sawmill Workers in the Härnösand District 1885—1914	166
Table 15. Annual Earnings (in kronor) and Hourly Earnings (in öre) in the Wood-Pulp Industry 1886—1915	172
Table 16. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Skilled Papermill Workers (Male) 1860—1914	187
Table 17. The Trend of Wages for Hand-Type-Setting at the Book-Printing Offices in Stockholm according to Collective Agreements 1890—1913	192
Table 18. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male and Female Workers in the Food Products Industry 1861—1914	196
Table 19. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Skilled and Unskilled and Female Workers at the "Combined Sugar Factories" 1883—1914	208
Table 20. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male and Female Workers in the Textile Industry 1865—1914	220
Table 21. Annual Earnings of Male Workers in the Leather and Rubber Goods Industries and the Chemical Industry 1870—1914	238
Table 22. Average Annual Earnings (in kronor) within the Different Branches of Industry in 1913 and 1916—1930.	
A. Adult Male Workers	248
B. Adult Female Workers	249
Table 23. Average Hourly Earnings (in öre) within the Different Branches of Industry in 1913 and 1920 (1921)—1930.	
A. Adult Male Workers	250
B. Adult Female Workers	251
Table 24. Index of Nominal and Real Earnings of Workers per Year, Day and Hour, 1914—1930 (1913 = 100)	255
Table 25. Index of Nominal and Real Earnings of Adult Workers in Manufacturing and Mining in 1913 and 1916—1930	258
Table 26. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in Manufacturing and Mining as a whole 1860—1930	260
Table 27. Hourly Money Earnings (in öre) at the Iron Works 1909—1928	270

LIST OF TABLES

	Page.
Table 28. Annual Earnings (in kronor) and Hourly Earnings (in öre) at Engineering Works 1903—1928 . . .	272
Table 29. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers in the Textile Industry 1909—1928.	
A. Male Workers	275
B. Female Workers	276
Table 30. Hourly Earnings (in öre) of Workers at Bofors in 1918—1925.	283
Table 31. Annual Earnings (in kronor) of Workers in the Blast-Furnace and Open-Hearth at Bofors 1875—1925	284
Table 32. Annual Earnings (in kronor) of Workers in the Rolling-Mills at Bofors 1894—1925	285
Table 33. Annual Earnings (in kronor) of Blast-Furnace Workers at Domnarfvet Ironworks 1897—1910	288
Table 34. Annual Earnings (in kronor) in Different Departments at Domnarfvet Ironworks 1892—1910	289
Table 35. Number of Days in Operation, Output of Iron (in tons), Number of Workers and Annual Earnings (in kronor) at Elfsjöhyttan 1865—1896	291
Table 36. Annual Earnings (in kronor) of Workers at Hellefors 1876—1910.	294
Table 37. Annual Earnings of all Workers at Hellefors. Cross-Section 1890	295
Table 38. Annual and Daily Earnings (in kronor) of Blast-Furnace Workers at Långshyttan 1880—1909	300
Table 39. Hourly Earnings (in öre) of Blast-Furnace Workers at Långshyttan 1880—1909	301
Table 40. Annual and Daily Earnings (in kronor) of Workers in the Bessemer Works and of Moulders at Långshyttan 1880—1909	302
Table 41. Annual and Daily Earnings (in kronor) of Open-Hearth Workers at Långshyttan 1905—1909	303
Table 42. Annual and Daily Earnings (in kronor) of Workers in the Rolling-Mill at Långshyttan 1880—1909	303
Table 43. Annual and Daily Earnings (in kronor) of Master Mechanic, Lathe-Hands and Tool-Makers, Blacksmiths, Builders and Carpenters at Långshyttan 1880—1909	304
Table 44. Annual and Daily Earnings (in kronor) of Workers at Näs 1893—1913	306
Table 45. Annual Earnings (in kronor) of Workers at Sandviken Ironworks 1869—1926	309

LIST OF TABLES

	Page.
Table 46. Annual Earnings (in kronor) of Rolling-Mill Workers at Smedjebacken 1865—1909	313
Table 47. Annual Earnings (in kronor) of Lathe-Hands at Smedjebacken 1865—1909	314
Table 48. Annual Earnings (in kronor) of Workers at Stjernfors-Ställdalen 1898—1914	316
Table 49. Annual Earnings (in kronor) of Workers in the Rolling-Mills at Stjärnsund 1880—1909	319
Table 50. Annual Earnings (in kronor) of Men in the Workshops, etc. at Stjärnsund 1880—1909	320
Table 51. Period during which Blast-Furnace and Rolling-Mill Have Been Working at Boxholm 1875—1927	329
Table 52. Money Earnings of Keepers (1875—1888) and Blast-Furnace Foreman (1889—1907) at Boxholm 1875—1907	330
Table 53. Money Earnings of Slagmen and Top-Fillers at Boxholm 1875—1914	331
Table 54. Money Earnings of Calciners and Average Earnings of Top-Fillers, Slagmen and Calciners at Boxholm 1875—1914	332
Table 55. Average Number of Workers and Average Earnings of those Receiving a Daily Wage and of all Blast-Furnace Workers at Boxholm 1875—1914	333
Table 56. Money Earnings of Workers in the Lancashire Works at Boxholm 1878—1914	334
Table 57. Money Earnings of Workers in the Bar Mill at Boxholm 1875—1914	335
Table 58. Money Earnings of Workers in the Bar Mill at Boxholm 1875—1914	336
Table 59. Money Earnings of Workers in the Sheet-Mill at Boxholm 1875—1914	337
Table 60. Average Annual Money Earnings of all Workers in the Rolling-Mills at Boxholm 1875—1914	338
Table 61. Annual Earnings of Workers in the Nail Factory, Engineering Works, the Rolling-Mill in the Lancashire Works, the Foundry, and other Occupations in the Cross-Sectional Years 1875, 1885, and 1905 at Boxholm	339
Table 62. Earnings (in kronor) of Keepers and Top-Fillers at Edsbro Blast-Furnace 1860—1874	342
Table 63. Annual Earnings (in kronor) of Workers at Fin-spong Ironworks 1860—1894	346
Table 64. Annual Earnings (in kronor) of Workers, Blowing Period and Output of Iron at Gimo 1865—1910	350
Table 65. Earnings (in kronor) of Workers at Söderfors 1860—1914	364

LIST OF TABLES

	Page.
Table 66. Earnings of Blast-Furnace Workers at Söderfors 1860—1914	365
Table 67. Earnings of Blast-Furnace Workers at Söderfors 1860—1914	367
Table 68. Earnings of all Workers at Söderfors. Cross-Section 1860	368
Table 69. Earnings of all Workers at Söderfors. Cross-Section 1885	370
Table 70. Earnings of all Workers at Söderfors. Cross-Section 1905	372
Table 71. The Number of Days (24 hours) per Year during which the Different Departments at Söderfors have been in Operation 1860—1914	375
Table 72. Annual Earnings (in kronor) of Workers at the Blötberget Minefield 1901—1913	377
Table 73. Annual Earnings and Daily Wage Rates (in kronor) of Workers at the Nora Bergslag's Joint Mining Administration 1860—1915.	
a. Striberg	380
b. Dalkarlsberg	380
c. Timansberg	381
Table 74. Annual Earnings (in kronor) of Workers at Norberg Minefield 1860—1913	383
Table 75. Annual Earnings (in kronor) of Drillers and Loaders at Rällingsberg Mine 1880—1909	385
Table 76. Annual and Daily Earnings (in kronor) of Workers at Falu Mine 1860—1914	387
Table 77. Annual Earnings (in kronor) of Workers at Ämmeberg Zinc Mine 1861—1914	391
Table 78. Daily Earnings (in kronor) of Workers at Ämmeberg Zinc Mine 1860—1914	392
Table 79. Annual Earnings (in kronor) of Workers at Carl Gustavs Stad's Small Arms Factory 1876—1910	394
Table 80. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Eskilstuna Ironware Manufacturing Company (Tunafors), Eskilstuna 1878—1913	396
Table 81. Annual Earnings of File Cutters at a File Works in Eskilstuna 1860—1914	397
Table 82. Annual Earnings (in kronor) of Workers at Bolinder's Engineering Works in Stockholm 1885—1905	400
Table 83. Annual Earnings (in kronor) of Workers at Motala Engineering Works 1860—1903	402

LIST OF TABLES

	Page.
Table 84. Annual Earnings (in kronor) and Hourly Earnings (in öre) at an Engineering Works in the County of Värmland 1880—1914	403
Table 85. Annual Earnings of Workers at the Bolt Manufacturing Company, Hallstahammar, 1876—1910	405
Table 86. Annual Earnings (in kronor) of Workers at Gunnebo Foundry and Manufacturing Company 1887—1910.	406
Table 87. Number of Workers and Annual and Daily Earnings (in kronor) of Workers at Höganäs-Billesholm 1860—1914	408
Table 88. Annual Earnings of all Workers at Höganäs-Billesholm in the Cross-Sectional Years 1865 and 1905	411
Table 89. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at the Annetorp Limestone Quarries 1887—1914	413
Table 90. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Limhamn Cement Works 1890—1914	414
Table 91. The Common Trend of Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Annetorp Limestone Quarries and Limhamn and Lomma Cement and Brick Works 1875—1914	417
Table 92. Number of Workers, Annual Earnings (in kronor) and Hourly Earnings (in öre) at Klagstorp Limestone Quarries 1908—1914	418
Table 93. Number of Workers, Annual Earnings (in kronor) and Hourly Earnings (in öre) at Klagstorp Cement Works 1909—1913	419
Table 94. Average Number of Workers in Different Occupations at Gustavsberg China Factory 1850—1915.	421
Table 95. Annual Earnings (in kronor) of Workers at Gustavsberg China Factory 1850—1915	422
Table 96. Daily Earnings (in öre) of Selected Workers at Gustavsberg China Factory 1858—1914	425
Table 97. Annual Earnings (in kronor) of Workers at Kosta Glass Works 1860—1914	429
Table 98. Daily Earnings (in kronor) of Workers at Kosta Glass Works 1860—1914	430
Table 99. Annual and Daily Earnings (in kronor) of Workers at Eda Glass Works 1886—1914	434
Table 100. Annual Earnings (in kronor) of Workers at Hellefors Sawmill 1865—1910	437

LIST OF TABLES

	Page.
Table 101. Annual Earnings (in kronor) of Workers at Mo Sawmill 1864—1893	439
Table 102. Annual Earnings (in kronor) of Workers at Robertsfors Sawmill 1865—1907	441
Table 103. Annual and Daily Earnings (in kronor) of Workers at Domsjö Steam Sawmill 1882—1925	444
Table 104. Earnings of all Workers (in kronor) at Domsjö Steam Sawmill in the Cross-Sectional Years 1886, 1895 and 1905	445
Table 105. Annual and Daily Earnings (in kronor) of Workers at Lugnvik Sawmill 1876—1914	450
Table 106. Annual and Daily Earnings (in kronor) of Workers at Skönvik Sawmill 1889—1913	452
Table 107. Standard Daily Earnings (in kronor) of Workers at Sund Sawmill 1862—1910	453
Table 108. Earnings of Workers (in kronor) at Sund Sawmill in the Cross-Sectional Years 1865 and 1875	454
Table 109. Annual and Daily Earnings (in kronor) of Workers at Sawmill I 1884—1914	461
Table 110. Annual and Daily Earnings (in kronor) of Workers at Sawmill K 1890—1913	467
Table 111. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Delary Sulphate Mill 1897—1910	470
Table 112. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Ed Sulphate Mill 1891—1913	472
Table 113. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Sulphite Mill C. 1893—1915	475
Table 114 a. Annual Earnings (in kronor) of Workers at Klippan Papermill 1860—1914	482
Table 114 b. Hourly Earnings (in öre) of Workers at Klippan Papermill 1860—1914	483
Table 115. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Klippan Papermill in the Cross-Sectional Years 1865, 1885 and 1905	485
Table 116. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Skilled Workers at Lessebo Papermill 1860—1914	491
Table 117. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Munkedal Papermill in 1880—1909	495
Table 118. Annual Earnings (in kronor) at Bonnier's Book-Printing Office in 1860—1900	498

LIST OF TABLES

	Page.
Table 119. Annual Earnings (in kronor) of Compositors at Hæggeström's Book-Printing Office in 1864—1916	500
Table 120. Annual Earnings (in kronor) at Åkerdahl's Book-Bindery 1898—1916	502
Table 121. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Arlöf Sugar Factory 1883—1914	504
Table 122. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hasslarp Sugar Factory 1897—1913	506
Table 123. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Sugar Factory 1892—1914	514
Table 124. a. Annual and Daily Earnings (in kronor) of Workers at Landskrona Sugar Factory 1860—1880 and 1906—1914	519
Table 124. b. Hourly Earnings (in öre) of Workers at Landskrona Sugar Factory in 1906—1914	520
Table 125. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Grinding-Mills in 1886—1914	522
Table 126. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Female Workers at Örebro Biscuit Factory 1911—1925	524
Table 127. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hamburger Brewery 1896—1925 and Pripp Brewery in 1868—1910	528
Table 128. Annual Earnings (in kronor) of Workers at Ljunglöf Snuff Factory in 1850—1905	530
Table 129. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Female Workers at Drufvefors Weaving Mills 1907—1925	533
Table 130. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Rydboholm Mills 1865—1914	534
Table 131. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Stigen Woollen-Spinning and Woollen-Weaving Mills 1896—1915	536
Table 132. Annual Earnings (in kronor) of Workers at Uddebo Knitting Mills 1887—1926	538
Table 133. Annual Earnings (in kronor) of Workers at Gamlestaden Cotton-Spinning and Cotton-Weaving Mills 1860—1926	539

LIST OF TABLES

	Page.
Table 134. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers in Claes Johansson & Co.'s Weaving Mills 1890—1911	540
Table 135. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Cotton-Spinning Mill H. 1865—1925	542
Table 136. Annual Earnings (in kronor) of Workers at Drag Woollen-Spinning and Woollen-Weaving Mills, Norrköping, 1877—1904	544
Table 137. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Gävle Cotton-Spinning and Cotton-Weaving Mills 1854—1915	546
Table 138. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Holma-Helsingland Linen-Spinning and Linen-Weaving Mills, Forsa, 1901—1911	550
Table 139. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at A. Ferd. Sjöberg & Company, Gävle, 1890—1912	551
Table 140. Annual and Daily Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Ehrnberg Leather Factory, Simrishamn, 1898—1914	552
Table 141. Annual Earnings (in kronor) of Workers at Lilljedahl Leather Factory, Sölvesborg, 1876—1914	554
Table 142. Annual Earnings (in kronor) of Workers at L. A. Matton Leather Factory, Gävle, 1860—1913	556
Table 143. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Rubber Factory 1892—1927	557
Table 144. Earnings of all Workers at Hälsingborg Rubber Factory in the Cross-Sectional Years 1905 and 1925	559
Table 145. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Liljeholmen Stearine Factory 1879—1915	561
Table 146. Annual Earnings (in kronor) of Workers at Zadig Soap Factory, Malmö, 1866—1908	563
Table 147. Annual Earnings (in kronor) of Workers at Reymersholm Superphosphate Factory, Hälsingborg, 1899—1926	564
Table 148. Daily and Annual Earnings (in kronor) of Workers at Reymersholm Copper Works, Hälsingborg, 1901—1926	566

LIST OF TABLES

		Pa
Table 149.	Annual Earnings (in kronor) and Hourly Wage (in öre) of Workers at Stockholm Superphosphate Factory at Gäddviken, 1884—1910 . .	5
Table 150.	Daily Wage (in kronor) of Workers at the Nitroglycerine Factory, Stockholm, 1870—1915 . .	5
Table 151.	Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Jönköping Match Factory, 1903—1927	5
Table 152.	Annual Earnings (in kronor) of Workers at the Scanian Vinegar Works, Perstorp, 1889—1905	5

LIST OF CHARTS.

		Page.
Chart 1.	Nominal and Real Annual Earnings of Male Workers in Manufacturing and Mining as a whole	63
Chart 2.	Nominal and Real Hourly Earnings of Male Workers in Manufacturing and Mining as a whole	64
Chart 3.	Annual and Hourly Earnings at the Iron Works	76
Chart 4.	Annual Earnings of Highly Skilled, Skilled and Unskilled Workers at the Iron Works	77
Chart 5.	Annual Earnings at Mines in Central Sweden .	105
Chart 6.	Annual and Hourly Earnings at Metal Manufacturing and Engineering Works; Skilled Workers	116
Chart 7.	Annual and Total Hourly Earnings of Workers in the Sawmill Industry	145
Chart 8.	Total and Standard Daily Earnings of Workers in the Sawmill Industry	146
Chart 9.	Annual and Hourly Earnings of Workers in the Wood-pulp Industry	173
Chart 10.	Annual and Hourly Earnings of Skilled Papermill Workers (Male)	188
Chart 11.	Annual Earnings of Male and Female Workers in the Food Products' Industry	197
Chart 12.	Hourly Earnings of Male and Female Workers in the Food Products' Industry	198
Chart 13.	Hourly Earnings of Male Skilled and Unskilled and Female Workers at the "Combined Sugar Factories"	209
Chart 14.	Annual Earnings of Male and Female Workers in the Textile Industry	221
Chart 15.	Hourly Earnings of Male and Female Workers in the Textile Industry	222
Chart 16.	Annual Earnings of Male Workers in the Leather and Rubber Goods Industries and Chemical Industry	239
Chart 17.	Nominal and Real Annual Earnings of Male Workers in Manufacturing and Mining as a whole 1860—1930	262
Chart 18.	Nominal and Real Hourly Earnings of Male Workers in Manufacturing and Mining as a whole 1860—1930	264

LIST OF MAPS.

	Page.
The Ironworks	68
The Mining Industry	68
The Metal Manufacturing	112
The Engineering Works	112
The Sawmill Industry	138
The Wood-Pulp Industry	169
The Paper and Cardboard Industry	169
The Woollen Industry	217
The Cotton Industry	217
Survey of the Geographical Distribution of Industries in Sweden	581
The Swedish Counties ("län")	581

INTRODUCTION.

CHAPTER I.

SCOPE, GENERAL OBJECT AND METHODS.

General Object.

THE series of studies on *Wages, Cost of Living and National Income in Sweden 1860—1930* carried on at the Institute for Social Sciences at the University of Stockholm were started in close connection with, and along lines laid down in, a work on wage theory¹ published by the leader of the present researches. The aim of the book was to adapt the theory of wages to the institutional structure of the modern labour market and at the same time to make possible the verification and further development of the theory by empirical and statistical research. Such empirical studies embrace indeed the whole field of social and economic life, and even if restricted to subjects more intimately related to the main topic will extend into most departments of social science. For an institution like the Social Science Institute of Stockholm University this aspect of the project is a favourable feature, as it makes possible the combination into a common aim efforts from different social sciences, a combination that forms one of the principal objects of the Institute. It should not be overlooked, however, that such a plan must also entail work of an exceedingly complex and very comprehensive character which is bound to take much time. It will in fact involve a plan of work for an entire institution for many decades to come rather than for certain individual scientists. Such a plan must allow certain freedom of choice of subjects and also of methods; it must further take

¹ *Bagge, Arbetslörens reglering genom sammanslutningar, Stockholm 1917.*

into consideration the special conditions under which the institution has to work and the needs and wishes of its individual members as well as the common goal of all their combined efforts. It cannot be permanently fixed in detail, but can only exist as a general framework, permitting all sorts of changes as may prove to be necessary.

In view of these considerations it has been found best to start with the collection and compilation of certain statistical material necessary to form a common basis for all the future investigations.

Statistical sources are abundant in Sweden, relating both to contemporary and to historical conditions. As regards Swedish demographic statistics, not only the source material but also the compiled statistical series are, as far as they go, of an unsurpassed quality. Studies of more specific demographic problems however, must often be based either on supplementary material collected for the purpose or on special compilations of already existing but hitherto unpublished material. In other fields of statistics necessary for the kind of social research here contemplated, such as production-, price- and wage-statistics, the main statistical series have been lacking for Sweden for periods long enough to be of value for our purposes. Sources, both printed and unprinted, of such statistics are not lacking but they have not been in a form where they could be utilized as a basis for further investigations of the kind here mentioned. In several fields the material has had to be gathered from private archives and compiled from primary sources, in others the published statistics have had to be revised or gaps filled in order that series may be constructed of sufficient length and sufficient value.

It was decided, that, first of all, investigations should be made regarding wages, national income (from the point of view of production) and cost of living from 1830 to 1930. It was found, however, that only the cost of living series could be carried back to 1830; in the other fields the character of the sources has made it necessary to restrict the purely statistical investigations to the period 1860—1930. This is from other points of view a suitable period for the

research-work in question, the sixties being a turning-point in the modern economic development of Sweden.

The investigations regarding the decades 1830—60, which owing to the nature of the material and the subject are of a more general and historical character, have been expanded into a historical study of the general changes in the social structure of Sweden, which during that time were of a radical nature and fundamental to its development during the following decades.

It is evident that general statistical series do not by themselves provide sufficient concrete knowledge for solving our problems. They are in fact from many points of view of an abstract and simplified construction, useful mainly for directing and keeping together the diversified empirical data from which more concrete knowledge can be obtained. They are valuable as indexes of more complex phenomena and make possible measurements of interrelationships, but it is as a basis and starting-point for further, more specific studies that they are most valuable.

Besides these basic investigations in social statistics certain studies of such a special character have already been started at the Stockholm Social Science Institute. Thus an intensive study of the migration in Sweden during the period 1895—1930 is in progress at the Institute and has proved an excellent basis for sociological investigations into contemporary conditions, of special importance for social and labour market problems. Besides these, more general investigations, a study has been made of the fertility in different social classes in Stockholm.

The main results of the general statistical investigations into wages, cost of living and national income now being ready, it has been thought proper to publish them in English in a common series. In their present form they are not and cannot claim to be anything but a body of material that is offered as a basis for further studies and research. In the present publication, however, Book IV will contain a combination of the general results as regards wages, production and prices and of certain broad demographic tendencies. A comparison will also be made of the diffe-

rent courses of development in different fields, such as manufacturing industries, agriculture and public services, secular and cyclical trends etc. Otherwise no further analysis will be attempted at this stage of the work.

Sources and Methods.

The earliest and most continuous series of wages in Sweden are found in the "*Markegångstaxor*", the official, annual price scales for various goods and services.¹ As far as agricultural wages are concerned they represent useful material when critically sifted and properly compiled. The material in the "*Markegångstaxor*" can from 1865 onwards be supplemented by certain wage data from the official agricultural statistics. Since 1911 the Social Board has published yearly statistics regarding wages and hours of work in agriculture.

As regards wages and labour conditions in other industries, only scattered and casual printed sources are available. The quinquennial reports of the Lords Lieutenant (*Könungens Befallningshavandes femårsberättelser*), which the authorities in every county were, up to the year 1905, directed to submit, concern chiefly the economic and social development within the county for the five-year period preceding each report and contain also in many respects valuable, though somewhat sporadic, material regarding labour conditions. More coherent wage statistics, though still rather summary and relating only to short periods, are published in various reports of Royal Commissions — such reports contain in fact the most important investigations made regarding Swedish social and economic conditions. The first official wage statistics of this character are published in the report of the tariff commission of 1882² and consist of data regarding the weekly wages in various industries (in the form of five-year averages) during the period 1860—1879. Weekly wages are also given for

¹ For a description of the "*Markegångstaxor*" see WAGES, COST OF LIVING AND NATIONAL INCOME IN SWEDEN 1860—1930 by the Staff of the Institute for Social Sciences, University of Stockholm. Vol. I *Myrdal*, The Cost of Living in Sweden 1830—1930, pp. 25—32.

² Tullkommitténs betänkande, Del I., Stockholm 1882.

two single years, September 1, 1884—August 31, 1885, and 1891, in the reports of commissions on workmen's compensation and insurance against industrial accidents.¹ All these wage data are, however, of a very incomplete character. The report of the emigration commission² which is otherwise one of the most comprehensive and important sources for the study of Swedish social conditions, does not contain any statistics regarding wages.

Miscellaneous data regarding wages and other labour conditions in different trades, mainly in Stockholm, during the years 1896—97 have been collected by *O. Dalkvist* and published in a volume *The position of industrial workers in Sweden*.³ For some trades statements are also made regarding wages in earlier years.

The *Lorén Foundation* has published a series of very valuable investigations into social conditions in Sweden⁴ during the nineties. These publications include wage data, which however only cover industries in special localities and relate to short periods. In this connection may be mentioned the many commemorative studies published on the occasion of jubilees of industrial concerns, associations, trade unions etc., which often contain wage data for the period described. These, however, appear generally in the form of scattered statements without sufficient information as to sources and methods of compilation.

The investigations of the Lorén Foundation were continued on a far larger scale by the Labour Bureau of the Board of Trade, originally established mainly for the task of compiling such general statistical descriptions of labour conditions. The living and working conditions of the workers were described in lengthy monographs on the bakery industry, (published in 1899), the tobacco industry (published 1899 and 1908), the metal manufacturing and engineering industry (published in 1901 and 1904) and the graphic in-

¹ Arbetareförsäkringskommitténs betänkande, Stockholm 1888—89 and Yrkesfarekommitténs betänkande 1892.

² Emigrationsutredningens betänkande med bilagor. Stockholm 1908—1914.

³ *O. Dalkvist*, De svenska industriarbetarnas läge. Stockholm 1899.

⁴ Skrifter utgivna av Lorénska stiftelsen. Stockholm 1893—1899.

dustries (published in 1909)¹, which was the last industrial monograph, this form of investigation then being abandoned. The Social Board, successor to the Labour Bureau of the Board of Trade, has published similar monographs on labour conditions of workers in different occupations, such as sailors (published in 1915 and 1919), dockers (published in 1916), hotel and restaurant employees (published in 1922 and 1931), mercantile employees (published in 1925). All these monographs contain detailed statistics of actual earnings, based on individual wage data from the employers' records or other sources, but only for the year to which the general investigation refers. Only in exceptional cases are summary wage data given for a period of years previous to that covered by the investigation.

The Social Board has also compiled annual wage statistics from the year 1913, covering mainly manufacturing industries but also to a certain extent building trades, municipal services, commerce and communications. The primary material is collected through questionnaires filled in by the employers and is described in greater detail in Chapter XIII. It does not permit of any specific classification of the workers, except in terms of adult male and female and non-adult workers, and the data are published only in the form of average wages *per annum* and hour, in earlier years *per diem*, for each industrial branch as a whole.

Further, from 1917/18 yearly statistics are published by the Social Board regarding the wages of forestry workers. A special enquiry has also been made of wages in forestry during the years 1913—1914.

From 1929 all the annual wage statistics, including those relating to agricultural wages, are published in a year-book on wage statistics.²

Employers' associations and trade unions often collect wage material that may be of use for their own activities. For our purposes such wage material might appear to be very valuable, being of a more detailed character and based on individual data. The collection of wage material by the

¹ Arbetsstatistik A: 1—4, A: 7, published by the Board of Trade.

² Lönestatistik årsbok för Sverige, published by the Social Board.

employers' and workmen's organisations is, however, confined, to the last few decades and can therefore give us no knowledge as to the previous trend of wages. These data are moreover limited to special industrial fields and are often not available even for scientific purposes, the members of the organisations being for various reasons unwilling to let anybody except the officials of the organisation use the data collected. The trade unions have as a rule very great difficulty in obtaining reliable data from their members as to their incomes, and the efforts on the part of the Institute to get wage material from them have not been successful. In some cases, e. g. in that of the Metalworkers' Union, valuable wage statistics are compiled by trade unions, but they are not published and moreover date from a very late period. The employers' associations, having access to the wage records of the concerns, are in a position to get most reliable and detailed material. In regard to certain industries it has in fact been possible to use such wage statistics for our purposes, but only for the last few decades and as a supplement to the official statistics.

During the years 1914—1921 the Swedish Employers' Association — a union of all the more important employers' associations in Sweden — published annually very valuable detailed wage statistics, covering most of the important manufacturing industries and classified according to occupations. This publication was unfortunately discontinued in 1922.

Another possible source of wage data are the collective agreements between the trade unions and employers or employers' associations. Apart from the fact that this way of regulating working conditions did not come into general use in Swedish industry until the beginning of this century and is still very unequally represented in different fields of industry, this material has from other points of view also not seemed suitable for our purposes. It is practically only the time wage in the collective agreements, that can as a rule be subjected to statistical compilation, the piece-work lists being generally too complicated and differentiated. Moreover, the technique of the piece-work often varies from locality to locality, and, owing to general tech-

nical changes and new ways of calculating the unit price, still more from one period to another. But in industries in which the volume both of piece-work and also of overtime relatively to the time wage for the ordinary hours of work changes during the period observed, the hourly or daily wage-rate of the collective agreements alone will be misleading as to the trend of wages during the period in question as well in regard to yearly income as from the point of view of cost of the employer. This is also the case when changes in the hours and days of work occur, such changes being often more important for the total earned income than changes in the wage rates.

The only way to fill the gaps left by the sources described above has been to go to concerns in which wage records have been preserved for periods long enough to make it worth while extracting the necessary data. This method is of course very laborious in several respects and presents many and difficult problems, which are treated in detail in the next chapter.

In manufacturing and mining industries such wage records have been found in sufficient quantity. The making of extracts from these records from individual concerns and the compiling of wage statistics on the basis of this material has constituted the bulk of this investigation. Other sources mentioned above referring to these industries have been mainly used to supplement and control the material obtained directly from the records of concerns.

As regards small-scale manufacturing, the handicraft trades and the building trades, this kind of material has not been available. The records, when any have been kept by the small employers here concerned, have not been preserved, at any rate not to the extent and for periods long enough to make it worth while using them as material for our purposes. The only remaining source would be the hourly wage rates of collective agreements, but the objections to this material already given are here specially strong, piece-work wages being the prevailing form of remuneration in the Swedish building trades. What also makes the use of the hourly wage rates in the collective agreements specially unsuitable

in this case is the fact that piece-work has not always prevailed in the Swedish building trades and that the present situation is the result of a decided change which has been effected more or less gradually during the period in question. This also holds true — though not to the same degree — in regard to many of the handicraft trades.

The lack of material from these important industrial fields, especially the building trades, is the most serious gap in our presentation of Swedish wage statistics. This however has been unavoidable.

Another field that is somewhat sparsely represented in our investigation is commerce and communications.

The national railways have supplied us with material of about the same character as the wage records from private concerns in manufacturing. Of this large body of material it has been possible to use only a part, which however seems to be representative of the development of wages on the state-owned railways and probably also on the private lines.

The above mentioned monograph on the labour conditions of sailors, published by the Social Board, includes series of wages for the period 1860—1917. These series have afterwards been continued in the review of the Social Board.¹ They give, however, the wages for every fifth year, only, and the material is in several respects unsatisfactory. It has not been found practicable to collect and compile more material of this kind and other data not being available we have had to restrict our presentation of statistics regarding sailors' wages to the already published official series, notwithstanding their rather unsatisfactory character.

A qualitatively and quantitatively satisfactory body of material of the same kind as that from private industrial concerns has been supplied by municipal works and enterprises.

The material regarding wages in forestry is very poor; the only source available being certain records from the public domains, which, however, as will be explained later, did not lend themselves well to our purposes.

¹ Sociala Meddelanden Vol. 1926 et seq.

As regards agriculture, the sources already mentioned have been used. They have been completed, regrouped and revised in many ways, as described in detail in Book III.

The results of the compilation of the primary material from private and public concerns are published in Book I and Book II. Book I gives the material regarding wages in manufacturing and mining, Book II the material regarding wages in government and municipal services. The latter contains the results of an investigation of wages at municipal works, published also in Swedish in a more comprehensive form,¹ and on the national railways, and here too are published wage series from the naval dockyard at Stockholm.

In Book III data regarding agricultural wages have been compiled and made comparable with other wage series. As forestry in Sweden forms an integral part of agriculture, the scanty wage material available from this industry is published in the same section.

In Book IV, The general movement of wages in Sweden 1860—1930, all the main wage series from the preceding sections are compared and combined so as to give an idea of the development of the general wage level in Sweden during this period. This section begins with a description of the general structure of the Swedish labour market and contains a compilation from the population censuses showing the number of workmen in different occupations, from which can also be judged the representativeness of the presented wage statistics in regard to the general trend of wages in Sweden. As a conclusion the last part of the section contains the already mentioned combination of the wage series and statistical series regarding changes in production, prices, population, etc. showing the relative movements of certain main factors influencing the development of wages.

It is apparent that the wage statistics thus presented are in many respects extremely heterogeneous. Even regarding the same industry it has been necessary to use material from many different sources in order to get as com-

¹ Kommunalarbetarnas löner i Sverige 1865—1930. Stockholm 1933.

SCOPE, GENERAL OBJECT AND METHODS 11

plete statistical series as possible, and the general series have been patched together from smaller series sometimes covering different periods and sometimes relating to different concerns or parts of the industry. In our case, therefore as almost always in regard to historical wage statistics it has been practically impossible to compile averages for different groups of workmen, which can be compared with each other for the same year. We have been reduced to what has been called the "kinetic" method, which consists in studying not the wages themselves, but their rates of change; i. e. to "study the proportionate changes of wages period by period, wherever we can obtain a sequence of figures, and combine the figures which indicate these rates of change independently of the actual rate of wages at any time or place"¹.

By this method it has been possible to use all this heterogeneous material which we have been able to collect and so to obtain general wage series based on a very comprehensive material and therefore representative of the real movement of wages in Sweden during not less than 70 years, a period including practically the whole modern development of Swedish industry.

The work of patching together all these different sources of Swedish wage statistics has not only been laborious and lengthy but has also entailed many risks of errors and mistakes. It has not been possible to rely on more or less automatic or technically refined methods. The defectiveness of the material has precluded the employment of that accomplished statistical technique which is the privilege of other fields of statistical research, e. g. vital statistics. As is so often the case in regard to wage statistics, our problems have been mainly problems of finding and turning to useful account different and often defective sources and applying common sense and a general knowledge of the social phenomena dealt with rather than refined statistical methods of a more or less mathematical character.

Under such circumstances it is of course very important not only to let the reader know as much as possible regard-

¹ *Bowley, Wages in the United Kingdom. Cambridge 1900, p. 3.*

ing the sources of information in each case but also to let him follow closely the process of compilation. The following volumes have therefore not been limited to giving the final results of the work done, but contain details in regard to both the material and its compilation, the text dealing largely with discussions on the nature of the material, the various ways in which it has been handled and special methods for obtaining out of scattered and inadequate data as good and definite results as possible.

This manner of presenting the results of the present investigations may appear unnecessarily detailed; it has however seemed to be the best way of giving this kind of statistical research a scientific value. It not only makes possible a critical examination of material and methods but also affords an opportunity of rearranging and revising the figures for other purposes than those the authors have had immediately in view.

A more detailed description of sources and methods used for special fields will be found at the beginning of each part.

BOOK I
MANUFACTURING AND MINING.

CHAPTER II.

SOURCES AND METHODS.

Extensive or Intensive Methods.

THE enquiry into the wages of industrial workers during the period 1860—1913 is based wholly on data extracted from the wage records of industrial concerns. Only for purposes of comparison have particulars been used from other sources.

The extent to which wage records from earlier periods have been preserved varies considerably in different industries and in different concerns. The nature of the records and their value from the point of view of wage statistics are extremely varied, and the mere search for satisfactory materials has involved a considerable amount of time and labour.

For reasons of economy it has been impossible to make a complete compilation of all the material available. The problem has therefore been how, within the limits of our budget, to obtain wage data of as representative a character as possible.

The first question to decide, then, was whether the investigation was to be of an extensive or an intensive character. An investigation of this kind might either aim at procuring summary average figures covering as many workers as possible from a large number of concerns. Or again, it could be confined to a more thorough enquiry into the wage conditions prevailing in a few concerns. In the former case the material would be more extensive but of a more heterogeneous character; there would be no guarantee that the "law of great numbers" in this case could be applied to the averages in respect of the entire

country and the proper interpretation of the results would be a very difficult matter. According to the latter method, the results, at any rate as far as the individual enterprises are concerned, would be correct and exhaustive, but they could hardly be generalized in the form of more representative averages, which indeed is, as explained in Chapter I, one of the main objects of this investigation.

In order as far as possible to evade these difficulties we have adopted a middle course. Our method has been to select as many concerns as possible from which could be procured good wage material covering a fairly considerable number of years. Within each of the concerns selected, the investigation has been confined to a small number of selected workers from representative occupations. From these series of wages of selected workmen averages have been constructed; and by this means have been obtained series showing the trend of wages at the different concerns. According as such series show a concordant tendency, they have been combined into averages. The representativeness of these averages depends directly upon the mutual conformity of the component parts. The more nearly the component series move together, the more probable it is that there exists a common basic trend, that the different wages are influenced by, on the whole, common causes, and that the mean series thus illustrates the general movement of wages. On the other hand, if we find that the wage movements of the series included in the averages lack uniformity, we are confronted with two possibilities, that there actually does not exist a general wage movement which can be expressed in representative averages, or that the lack of agreement may be due merely to the unsuitability of the selected wage data. Whether the differences between the series are to be regarded as fortuitous or not can generally be best determined by making a comparison between averages of different groups of series. Such comparisons, and the critical analysis of the results, have formed one of the main parts of the enquiry; they will be found in the subsequent chapters.

A calculation of mean errors has not been possible owing to the character of the material. By thus working out wage series representative of a great number of individual concerns there is more likelihood of obtaining a true idea of the trend of wages than if purely extensive or intensive methods are employed.

A resolution passed by the International Statistical Institute in 1891 laid down that modern wage statistics ought to be based on individual primary data in respect to the different workers, and must give the workers' actual earnings. Another generally simpler procedure when calculating the average earnings in a given concern is to extract from the wage records the total sum paid out in wages during a given period (one year), which is often easily ascertainable, the total working time (in hours or days), and the number of workers (calculated as the average number of workers payed at the pay-days during the given period) then to divide the total sum of earnings by the total working time and the average number of workers, the results obtained representing the average hourly or daily earnings and annual earnings respectively. Generally speaking, however, such an average figure is not of great value. In the first place it is technically impossible by this method to control the reliability of the primary data, and there is no means of examining the material furnished. Further, the wages paid to female, over-age and non-adult workers are usually included in the total of earnings. Even if it is possible — though certainly only after much trouble — to extract these groups from the average, there will nevertheless be included occupations of a widely varying standard, with their different earnings. A difference observed between two such averages (these averages can either be constructed as applying to two different concerns during the same period or else to two different periods in respect to the same concern) may thus be due either to a change in the number of workers in different occupations or to a real difference in wages; that is to say, different wages being paid to workers in the same occupation in both concerns or during the two periods. There is thus no means of deciding

how far the disparity in wages is due to the one factor or the other. Even if one or more homogeneous groups of occupations are selected and the wage material is used in this manner, a variation in wages may just as well be caused by a change in the composition of the group in question as by a significant change in wages. In particular, variations in the average wage are caused by the taking on of new employees and the discharge of old ones, these variations being merely due to the fact that the new workers' wages, as well as the wages the discharged workers would have received if still employed, are on a different level from those of the workers in regular employment. This circumstance is of special importance in regard to the cyclical development, during which such wage averages are greatly influenced by the variations in the number of workmen employed during the different phases of the business cycles.

Moreover, such averages tend to be too low because workers who have left their jobs during a period between two pay-days (not owing to absence on account of sickness, which finds due expression in this method) are included in the average number of workers as whole-time workers, although they have only been at work for a part of the period. On the other hand, the average wage may well be too high, since it is based on what a worker *would* earn had he been at his job during all the wage periods concerned and received the average earnings per wage period. In actual fact, it can very well happen that the annual working time of some, or even all, of those employed in the concern has been shorter than the number of wage periods indicates. In that case a certain amount of replacement has been going on amongst the workers at the concern. Strongly marked seasonal phenomena invariably result in poor annual averages of this type because the earnings of workers who have only taken part in the work for a short period during the year ("seasonal" workers), and whose wage rates may be very different from those of workers employed all the year round, will be included in the average annual earnings.

Variations in wages that are due, for instance, to a change in the composition of occupations in a concern are of minor interest for our present purpose. The fact that the average hourly earnings in a concern may have been lowered through the concern's having expanded and taken on new and less experienced hands does not entail any reduction in the cost of labour, defined as the price of labour of a constant quality. Nor has such a fall in the average wage in a concern any interest from the point of view of the standard of income of the workmen, due to the fact that, although the average income within that concern has apparently fallen, it may nevertheless have risen as far as regards each worker individually or each group of workers.

An average is only of significance if it is possible to give some idea of the dispersion of the components around the average by means of a table showing the distribution, or by means of some number representing the degree of dispersion. The greater the dispersion of the components around the average, the less does the average tell us and the less does it give any concrete idea of the real conditions. Consequently, an average of the annual or hourly earnings of all the workers in a concern is often without any real significance. In order to give an idea of the true level of wages in a concern it is necessary to make an intensive classification of the workers in wage-groups, and such a classification must be based on individual data. But, any such method of compiling the wage records of the concerns has been out of the question in the present enquiry because of the expense involved; moreover, the value of the results would not be in proportion to the costs when compared with what can be obtained by far simpler methods.

The Kinetic Point of View.

The method used in this enquiry, based on wages from selected workers within selected occupations, both selections having been made from the point of view of getting data as typical as possible, both in regard to the work-

men within the special groups and in the choice of groups, does not differ in fact so very much from certain generally adopted methods. The different ways of attempting to get *typical* values of wages instead of the arithmetical mean of all wages within a concern or a group of workers thus often afford examples of methods closely akin to the double selection of typical workers used in the present enquiry.¹ The main aim of an historical enquiry into wages like the present one will always be to find the trend of wages from different points of view. By thus making the *movement* of wage levels during different periods the central problem, the compilation of the material is considerably simplified in many other respects also, as e. g. in regard to the weighting when constructing more extensive averages, in calculating the value of certain benefits etc. On the other hand, it must be observed that by such a "kinetic" method comparisons between wages in different industries or in different geographical areas at any specific time will as a rule give very uncertain results. Our method with data relating to wages of selected, typical workers is thus apt to give — if properly used — a good result from the "kinetic" point of view but, lacking material regarding the actual earnings of *all* workers, cannot pretend to give any certain results in regard to absolute, actual earnings at any specific time or place.²

¹ *Jørgen Pedersen*, in his work on wages in Denmark 1850—1913 (*Arbejdslønnen i Danmark under skiftende konjunkturer i perioden Ca 1850—1913*. København 1930), affords an interesting example. He uses "the modal value", the typical value of daily wage rates, instead of the usual arithmetical mean for almost the same reasons as we have used the methods of selected typical workers instead of a mean for the total number of workers. The reason why we have not been able to calculate "modal values" in the same way as *Jørgen Pedersen* is *inter alia* that our aim has been to find a statistical expression for the *real earnings*, which has made our task more complicated.

² *Bowley*, *Wages in the United Kingdom*. Cambridge 1900. P. 3: "The 'kinetic' method consists in studying not wages themselves, but their rates of change, making no attempt to construct a wage census for former dates or at the present time, but to study the proportionate changes of wages period by period, wherever we can obtain a series of figures, and combine the figures which indicate these rates of change independently of the actual rate of wages at any time or place."

If from among certain important and typical occupations within the concern some few workers are selected whose wages are normal for their respective occupations and who otherwise appear to be representative, it is possible to use the trend of wages in these occupations, based on the averages of the wages of the selected workers, as norms for the general trend of wages in the concern in question. From the point of view of showing changes in the costs of labour, this method of drawing up series representing selected workers seems to be a very suitable one. By following the trend of the same workers' earnings during a sequence of years we can get a picture of the development of wages of labour of a fairly constant quality during this period — provided, of course, that the wages of the same workers are not followed for so long a period that the changes in wages due *inter alia* to age will influence the series. The measures taken to avoid such faults are described below.¹ Also as a measure of the standard of income of the workers there is no reason why the average variation in the annual earnings of all the workers in a concern should differ from that of suitably selected workers, when the variations are adjusted to changes in the composition of the concern's labour personnel. Among the total number of workers there is, however, a certain average annual period of absence on account of sickness, which cannot be expected to be wholly reflected in the average representing the absence of the selected workers, these being too few to represent the normal tendencies in this respect. Therefore the gaps in the earnings caused by absence on the part of the selected workers have been "filled up" to a certain percentage of the maximum working time of the concern, in the manner described in detail below.² General absence of the whole staff of workers on account of strikes, short time etc. at the concern in question is fully accounted for when the method of selected workers is employed. Other forms of unemployment, which of course are extremely important from the point of view of income standard,

¹ P. 27.

² P. 31.

have not been taken into account in the results, since it is only the workers employed in the concern that can be included in the enquiry, but this deficiency cannot be remedied by any method that is based wholly on the concerns' wage records.

The Concerns' Wage Records.

The concerns' wage bookkeeping records consist of wage-ledgers, payrolls, wage-cards, account books, piece-work books etc. Their arrangement and contents vary considerably. Usually the details for each wage period (week, fortnight or month) are booked separately for each worker under the name of his foreman. The occupational group to which he belongs is usually stated, but all sorts of skilled and unskilled labour, including non-adult and female workers, may be registered within the same group. If the workers' names are given, it is possible to distinguish between the female and the male workers, but often only the workers' numbers are stated, in which case skilled and unskilled, female and non-adult workers, can be distinguished only by the different level of their earnings. The data regarding the different workers are, however, often arranged in a definite order, starting with the foreman and finishing with the non-adult or female workers, if any, which may serve as a guide when such records are used.

Concerning each worker it is stated in the records how much he has earned during the wage period in question. In the best bookkeeping systems these earnings are divided up into time-wages, piece-work wages and overtime earnings. In many systems, however, it is not stated whether time-wages or piece-work wages, or both, are referred to. Earnings at purely time-wage rates can, however, be recognized by their regularity. Sometimes the piece-work wages are posted in a special wageledger, in such cases usually as the so-called "piece-work supplement" i. e. the amount by which the earnings at piece-work exceed the time-wage. Under the system of collective piece-wage the

wages for the work done are often paid to one of the workers, to be distributed by him to the rest of the men, the total sum being then entered in that workers' account, but no details being recorded as to how the money was apportioned, with the result that such material cannot be used at all. Now and then the quantity of work carried out is recorded instead of the amounts paid in wages, and if the list of piece-work prices is available it is possible to calculate the amount of piece-work earnings. Piece-work earnings often prove to be very irregularly spread over the different wage periods owing to the fact that the account is not settled until the work has been completed, or else that the workers take out their wages in advance and earn less during subsequent periods while the piece-work job is still going on.

As regards time-work, the amount of time worked is generally, but not always, stated in the wage records. In former years it is given in days and in later years in hours, as a result of the transition from daily wages to hourly wages. Even if in time-wage work the hours worked are not stated for each wage period, it is generally possible to ascertain the regular working hours per week, and this can serve as a basis for calculating the hourly earnings, provided only time-work is being done. The regular hourly wages thus obtained do not, however, comprise the whole amount of earnings. Even if the workers have no piece-work, overtime work is carried out in practically every enterprise, often, too, on a considerable scale. When the amount of overtime is recorded, it is possible to calculate the average hourly earnings for all the work done, and this average generally differs considerably from the regular hourly wage, particularly in regard to the variations during different periods. A special difficulty is found in cases when the overtime is accounted for in the following way: if the overtime work is paid for at a certain percentage above the regular hourly wage, the employer records this in the books by increasing the number of overtime hours by that percentage and then calculating the amount paid on the basis of the regular hourly wage. If, then,

the total earnings are divided by the quoted hours worked, the quotient gives merely the regular hourly wage and not the total earnings per hour. Only in a few cases is the time spent on piece-work recorded. Indeed, from the bookkeeping point of view, the employers are not particularly interested in knowing it. It may often be difficult to differentiate between the so called "piece-work supplement" by collective piece-work (see above) or the premium by collective progressive wages, which have been earned during the regular working time quoted for time-work, and piece-work proper that is carried out at other times and for which the time worked is not recorded. It is as a rule possible, however, by comparing the variations in working hours with those in piece-work earnings, to decide whether the latter are to be added to the time-wage for the calculation of the hourly earnings or not. As pointed out above, in former years the regular working-time was often stated in days, but the over-time in hours. A day's earnings are then calculated by dividing the total earnings by the number of days irrespective of overtime, which will instead involve an extension of the hours worked per day. The average hourly earnings are obtained by dividing the total earnings by the number of days \times the regular working hours per day $+$ overtime.

In the iron, steel and mining industries the bookkeeping system is to a certain extent different from that in other industries, which has necessitated slightly different methods of compilation. In the main, however, the methods are the same; special features are dealt with in Chapter IV.

The Collection of Primary Material.

Details of wages have been collected from about 160 industrial concerns. The choice of concerns has been limited by the fact that the wage records of many of our older and more representative concerns have proved unsuitable, or could only with great difficulty be used for statistical compilations or more commonly still, they have been either wholly or partially destroyed, thus making it

impossible to form any continuous wage series for long periods. Moreover, it has often been impossible to procure wage data from concerns that now no longer exist, but which at one time held a representative position. Questionnaires asking for specific details of the data which they could furnish were sent to most of the concerns which are now in existence and were in business during a substantial part of the period 1860—1913. The answers to these questionnaires made possible a first thinning out. This procedure was followed by a personal enquiry, through agents from the Institute visiting the different concerns and making a careful examination of their wage records. When the records of a concern proved suitable for statistical compilation, the agents arranged either for the work to be started on the spot, usually by a member of the concern's staff, who was given the necessary instructions, or by the agent himself, or else for the wage records to be sent to the Institute and there compiled. As many of the concerns were unwilling to lend out their wage records, it was necessary to make a great many extracts in the offices of the concerns themselves. A considerable proportion of this material has, it is true, been collected by the agents sent out by the Institute, but it has not been possible to exercise the same kind of control on the wage extracts from these concerns as when wage books have been sent to the Institute and there compiled by the staff of the Institute. The instructions given have sometimes been misinterpreted, unsuitable occupations and workers have been selected, too few or too many replacements of workers have been made, the wage records have been misunderstood, etc. Consequently, after the particulars extracted from the wage books had been submitted to the Institute, an extensive correspondence had to be carried on, enquiries made and supplementary information asked for, all of which caused considerable delay and much work. Moreover, as is but natural when an investigation is planned covering hitherto comparatively unworked ground, mistakes were made, which could have been evaded, if we had at the start acquired the experience subsequently gained during

the progress of the work. Moreover, the value of the wage records has varied considerably from the point of view of the plan adopted for the enquiry. The primary material is thus not of a homogeneous character, and in many cases it has been necessary to let the measure of agreement between the results decide their degree of dependability. The discussion of the relative reliability of the different series forms an important part of the subsequent chapters.

Selection of Occupations.

In the compilation from the concerns' wage books, the first question was: what occupations are to be regarded as representative? In deciding this question an attempt generally was made to secure, if possible, representatives of both skilled and unskilled workers, the relative trend of whose wages is a matter of great interest. Where female workers have been employed to any considerable extent, their wage conditions were also investigated. Foremen's wages, on the other hand, were generally disregarded.

When it came to selecting occupations on these general principles, we tried, wherever possible, to get information and advice from persons with special knowledge regarding the conditions prevailing at earlier periods such as employees of long standing, foremen etc. Further, when dealing with concerns engaged in the same industry we endeavoured, wherever possible, to select the same or similar occupations in all concerns. Advice and information was also obtained from representatives of employers' and workers' organizations. It was frequently easy to determine directly from the concerns' wage books what occupations were of predominant importance, but where the books have not differentiated between occupations the task has been far more difficult.

The number of occupations selected from different concerns varied considerably according to the nature of the wage material furnished.

Selection of Workers.

In the selection of workers from a given occupation the procedure was as follows. Where each worker's year of birth is given, as is often the case, workers of normal age could be easily selected. If possible, they were chosen in different classes of age, so that the variations in wages according to age were counterbalanced. In most branches of occupation, however, this variation is within certain age-limits not strongly marked. Nevertheless, misleading results might be obtained if workers were selected belonging to about the same age-class and were then followed up for a long sequence of years. Even if we have not succeeded throughout in selecting workers of different ages in each series, their mean age will in averages based on more extensive data remain fairly constant from year to year, as in these averages constructed from many series there will always be workers both on the rising and on the falling part of the age-curve. Our selection made it unlikely that any mistake would arise on account of the age variations among the selected workers. In order still further to preclude possible errors from age-variations in the wages and other special circumstances relating to selected, individual workers, a further rule was always observed — specially important in cases where data regarding the age of the workers are lacking — that a certain turnover of workers represented in the different wage series was effected so that every selected worker was replaced in the series after 5—10 years, and replacements of several workers in a series at the same time has been avoided.

There are of course other circumstances also that may create difficulties in regard to the selection of really representative workers. One of the more important is the different kinds of wages. If, for instance, the workers in a given occupation are generally engaged at a time-wage, it will give a false idea of the trend of wages in that occupation if only workers engaged at a piece-wage are selected. If the earnings and the forms of wage-remuneration in an

occupation vary, more workers must be selected than if, for instance, all workers are engaged on a time-wage basis for the same hourly wage, and the difference in earnings thus merely arises from slight variations in working hours, or if the workers are working under the method of collective piece-wages the earnings of the group being apportioned among the members of that group according to fixed percentages. In cases such as the latter, where the earnings of the different workers in question must be fairly uniform, we have selected only one or two workers, while in other cases as many as 10 may have been chosen. Four workers may be regarded as the most usual number selected.

As a general check on the representativeness of the chosen workers the method has been used of comparing their earnings during a sequence of wage periods with those of other workers in the same occupation.

The extracts from the wage records that have been submitted to the Institute or compiled at the Institute are drawn up in the following form in respect to each one of the selected workers named.

Year 1884. Filer A. Petterson, born in 1860. Motala Verkstad.

Wage period	Time spent on time-work	Time-wages	Over-time	Over-time earnings	Time spent on piece-work	Piece-work wages
$\frac{1}{2}$ — $\frac{1}{4}$. . .	50 hours	10 kr.	2 hours	0: 60 kr.	15 hours	4 kr.
$\frac{1}{2}$ — $\frac{1}{2}$ etc.	—	—	—	—	—	—
	Total 2,500 hours	500 kr.	100 hours	30: — kr.	750 hours	200 kr.

Usually, however, as pointed out above, particulars are missing from some of the columns, and in some cases only extracts of the earnings of the worker in question for the whole year have been sent in, together with supplementary information on the number of wage periods.

The worker may have been absent for a number of wage periods on account of sickness, strikes etc. If this absence applies to all the selected workers, it is probable that there was a common reason for it, and that all the workers in the concern were involved. In that case, the fact of ab-

sence has had to be recognized in the form of lower annual earnings and shorter annual working hours. If, on the other hand, one of the workers is temporarily absent, the gap in both earnings and working hours has been filled up, so that these two items apply to the entire working-year or to such period as would appear to have been the normal one in the occupation in question. An "allowance" for absence representing $1/12$ th of the normal working time has been made without the gaps being filled in.

The totals of earnings and working hours for the whole year having thus been made comparable as between the selected workers in each series, the average for each column has been calculated for these workers. Before these averages were worked out, certain workers had to be excluded, in order that the series should be as homogeneous as possible.

Above all, corrections have had to be made when workers have not been replaced in a proper way (see above p. 27). If, for instance, a worker earning low wages has been exchanged for a worker earning high wages, the average earnings of the selected workers consequently show a rise, that in reality has not occurred. Such a break in the wage series has had to be adjusted in one way or another. Either both workers have been excluded from the series — a procedure, however, that has been followed with some reluctance, as the series would then constantly contain one worker less than normally — or else, and preferably, the percentage by which the earnings of the remaining non-replaced workers have changed have been used as a basis for correcting the earnings of the replaced worker and the new worker for one or other of the two years, so as to get the correct relation between them. In that case, the earnings of either of the two workers must often be corrected by the same percentage for all preceding or all subsequent years. Such a chain index method (which is described in detail below¹) has however been used very seldom for the purpose of correcting series in which individual replacements have taken place. The rule has been

¹ P. 39.

that, when a worker has had to be replaced, an effort should always be made to substitute for him a worker whose earnings were as near as possible on a level with the replaced worker's. Minor breaks now and then occurring in the various series are to be regarded as corrections of the age-variation of wages, and in averages based on more extensive data, when the replacement of workers goes on more continuously, they will counterbalance one another.

In order to facilitate the determination of the reliability of the series thus obtained, all averages (annual, daily and hourly earnings) have been drawn to a logarithmic scale. The series from the same concern have been made comparable with one another by this means, and, where agreement in their trend is lacking, we have gone back to the primary extracts of the wage records in order to find out whether the disparity is due to a replacement that has not been properly made, to an incorrect filling up of gaps, or some such cause, and have thus been able to correct the series. If the curves representing a concern's wage conditions show a parallel movement, it is reasonable to assume that the series are representative. If a series has exhibited a peculiar and deviating movement during a given period, the separate workers' earnings have been plotted individually on a logarithmic scale in order the more easily to make it possible to decide whether that fact has been due to an unsuitable selection of workers or not. This procedure has often proved, upon further investigation of the primary material, that the divergent tendency has been due to peculiar circumstances connected with the selected workers (age, promotion to foreman, etc.), and the necessary adjustment has simply been effected by excluding such data. On the whole, these logarithmic curves have proved very valuable for testing the reliability of the series.

"Cross-Sections" for Special Years.

In order to enable us to determine how the averages obtained on the basis of the series containing selected workers

stand in relation to the average earnings of *all* the workers combined within the occupations and concerns in question, we have for a number of concerns struck "cross-sections", embracing all the workers in the concern, for certain years. Wherever possible such "cross-sections" have been struck for the years 1865, 1885 and 1905, which do not, it is true, have exactly the same position within the business cycles, but nevertheless have this in common, that they are not years characterized by markedly high or low conjunctures, so that the trend of wages during the periods between these years should also serve as a kind of measure of the secular changes in wage conditions.

The method of arrangement and compilation in striking these "cross-sections" has depended upon the state of the wage records. When the total sum paid out in wages has been worked out for each wage period in the wage records in question, then only that total has been extracted, together with the number of workers involved. By dividing the total wages for the whole year by the average number of workers employed an average of the annual earnings per worker has been obtained. If the working hours have also been recorded, an average daily or hourly wage has been constructed by dividing the total amount of wages by the total time worked by these workers. When the occupations have been specified in the wage records, each occupation has been dealt with in the same way. For purposes of comparison it is, of course, important that the same occupations as appear in the series containing selected workers should also, if possible, be represented in the cross-section tables.

In the case of some concerns "cross-sections" have been worked out on individual data. In such cases the workers (in each occupation) have been divided into full-year, part-year, and (if any) seasonal, workers. By full-year workers are meant those who have been working for at least $11/12$ ths of the normal working time during the year.¹ The average annual earnings of these full-year workers have been worked out, and, wherever possible, their

¹ Cf. *N. Wohlin*, *Modern lönestatistik*. Stockholm 1915, p. 26.

average daily and hourly earnings. As regards the part-year workers, i. e. those workers who have been absent for at least $1/12$ th of the ordinary working time during the year, we have either confined ourselves to working out their average daily or hourly earnings, or else, where that has not been possible, we have made their earnings cover an entire year and calculated an average (fictitious) annual wage. Where the work has been of an obviously seasonal character, we have made a special calculation, provided individual records have been available, of the average daily and hourly earnings of the seasonal workers.

Apart from the fact that the "cross-sections" afford an independent method of throwing light on the wage level of the individual concerns during a given year, they also serve as a useful guide in assessing the value of the series based on the earnings of selected workers. If the average wages of the selected workers closely correspond to the average wages according to the "cross-sections", it seems reasonable to regard the trend of wages in that series as representative for the concern in question. On the other hand, divergent results do not within reasonable limits prove that the wage series of the selected workers are not representative, and even considerable differences *need* not call for the exclusion of such series, as the cross-section may include some very heterogeneous category of workers. Generally speaking, it has been found that the wages of the selected workers are about 5 % above those of the cross-sections, doubtless owing chiefly to the fact that as regards quality the selected workers will prove slightly above rather than below the average of an occupation; the reason probably being that the turnover of less qualified labour generally has a tendency to be greater than that of more qualified labour, and consequently the selected workers more often belong to the latter than to the former group.

Approximations and Estimates.

Apart from the estimates made in order to fill up gaps caused by absence from work, it is mainly in connec-

tion with the working hours that estimates have had to be made. The pay-rolls often contain no particulars whatever as to hours worked, only an approximate figure being given for the standard working time per day or week. In the case of some wage series a plausible annual working time has been calculated by subtracting from the standard working time a probable period of absence for every wage period, estimated by the size of the earnings. With work on time-wage the results have as a rule been satisfactory, but with piece-work such a calculation has usually proved unsatisfactory and has not been attempted. Piece-work earnings fluctuate from week to week, and it is impossible to tell whether these variations are caused by corresponding fluctuations in the working hours, or whether the earnings vary irregularly independently of the hours worked. When occasional piece-work on a small scale has been done in addition to the ordinary time-work, it has been possible with a fairly small margin of error to make estimates with the aid of the standard working hours and the size of the time-wage. As a general rule, for determining the annual working time, where it has not been stated or could not be otherwise estimated, 52 weeks (52 or 26 wage periods) have been taken to equal 300 days. Estimates of the working hours have not however been made very frequently (and mostly in isolated years only) for individual series, but have generally been constructed in connection with the averages of several series, in the manner accounted for in detail in subsequent chapters.

Benefits in Kind.

In former times the workers received wages in kind on a far larger scale than they do nowadays. The most common benefits were free housing and free firewood, but, besides these, often free potato-patch, free medical attention and medicine, as well as an old age pension. The workers could sometimes obtain the concern's products at a cheaper price or even gratis (at breweries, for instance). At concerns situated in more or less isolated country di-

stricts the employer often provided the workers with certain necessities of life, such as grain and milk, at prices far below the market price. This was very often the case at the ironworks. As regards "reduced-price" benefits, their monetary value can be estimated from the wage records and available price-lists, and be embodied in the earnings. A further account of this subject will be found in Chapter IV, on the wage conditions in the iron and steel industry, the main field for this system of wage-remuneration.

The benefits by way of free medical attendance and medicine are not generally valued in money, and as their value has in all probability been very small in proportion to the total annual earnings, they have been entirely left out of the calculation and only mentioned in the text. As a matter of fact, they belong to those factors of a general nature, mentioned below, the variations of which can be wholly disregarded.

Free housing and free firewood are granted in certain industries as a regular custom, as for instance in the iron industry, but in others, as in the engineering industry, only on a comparatively small scale, depending mainly on whether the industry on the whole is located in the country or in the towns. When establishing a factory in the country the employers often find it necessary to build dwellings for their workpeople, and in that case the housing becomes an integral part of the wages. It has generally not been stated in the wage records whether the workers have had free housing or not, and it has thus been necessary to procure special information on the point. We thus obtained statements as to whether most of the workers have had free housing and during which years they have enjoyed that benefit, and also sometimes a monetary valuation of the benefit (which however often appears to be a fairly rough estimate). A somewhat more reliable valuation is usually obtained when, at the time of, or subsequent to, the introduction of collective agreements, the free housing benefit has been replaced by an augmentation of the money-wage, the worker then having to pay a specified rent for the housing.

Where the housing has been free it has naturally been of an extremely varying quality. Even in one and the same industry the conditions vary considerably. Furthermore, in the course of time they have undoubtedly improved, though to what extent is more or less unknown. If we attempt to embody the value of the free housing in the earnings at those concerns where this benefit has been prevalent, we cannot therefore merely add an amount constant for the whole period in question. The trend of wages will presumably be more correctly disclosed without such a constant amount, as it is more likely that the housing benefit will have to some extent shown the same progressive tendency as the wages. Such a procedure would in fact probably result in a retardation of the growth of wages at concerns providing free housing as compared with concerns not providing free housing, which would be altogether wrong. Moreover, the augmentation in the building costs must be considered, especially from the point of view of costs of production. But as mentioned above information regarding the changes in the quality and the value of the free housing has not been available. We have therefore generally preferred not to incorporate the value of free housing in the earnings.

During long periods, however, the quality of the housing accommodation seems to have been fairly constant at the individual concerns, so that the variations of the real wages will thus be slightly exaggerated, when account is not taken of this factor. On the other hand, the improvements in housing conditions carried out more or less intermittently in each concern would in large measure counterbalance each other in the average of several series; the continuous progress made in the standard of housing should also keep pace fairly well with the cash earnings, and the result will therefore not be so very different in regard to the averages based on more extensive data, whether the value of the free housing is included in the series or not. The error becomes still slighter when the wages of workers who have paid rent for their accommodation are included in the averages. Furthermore, thanks to the kinetic me-

thod, the mathematical error caused by not including the value of the free housing will in any case be of a low order. If, for instance, we make the reasonable assumption that the value of his free housing represents 10 % of a worker's real annual wages, and if, furthermore, his wages in cash during a given period of time have gone up 10 %, his free dwelling, as also its value, remaining however unaltered, a calculation by our method will give a 10 % rise in wages, whereas the true increase is 9 %.

The value of the free housing as given in the reports varies from 50 to 300 kronor *per annum*.

The same reasons that have been given above for the method used in regard to free housing applies also to free firewood and free potato-patch, etc., but these latter benefits are of very slight importance, seeing that the annual value of the firewood consumed is estimated at between 20 and 50 kronor, and that of a potato-patch at about 5 kronor. Besides, it should be observed that in many cases the free firewood had to be collected and chopped by the worker himself, and the work entailed, like that expended on the potato-patch, should be deducted from the value of the benefit.

In certain cases, however, the values of these benefits are included in the earnings. It has sometimes happened, for instance, that a worker belonging to a series of selected workers has had free housing, while the others have not had that benefit, having received a cash allowance for rent. In order, then, to make the series homogeneous, we have added to this worker's wages the value of his free housing, which we have taken to equal the cash allowance paid to each of the others. A similar correction has been made in the case of individual concerns that have differed from the others in the same industry in the matter of workers' benefits in kind. When free housing has been replaced by cash remuneration and the workers have paid a normal rent during the following years, the series has been corrected either by deducting from these years' earnings a (constant) sum equivalent to the value of the accommodation, or else by adding the same sum to all preceding years.

Our procedure in each particular case has always been fully accounted for in the subsequent chapters.

The Construction of Averages of Several Series.

The greatest difficulty in constructing averages of the different series has been the determination of the weights. In the weighting of series in the same concern, consideration has had to be taken of the following factors: 1) the quality of the series and 2) the size of the occupational groups they represent. In weighting series from different concerns in an average for a whole industry, the following points have had to be considered in addition: 3) the size of the concern, 4) the number of workers in that particular industry in the district in which the concern is located. And finally, in the weighting of series from several industries, the series have had to be allotted weights in the calculation of which 5) the number of workers in the different industries has had to be taken into consideration.

The system of equations that expresses the five above-mentioned requirements of our weights is often insoluble as the different conditional equations may exclude each other. Above all, the first condition may often operate dead against the rest. A series may be of a very homogeneous character and contain many, say 10, selected workers, yet it may represent a concern or an occupation of little importance, whereas from a large concern or an important occupation we may have a series containing only a few selected workers on widely differing wage levels. How then are the relative weights to be determined in such a case? The other conditions may also conflict with one another. A selected concern may be important in size and in the number of employed workmen but its situation may be far removed from the district in which the other part of the industry in question is located, and out of which we may have only a small concern represented in the material. Or again, we may find an occupation of minor importance represented in a large concern, but a small concern represented by an occupation of

predominant importance to that industry. In all such cases the composition of the weights must largely be a compromise based on subjective judgments.

Another difficulty is this, that the relative size and importance of the occupations, concerns, etc. alter in the course of time, and properly speaking, the weights chosen should likewise vary. But if the weights vary, it may happen that a given change in the averages is merely due to the changed weighting, whereas the earnings in each one of the series are constant. If all industrial workers were represented, the different series would obviously have to be weighted also according to the variable number of workers, since a change in the general wage level can take place as a result of workers moving from one concern or occupation to another with different wage levels, as well as through an alteration of the wages in each occupation or concern. With the method and material used in this enquiry it is, however, impossible to know whether the change that justifies an alteration of the weights is of general application or not, and thus a varying scale of weights must be regarded as inexpedient. Further, the average earnings of the different series of selected workers cannot, as has been emphasized above, be assumed to express the *absolute* height of the wage level in each occupation or concern, but merely the trend of the wages. Therefore it becomes impossible to bring out the result of the transition and removal of labour from one concern, occupation or industry to another on the general level of earnings, and it has been necessary to limit the construction of general averages to a weighted average of the trend of the wages of the different series, without considering the influence on the general level of wages of the movement of the population between different industrial fields.

Contrary to what one might expect after reading this general exposition of the problem it has proved quite easy to determine the weights in the different concrete instances. The greatest attention, then, has been paid to the quality of the series, though to some extent the re-

lative size of the occupations and concerns have also been considered. If two series have been equivalent to one another in homogeneity and the number of selected workers, but the concerns represented have been of different sizes, the series taken from the larger concern has been more heavily weighted. If more series have been taken from one concern than from another of equal size, each of the series from the former concern has been less heavily weighted, so that the total weights of the two concerns has been approximately the same (although, perhaps, owing to the greater number of series, slightly larger in the case of the former concern). The size of the concerns (as measured by the number of employees) has been determined by figures from the middle of the period covered by the investigation (1896—1900), taken from primary material in the archives of the Board of Trade. Obviously, weights determined on such loose principles must be somewhat arbitrary, but, as is usually the case, they are not of decisive importance, seeing that the number of series is comparatively large and the trend of wages in the different series fairly uniform.

The Chain Index Method.

The series taken from the concerns represented do not all commence in the same year, neither do they as a rule continue during the whole length of the period of investigation; a steady influx of new and withdrawal of old series is therefore taking place all the time. Only a few concerns have been able to supply wage data all the way back to 1860, and during the sixties, seventies, eighties and nineties new series are constantly added to the material. By the beginning of the first decade of the present century the number of selected concerns, generally speaking, reaches its maximum, and after that the number diminishes again to a varied extent in different industries. Averages worked out on the basis of this varying number of series will naturally be subject to variations, due to the influx and withdrawal of series. If in any year a series is taken

in that shows, let us say, earnings above the average, this will bring about a rise of the average stronger than it would otherwise have been, or its incorporation may even convert a lowering of the average under both comparative years into a rise. Breaks of this kind in the wage series must be eliminated. A concern from which material has been procured in a certain year may actually have been in existence before, although the data required may not have been available or for some reason or other not extracted; in such a case it is obvious that the incorporation of this concern's series in the averages must not be allowed to cause a break in the average-series. Even if the concern in question were founded in the same year as that in which it is included in the averages, it will in this first year have far too great an effect on the averages if its wage level differs materially from that of the other concerns included. And the third reason why the elimination of such breaks in the series is essential is that the results of our methods are rather uncertain in regard to the absolute height of the wage level, a fact to which reference has already been made several times above.

In order to eliminate the effects of these defects in the material, use has been made of the ordinary chain index method. The object is to ascertain how the average has altered from one year to the next if those series are excluded that are not represented under both years in question. The method may be illustrated by an example taken from the calculations of averages in respect of the textile industry:

1.	2.	3.	4.		5.	6.
Year	Weighting total	Average annual earnings for all series	Average annual earnings for series occurring throughout		Chain index number	Total index number (1860=100)
			a)	b)		
1895	20	600	—	—	101.2	162.5
1896	22	605	613	638	102.2	166.1
1897	18	680	673	674	105.5	175.2
1898	18	703	705	—	104.6	183.3
1899	19	723	720	—	102.4	187.7

If we divide by the weighting totals in Col. 2, the aggregates obtained by multiplying the annual earnings of the

primary wage series by the corresponding weighting numbers and adding these products, we get the averages in Col. 3. These latter, however, are not comparable with one another, as the series involved are not the same throughout all years. It is for this reason that the averages in Col. 4 have been calculated. The average annual earnings for the year 1896 (605 kronor) contain two series that are not included in the average annual earnings for the year 1895. In order to obtain an average variation for the series occurring throughout, these two series have to be excluded when the average for 1896 is constructed; the figure 613 is thus obtained. The ratio $613 : 600 = 102.2$ is the required index number and is entered in Col. 5. If we wish to compare the average annual earnings in 1897 with those of 1896 we must eliminate from both averages those series that do not occur in both years, and compare the average annual earnings 673 and 638, which contain the same series and give the index number 105.5. The same process is continued from year to year, care being always taken to ensure that the comparative years contain exactly the same series. Column a) shows the corrected average annual earnings that are to be compared with (divided by) those of the immediately preceding year; column b) shows the averages that are to be compared with those of the immediately succeeding year. In Col. 5 we get a series of chain index numbers (the figure 101.2 is based on a comparison between the years 1895 and 1894). By multiplying these index numbers all the way through from the first index number (in this case that for 1865), which equals 100, to the final index number (for 1914), index numbers are obtained representing the trend of wages, in which variations due to changes of series between different years are eliminated. These total index numbers are entered in Col. 6 ($166.1 = 162.5 \times 102.2$, $175.2 = 166.1 \times 105.5$, etc.). A correction of the direct averages in Col. 3 is obtained by multiplying the index numbers in Col. 6 by a certain factor, the nature of which is such that the raised series of index numbers very nearly coincides with the series of averages. We have always moved the series of index numbers on to

a level with the series of the direct calculated averages during the years in which the latter is most reliable, i. e., in which the most numerous and best series are included, and this occurs as a rule between the years 1900 and 1910. In general it will be found that the difference between the series of index numbers and the series of averages during long periods is but slight, though towards the beginning of the period of the investigation it becomes sometimes considerable (a deviation of as much as 20—30 %). Only this raised series of index numbers is published, as the averages calculated direct are of no special interest.

Generally speaking, we have encountered no difficulties in calculating the indexes. It goes without saying that no data were used that relate only to isolated years. There are no series covering alternate years, so that it has always been possible to make comparisons between consecutive years. Occasionally no common series for some of the earliest years existed, in which case it has not been possible to employ the index method, and we have had to use only direct averages. Any such deviations from the method now described have, however, always been commented upon in the text.

The index numbers are, then, averages of a widely varying number of series, and their reliability as a rule varies in the same direction as the number of series included. When publishing such index numbers, therefore, we have always stated the number of series involved and the number of workers selected.

Index numbers based on one-year chain index numbers give correct averages only for variations reckoned from one year to the immediately succeeding year, but for longer variations they may be incorrect. Suppose, for instance, that we wish to ascertain the growth of the average annual earnings for a period of 10 years by the chain index method, the enquiry dealing with material from two concerns during the first 5 years, though material from only one of them is available for the remaining 5 years. The wages in the concern, from which material is obtained for the whole 10-year period prove to be constant through-

out the entire 10 years, while the other concern's wages have increased on an average by, say, 50 % in the course of the first 5 years, the weight of both series being equal the first year. If both concerns employ the same number of workers, the average rise in wages will be, for the first 5-year period, 25 % and for the second 5-year period 0 %, and the chain index method will show a rise in wages, for the entire decade, of 25 %. Manifestly, this may be an entirely erroneous result, since in the concern in which the workers were employed throughout the entire period covered by the investigation the wages were constant.

In order to prevent misinterpretations of this character the differences between the raised index numbers and the direct computed averages have always been stated and, in case of more considerable differences, their causes have been investigated in detail. In the example cited above, a direct calculated average would thus show an unaltered wage level after 10 years and the due consideration of that fact would preclude any mistake of the kind suggested in the example. Moreover, for the purpose of determining whether the index numbers really represent average variations of integral series occurring throughout the investigation, and whether they lie concentrated around these averages, we have in all cases selected periods of different lengths and compared the percentage variations of the series with those of the raised index numbers. Such an investigation of "the kinetic dispersion" will be found in each of the subsequent chapters. Such periods have been preferably chosen in respect of which the index numbers exhibit characteristic and interesting movements, with particular reference to the typical cyclical periods, *inter alia*, to observe any noteworthy deviations from the general cyclical trend occurring in certain concerns. We have also selected periods of greater length for purposes of comparison with the shorter ones.

The series have in the first place been weighted on the basis of the division made in the official Industrial Statistics into different industrial branches; thus, averages have been worked out for iron and steel, mining, metal

manufacturing and engineering, sawmills, wood-pulp mills, papermills, food products, textile industry and leather, rubber goods and chemical industries. The concerns in each of these branches are, generally speaking, fairly closely akin as far as regards raw materials, finished products or technical processes etc., so that a summary indicating the trend of wages in each branch is of real interest.

Where the available material has permitted, the series have also been combined according to occupations (skilled and unskilled workers).

A division of the material from geographical points of view would also have been very desirable. The methods of collecting and compiling the wage data regarding manufacturing and mining have however not made such a division suitable, the results being — as has already been emphasized — somewhat uncertain in regard to differences in the absolute wage levels. As a rule therefore a comparison between wage levels in different districts, which is the main purpose of a geographical division of the wage material, on the basis of the material presented in this part of our investigation¹ would not be advisable. Neither can the *development* of the industrial wages in different geographical districts be suitably studied from our material, since it was not collected for this purpose. The fact is that the different industries are generally located in special districts (e. g. the iron industry mainly in "Bergslagen", the sawmills in the coast districts of "Norrländ", the food products industries in the towns etc.) and this localization of the industries often makes other geographical divisions of the material impossible. On the other hand, this localization of the industries will not infrequently be found to give the averages for the different industries a certain interest also from a geographical point of view.

Similar reasons have made it necessary to limit the use of the results obtained in the volume on the cost of living²

¹ A geographical study of wages will be found in Book III, the material regarding wages in agriculture being of a different character and permitting of such a division.

² *Myrdal*, The Cost of Living in Sweden 1830—1930. Stockholm 1933.

to the construction of a general index of real wages for all industries combined and to desist from computation of series of real wages for the different branches of industry.

Monographs.

In appendices to Chapters IV—XII are published primary wage series from individual concerns, and these series together with data regarding working hours and other labour conditions have been combined into a monograph for each concern. We have tried to make the selection of concerns as representative and the presentation of particulars as systematic as possible, but have in many cases been hindered mainly by the character of the material, but also in certain cases by the unwillingness of the managements to have such details published separately.

The data contained in these monographs represent the first results of compiling the concerns' wage records. It has been considered advisable to publish them on a scale that might perhaps seem unnecessary, especially to a general reader. However, with the methods of compilation chosen, such a detailed publication will provide an indispensable means of control over the results of the compilation as well as assist anyone who desires to make use of the statistics for scientific purposes to understand the nature of the material. It also affords the possibility of assembling and comparing the data in another manner or from other points of view than those which have characterized our presentation. And to readers who are not familiar with Swedish economic and social conditions these monographs will give a more concrete and intimate knowledge, which may be useful for a scientific interpretation of the results of this enquiry.

Wage Statistics for the Period 1913—1930.

The material, the collection and compilation of which has been described above, relates as a rule to the period 1860—1914. Chapters III—XII therefore only cover that period; the reason being, as already mentioned, that for the

period after 1913 yearly official wage statistics have been published. A summary of these statistics, together with a presentation of methods and sources, will be found in Chapter XIII, where also a comparison is drawn between the official wage series and those compiled from our material, and a combination of both is attempted in order to get a continuous series showing the general trend of wages in manufacturing and mining during the whole period from 1860 up to 1930.

CHAPTER III.

GENERAL TREND OF WAGES IN MANUFACTURING AND MINING.

THE annual and hourly earnings of male workers in the different branches of manufacturing and mining have been so combined in weighted averages as to be representative of these industries as a whole. These average earnings constitute the main result of the investigation as far as industrial workers are concerned, and are published below in Table 1.

The Calculation of Averages.

The annual earnings averages have been computed in two different ways, Average I and Average II, in Table 1.

In Average I the average annual earnings in the different branches of industry have been combined by applying weights that are constant throughout the whole period. These weights are assigned according to the relative size of the branches of industry (number of employees) around the year 1913, the varying degree of reliability of the figures relating to the average annual earnings for each industry also being duly taken into account. Mining series have been assigned a weight of 1, iron and steel 3, metal manufacturing and engineering 4, mineral and stone industry 3, sawmills 3, wood-pulp 1, papermills 1, food products 3, textiles 3, leather and rubber goods and chemical industry 2. Corrections, as described in Chapter II, were made when new series were introduced into the total.

Average II has been computed on the basis of chain index numbers worked out for each particular branch of industry, i. e., numbers that express the relation between one year's average earnings and those of a preceding year, any changes that may take place in the series being duly adjusted. The different chain index numbers covering

Table 1. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in Manufacturing and Mining as a whole 1860-1914.

Year	Annual earnings		Hourly earnings	Year	Annual earnings		Hourly earnings
	Average I	Average II			Average I	Average II	
1860 . . .	414	421	11.8	1890 . . .	741	773	22.4
61 . . .	416	430	12.4	91 . . .	748	773	22.8
62 . . .	439	455	13.6	92 . . .	744	772	23.1
63 . . .	446	460	13.7	93 . . .	754	776	23.7
64 . . .	439	459	12.8	94 . . .	766	777	23.9
65 . . .	458	469	13.8	95 . . .	779	795	24.2
66 . . .	456	467	13.3	96 . . .	805	822	25.1
67 . . .	460	475	13.8	97 . . .	829	844	26.3
68 . . .	476	500	14.8	98 . . .	879	892	27.9
69 . . .	490	504	15.7	99 . . .	917	928	29.1
1870 . . .	501	512	15.0	1900 . . .	947	958	30.4
71 . . .	509	527	15.4	01 . . .	933	939	30.4
72 . . .	558	576	17.3	02 . . .	949	952	31.0
73 . . .	609	637	18.4	03 . . .	968	984	31.3
74 . . .	653	683	20.2	04 . . .	997	1017	32.4
75 . . .	668	704	20.3	05 . . .	995	1032	33.4
76 . . .	656	704	19.6	06 . . .	1086	1114	35.2
77 . . .	668	709	20.3	07 . . .	1147	1176	37.2
78 . . .	617	662	19.3	08 . . .	1146	1172	38.1
79 . . .	576	616	18.0	09 . . .	1042	1053	39.1
1880 . . .	621	660	19.0	1910 . . .	1230	1285	40.9
81 . . .	646	672	19.8	11 . . .	1246	1295	41.5
82 . . .	664	696	20.5	12 . . .	1293	1346	43.1
83 . . .	663	710	20.5	13 . . .	1313	1371	43.9
84 . . .	681	731	20.8	14 . . .	1263	1329	43.4
85 . . .	675	722	20.7				
86 . . .	662	696	20.1				
87 . . .	668	693	20.2				
88 . . .	684	708	20.7				
89 . . .	725	745	21.9				

each period of two consecutive years have been combined to an average chain index number. The weights here have been the number of series that goes to make up the chain index number representing each specific branch of industry. The weights have thus been chosen with a view to the degree of reliability of the different averages, as it may be assumed that the series possess on the average the same value in the different branches of industry. The average may thus be said to have been calculated direct from the individual series irrespective of the size of the different

branches of industry. This method of weighting produces a varying scale of weights according to the relative number of the series comprising the averages in each branch of industry. The weights, therefore, are on a different basis and have different values from those used in Average I. In 1906, when the number of series reaches its maximum (262), mining is represented in the average by the weight (= number of series) 18, iron and steel by the weight 103, engineering and metal manufacturing by 22, mineral and stone industry by 9, sawmills by 28, wood-pulp by 20, papermills by 10, food products by 22, textiles by 12, leather and rubber goods and chemical industry by 16 and the book-printing industry by 2. The average chain index numbers have then been multiplied and the index series raised to a level with an average for the year 1906 calculated direct on the basis of the weight quoted above.

As Table 1 shows, the difference between the two averages computed by these different methods is on the whole fairly small. Average II lies consistently above Average I, with a slightly varying percentage difference. In the sixties Average II exceeds Average I by about 3%. The percentage rises in the seventies and the first half of the eighties to 6—7, but then it falls steadily until by 1901 and 1902 the averages practically coincide. In the years 1910—1914 the difference again rises up to 5% in 1914. We find then, that, in spite of the very different weights, the results tally closely. This indicates a good agreement between the components of the averages, so that the system of weights may be regarded as being of minor significance. This question will be further discussed below.

The averages comprise a widely varying number of series. In the first few years of the sixties the number is about 40, by the beginning of the seventies it has increased to 70 and during the eighties it ranges between 120 and 170. From the middle of the nineties the number of series exceeds 200, remaining around 250 during the period 1902—1909. It then falls rapidly, and by 1913 it has dropped to 139 and in 1914 to 117. The number of selected workers fluctuates around 1,000 during the years in which the num-

Table 2. Index of Annual Earnings in Specified Branches

Year	Iron & steel	Mining	Engineering	Mineral & stone	Saw-mills	Wood-pulp
1860	30.2	36.6	33.1	33.8	—	—
61	31.2	37.6	32.3	34.5	—	—
62	35.4	39.6	34.0	35.9	—	—
63	35.2	38.3	34.5	36.5	—	—
64	35.2	39.4	32.4	36.1	—	—
65	35.9	39.7	36.5	36.2	—	—
66	35.7	40.4	35.9	37.7	—	—
67	37.2	40.2	37.6	35.6	—	—
68	40.8	41.4	38.8	35.6	—	—
69	41.4	41.6	43.6	34.5	—	—
1870	41.9	42.3	44.8	36.1	—	—
71	42.8	43.1	44.3	39.5	—	—
72	47.1	48.8	50.1	42.8	—	—
73	49.8	60.8	53.5	44.2	—	—
74	53.0	63.6	55.9	48.4	—	—
75	55.3	62.4	54.8	49.1	—	—
76	56.6	59.3	53.0	49.2	—	—
77	55.3	58.5	51.1	51.1	—	—
78	52.7	54.6	47.7	44.2	—	—
79	48.4	51.1	43.8	39.1	—	—
1880	51.9	53.7	48.7	43.7	—	—
81	52.0	54.2	54.4	43.9	—	—
82	54.3	56.6	55.3	46.4	—	—
83	56.3	57.6	53.8	46.7	—	—
84	58.1	58.9	55.2	46.8	67.6	—
85	57.5	57.4	53.5	47.2	66.6	—
86	54.7	53.6	50.9	47.7	65.5	—
87	53.8	51.0	51.2	48.1	65.5	—
88	55.5	48.2	53.6	49.1	68.4	—
89	57.3	53.0	57.5	51.8	79.3	—
1890	60.8	57.1	58.2	53.2	72.9	—
91	59.6	57.2	59.7	52.6	71.7	—
92	59.6	59.0	56.6	53.5	71.3	—
93	58.9	58.8	59.9	52.9	73.8	—
94	57.6	59.1	58.8	56.4	76.0	62.9
95	59.9	58.9	61.7	55.9	75.8	59.8
96	61.9	59.4	64.7	55.7	79.8	62.1
97	62.9	64.0	66.0	57.7	79.7	63.6
98	66.3	67.2	71.2	62.1	82.9	70.0
99	69.3	71.9	74.7	69.6	86.2	71.0
1900	70.8	75.2	79.4	69.3	89.2	74.3
01	67.4	76.2	75.2	68.0	86.9	75.6
02	68.4	76.6	78.4	69.8	82.0	77.5
03	72.2	74.0	77.8	71.1	85.6	84.5
04	74.7	77.8	83.6	73.1	84.9	91.1
05	76.3	79.1	72.9	75.0	84.5	92.5
06	82.4	82.0	88.0	77.3	91.4	94.8
07	87.6	87.4	93.9	84.5	95.0	97.1
08	84.5	93.4	93.8	86.1	89.9	101.4
09	73.9	75.5	83.5	76.4	81.2	80.5
1910	96.1	96.8	97.2	96.0	99.5	98.9
11	96.2	99.7	99.9	97.9	99.7	98.5
12	102.8	99.7	102.3	101.4	100.4	99.8
13	104.9	103.8	100.6	104.7	100.4	102.6
14	98.9	90.2	99.2	82.6	101.1	105.6

GENERAL TREND OF WAGES

51

of Industry 1860—1914 (1910—1913 = 100). Male Workers.

Paper-mills	Food products	Textiles	Leather, rubber & chemical industry	Average I	Average II
28.8	—	—	—	32.6	31.8
29.4	29.4	—	—	32.7	32.5
29.6	29.5	—	—	34.5	34.4
31.7	30.6	—	—	35.1	34.7
31.5	31.0	—	—	34.5	34.7
31.6	31.4	37.6	—	36.0	35.4
31.0	31.5	35.1	—	35.9	35.3
32.0	30.9	35.3	—	36.2	35.9
31.9	32.6	35.4	—	37.5	37.8
31.8	32.0	35.5	—	38.6	38.1
32.0	32.3	35.5	34.5	39.4	38.7
33.9	33.0	37.1	30.8	40.0	39.8
35.6	35.4	37.3	35.6	43.9	43.5
41.6	38.6	41.1	43.6	47.9	48.1
47.2	40.5	46.4	46.9	51.4	51.6
49.0	41.5	50.3	49.8	52.6	53.2
50.0	37.2	50.0	50.8	51.6	53.2
49.5	47.7	50.5	48.0	52.6	53.5
44.9	44.5	45.9	45.3	48.5	50.0
44.4	45.8	42.5	41.6	45.3	46.5
45.4	46.3	47.9	42.8	48.9	49.8
47.4	46.6	49.6	44.6	50.8	50.8
46.9	45.8	53.1	45.3	52.2	52.6
47.3	44.5	54.8	43.8	52.2	53.6
49.0	46.0	53.9	47.3	53.6	55.2
47.7	47.9	54.0	46.5	53.1	54.5
46.0	48.0	52.4	50.2	52.1	52.6
48.2	50.9	52.8	51.3	52.6	52.3
49.4	51.1	53.6	50.9	53.8	53.5
49.7	53.6	54.0	52.1	57.0	56.3
54.1	58.9	55.2	51.0	58.3	58.4
57.1	59.7	56.1	54.5	58.9	58.4
57.9	60.6	55.7	54.9	58.5	58.3
56.8	59.2	55.8	58.0	59.3	58.6
57.8	59.0	60.4	57.8	60.3	58.7
58.9	58.5	61.2	61.1	61.3	60.0
58.5	61.9	62.5	62.9	63.3	62.1
61.8	65.3	65.9	64.3	65.2	63.7
63.8	68.6	69.0	67.9	69.2	67.4
65.4	70.0	70.7	67.2	72.1	70.1
69.6	74.7	67.2	69.5	74.5	72.4
65.3	76.2	70.5	72.8	73.4	70.9
70.5	76.8	73.6	73.7	74.7	71.9
71.8	77.6	72.1	77.3	76.2	74.3
74.6	76.8	71.4	79.7	78.4	76.8
77.6	81.2	78.4	80.7	78.3	77.9
80.8	87.4	84.7	86.6	85.4	84.1
86.0	92.8	86.3	90.3	90.2	88.8
85.6	91.8	87.4	94.2	90.2	88.5
79.8	88.5	86.6	91.2	82.0	79.5
94.8	97.7	92.1	99.3	96.8	97.1
97.2	96.8	97.2	97.0	98.0	97.8
104.6	100.9	104.2	100.2	101.7	101.7
103.2	104.5	106.4	103.4	103.3	103.5
105.5	109.9	101.0	105.0	99.4	100.4

ber of series is at its maximum; in this calculation, where the series containing all workers are concerned, we can regard each series as representing four selected workers.

The average hourly earnings quoted in Table 1 are of a very summary character. In the case of a large number of annual earnings series there are no particulars as to hours of work, and it has been impossible to make an exact calculation of the hourly earnings. Such averages of hourly earnings as have been computed for specific branches of industry are therefore based on a far smaller number of series than the averages of annual earnings. The hourly earnings within the group iron and steel and engineering are based entirely on estimates. It has not been possible to calculate any averages of hourly earnings for mining, the mineral and stone industry and the leather, rubber and chemical industries; none of these latter industries is therefore included in the averages of hourly earnings in Table 1. In the case of a number of series belonging to these branches of industry, however, there are exact hourly earnings on record, and these branches have accordingly been incorporated into a remainder group. The average of hourly earnings has been computed by combining the several series after they have been weighted by the same constant weights used in calculating Average I. Notwithstanding the comparative scarcity of the material available, the trends of the hourly and annual earnings show a very close agreement, if due regard is paid to the change in hours of work *per annum*.

In order to be able to analyse the trend of wages within industry as a whole and to compare it with that of the individual branches of industry, all averages for the different industries have in the following tables been reduced to index numbers with the average earnings during the period 1910—1913 = 100.¹

¹ From certain viewpoints it would have been more convenient to select the years 1861—1870 as the base period, but some of the averages do not begin until later on, and moreover the averages for these earlier years are not so reliable as those for later years.

Table 3. Index of Hourly Earnings in Specified Branches of Industry 1860-1914 (1910-1913 = 100). Male Workers.

Year	Iron and steel	Engineering	Saw-mills	Wood-pulp	Paper-mills	Food products	Textiles	Remainder group	Average
1860.	20.9	26.4	—	—	28.8	—	—	—	27.8
61.	24.7	25.9	—	—	28.8	32.7	—	—	29.2
62.	33.7	27.3	—	—	29.4	32.7	—	—	32.1
63.	31.8	27.7	—	—	30.9	33.9	—	—	32.3
64.	26.4	26.2	—	—	30.9	34.2	—	—	30.2
65.	29.0	29.5	—	—	30.9	34.7	33.5	—	32.5
66.	23.5	29.1	—	—	30.3	34.7	33.5	—	31.4
67.	27.3	30.6	—	—	30.6	34.4	33.9	—	32.5
68.	34.7	31.5	—	—	31.5	35.7	33.5	—	34.9
69.	38.2	35.6	—	—	30.9	35.2	33.2	—	37.0
1870.	27.1	36.7	—	—	30.9	35.9	33.5	—	35.4
71.	31.1	36.3	—	—	32.1	35.9	35.1	—	36.3
72.	37.8	41.2	—	—	36.2	39.2	35.1	—	40.8
73.	38.5	44.1	—	—	41.5	42.9	37.6	—	43.4
74.	47.0	46.1	—	—	46.5	44.9	41.3	—	47.6
75.	46.1	45.4	—	—	48.5	44.6	45.0	—	47.9
76.	43.9	43.9	—	—	49.4	41.1	45.7	—	46.2
77.	47.0	42.5	—	—	50.3	48.4	46.3	—	47.9
78.	45.4	39.8	—	—	48.2	44.9	46.9	—	45.5
79.	38.5	36.7	—	—	45.9	45.6	43.8	—	42.5
1880.	40.6	41.0	—	—	46.5	46.1	43.8	—	44.8
81.	37.5	45.9	—	—	47.6	46.4	46.6	—	46.7
82.	42.0	46.8	—	—	47.6	46.1	48.8	—	48.3
83.	45.1	45.8	—	—	48.5	44.4	48.8	—	48.3
84.	45.4	47.0	—	—	49.4	46.1	48.1	—	49.1
85.	44.7	45.8	62.1	—	50.0	46.1	49.7	—	48.8
86.	43.0	43.8	60.8	—	47.1	46.1	49.7	—	47.4
87.	43.0	44.1	59.3	—	47.9	46.6	50.3	43.0	47.6
88.	43.2	46.5	62.1	—	48.8	46.6	50.6	46.3	48.8
89.	42.8	50.1	71.2	—	49.7	47.4	50.6	48.8	51.7
1890.	45.8	51.0	65.9	—	53.2	50.9	51.6	52.6	52.8
91.	44.4	52.6	65.1	—	56.5	54.6	52.5	53.0	53.8
92.	48.7	50.1	65.4	—	57.6	55.6	54.3	57.0	54.5
93.	46.8	53.2	68.4	—	56.8	58.4	53.7	57.0	55.9
94.	47.0	52.4	70.0	—	58.2	58.1	56.2	58.1	56.4
95.	40.8	55.3	70.2	54.5	59.1	58.6	56.2	57.5	57.1
96.	46.6	58.2	73.0	58.4	59.1	61.1	57.8	61.0	59.2
97.	50.1	59.9	75.3	64.5	63.8	65.3	60.9	62.1	62.0
98.	54.6	65.1	75.8	68.5	66.2	67.6	66.5	65.9	65.8
99.	57.7	68.5	77.6	71.1	67.4	69.8	68.6	70.6	68.6
1900.	60.8	73.4	82.4	72.1	70.6	72.3	68.3	73.1	71.7
01.	62.9	69.8	81.4	75.8	68.8	73.3	72.0	72.4	71.7
02.	65.1	73.4	77.9	71.9	72.1	75.6	74.8	73.3	73.1
03.	64.8	73.2	81.4	74.6	74.1	75.8	72.4	76.4	73.8
04.	66.7	79.6	81.7	77.0	75.3	76.6	73.6	79.1	76.4
05.	69.1	82.3	81.7	80.0	79.4	80.5	77.0	79.7	78.8
06.	74.6	84.8	87.5	81.9	82.1	84.0	82.6	85.7	83.0
07.	76.7	91.0	91.6	90.7	87.9	88.0	87.0	91.1	87.7
08.	76.2	91.5	95.2	94.1	89.4	94.0	87.6	94.7	89.9
09.	81.9	94.0	91.9	95.4	93.5	96.8	91.9	95.1	92.2
1910.	97.6	96.2	97.2	93.9	96.8	98.8	92.5	97.1	96.5
11.	97.6	99.5	97.2	98.5	96.8	98.0	97.2	98.0	97.9
12.	101.7	102.7	101.3	99.3	101.5	101.0	103.1	100.9	101.7
13.	102.6	101.6	104.1	108.6	104.7	102.5	107.5	104.0	103.5
14.	97.4	100.9	96.7	112.5	105.9	106.7	105.9	104.9	102.4

MANUFACTURING AND MINING

Table 4. Index of Annual Earnings and Hourly Earnings in Specified Branches of Industry 1865-1914 (1910-1913 = 100). Female Workers.

Year	Annual earnings		Hourly earnings	
	Food products	Textiles	Food products	Textiles
1865	—	36.8	—	31.8
66	—	39.7	—	35.0
67	—	37.7	—	34.5
68	—	34.5	—	31.8
69	—	34.8	—	32.7
1870	—	39.1	—	33.2
71	—	43.6	—	37.3
72	—	44.9	—	37.7
73	—	44.0	—	37.7
74	—	49.5	—	41.4
75	—	46.7	—	41.8
76	—	48.9	—	40.9
77	—	50.0	—	43.6
78	—	42.3	—	42.7
79	—	41.0	—	42.3
1880	—	45.1	—	42.7
81	—	49.2	—	43.6
82	—	48.5	—	45.5
83	—	49.0	—	45.9
84	—	52.0	—	47.7
85	32.4	51.3	—	47.7
86	32.4	50.0	—	47.7
87	37.9	53.4	—	49.1
88	37.9	57.0	33.0	51.8
89	40.6	59.6	35.2	54.1
1890	48.8	58.5	46.1	55.5
91	52.2	59.2	47.6	55.9
92	48.7	57.8	47.6	55.0
93	52.8	58.8	49.4	55.5
94	50.8	61.4	48.7	57.3
95	55.2	61.4	51.7	59.1
96	55.1	61.9	54.3	61.4
97	57.0	63.7	56.6	61.4
98	64.5	70.4	60.3	66.4
99	62.8	72.7	57.3	68.2
1900	61.9	72.2	58.1	69.5
01	66.2	70.9	61.4	68.6
02	64.4	73.2	62.9	69.5
03	65.8	75.0	63.7	70.5
04	68.0	76.1	65.9	72.7
05	74.0	80.9	67.8	76.8
06	83.9	85.0	73.0	80.9
07	92.9	89.9	80.1	86.8
08	87.4	90.0	87.6	87.7
09	86.8	90.5	95.9	92.3
1910	99.2	93.6	99.6	94.5
11	94.9	97.4	97.8	96.8
12	100.1	102.5	99.3	104.5
13	105.6	106.2	103.0	103.6
14	104.9	100.2	104.5	100.9

Annual Earnings of Male Workers.

To start with Table 2, we note that the index numbers relating to the various branches of industry in the sixties are on a fairly constant level. On an average for the period 1860—1869, the index of the different branches of industry would work out as follows (taking the years 1910—1913 and 1860—1869 respectively as base):

	Iron and steel	Mining	Engineering	Mineral & stone industry	Paper	Food products	Textiles	Average I	Average II
1910—13 as base	35.8	39.5	35.9	35.6	30.9	31.0	35.8	35.4	35.1
1860—69 as base	279]	253	279	281	323	323	279	283	285

If we disregard the averages for mining, which are not very reliable (see below, Chapt. IV), and those for paper and food products, which differ somewhat in trend, we find that the index numbers of the remaining four branches are on a very even level with the averages. The stronger rise in wages in the food products industry than in the textile industry is discernible also in the wages of the women workers in Table 4. The annual earnings of women workers in the food products industry increased 209 % from 1885 to 1910—13, whereas the increase for the same period of women workers in the textile industry was only 95 %; the corresponding figures for male workers are 109 % and 85 %. In 1884, when the sawmills are first represented, we can still observe the relatively weaker rise in wages up to the base period in the ore-mining and metal industry groups, i. e. rises ranging from 70 % to 81 %, as compared with the trend of wages in the mineral and stone industries, papermills, food products industry and leather, rubber and chemical industries, where there were rises ranging from 104 % to 117. There is thus a fairly considerable difference between the trend of wages within these two groups of industries. The textile industry comes midway between the two, the rise in that industry during the period in question being 85 %. The annual earnings in the sawmill industry have increased by only 48 %, thus

differing considerably from those in the other branches of industry. This fact is mainly due to a less pronounced increase in wages after 1900 as compared with the normal trend in the other industries. Thus, the average annual earnings at the sawmills rose 32 % between the years 1884 and 1900, while the mean percentage for all branches of industry was about 31 for the same period. From 1900 to the base period 1910—1913 the sawmills' average went up 12 %, while the average for industry as a whole rose 34 %. This difference coincides with a corresponding difference in industrial development. By 1900 the sawmill industry was on the whole already fully developed, and since that period it has not undergone much further expansion, whereas elsewhere the industrial expansion has been very considerable.

In 1895 the index numbers for the different branches of industry (apart from the sawmills) are very close together, falling as they do within the narrow limits of 55.9 to 61.7. This means that from 1895 to the base period the trend of wages has been uniform, if we except the peculiar trend exhibited by the sawmills. This parallel course of development is not found in detail when certain shorter periods are considered. In 1900, for example, the index numbers are not very closely concentrated, owing to a difference in the extent of the rise in wages during the period 1895—1900. In order to show the movements of the annual earnings for brief periods, the percentage changes in the annual earnings during those periods that are in a general way determined by the maximum and minimum points of the averages are given below (p. 57).

The average annual earnings of male workers are distinctly influenced by the general business cycles. Wages advanced strongly during the periods 1870—1875, 1879—1884, 1887—1890, 1895—1900 and 1905—1907. Wages fell, or their rise was interrupted, in 1877—1879, 1884—1887, 1890—1894, 1900—1901 and 1913—1914.

The trend of wages during the first of the periods selected here (1860—1870) differs widely within the different branches of industry, chiefly due, no doubt, to the rather

GENERAL TREND OF WAGES

57

*Percentage Variations in Annual Earnings between the Years
stated below (+ increase, — decrease).*

	1860	1870	1877	1879	1884	1887	1890	1895	1900	1901	1905	1908	1913	1914
	/70	/75	/79	/84	/86	/90	/95	/00	/01	/05	/07	/13	/14	
Iron and steel . . .	+39	+32	-12	+20	-6	+13	-1	+18	-5	+13	+15	+24	-6	
Mining	+16	+48	-13	+15	-9	+12	+3	+28	+1	+4	+11	+11	-13	
Engineering	+35	+22	-14	+26	-8	+14	+6	+29	-5	-3	+29	+7	-1	
Mineral & stone . .	+7	+36	-23	+20	+2	+11	+5	+24	-2	+10	+13	+22	-21	
Sawmills	—	—	—	—	-3	+11	+4	+18	-3	-3	+12	+12	+1	
Wood-pulp	—	—	—	—	—	—	—	+24	+2	+22	+5	+1	+3	
Papermills	+11	+53	-10	+10	-6	+12	+9	+18	-6	+19	+11	+21	+2	
Food products . . .	—	+29	-4	± 0	+4	+16	-1	+28	+2	+7	+14	+14	+5	
Textiles	—	+42	-16	+27	-3	+5	+11	+10	+5	+11	+10	+22	-5	
Leather, rubber & chemical industries	—	+45	-13	+14	+6	-1	+20	+14	+5	+11	+12	+10	+2	
<i>Average I</i>	<i>+21</i>	<i>+33</i>	<i>-14</i>	<i>+18</i>	<i>-3</i>	<i>+11</i>	<i>+5</i>	<i>+22</i>	<i>-1</i>	<i>+7</i>	<i>+15</i>	<i>+15</i>	<i>-4</i>	
<i>Average II</i>	<i>+22</i>	<i>+38</i>	<i>-13</i>	<i>+19</i>	<i>-5</i>	<i>+12</i>	<i>+3</i>	<i>+21</i>	<i>-2</i>	<i>+10</i>	<i>+14</i>	<i>+17</i>	<i>-3</i>	

scanty material on which the averages for these years have had to be based. On the other hand, the rise in wages in 1870—1875, as also the decline in 1877—1879, is very pronounced in all branches of industry and is of approximately the same dimensions. The trend of wages in the food products industry is, however, as a rule relatively stable. The period 1884—1886 is characterized by a general decline in the annual earnings, but without very violent movements in either direction. During the years 1887—1890 there occurred a rise in the annual earnings which was of about the same magnitude for all the different branches of industry with the exception of the textile industry and the leather, rubber and chemical industries. These latter branches exhibit only a slight increase in the annual earnings during those years, though they experienced a strong rise in wages during the succeeding period 1890—1895, when the wages in other branches of industry as a whole were stagnant. The years 1895—1900 are marked by a very strong rise in annual earnings, on the average 21 %. The ironworks do not display during this period the same strong advance in wages as that shown by the other two branches within their industrial group. The wages at the ironworks, on the other hand, underwent a relatively stronger expansion during the period 1901—

1905. The relatively low percentage rise within the textile industry is due to a temporary decline in the annual wages for 1900. Reckoned up to 1899 this figure works out at 16 %. Those branches of industry in which the strongest rise in wages took place during the period 1895—1900 generally record a stagnant wage level during 1901—1905, and often a downward tendency 1900—1901. The ironworks, the textile industry and the leather, rubber and chemical industries, on the other hand, show a steadier and more gradual rise in the annual earnings from 1895 to 1907. In the wood pulp industry, which was undergoing rapid expansion during these years, we note a particularly strong rise in the annual earnings (55 %) between 1895 and 1905, but after that period the wages were fairly constant. During the years 1905—1907 the percentages are at a very uniform height, with the exception of the engineering industry, which shows a considerably more substantial rise in wages (29 % compared with 15 % in the average series). The period 1908—1913 (and in particular the years 1908—1910) is characterized generally by a strong rise in wages, especially in the ironworks, mineral and stone industry, papermills and textile industry, i. e., generally those industries in which the wages had not increased so strongly in earlier years. On the other hand, the annual earnings within the engineering industry increased by no more than 7 %. In the year 1909 there is a very marked drop in these as well as in all following series of annual earnings in manufacturing and mining, — caused by the general strike during that year. In the series of hourly earnings the results of the strike in 1909 is of course not reflected on the income of the workmen. The decline in 1913—14 recorded in the table is uncertain, since the wage data referring to that year have shrunk considerably.

To sum up, it may be said that in the course of long periods the annual earnings exhibit in the main similar percentage variations, but that as far as shorter periods are concerned disparities easily arise. Nevertheless, the earnings always vary in the same direction.

Hourly Earnings of Male Workers.

The averages of hourly earnings show on the whole the same development as the annual earnings and they need not be described in detail. As Table 1 shows, the averages of annual and hourly earnings move almost completely parallel up to 1890. After that year the hourly earnings rise more rapidly and, in the aggregate, from the period 1861—1870 to the period 1910—1913, they went up 205 %, whereas the annual earnings rose only 179 %, which indicates a shortening of the average annual working time by 8.6 %. According to the Board of Trade's enquiry into "The length of the hours of labour in industry in Sweden",¹ the average net working period per day was 11.1 hours in 1885 and 10.0 hours in 1905—06. That is to say, according to that enquiry, the hours of labour during this period were shortened by 9.9 %. Between 1885 and 1906 the annual earnings increased on an average by 57 % and the hourly earnings by 72 %, implying a shortening of the hours of work by an average of 8.4 %. The agreement; then, is very close, and this shows that, in spite of the somewhat scanty material, the averages of the hourly earnings indicate the trend with a fair degree of reliability.

Earnings of Female Workers.

The average earnings of female workers in the food products and textile industries (the branches of industry in which women are employed to any great extent) published in Table 4 have not been combined in a weighted average, since these two branches of industry differ greatly in their trend of wages. From the latter half of the eighties up to the period 1910—1913 the annual earnings of women workers in the food products industry have increased by, on an average, 175 %, and those of women workers in the textile industry by only 84 %. A comparison with the trend of men's wages in the same branches of industry shows that in the textile industry the wages of male and

¹ *Arbetstidens längd inom industri och hantverk i Sverige. Arbetsstatistik A: 10*, published by the Board of Trade. Stockholm 1911.

female workers have risen to an equal extent, whereas in the food products industry the annual earnings of the male workers have advanced only 100 % as compared with the female workers' 175 %. For a detailed study of the trend of the women workers' wages the reader is referred to Chapters X and XI.

Real Earnings.

The real earnings of industrial workers have been calculated by reducing the nominal earnings with a cost of living index computed for this purpose and based on studies published in a special volume.¹ For a detailed description of the construction of our cost of living index the reader is referred to that volume. The index can only be used as a very rough measure of the general change in the cost of living in Sweden during the period under review. A series of "real earnings" comprising such a long period is always a statistical computation, which can not, under any circumstances, be regarded as a complete picture of the real changes in standard of living but only as a basis for further, more diversified studies. For the general purposes of such a computation of real earnings our cost of living index is, however, sufficiently accurate.

It is mainly annual earnings that are of importance as a measure of the standard of income; hourly earnings may be used as measuring the cost of labour. It would therefore be of greater interest to compare the development of the nominal hourly earnings with indexes of the prices of corresponding products. As material for such an index, suitable for our purposes, has not been available, we have, however, preferred to use the cost of living index also in regard to hourly earnings.

In the following Table 5 the average of nominal annual earnings has been calculated as a mean between Average I and Average II in Table 1. This average and the average of hourly earnings in the same table, reduced to index numbers with the years 1861—1870 taken as base (= 100),

¹ *Myrdal*, *The Cost of Living in Sweden 1830—1930*. Stockholm 1933.

have been divided by the cost of living index (with the same base years). These calculations give the real annual and hourly earnings index numbers published in Table 5.

The table shows that the real annual wages increased between the periods 1861—1870 and 1910—1913 by 140.6 % and the real hourly wages by 163.4 %. That is to say, in round numbers the real annual wages are in the latter period $2\frac{2}{3}$ times as great as they were in the sixties, and the real hourly wages $2\frac{2}{3}$ times as high.

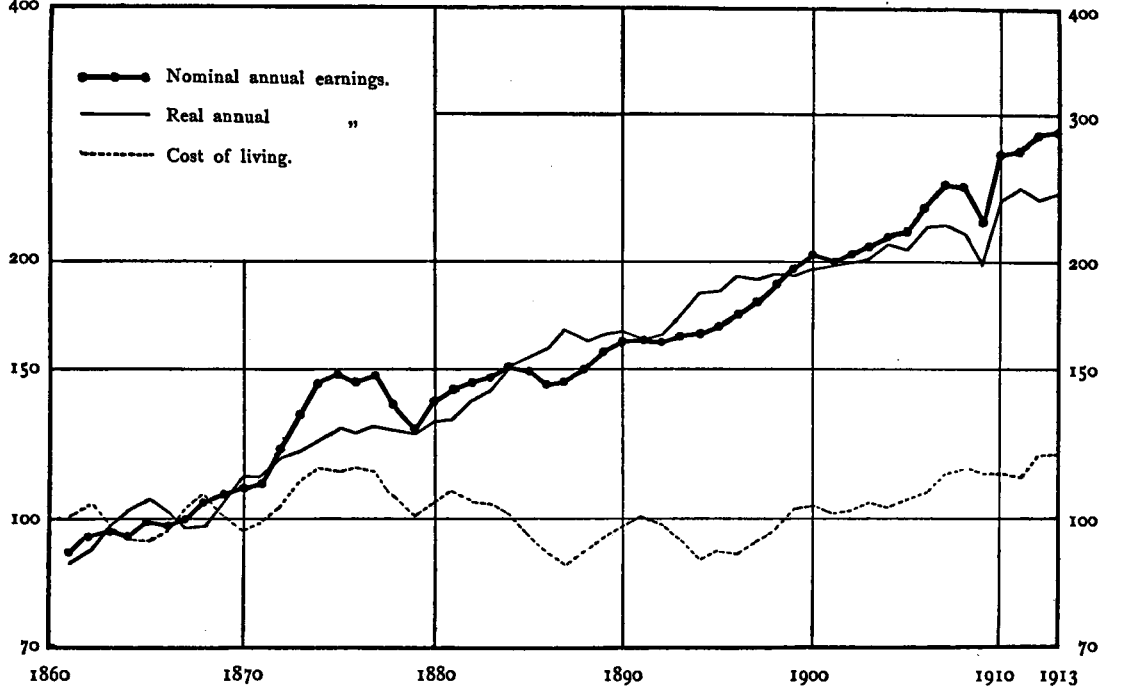
A comparison between the trend of the earnings and the price index numbers gives the following results. During the boom period that set in in the seventies, wages rose more rapidly than prices, and the result was an increase of about 15 % in real wages in the first half of the decade. Wages and prices included in the cost of living index began simultaneously the violent fall that took place at the close of the seventies 1877—1879 and the percentage rate at which they fell was about the same (the annual earnings by 13 %, the hourly earnings by 11 % and the cost of living by 12 %), so that the real wages remained more or less unaltered. From 1881 the price index number fell heavily (19 %) until 1887, while the earnings were fairly constant, the result being a substantial rise in real wages (about 26 %). During the succeeding years up to 1891 the price index advanced as strongly as, and sometimes slightly more strongly than, the wages, and thus the real wages showed a slight tendency to fall. Up to the middle of the nineties the cost of living went down (about 10 %), while the earnings only exhibited a weak rising tendency, and these movements resulted in a rise of 18 % in real annual wages and of 22 % in real hourly wages between 1891 and 1896. During the years 1896—1899 annual wages and cost of living rose at the same rate (13 %), so that during these years the real annual wages were constant. In the last year of the boom period ending 1900 the annual earnings rose to a greater extent than the cost of living, the result being a minor increase in real wages. If we take the whole period 1895—1900, we find that the increase in the real annual earnings amounted to 7 %, due mainly to

Table 5. Index of Nominal and Real Annual and Hourly Earnings of Male Workers in Manufacturing and Mining as a whole 1861-1913 (1861-1870 = 100).

Year	Nominal		Real		Cost of living
	Annual earnings	Hourly earnings	Annual earnings	Hourly earnings	
1861	90.9	89.2	89.6	88.0	101.4
62	96.0	97.8	92.1	93.9	104.2
63	97.3	98.6	98.3	99.6	99.0
64	96.4	92.1	101.7	97.2	94.8
65	99.5	99.3	105.1	104.9	94.7
66	99.1	95.7	101.4	98.0	97.7
67	100.4	99.3	96.7	95.7	103.8
68	104.8	106.5	97.7	99.3	107.3
69	106.7	112.9	105.4	111.6	101.2
1870	108.8	107.9	112.2	111.2	97.0
71	111.3	110.8	111.9	111.4	99.5
72	121.8	124.5	117.7	120.3	103.5
73	133.8	132.4	119.8	118.5	111.7
74	143.5	145.3	124.0	125.6	115.7
75	147.3	146.0	128.2	127.1	114.9
76	146.0	141.0	126.6	122.3	115.3
77	147.9	146.0	128.9	127.3	114.7
78	137.3	138.8	128.1	129.5	107.2
79	128.0	129.5	127.2	128.7	100.6
1880	137.6	136.7	130.1	129.2	105.8
81	141.5	142.4	130.5	131.4	108.4
82	146.0	147.5	138.4	139.8	105.5
83	147.4	147.5	140.5	140.6	104.9
84	151.6	149.6	150.0	148.0	101.1
85	150.0	148.9	155.8	154.6	96.3
86	145.8	144.6	159.2	157.9	91.6
87	146.2	145.3	165.6	164.6	88.3
88	149.5	148.9	163.4	162.7	91.5
89	157.9	157.6	165.2	164.9	95.6
1890	162.6	161.2	166.4	165.0	97.7
91	163.3	164.0	162.2	162.9	100.7
92	162.8	166.2	164.6	168.0	98.9
93	164.3	170.5	173.1	179.7	94.9
94	165.7	171.9	183.9	190.8	90.1
95	169.0	174.1	184.3	189.9	91.7
96	174.7	180.6	192.0	198.5	91.0
97	179.7	189.2	191.4	201.5	93.9
98	190.2	200.7	193.3	204.0	98.4
99	198.1	209.4	192.7	203.7	102.8
1900	204.6	218.7	196.9	210.5	103.9
01	201.0	218.7	198.2	215.7	101.4
02	204.1	223.0	199.7	218.2	102.2
03	209.6	225.2	201.5	216.5	104.0
04	216.3	233.1	210.6	227.0	102.7
05	217.7	240.3	207.5	229.1	104.9
06	236.3	253.2	220.6	236.4	107.1
07	249.5	267.6	221.6	237.7	112.6
08	248.9	274.1	217.8	239.8	114.3
1909	225.0	281.3	198.6	248.3	113.3
10	270.1	294.2	238.6	259.9	113.2
11	272.9	298.6	244.5	267.6	111.6
12	283.4	310.1	238.0	260.4	119.1
13	288.2	315.8	241.4	264.5	119.4

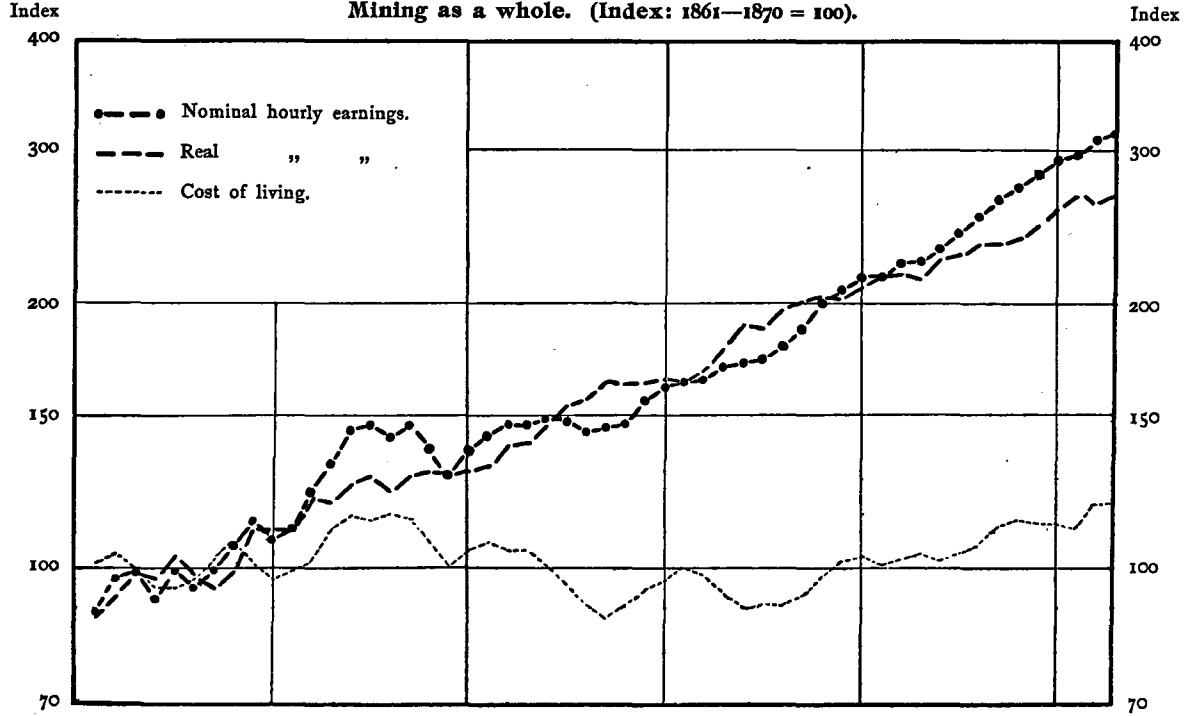
Index
400

Chart 1. NOMINAL AND REAL ANNUAL EARNINGS OF MINING WORKERS IN Manufacturing and Mining as a whole. (Index: 1861-1870 = 100).



GENERAL TREND OF WAGES

Chart 2. Nominal and Real Hourly Earnings of Male Workers in Manufacturing and Mining as a whole. (Index: 1861-1870 = 100).



the fact that the wages began to go up one year earlier than the prices. During the same period the real hourly earnings increased by 11 %. Up to the year 1901 both annual earnings and prices showed a falling tendency, (hourly earnings being constant) the fall in prices was however the stronger, so that after all there was a rise in real wages. This continued up to 1904, the total rise in real annual earnings from 1900 being 7 % and in real hourly earnings 8 %. Wages have gone up while the cost of living has remained constant. From 1904 to 1907 the cost of living went up 10 % and the annual and hourly earnings 15 %, so that the resultant rise in real wages was not more than 5 %. In 1904—1905 the rise in the cost of living was stronger than that of the annual earnings, but, as far as the annual earnings are concerned, this was due to shorter working hours in 1905 (work at certain factories being suspended). The real hourly earnings increased slightly in 1904—1905. The cost of living continued to go up from 1907 to 1908, while the annual earnings showed no movement, which resulted in a fall of 2 % in real wages. The contrary was the case in regard to the real hourly earnings, for during this year they increased by 1 %. Between 1908 and 1911 the annual earnings went up 10 %, the hourly earnings 9 % and the cost of living fell 2 %, so that there was a net increase of 12 % in the real earnings. From 1911 to 1912 the cost of living rose very rapidly by as much as 7 %, whereas the annual earnings only advanced 4 %, with a resultant fall of 3 % in real wages. The real hourly earnings likewise exhibited a falling tendency — though only a very slight one — in the course of this year. Up to 1913 the real wages on the whole rose slightly.

The increase in real wages has thus for the most part taken place during periods when prices have had a falling tendency. At such times the wages have been either constant or else slowly rising. In periods of general economic progress both the cost of living and wages go up, and the increase in real wages is generally of minor significance.

CHAPTER IV. IRON, STEEL AND MINING.

I. IRON AND STEEL.

THE mining and refining of iron-ore is in the Swedish official statistics divided into three stages: iron-mining proper, the manufacture of iron and steel and the mechanical engineering and machinery industry. In the present chapter, however, the intention is to examine the general trend of wages at the ironworks with reference to the special conditions prevailing there, irrespective of whether or not they are combined with manufacturing and engineering works, as is often the case.¹ The method adopted has rather been to regard as one entity all the different processes carried out at the ironworks: the blast-furnace process, the further working up of the iron in the rolling-mill, and the final process of production in the manufacturing and engineering works; to select from these a number of typical occupational categories and follow from year to year the trend of wages of a number of representative workers within those categories.

Iron-mining, and the engineering and machine-making industry combined with it, was formerly the most important industry in Sweden, and to this day the group retains its preeminent position both in regard to the number of workers employed in the industry and to the total value of its products. According to the Board of Trade's report on mining² there were employed at the ironworks during 1913 27,146 workers, representing 7.5 % of the number of workers

¹ Some allowance for this has however been made in calculating special averages (see below).

² Bergshanteringen, Berättelse för år 1913, published by the Board of Trade in Sveriges officiella statistik.

X: 946.571.N3
63.2.1
81869

within all branches of industry accounted for in the industrial statistics for the same year.¹ According to the latter source the workers employed at the ironworks, including certain works which, besides producing iron, were engaged chiefly in iron-manufacture or in the engineering business, at the same time represented 25 % of the total number of workers within the entire industrial group iron-mining and metal industry. The number of workers within this industrial group amounted to 31 % of the total number of industrial workers.

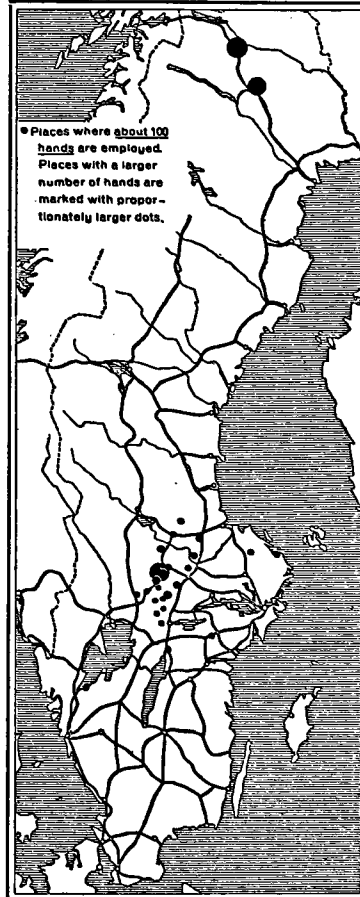
From the very earliest times the ironworks have been strongly localized within five central Swedish counties known under the combined name of *Bergslagen* (cf. map, p. 68). The extent of this localization is indicated by the fact that in 1913, an aggregate of 75 % of all the workers in the country's ironworks was employed in the Bergslagen counties named below, viz. — 12 % in Värmland, 16 % in Örebro, 13 % in Västmanland, 17 % in Kopparberg and 17 % in Gävleborg.

Selection of Concerns.

As already mentioned in Chapter II, we have been obliged to lay special stress on the possibility of statistical adaption of the wage material when choosing the concerns. In view of the fact that, particularly during the earlier decades of the period investigated, special conditions prevailed at the Swedish ironworks, such as payment being largely effected in kind, and the "master-and-helper" system (i. e., the masters and other qualified workers themselves either wholly or in part maintained and paid wages to their assistants), it has only been possible to procure such material from the concerns direct where the bookkeeping system has permitted a determination of the value of the benefits in kind, and where it has been possible to differentiate between the earnings of the masters and those of their assistants. With regard to the benefits in kind, it has been observed that they have been far more carefully

¹ *Industri, Berättelse för år 1913*, published by the Board of Trade in Sveriges officiella statistik.

The Mining Industry. 1924.
(Right.)



The Ironworks. 1924.
(Left.)



detailed and assessed when the legal form of the enterprise has been that of a limited company. This means in fact that by devoting our attention mainly to the more important concerns we have secured more reliable and complete data. In cases where, for some reason or other, the material is not so reliable, the fact will be indicated later on in the description of the methods of compilation and weighting. The establishments concerned in the investigation are:

Within the Bergslagen counties:

	<i>County:</i>	<i>Period:</i>
A. Bofors	Örebro	1875—1925
B. Domnarfvet	Kopparberg	1892—1910
C. Elfsjöhyttan	Värmland	1867—1896
D. Hellefors	Örebro	1874—1910
E. Långshyttan	Kopparberg	1880—1909
F. Näs	„	1893—1913
G. Sandviken	Gävleborg	1869—1926
H. Smedjebacken	Kopparberg	1865—1909
I. Stjernfors-Ställdalen	Örebro	1898—1914
J. Stjärnsund	Kopparberg	1880—1909
K. Fliken	Västmanland	1872—1888
L. Gnarp	Gävleborg	1860—1878
M. Hagge	Kopparberg	1865—1896
N. Lindesnäs	„	1860—1876
O. Västanfors	Västmanland	1867—1910
P. One of the largest Swedish Ironworks	—	1880—1925

Within other counties:

Q. Boxholm	Östergötland	1875—1914
R. Edsbro	Stockholm	1860—1874
S. Finspong	Östergötland	1860—1894
T. Gimo	Uppsala	1865—1910
U. Söderfors	„	1860—1914
V. Lögdö	Västernorrland	1887—1915
X. Robertsfors	Västerbotten	1865—1903

Selection of Occupations.

Among the Swedish ironworks specialization has, as a rule, hitherto not been carried very far. Therefore the techniques of production are heterogeneous, comprising products in every conceivable stage of manufacture. This heterogeneity renders it very difficult to study the average trend of the wage level. It has therefore been found necessary to select a number of representative specialized occupations from all the typical manufacturing processes with due re-

gard to the relative importance of each process, as measured by the number of workers employed.

As representatives of the workers engaged in the blast-furnace process, we have as a rule selected workers from the occupational categories keepers, top-fillers and calciners. Those in the first two categories work at the blast-furnace itself, the former being engaged in draining off the molten iron and slag from the furnace, and the latter in charging the uppermost part of the furnace, "the furnace top", with ore and charcoal. The calciners work at the calcining-kiln, in which the ore is freed, *inter alia*, from a portion of its sulphur content and is rendered porous. Besides these three occupational groups there are several others, such as: ore-hoist men, ore-wheelers, ore-breakers, limestone-breakers, slagmen, charcoal-forkers, charcoal screeners, etc. As a rule, however, each occupational group comprises only a few workers. The difference in wages between categories of workers or among the workers in a given category are usually small, owing to the manner in which these workers are paid. However, we shall revert to this point later on. No particular manual skill is required of the keepers, but it is hard work and requires vigilance and good judgment.

The workers engaged in the production of wrought iron constitute a far more heterogeneous group than the blast-furnace employees, partly owing to the manifold methods employed in producing wrought iron and partly owing to the different qualifications required in these processes. Among the more common methods may here be mentioned: the German process, the Walloon process, the Franche-Comté process, and the Lancashire process. The latter method is the only one that is still employed on a larger scale. The Walloon process, which was a particularly widespread method in the sixties, like other methods, disappeared more and more as the iron industry came to be concentrated in a smaller number of important works. As early as in 1887, the first year in which iron made by these processes is accounted for among the various methods of blooming in the Mining Report of the Board of Trade,

the predominant importance of Lancashire iron is distinctly noticeable. Lancashire iron represented 91 % of the total output of 221,143 tons. In 1913 158,472 tons of wrought iron were produced, and similarly as much as 90 % of this quantity consisted of iron made by the Lancashire process. As to the other methods of producing wrought iron, owing to the small body of material available and the outstanding relative importance of the Lancashire process, we have made no classification of the different methods in the final tables, but refer the reader to the specific series given in the monographs.

The "master-and-helper" system flourished particularly during the earlier decades of the period covered by the investigation, and this circumstance, as already mentioned above, involved difficulties when it came to computing the nominal annual earnings of the workers. At some works the masters themselves both paid and maintained their assistants (Bofors, Hagge); elsewhere the assistants were paid by the concern direct but received their board from the masters (Boxholm, Hellefors, Lindesnäs); finally, there were works at which the assistants used to do their own house-keeping and were paid direct through the works (Gimo, Söderfors). Obviously, where the master-and-helper system was practised, these various methods of paying wages have sometimes been combined, for instance, the works paying the master a certain sum annually for the upkeep of his assistant (as was the case at Smedjebacken's rolling-mill). The number of assistants per master was dependent upon certain circumstances: the method employed, the construction of the hearth, the mechanical equipment, the quality of the pig iron and of the charcoal, the masters' and assistants' capacity for work, trade conditions, etc. For further discussion of these factors the reader is referred to the special monographs (see, for instance, that on Boxholm). In the average earnings calculated for men at the forge there have been included only such workers as are to be regarded as typical and fully skilled workers, provided also that it was possible to distinguish between their own and the assistants' wages. Assistants, extra melters and certain

other occupational groups from among the lowest qualified employees at the forge have been assigned to what we have called the remainder group, which includes, besides those mentioned, workers of an indeterminate quality and those whose occupation is not specifically stated, such as day-labourers, etc.

Ingot steel has gradually supplanted Lancashire iron. It has been found that certain kinds of open-hearth and Bessemer steel can be employed without difficulty for various purposes for which Lancashire iron has hitherto been predominantly used, and as the former is always cheaper than the Lancashire iron there is naturally bound to be a gradual falling-off in the production of the latter. It is recorded in the Report on the Mining Industry that in 1861 steel was manufactured by the Bessemer method at only one place and that this product represented at that time 13 % of the total output of steel.¹ It was not until 1874 that steel-manufacture was classified in the Mining Report under the different headings Bessemer steel, open-hearth steel and other kinds. The production of Bessemer steel then represented 92.8 %, and that of open-hearth steel 0.5 % of the total output. It is particularly striking to note the heavy quantitative increase in the production of ingots by the open-hearth method. Thus, it is recorded that of the total output of ingot steel in 1913 79.4 % of the ingots were produced by the open-hearth method and 19.6 % by the Bessemer method. Of the occupational groups in the Bessemer and open-hearth works, which we have selected for the present purpose, may be quoted steel-blowers, melters, helpers, ladlemen, etc. The steel-blowers and the open-hearth melters are to be regarded as highly skilled workers, the rest as less highly skilled and unskilled workers.

Side by side with the vast changes that the metallurgical methods of production underwent during the period covered by our investigation, the further processes to which iron was subjected, such as rolling and forging, reached an increasingly high standard of perfection. Even in the early

¹ Bergshanteringen, published by the Board of Trade in Bidrag till Sveriges officiella statistik.

part of the sixties the manufacture of iron was still carried on for the most part by means of forges driven by water-wheels. Gradually the manufacturing processes were taken over to an increasing extent by the rolling-mills. From among the workers at the rolling-mills have been selected: head-rollers, heaters, rollers, catchers. From some concerns there have also been selected foremen, as well as a number of other occupational groups. Foremen, head-rollers and heaters are to be regarded as highly skilled workers, the rest as in a lower degree skilled workers. The head-rollers look after and are responsible for the adjustment of the roll, so that the rolled products are given the correct dimensions. Before being rolled the iron is usually heated to a suitable temperature in a "heating-furnace". This work, which is performed by the heaters, demands great skill. The rollers and catchers are engaged on the actual rolling out of the iron.

During the latter half of the nineteenth century there grew up at the Swedish ironworks a series of establishments designed to carry out further stages in the manufacture of iron. True, these establishments were originally engaged, like the engineering works, partly in manufacture for their own consumption and for repair purposes, but as the practice of maintaining a self-contained economy gradually disappeared, the production of manufactured goods became an important part of the output of the iron industry proper. The workers selected from the manufacturing and engineering works are: blacksmiths, roll-turners, vice-hands, lathe-hands, tool-makers, sheetmetal workers, all of whom are to be regarded as skilled workers. That portion of the pig iron and steel that goes to the foundries for conversion into castings is dealt with by the moulders and their helpers. The moulders are skilled workers but their helpers unskilled workers.

Annual and Hourly Earnings.

The final results of the study of wages at the ironworks are given in Table 6 (p. 74—75), in the form of average annual earnings and hourly earnings, grouped according to

Table 6. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) at the Iron Works 1860—1914. Grouped According to Technical Units and the Workers' Qualifications.

Year	Average annual earnings					Average annual earnings			Average	
	Blast-furnaces	Wrought-iron production	Bessemer and open-hearth works	Rolling-mills	Engineering shops, foundry etc.	Highly skilled workers	Skilled workers	Unskilled workers	Annual earnings	Hourly earnings
1860	310	592	—	553	502	741	396	313	434	8.8
61	359	587	—	556	457	734	405	347	449	10.4
62	432	692	—	616	523	838	494	358	509	14.2
63	457	658	—	647	499	840	487	344	507	13.4
64	383	707	—	627	535	836	456	360	507	11.1
65	419	701	—	626	553	838	483	352	516	12.2
66	303	755	—	621	590	858	489	356	514	9.9
67	433	706	—	694	512	954	441	347	536	11.5
68	480	806	—	739	580	1030	541	386	587	14.6
69	554	758	—	684	626	924	588	380	596	16.1
1870	482	771	—	794	670	1081	539	346	603	11.4
71	517	821	—	741	641	1033	563	378	616	13.1
72	629	889	—	817	661	1115	646	392	678	15.9
73	687	923	—	802	719	1112	717	422	716	16.2
74	774	987	—	799	793	1181	750	457	763	19.8
75	754	1123	—	849	814	1274	748	472	796	19.4
76	745	1140	—	901	862	1324	757	466	814	18.5
77	724	1069	—	889	807	1270	748	482	796	19.8
78	694	1109	—	789	670	1142	698	498	758	19.1
79	652	982	—	734	566	1059	632	468	697	16.2

1880	679	1030	792	848	616	1185	715	498	747	17.1
81	648	1095	860	803	676	1182	685	501	748	15.8
82	679	1203	819	829	766	1205	759	519	782	17.7
83	679	1230	852	893	793	1233	793	522	810	19.0
84	735	1237	835	936	808	1297	797	506	836	19.1
85	724	1234	887	885	801	1233	782	530	827	18.8
86	674	1146	932	828	749	1209	738	522	787	18.1
87	642	1090	807	876	747	1193	730	496	774	18.1
88	669	1158	832	903	742	1237	735	512	799	18.2
89	694	1173	831	934	782	1293	745	529	824	18.0
1890	714	1207	975	982	818	1320	805	578	875	19.3
91	680	1177	975	969	822	1317	788	570	858	18.7
92	731	1176	899	965	808	1332	802	547	858	20.5
93	712	1177	934	951	793	1330	780	524	847	19.7
94	705	1136	870	945	763	1313	758	537	829	19.8
95	720	1145	991	960	790	1321	784	548	862	20.2
96	733	1178	988	1007	852	1362	816	559	891	19.6
97	739	1198	1019	1004	908	1376	847	553	905	21.1
98	817	1223	1002	1061	950	1428	888	596	954	23.0
99	853	1184	1067	1109	978	1415	925	663	997	24.3
1900	887	1259	1109	1117	962	1436	945	688	1019	25.6
01	891	1207	1039	1023	900	1345	917	682	970	26.5
02	885	1250	1065	1054	919	1369	921	659	984	27.4
03	929	1228	1127	1121	971	1419	975	720	1039	27.3
04	941	1376	1146	1150	1018	1494	996	768	1075	28.1
05	958	1286	1171	1200	1049	1522	1011	781	1098	29.1
06	1058	1371	1239	1310	1123	1637	1093	812	1186	31.4
07	1114	1442	1370	1355	1227	1686	1171	877	1261	32.3
08	1101	1350	1350	1257	1218	1592	1140	842	1216	32.1
09	1022	1122	1226	1104	983	1402	1002	686	1064	34.5
1910	1266	1463	1589	1471	1346	1845	1291	852	1383	41.1
11	1301	1425	1634	1440	1357	1841	1300	850	1385	41.1
12	1343	1559	1726	1560	1448	1987	1366	929	1479	42.8
13	1358	1552	1744	1642	1458	2044	1373	912	1510	43.2
14	1277	1399	1720	1539	1332	1911	1289	847	1423	41.0

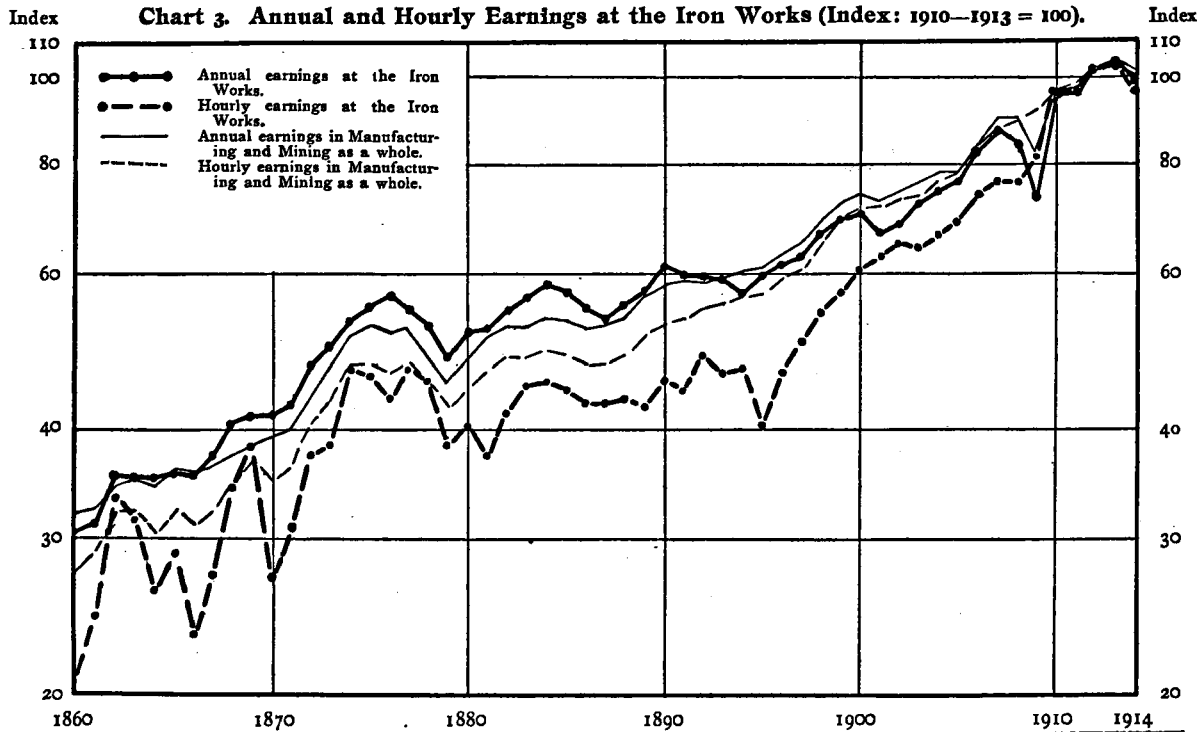
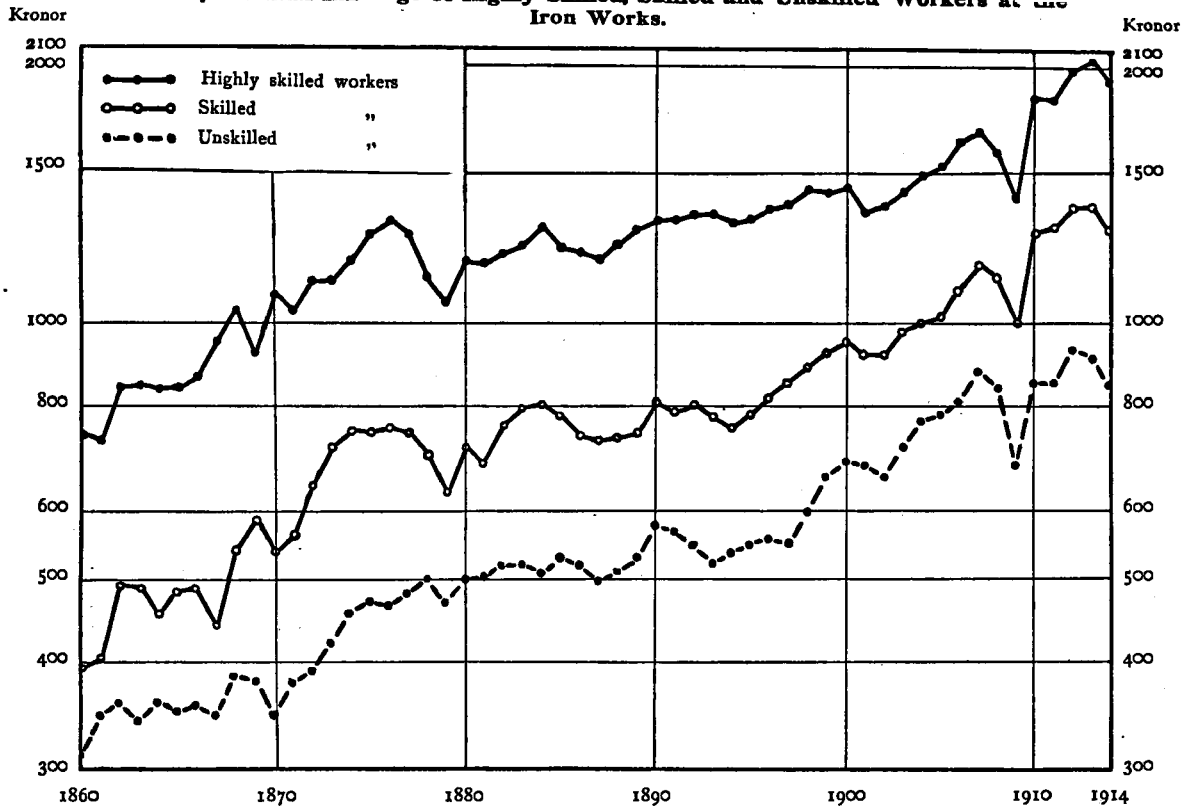


Chart 4. Annual Earnings of Highly Skilled, Skilled and Unskilled Workers at the Iron Works.



IRON, STEEL AND MINING

different technical units within the ironworks and the workers' qualifications.

The general conditions of trade are clearly reflected in the trend of wages at the ironworks. Heavy increases in the annual earnings occurred during the periods 1871—75, 1879—84, 1887—90, 1894—1900 and 1902—07. Between 1908 and 1910 there was apparently a marked increase in earnings in conjunction with the introduction of the national collective agreement between the employers' and the workers' associations. The reliable measure of this increase is, however, difficult to establish owing partly to the general abolition of benefits in kind, and partly to the substantial falling-off in the number of series in the course of these years. The drop in 1909 is due to the general strike that year. The wages show a falling tendency during the periods 1876—79, 1884—87, 1890—94 and 1900—01.

In order to show the uniformity that characterizes the wage variations, in the following the percentage variations of the different averages during the periods just mentioned are given below.

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease). Grouped according to A) Technical Units and B) the Workers' Qualifications.

	1871/75	1876/79	1879/84	1884/87	1887/90	1890/94	1894/00	1900/01	1902/07	1871—80/ 1901—11
A) Keepers, top-fillers, calciners	+46	-12	+13	-13	+11	-1	+26	±0	+26	+52
Wrought-iron workers	+37	-14	+26	-12	+11	-6	+11	-4	+15	+33
Bessemer & open-hearth workers . .	—	—	—	-3	+21	-11	+27	-6	+29	—
Workers in rolling-mill	+15	-19	+28	-6	+12	-4	+18	-8	+29	+52
Engineering shops, foundry etc.	+27	-34	+43	-8	+10	-7	+26	-6	+34	+56
<i>All workers</i>	+29	-14	+20	-7	+13	-5	+23	-3	+28	+57
B) Highly skilled workers	+23	-20	+22	-8	+11	-1	+9	-6	+23	+35
Skilled workers	+33	-17	+26	-8	+10	-6	+25	-3	+27	+55
Unskilled workers	+25	±0	+8	-2	+17	-7	+28	-1	+33	+73
<i>All workers</i>	+27	-13	+22	-7	+11	-4	+19	-4	+26	+53

The average percentage given in B) is based on the one of the four averages mentioned below (p. 101), which is computed with the aid of chain index numbers and varying weights assigned to the three averages for workers of different degrees of skill.

The trend of the different averages is on the whole, as the table shows, similar during these periods, and generally there is not a very wide divergence between the different percentages, in spite of the fact that, as will more readily be seen from the specific monographs, the trend of wages in the different series representing different groups in each works may show as considerable a deviation as the trend of wages of the different works as compared with one another. Thus, there is often discernible a particular variation in the wages of the keepers owing to their being directly dependent upon the length of the blowing period (see below p. 91).

The figures representing the average percentage rise in the annual earnings from the period 1871—1880 to the period 1901—1911 (excluding 1909, the year of the general strike), which will be found in the same table, show the secular trend. These figures clearly disclose the stronger rise in the wages of the unskilled workers than those of the more highly skilled workers. The unskilled workers' annual earnings thus increased by 73 %, those of the skilled workers by 55 % and of the highly skilled workers by only 35 %. The annual earnings of the wrought-iron workers, which in earlier years stood at a far higher level than those of the workers in other departments, have gone up only 33 %, whereas the average rise in the other departments of the ironworks is around 53 %.

With regard to the trend of the hourly earnings, it may be observed here as elsewhere that after 1879 they show no declines. Between the years 1885 and 1906 the annual earnings at the ironworks rose on an average 43 % and the hourly earnings 67 %. According to the Board of Trade's enquiry into the length of the hours of labour,¹ the

¹ Arbetstidens längd inom industri och hantverk i Sverige. 1. Arbetsstatistik A: 10. Stockholm 1911.

average net hours of work *per diem* in the iron and steel industry was in 1885 11.7 and in 1905—1906 10.6. That enquiry thus reveals a shortening of the hours by 9.4 %, whereas our figures would indicate a shortening of the annual working time by 14.4 %. This fact is due, in part to a shortening of the time worked *per annum* expressed in days. The daily earnings have increased during this period by 46 %, according to an approximate estimate based on those series for which the time worked is expressed in days. The lack of agreement may also be due to a lack of correspondence between the averages of hourly and annual earnings, the former average being based on a much smaller body of material.

Wage Data at the Iron Works.

It has already been pointed out in Chapter II that the method of keeping wage records at mines and ironworks was in part different from that employed in other branches of industry. The bookkeeping at the ironworks is chiefly notable for its great accuracy and its detailed specifications. It may be said on the whole that there is a far greater wealth of statistical information of various kinds dating from earlier periods in connection with the iron industry than in connection with any other branch of industry. The sources that have served as a basis for the present investigation consist of account-books kept by the works, such as ledgers, wage-books and payrolls, grain-journals, and also journals relating to output, wrought-iron and pig-iron production etc.

In earlier times all particulars recorded apply as a rule to so-called "*blast-furnace years*". The blast-furnace year was reckoned from the 1st November one year up to the 31st October the next. When the transition was made from blast-furnace years to calendar years, the records in several concerns therefore covered 14 months, for the transitional year. In such instances all particulars have been reduced in order to cover a period of 12 months. The date of this transition from blast-furnace year to calendar year varies

in different works. It is always stated in the monographs when the transition took place and whether any adjustment has had to be made on that account. This transition from blast-furnace year to calendar year as the accounting period applies equally to the official statistics, in which all figures up to 1877 refer to blast-furnace years and from 1878 to calendar years. At the time of the transition, statistical details were, moreover, collected and published for November and December 1877.

As the methods of wage-bookkeeping were by no means similar at all the works represented in this investigation, a brief description of the manner in which the information concerning wages and hours of labour has, as a rule, been procured has seemed necessary.

In order to understand the bookkeeping system it is necessary to have some acquaintance with the various methods of paying wages. The first process which the iron undergoes, the main features of which have been explained above, is also termed "*pig-iron blowing*", owing to the fact that for long periods the process is carried on under a constant and incessant blast. By blowing-period is meant that period of the twenty-four hours in which pig-iron blowing has proceeded during the year. All further details concerning the pig-iron "blows" are contained in the "blowing journal" for each works, and in earlier times it was the duty of the owner or administrator of the blast-furnace to keep this journal and to submit it periodically to the office of the chief furnace-master. In the journal is recorded for each twenty-four hours all the technical factors that are associated with the blowing of pig-iron, such as the quantity of iron-ore received, the supply of coal, the temperature of the blast, etc. The blowing journal has been of very great assistance in determining the number of hours of work *per annum* for the keepers concerned in the investigation. We shall revert to the subject later on when dealing with the period worked by these employees. The money earned during the blowing period is called the "blowing earnings". While blowing was not going on these men were employed in repairing the blast-furnace, re-

pair-work in the works, jobs on the concern's agricultural estates, etc. Generally the quantity of pig iron produced has served as a basis on which to calculate the blowing earnings of the selected occupational categories. For every unit produced the blast-furnace workers received a certain allowance according to a graduated scale. In some quarters, however, payment was made according to other systems: at shift rates or daily wage rates. All other work apart from that on the blast-furnace usually consisted of time-wage work.

The daily wages earned during the year are generally recorded in the journals mentioned above. When for any reason work was suspended in one of the works, the workers were bound by contract to perform day-jobs at the works at the ordinary daily wage rate. The journals contain particulars of the day-jobs performed by each worker under different headings: agriculture, maintenance of the works, etc., from which the nature of the work can be ascertained.

The men engaged on wrought-iron production, the melters, were paid at a certain rate per unit of iron produced by them. For the production of a certain quantity of iron a fixed amount of pig-iron and a similarly fixed amount of coal were provided. If the melter produced more iron than the standard quantity, the amount in excess was called "excess iron". If he had coal left over, the quantity thus saved was called "excess coal". If on the other hand, more iron and coal were consumed than the quantities fixed, these extra quantities were called only "wasted" iron. In the former case the melter was paid an allowance for excess iron and excess coal, and in the latter case he had to compensate the work for the wasted iron and wasted coal. The allowances for excess iron and excess coal were usually not paid until the end of the year, and were then entered, like the rest of the earnings, in the "account books" that have already been described in detail. A detailed account of the wrought iron production is to be found in the "wrought iron reports", which thus correspond to the blowing journals, kept by each works. These reports

provide particulars of the wrought iron production for each week: the number of forges and hammers that have been working, the time spent on the work and the wages received for the quantities produced in each forge. When work was suspended at the forge owing to lack of water, repairs etc., the men had to undertake day-jobs at the works, and these jobs were recorded in the above-mentioned day-job journals. Workers at the Bessemer and open-hearth steel-works and in the rolling-mills were paid on a piece-work basis. The entire shift received for each unit (centner, ton, etc.) a certain sum which, as in the case of the blast-furnace workers, was divided up between the various specialized occupations on a graduated scale.

Workers in the blast-furnace, Bessemer and open-hearth works and rolling-mill, received their wages, then, on a group basis. Each shift was paid, per unit of pig-iron produced, ingot metal and rolled iron, a certain wage, which was divided up on certain fixed principles between the different occupational categories. The wages were divided up equally amongst the workers engaged on the job in one and the same specialized occupation provided that all the workers had been present throughout the entire period in question.

When for any reason a worker was absent from his shift, recourse was had to an extra man, who was then said to work an "auxiliary shift". The system of extra shifts was practised on a particularly large scale in the production of wrought iron. It was customary for extra melters to be employed at the works, who, when not engaged in forging, were employed on repair work, agricultural work, etc. When required, they were called upon to serve at the forge. Extra melters were paid at a certain rate per shift. The extra melters' earnings were entered in the account books as a charge on the melter for whom the extra shift was performed, and it has therefore been necessary, in order to obtain the true earnings of the melters, to deduct from the melters' total cash earnings such wages as were paid to extra melters for the extra shifts worked by them.

Other occupational groups were, with the exception of the moulders, paid mainly on a time-wage basis, and their wages were entered in the day-job journals. The moulders' earnings were as a rule calculated on a piece-work basis.

The ironworks' report books, blowing journals and wrought iron journals etc. thus constitute a series of more or less detailed accounts of the different main productions. At the end of the year the workers' income and expenditure were brought together in the "balance books", and it is chiefly these books that have formed the primary material as far as the ironworks are concerned. In these books an account was kept for each worker. On the credit side were entered all the workers' earnings during the year. Charge for extra shift and wages paid to melters' helpers were entered on the debit side. It frequently occurred that the income earned by other members of a family was included in the account of the head of the family. In such cases it involved extra labour to extract the earnings of the various members of the family. Thanks however to the detailed journals and the day-job records it has generally been possible to calculate the wages earned by the members of the family. Nevertheless in some cases it has been necessary to reject the material altogether owing to the impossibility of exactly dividing up the booked earnings between the head and the rest of the family.

Moreover, during the earlier years of the period covered by the investigation, the workers received payment largely in the form of benefits in kind: grain and other necessities of life at prices below market rates, pasture-land and potato patch, free housing, free medical services and medicine. With regard to benefits in kind granted at the ironworks the reader is referred in the first place to the monograph on Söderfors Works, where the workers received all the above-mentioned benefits, and in connection with which the manner of estimating the value of the various benefits has been described in detail. At Söderfors and some other works, during the period in which the said benefits were operative certain of them were entered in the balance books as income. Many ironworks have not

calculated the value of the benefits, and it has been necessary to make special estimates in order to get at these figures. We give below — in broad outline only — a general account of the nature of the benefits in question.

Benefits in Kind.

In earlier times the ironworks often provided its workers with certain necessaries, principally grain, at prices lower than those prevailing in the locality. Usually then each worker's allowance of the different supplies at reduced prices was fixed at certain quantities. If the workers took out more than the regulation quantity of any article, they had to pay for the excess quantity at market rates. The grain journal is generally found to contain a record of each worker's withdrawals during the year, and, on the basis of the market price prevailing in the locality and the reduced price at the works, which was very often fixed to hold good for lengthy periods, it is possible to estimate the value of this reduced price benefit as the product of the quantity withdrawn and the difference between the market price (usually based on the table of market rates operative in the respective counties) and the reduced price. By this means the reduced price benefit is embodied in the annual earnings of the workers. When the system was abandoned, which occurred in most cases at the close of the sixties, in order to effect the transition it was often arranged that the workers were debited during the year for the grain they had withdrawn at the current price, and then, at the closing of the annual accounts, they were credited with the difference between the value at the current price and the reduced price. The difference was then entered in the balance book as an item of income.

At a number of works the workers were paid in kind. In such a case the workers received, besides a small cash wage, a certain allowance of grain, exactly fixed in the case of each worker.

At several of the ironworks represented in our investigation, so-called "children's grain", consisting of half corn

and half rye, was supplied free to families with minor children not in employment. As a rule this benefit ceased when the children reached the age of 12. As has already been indicated above, this investigation is concerned only with the income of the head of the family during the year. In a case such as this, therefore, it may be questioned whether this "children's grain" should be included as income on the father's account or not. Here, however, the children's grain is to be looked upon as a bonus granted to the head of the family and as such it has been assessed at the market value and added to the rest of the annual income. When at a more advanced age the children commenced their day-jobs at the works and their grain benefit was replaced by the workers' usual reduced-price benefit, the value of the benefit was not included in the father's annual earnings any more than the children's earnings on day-jobs.

As to the free pasturage and potato patch, it has generally been possible only, in the case of the former to ascertain at what works this benefit existed, there being as a rule no recorded estimate of the value thereof. Occasionally, however, we find particulars as to allowances paid to workers to whom no pasturage or potato patch was assigned, and these particulars have served as a basis for estimating the monetary value of these benefits. The potato patch forms part of the housing benefit, as the dwelling that was supplied free to an employee in an ironworks was generally surrounded by a plot of land intended for the cultivation of potatoes. How the estimation of the value of these benefits varied will at once be seen from a comparison of the monographs on Boxholm and Söderfors. At the former works the workers considered it to be cheaper to purchase their potatoes from the works and to let their plots of land lie fallow, with the result that after a time the works had to take back the land they had allotted to the employees. At the latter works, on the other hand, there was a great scarcity of land and the value of each plot was carefully assessed. As will be seen from the monograph, the workers received either a "potato allowance" or else

potatoes *in natura*, when there was no ground available for the cultivation of potatoes.

The benefit of free housing accommodation was granted at all the ironworks during the greater part of the period under investigation. In only a few cases is information available as to the quality, size and value of the dwelling. As regards the earnings published in the monographs, we have not taken the housing benefit into account when compiling them, contenting ourselves with stating the years during which free accommodation was granted and, wherever possible, its quality and value. Corrections to allow for housing benefit have been made only in the averages for all ironworks. Both the value and the quality of the dwelling varied considerably in different works, and undoubtedly also in different years. The system of free housing was on the whole abolished during the period 1905—1910, mostly in 1908 and 1909, in connection with the transition to collective agreements and the "Own Home" movement. When a worker built a home of his own, the works usually provided land and timber at cheap prices. During the general strike in 1909, this kind of building was particularly lively. At some works, however, for example Lögdö and Gimo, free housing is still provided as a benefit. It was stipulated in the collective agreements that, when the system of free housing was done away with, the wages should be proportionately increased. A correction has had to be made to allow for this. Otherwise it would not have been possible to compare the annual earnings in 1906 and previous years with those in 1910 and subsequent years, as in the earlier period the free housing benefit was operative and in the later period it was not. According to figures supplied by several works, the value of the free housing benefit was assessed at the time of its abolition in 1907—1909 at, on an average, 100 kronor for the most usual accommodation, 1 room and a kitchen. This figure tallies with the particulars given in the statistics of the Ironmasters' Association as to the amount of rent that was thenceforward charged to the workers. The particulars published by the Board of Trade's Department of Labour Statis-

tics concerning house-rents in different districts indicate the same average in respect of localities in which ironworks are situated.¹ Taking this value as a basis, and knowing the number of those works here represented that wrote off their housing benefit each year, we have been able to effect a proportionate reduction in the average annual earnings in respect of the years subsequent to 1906. All figures in the averages of annual earnings from 1860 to 1914 are thus made directly comparable with one another and show the earnings *exclusive* of free housing accommodation or of the corresponding amount of rent.

Value of the Free Housing Benefit.

In order, therefore, to arrive at the real annual earnings, we must add for each year a sum corresponding to the free housing benefit. To gain some idea of the trend of the value of the accommodation, we have obtained from a number of works information as to the average cost of erecting workmen's dwellings consisting of 1 room and kitchen². In most cases the workers lived in houses comprising a number of flats, and the average expenditure has then been calculated from the cost of building these houses.

Particulars of building costs have been obtained from a number of those ironworks that provided the best series, such as Långshyttan, Söderfors, Sandviken, Lindesnäs and Domnarfvet, and, further, from certain other ironworks, as well as sawmills and papermills in the same districts. Enquiries have been addressed to the works regarding the capital cost of building workmen's dwellings during various periods from 1860 onwards and concerning the number of fireplaces in each dwelling. The cost per fireplace incurred by the different ironworks has then been totalled, and averages, computed for each decade, are given below.

¹ Livsmedels- och bostadspriser i Sverige under åren 1908—1909. Arbetsstatistik D: 2, published by the Board of Trade. Stockholm 1912.

² The cost of building index compiled in the volume on cost of living is not convenient for this purpose, because it does not take into account the rise in the standard of workmen's dwellings. Cf. *Myrdal*, *The cost of living in Sweden 1830—1930*. Stockholm 1933. P. 125—131.

1860—69	1870—79	1880—89	1890—99	1900—09	1910—14
Kronor 513	768	751	827	1012	1287

The data on which these averages are based are not very satisfactory. Dwelling-houses naturally vary considerably in quality. Sometimes the figures include the cost of building cellars, washhouses, outhouses etc., and sometimes they do not. Moreover, the costs are very inconsistently recorded in the books. The ironworks could often get both timber and labour without any appreciable expenditure. This meant that the details of costs incurred by the different ironworks varied considerably. For instance, the particulars supplied as to the building cost per fireplace ranged between 350 and 760 kronor in the sixties (the average is made up from 10 reports), between 490 and 1 020 kronor in the seventies (12 reports), between 480 and 960 kronor in the eighties (12 reports), between 540 and 1 190 kronor in the nineties (23 reports), between 660 and 1 320 kronor in the first decade of the present century (14 reports) and between 1 080 and 1 411 kronor for the years 1910—1914 (7 reports). A number of ironworks, including Långshyttan and Söderfors, have supplied us with lengthy series showing the growth of building costs. At the former concern the capital cost per fireplace is stated as 360 kronor in 1860, rising from 500 to 660 from the beginning to the middle of the seventies, and then dropping in 1878 once more to 500 kronor. Around the year 1890 the cost varied between 580 and 770 kronor, and in the middle of the nineties was 850 kronor, rising, up to the year 1900, to between 1 200 and 1 300 kronor. Then the building costs again fell to about 1 100 kronor in 1905 and 1 060 kronor in 1908. During the period 1911—1914 the building costs were, on an average, 1 350 kronor. They were thus quite distinctly influenced by the general business cycles. As to Söderfors, their figures are not recorded by the year but as an average for longer periods. Taking the years 1860—1869 as base, we get the following index numbers:

	1860	1870	1880	1890	1900	1910
	/69	/79	/89	/99	/09	/14
Långshyttan	100	150	158	232	304	374
Söderfors	100	172	182	207	243	—
<i>Total average</i> (see above)	100	150	146	161	197	251

These figures show how unreliable the averages are. This much however we should be able to read from them, that from the sixties up to the first decade of the present century the building costs went up considerably, as much as 100—200 %. As during this period the annual earnings increase by 108 %, i. e. slightly more than doubled, and as at the same time the quality of the accommodation was in most places improved, the index numbers showing the trend of the annual earnings are likely to some slight extent to underrate rather than exaggerate the growth of earnings. The error cannot, however, be very great, partly because the movement of the wages exclusive of housing accommodation and of the cost of a dwelling probably diverge only slightly, and partly because the value of the dwelling in proportion to the annual earnings is relatively small.

Hours of Work.

Besides the very summary information concerning the hours of work that can be gathered from a comparison of the averages for the annual and hourly earnings, there will be found below such particulars as have resulted from the compilation of data supplied by the different enterprises.

The heterogeneous character of the production at the ironworks has already been noted. One result of this is that the hours of work both *per annum* and *per diem* vary considerably as between the different occupational categories.

As has been indicated above, most of the work consists of piece-work, for which in the majority of cases no individual working hours are stated. Only for work on a time-wage basis the working hours are usually stated or else are easy to estimate. In the case of a worker who has been

occupied, at the blast-furnace for instance, the whole time during which the ironworks have been operating, it is, however, possible to ascertain his working hours *per annum* from the "blowing journal". Whether the worker has been working the whole time, or for only a part thereof, can be seen at once from the balance book, in which is recorded not only the quantity produced — in this case pig-iron — but also the wages he has received for it. Thus, the number of days worked by a part-year worker is obtained by ascertaining by division the average output for the whole works per 24 hours and then dividing the worker's output for the year as recorded in the balance book of the part-year worker in question by this average output. So far as the blast-furnace in particular is concerned, however, a number of difficulties arise, rendering the estimated working hours rather uncertain. At certain blast-furnaces there was extra time-wage work performed in shifts, sometimes even in free shifts; moreover, the work done while the blast-furnaces were being blown down was reckoned as time-wage work. It is under these circumstances usually impossible to distinguish between time-wage work performed during the shifts and other forms of time-wage work. Obviously, however, the wage paid for time-wage work performed during the shifts should contribute towards increasing the average daily earnings. During the shifts, too, minor piece-work operations were performed, such as weighing and casting of slag-bricks.

The hours of work can similarly be calculated for workers engaged on other than blast-furnace work. In summary it is usually possible to compute the time worked *per annum* by employees at the ironworks, but as this would have involved a considerable amount of work, it has only been done in the case of a few ironworks whose wage-data were particularly good. In view of the wide differences in the number of hours worked by the different categories no general estimates of any kind have been made as to the number of days worked annually in this industry.

The length of the blowing-period at the blast-furnace depends upon economic and technical circumstances. In

times of depression the number of blast-furnaces out of use increases considerably and the average blasting-period *per annum* for the blast-furnaces that are in operation is reduced. When trade conditions are improving, then the contrary is the case. But, as we have already said, the length of the blowing-period is determined also by technical factors. It is necessary, for instance, to repair the blast-furnaces when the brickwork has worn out. The maximum length of a blowing-period is between 4 and 5 years.

In regard to those blast-furnaces for which data have been obtained both as to annual earnings, comprising earnings on blast-furnace work and other earnings, and as to blowing-period, there has always been a strong correlation observable between annual money earnings and blowing-period. When there has been a change in the annual earnings which cannot be accounted for by cyclical variations, the explanation is generally found by examining the period during which blowing took place. Naturally, when the economic conditions for producing pig-iron are favourable, then every effort is made to carry on blowing for as long a time as possible and to keep the repair-work for times of depression. For every ironworks represented in the investigation by series covering the wages of blast-furnace workers, extracts have been made relating to the period during which blowing operations were carried on and to the quantity of pig-iron produced each year — this in order to explain certain changes in the wage curve. These particulars' as far as the years 1860—1891 are concerned, have been taken from the mineral surveyors' reports, which were annually rendered to the Board of Trade by the mineral surveyors in the different districts. Similar particulars covering the period 1892—1927 have been extracted directly from primary material on which these reports were based. This information is published side by side with the annual earnings in the monographs below.

Furthermore, extracts have been made from the Board of Trade's reports on the mining industry, concerning the number of blast-furnaces in operation in the country during each year, the average blowing period and the average

output per blast-furnace. Up to 1877 all figures relate to "blast-furnace years", while from 1878 onwards they refer to calendar years. The following Table 7 gives the development during the period in question.

Table 7. Number of Blast-Furnaces in Blast, Average Blowing-Period and Production in 1860—1914.

Year	Number of blast-furnaces in use	Average blowing period (24 hours)	Average output per blast-furnace in tons	Year	Number of blast-furnaces in use	Average blowing period (24 hours)	Average output per blast-furnace in tons
1860	229	134	808	1890	154	246	2962
61	226	122	751	91	155	259	3167
62	221	137	903	92	153	257	3174
63	207	133	902	93	152	245	2983
64	237	150	1019	94	145	257	3192
65	219	149	1035	95	146	252	3171
66	220	150	1046	96	140	271	3532
67	220	158	1152	97	144	286	3737
68	207	165	1271	98	143	279	3719
69	199	188	1468	99	141	263	3530
1870	213	178	1410	1900	135	283	3903
71	207	181	1443	01	139	272	3801
72	212	197	1601	02	136	274	3957
73	213	202	1620	03	136	256	3727
74	217	180	1511	04	133	263	3974
75	224	184	1565	05	129	270	4182
76	206	189	1711	06	128	290	4725
77	202	191	1740	07	130	280	4737
78	193	186	1766	08	121	261	4693
79	182	193	1882	09	108	232	4118
1880	193	210	2104	1910	112	284	5392
81	197	227	2183	11	114	282	5565
82	185	217	2157	12	119	293	5881
83	191	216	2213	13	117	301	6242
84	178	227	2419	14	116	265	5515
85	179	237	2596				
86	164	243	2608				
87	164	247	2784				
88	162	246	2821				
89	150	239	2804				

As the table shows, there has been a heavy falling-off in the number of blown-in furnaces each year ever since the beginning of the period — this being the result of the process of strong concentration which, as previously pointed out, had been going on for a long time amongst the

Swedish ironworks. All the same, a substantial increase can be observed in the average blowing-period and the average output per 24 hours.

The number of days worked by the blast-furnace workers when the blast-furnace was kept constantly going could amount to as much as 365 *per annum*. In other departments, in which the process of starting operations did not involve such important preliminary work and such heavy expenditure as were incurred when a blast-furnace was being blown in, the normal annual running-period was about 300 days. Moreover, the forging and rolling processes were largely dependent upon the supply of water at the different seasons of the year. As the keepers' annual earnings invariably fall short of those of most other occupational categories in the ironworks, it follows that, owing to the length of their annual working period, their daily earnings work out still lower.

The data regarding the hours of work supplied by the ironworks represented are as a rule far too meagre and incomplete to enable an exact calculation of the average hourly earnings for all works. We have instead, as in the case of the daily earnings, worked out the hourly earnings only at those works that have supplied exact information as to the number of hours a day worked by the different occupational groups.

In the blast-furnace the work was carried on throughout the week by two alternate shifts, working for the most part 8 hours at a time (making, that is to say, an average working period of 12 hours out of the 24 and of 84 hours a week), until the time of the introduction of the 8-hour day, when a third shift was added. The working hours could, however, vary in the case of different groups of workers, according as their work was more or less fatiguing. Thus many ironworks adopted the three-shift system (averaging 8 hours a day) at a quite early period, during the nineties a 6-hour shift being worked by the top-fillers at the blast-furnaces. The following workers generally worked in shifts: keepers, top-fillers, slag-wheelers, coal-wheelers, kiln foremen, calciners and ore-wheelers, while those who

"did work by the day until the task allotted had been carried out" were: ore- and limestone-breakers, crusher-tenders, charcoal-screeners and weighers. In the case of the last-mentioned categories, therefore, the number of hours of work per day might, owing to the nature of the job, vary within wide limits. The result of the early transition to the three-shift system in the case of the top-fillers was that, since there was no simultaneous change in the annual earnings, the hourly earnings rose rapidly, not returning to a level with the hourly earnings of the other blast-furnace workers until the introduction of this shift-system became general.

As to the production of wrought iron, the length of the shift depended upon the time needed to produce a certain number of blooms, the number of blooms varying according to the method employed. In the Lancashire process the number of blooms produced per shift was usually 6. Each bloom took about 1 hour to produce.

In Lancashire, open-hearth and rolling mills, in earlier times the first shift of the week began on Sunday afternoon. Moreover on Sunday mornings the melters had to clear out their respective furnaces so that work could be started at a given time. Work in these departments was performed by two alternating shifts until the time of the introduction of the 8-hour day, when a third shift had to be added. The average daily working period was shortened as a result of the extension of the Sunday break, the resumption of work in the different departments being gradually postponed until Monday morning. In this case it is hardly possible to make any general statement as to the date of the transition, but as an example it may be cited that this took place in 1900 at Boxholm and Smedjebacken, the result being that there the average number of hours of work per day fell from 12 to 11.

As to the workers on day-jobs, information concerning working hours during different periods is of the same unsatisfactory kind as that concerning those working in shifts.

In the investigation carried out by the Board of Trade's Department of Labour Statistics into the length of the

working time in industry and trade in Sweden covering the years around 1905 it is pointed out that of all occupational groups the iron industry was found to have, on an average, the longest working time per week, and further that the net and gross working times fully coincide with one another owing to the fact that work performed in shifts at the ironworks never goes on for longer than 8 hours at a stretch, so that intervals for meals etc. can be disregarded. At this period, then, more than half of the workers belonging to this group — 52.6 % — worked more than 60 hours a week. Especially as regards employees in ironworks as a whole, there is undoubtedly a considerable difference between the net working hours and the effective working hours *per diem*. The net working hours are the number of hours during which the worker is actually employed, i. e. exclusive of intervals, but it includes periods of waiting and suchlike ineffective working time. Particularly in the case of the blast-furnaces and wrought-iron production the effective working hours differ widely from the net working hours. In the year 1929 the effective time worked by keepers was the subject of an enquiry by the Ironmasters' Association. From this enquiry it would appear that the effective working period represented only 40—85 % of the net working period. The effective number of hours worked by the melters is actually only half of the period represented by the length of the shift, as the procedure followed is this: a melter produces a bloom (which takes about 1 hour), after which he rests while the other melter makes the next bloom, and so on. In the rolling-mills, on the other hand, the effective working period on the whole coincides with the net working period.

The Calculation of the Averages.

The averages analysed in the following pages all relate to annual earnings. Data regarding the hourly earnings are, as already explained, rather scarce and have only been weighted together to form an average for all series. Special averages have been worked out for men employed in

the blast-furnace, Lancashire works, Bessemer and open-hearth works, rolling-mills, iron and steel manufacture and engineering works. Series which cannot appropriately be referred to any of these five groups have been placed under a remainder group representing various kinds of labourers, mainly unskilled workers. This average for the remainder group includes, besides day-labourers, stone- and wood-workers, unskilled workers etc., also "helpers" from different departments. If the latter's wages were embodied in those of the respective departments, it would render their averages far too heterogeneous. The remainder group will therefore consist of the least qualified workers in the ironworks and those in it are classed as unskilled workers.

All the averages described are computed with the aid of chain index numbers, the total index numbers having been raised for this purpose to a level with the average annual earnings for the year 1907 computed directly on the basis of the absolute numbers. In determining the weights we have been guided by the quality of the series and the size of the works and occupations respectively. As a rule, the ironworks series are unusually long and comprehensive, so that the number of serial variations is relatively small. Most series, however, begin as late as 1880 and finish in 1910; consequently, the averages prior to 1880 and subsequent to 1910 are not so reliable as the others and rather wide deviations from the directly computed averages arise.

To provide the averages for the blast-furnace all series have been selected, comprising keepers, top-fillers and calciners, who form a very homogeneous group, though this does not prevent the possibility of the earnings, particularly during the earlier years, showing a wide divergence as between the different ironworks. Thus, the keepers at T¹ earned 276 kronor in 1874, while the keepers at G earned 887 kronor. If we except the former ironworks (T), where the earnings were consistently far below those of the other ironworks, we find that the different series are fairly closely concentrated. The annual earnings in 1880, for instance, varied between 500 and 850 kronor, in 1890

¹ The letters represent the different ironworks named on p. 69.

between 500 and 930 kronor, in 1900 between 700 and 1 000 kronor, and in 1910 between 1 200 and 1 500 kronor. For the years 1860—1866 the average is made up of only 2 series (from R and U), but after that further series are gradually added, so that the number ranges between 8 and 10 during the period 1875—1910, after which it drops to 5 in 1914. The concerns A, E, Q and U furnish the best series and have been assigned the highest weightage figures.

A special average has been computed of all series relating to wrought iron production and allied occupations engaged in the process, such as shinglers, tilters and melters. There were only 2 series in 1860—1864 (concerns N and S), 4—5 in 1865—1877 (G, M, N, T and U), and 6—8 series in 1878—1913 (A, D, G, M, P, Q, T and U). The series generally cover a fairly long sequence of years, so that the number of serial variations is small. Although all the occupations included in this group are to be regarded as skilled, the annual earnings involved in the different series are often found to be on a very uneven wage level. At the beginning of the seventies the tilters and melters at U and T earned about 600 kronor *per annum*, whereas the same occupational categories at M and N had more than 1 200 kronor. The relatively low wages at T apply also to later years. Thus, the annual earnings of the melters at T amounted to 847 kronor in 1910, while the shinglers at U received 1 747 kronor.

The average for those employed in the Bessemer and open-hearth works comprises a very variable number of series. In 1868—1878 there are 2 series (from F), in 1880—1884 the number has increased to 7 (series from P and E having been added), in 1884—1900 there are 11—12 series (from concerns D, E, P and U). In 1901 there is an addition of 3 series from A and in 1903 3 series from B. In 1905—1909 the number of series is 22, but after 1910 it is only 9 (concerns A, P and U). The averages for those employed in the Bessemer and open-hearth works are very heterogeneous. They comprise very highly skilled workers, such as steelblowers and melters, who earn 2 or 3 times as much as the least skilled workers.

The rolling-mills average is based on the largest number of series. In 1860—1862 there are only 2 (from concern N), but by 1865 the number has reached 6 and from 1869 it amounts to 8 (H, N and S). During 1875—1880 the number of series increases from 13 to 24, with the addition of series from G, Q, U, D, P, E and I in the now mentioned order. The number ranges around this latter figure up to the beginning of the nineties, when, by the addition of series from B, F and P in 1895 it reaches 34, remaining mostly at that figure until 1909. At the end of that year the series from concerns E, H and J fall out, so that in 1910 there are only 20 series left. By 1914 the number has dropped to 12 (concerns A, G, P, Q and U). The best represented occupations are heaters and rollers which together are represented by about half the total number of series. Other occupations that frequently occur are: rolling-mill foremen, catchers, welders etc. Amongst such differently qualified occupations the latitude of variation in the earnings is naturally very wide. Thus, in 1880 the annual earnings varied between 550 and 1 650 kronor, in 1890 between 650 and 1 700 kronor, in 1900 between 660 and 1900 kronor, and in 1910 between 1 200 and 2 300 kronor.

Workers in the engineering shops, foundry and manufacturing forge comprise the fifth group. The most strongly represented occupation is that of the moulders, but there are also tool-makers, sheet-metal workers, vice-hands, lathe-hands, blacksmiths, etc. In earlier years the average is, as usual, less reliable. In 1860—1864 there is thus only 1 series (from S), and in 1865—1879 3 (H, S and X). By 1880 the number has reached 8 (E, J and P being added), in 1886—1902 the number is 13—15, and after that up to 1910 it remains at about 17 (concerns B, D, E, H, J, P and U). In 1910 there are again only 8, and after that 4 (P and U). The occupations included in the average are in this case of a more consistent quality, so that the dispersion of the annual earnings is not so wide. In 1880 they ranged between 420 and 833 kronor, in 1890 between 540 and 1 050 kronor, in 1900 between 690 and 1 150 kronor and in 1910 between 990 and 1 580 kronor.

The remainder group, as already mentioned, comprises mainly unskilled workers, such as helpers, day-labourers, odd-jobbers, stone-workers, and coal-washers. The number of series in 1860—1864 is 3 (concerns N, S and U), up to 1879 it is 8 (H, M, N, S, T, U and X). From the year 1880 the number of series, as elsewhere, is greater. It varies between 13 and 15 up to 1909 (concerns B, E, J, Q and V are added). In 1910 the number is 8, and after that 2—3 (Q and V). The wages fluctuate in 1880 between 310 and 800 kronor, in 1890 between 400 and 825 kronor, in 1900 between 420 and 1 040 kronor, and in 1910 between 760 and 1 230 kronor; as a rule, then, there is a fairly wide dispersion.

The wage data have also been divided into three groups, according to the degree of skill of the various occupations: highly skilled workers, skilled workers and unskilled workers. The last group is the same as the remainder group dealt with above. To the group highly skilled workers are assigned those workers who, as compared with other branches of industry, come closest to the rank of foreman. This group comprises the following occupations: blast-furnace foremen, Lancashire foremen, open-hearth melters, steel-blowers, rolling-mill foremen, heaters, head-rollers, forge foremen and master mechanics. In 1860—1864 there are 3—4 series (concerns N, S and U), in 1865—1868 there are 7 (H, M, N, S and U), in 1869—74 10—12. The number of series then rises gradually, amounting in 1880 to 21, in 1890 to 23, and ranging between 30 and 36 during the period 1894—1909. By 1910 the number has dropped to 24 and in the following years to about 15 (concerns A, F, G, P, Q and U). Among such a comparatively large number of series the absolute dispersion of the wages is naturally considerable. In 1870 the annual earnings range from 630 to 1 680 kronor, in 1880 from 740 to 1 660, in 1890 from 814 to 1 770 kronor, in 1900 from 970 to 1 890 kronor, and in 1910 from 1 390 to 2 600 kronor. The maximum wage is thus consistently twice as high as the minimum wage.

To the skilled workers' group have been assigned a large number of occupations and series, all of which are to be

regarded as skilled, but which nevertheless show a marked difference from those categories that have been dealt with in the groups highly skilled and unskilled workers. The skilled workers group includes, besides the different blast-furnace occupations, ladlemen, catchers, rollers, heaters, furnacemen, vice-hands, lathe-hands, moulders etc. The number of series in 1860—1864 is 3 (concerns N, S and U), by 1865 it has risen to 8 (N, S, T, U and X), and by 1870 to 11 (C, G, L, N, S, T, U and X). During the latter half of the seventies the number ranges around 18, during the eighties around 30, rising up to 1900 to 40 and in 1903 to 46. By 1910 the number of series is 35, and after that year 21 (concerns A, G, F, I, P, Q, U, X).

Finally, all the series relating to the ironworks have been weighted together, irrespective of the employment in different departments and of the quality of the work. For the sake of control we have employed different weighting numbers and methods. On the one hand, we have weighted together the average annual earnings for the various departmental works (blast-furnace, Lancashire works etc.), and on the other hand the average annual earnings of the three groups (highly skilled workers, skilled workers and unskilled workers). The average calculations have been based firstly on the chain index numbers with the use of varying weights and secondly on the total index numbers (compare p. 41) with the use of constant weights. In determining the varying weights regard has been had to the number of series included in the averages, while the constant weights applied to the different works have been assigned according to their relative size in average during the period of the investigation (as measured by the statistics in the Board of Trade's Reports on the mining industry) and those applied to the three groups according to their relative size (as measured on the basis of the statistics compiled by the Ironmasters' Association). The four different averages agree very closely, in spite of the entirely different weighting methods, the maximum deviation being about 8 %, and they show an almost entirely parallel wage-trend. It has therefore been considered necessary to publish

only one of the averages, namely, that which has been computed on the basis of the chain index numbers for the different works, as the weighting procedure adopted here most closely resembles that applied in calculating the averages in respect of the other branches of industry. The number of series ranges during the earliest part of the sixties around 10, rises in the seventies to 30, in the eighties to 60, reaching its highest value — about 100 series — during the period 1895—1909. By 1914 the number has fallen to about 40. It is of no particular interest to state the number of selected workers, as some of the series cover all workers. Concerns A, E, G and U are represented by good series, extending over a large number of years, and they contribute the largest weights to the averages.

As already pointed out, the data relating to the hours worked at the ironworks are very scanty and irregular. As a rule, it was impossible to calculate with any degree of certainty the number of working days *per annum* or hours *per diem*, as the estimates varied considerably on a comparison both between different works and between different occupations at the same works. An average has been struck of those hourly earnings that are based on exact data regarding hours of work (*per annum* and *diem*). Such details are available for the period prior to 1914 in the case of only a few works (concerns E, Q and U), but as these concerns belong to those which are represented by most series and contribute the largest weights to the annual earnings averages, the average hourly earnings should prove to be fairly representative. In 1860—1874 3 series from U are included in the average, in 1875—1879 7 series from U and Q, and in 1880—1909 12 series from E, Q and U, while after 1910 there are included only 9 series from U and Q.

2. MINING.

According to the Board of Trade's report on industry in 1913,¹ there were employed in iron-ore mines and enrich-

¹ Industri. Berättelse för år 1913, published by the Board of Trade in Sveriges officiella statistik.

ment works in 1913, 12 141 workers, and in other ore mines and enrichment works 1 440 workers, together representing 3.8 % of the total number of industrial workers. The workers were distributed over 132 establishments. Of the total quantity of iron-ore mined in 1912 64 % came from Norrbotten, 19 % from Kopparberg, 8 % from Örebro and 5 % from Västmanland counties. It was in the nineties that the ore-fields in Lapland were first exploited on a large scale. Prior to that period most of the iron-ore came from the counties of Kopparberg and Örebro (cf. map, p. 68).

Selection of Concerns.

The present study of the trend of wages at the Swedish mines embraces 10 iron-ore mines, 1 copper mine and 1 zinc mine. The establishments concerned during the periods stated are the following:

	<i>County:</i>	<i>Period:</i>
A. Blötberget Minefield	Kopparberg	1901—1913
B. Nora Bergslag's Joint Mining Administration		
1. Striberg	Örebro	1860—1875
2. Dalkarlsberg	" "	1860—1915
3. Timansberg	" "	1904—1915
C. Norberg Minefield	Västmanland	1860—1913
D. Rällingsberg Mine	Kopparberg	1880—1909
E. Fagersta Ironworks	Västmanland	1902—1910
F. Sirsjöberg Mine	Örebro	1903—1910
G. Stjernfors-Ställdalen Mine	" "	1860—1873
H. One of the oldest iron-orefields in Sweden	—	1870—1910
I. Falu Copper Mine	Kopparberg	1860—1914
J. Ammeberg Zinc-Mine	Örebro	1860—1914

These concerns are all located in central Sweden. The establishments working the ore-fields in Lapland, which began to be developed after 1890, and which are now of predominant importance, are unfortunately not included in this list, the concern owning the principal ore-fields having refused to open its records. Some brief data have been obtained about the Malmberget Mines, and mention is made of them below.

Wages at Mines in Central Sweden.

This table indicates the manifest influence exerted by the general economic conditions on the trend of wages.

Table 8. Annual Earnings (in kronor) at Iron-Ore Mines and all Mines in Central Sweden.

Year	Iron-ore mines	All mines	Year	Iron-ore mines	All mines
1860	303	381	1890	559	594
61	305	391	91	548	595
62	313	412	92	567	614
63	286	399	93	572	612
64	275	410	94	568	615
65	310	413	95	568	613
66	317	421	96	573	618
67	329	419	97	641	666
68	365	431	98	672	700
69	358	433	99	713	748
1870	383	440	1900	767	783
71	391	449	01	790	793
72	458	508	02	782	797
73	614	633	03	744	770
74	628	662	04	784	810
75	577	650	05	790	823
76	558	617	06	827	854
77	555	609	07	879	910
78	517	568	08	935	972
79	453	532	09	789	786
1880	484	559	1910	1019	1008
81	529	564	11	995	1038
82	537	589	12	962	1038
83	564	600	13	1026	1081
84	579	613			
85	553	598			
86	491	558			
87	477	531			
88	462	502			
89	513	552			

There are substantial rises during the periods 1871—1874, 1879—1884, 1888—1890, 1896—1900 and 1905—1908, whereas the wages fell during the periods 1875—1879, 1884—1888 and 1900—1901.

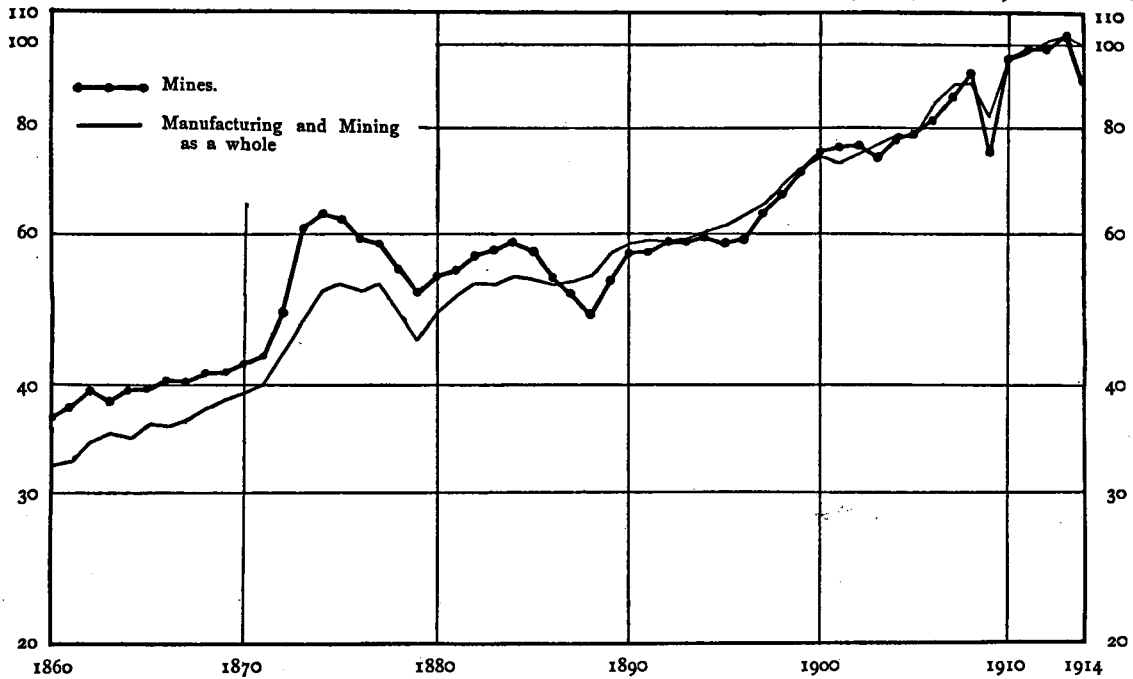
In order to demonstrate the conformity of the trend as between the different series, a certain number of periods have been selected and the percentage variations in the annual earnings in the course of these periods compared. If no data were available covering just those years to which the comparison applies, adjacent years have been chosen, and the fact indicated in a note.

The variations in the daily earnings at the zinc mine at Ämmeberg (concern J) have also been included, as

Index

Chart 5. Annual Earnings at Mines in Central Sweden (Index: 1910-1913 = 100).

Index



IRON, STEEL AND MINING

105

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease).

(The letters denote the different concerns, the figures in the same column the various series from each concern.)

	1870 /74	1875 /79	1879 /84	1884 /88	1888 /90	1896 /00	1903 /08	1870 /12
A	—	—	—	—	—	—	+29	—
B 2	+30	-23	+39	-4	+9	+32	—	—
C	+98	-20	+52	-35	+32	+53	+34	—
D 1	—	—	+18 ^a	-32	+40	+16	+6	—
2	—	—	+4 ^a	-26	+45	+45	+19	—
E	—	—	—	—	—	—	+51	—
F 1	—	—	—	—	—	—	+30	—
2	—	—	—	—	—	—	+5	—
G	+60 ^b	—	—	—	—	—	—	—
H 1	+30	-32	+69	-8	-3	+40	+21	+170 ^c
2	+61	-13	-3	+6	+3	+4	+16	+257 ^c
I 1	+17	-33	+13	-19	+8	+23	+91	+79
2	+36	-8	-18	-17	+35	+22	+6	+106
J (annual earnings) . . .	+42	-6	+14	-11	+9	+8	+13	+129
(daily earnings) . . .	+38	-1	+7	-5	+6	+7	+12	+109
<i>Iron mines</i>	+64	-21	+28	-20	+21	+34	+26	+151
<i>All mines</i>	+50	-18	+15	-18	+18	+27	+26	+136

in the case of that concern they are more reliable than the annual earnings (see monograph, p. 388). As regards this concern, the agreement between annual and daily earnings in the shorter variations is, however, very close, the latter recording a slightly more even movement. As the table shows, the different wage series as a rule tend to vary in the same direction during the typical business cycles that we have chosen, although the strength of the deviations may vary considerably. Only a few series extend over long periods, but these few display a fairly dissimilar trend, as the percentages for the secular period show. Between 1860 and 1913 the annual earnings at the iron mines rose on an average 239 %, those at the Falu copper mine 126 % and those at the Ämmeberg zinc mine 124 %.

Those concerns that are not included in the average likewise display a similar trend of wages. At concern B I

^a 1870—1873.

^b 1880—1884.

^c 1870—1910.

the daily wage rate went up 85 % during 1871—1875, and at concern B 3 it rose 39 % during 1903—1908.

Wages at Mines in Norrland.

The trend of the wages that we have studied above cannot in any way be regarded as representative also of the mines of Norrland. In the first place, the wages in that province are considerably higher. Around the middle of the nineties the miners at Gällivare (in Lapland) often earned 4—4.50 kronor a day, whereas the daily wage rate at Dannemora (in Uppsala county, Central Sweden) varied between 0.90 and 1.10 kronor.¹ According to the statistics regarding miners' wages compiled by the Ironmasters' Association, the average annual earnings as applied to 6 500 miners in Central Sweden in 1913 were 802 kronor, and the hourly earnings 47.5 öre, while 4,600 miners in Norrland earned on an average 1 285 kronor *per annum* and 75.4 öre per hour. The reason for this difference in money wages between the North of Sweden and Central Sweden

Table 9. Daily Earnings at the MalMBERGET Mines (in öre).²

Year	Loaders	Drillers	Year	Loaders	Drillers
1895	341	438	04	458	566
96	337	461	1905	476	595
97	361	467	06	476	622
98	414	491	07	487	639
99	413	527	08	526	634
1900	451	527	09	576	675
01	448	551	1910	626	714
02	408	469	11	647	753
03	462	555			

¹ G. af Geijerstam, *Arbetarnas ställning vid fyra svenska gruvor.* Stockholm 1897.

² Hourly earnings during the period 1912—1915.

Year	Loaders	Drillers
1912	86	110
13	87	112
14	91	115
15	96	119

is partly the difference in the cost of living. The cost of living in Norrland is in fact very much higher than elsewhere in Sweden. On p. 107 is given a brief summary showing the average daily earnings of loaders and drillers at the Malmberget mines situated in Lapland. The figures are based on the concern's own extracts. For some years they apply only to certain months of the year.

While the average daily earnings at the central Swedish mines corresponding to the annual earnings in Table 8 were 1.91 in 1895 and 3.57 in 1911, the corresponding figures for Malmberget ranged from 3.41 to 4.38 in 1895 and from 6.47 to 7.53 in 1911. Between 1895 and 1911 the daily earnings of the loaders at Malmberget went up 90 % and the drillers' 72 %, while the corresponding percentage for the iron mines included in the average (Average I, p. 48) is 75 %. The actual trend of wages thus seems to have been fairly parallel.

Quality of the Wage Data.

Unfortunately, the wage data collected concerning the mining industry are very incomplete. The wage conditions prevailing at the mines very closely resemble those at the ironworks, and the bookkeeping system is equally complicated. Owing to the fact that the material is extremely scanty, and to the lack of uniformity displayed by the trend of wages at the different mines, the averages published above are very unreliable.

Frequently there is no grouping by occupations in the payrolls, so that as a rule only wages for selected mine-workers in general have been stated. Where occupational groups are given, the following occupations have generally been selected: drillers, miners and loaders. The work of the two first-mentioned categories is generally done under-ground, whereas the loaders work also above-ground. Usually, however, no record is made as to where the workers have carried out their jobs, and we have not been able when computing the averages to differentiate between workers above-ground and workers under-ground. As there is a great difference between work down in the mine and

work above-ground, this is a serious omission. Work done under-ground makes considerable demands on both the physical strength and the endurance of the worker, and the miner does not work as many hours *per diem* as a worker above-ground. The number of working hours per day under-ground has generally been about 8 hours, but it varied considerably as between the different mines. The number of hours worked daily by those employed above-ground varied, as elsewhere, between 10 and 12.

The number of selected workers in each series ranges generally from 2 to 4, but this has proved inadequate for ascertaining the trend of wages in a miner's occupation. It seems that the turnover of labour has been very considerable, so that it has frequently been found extremely difficult to follow up a given worker for a longer period of years. A notable feature of the miners' series is therefore the frequent replacement of workers, which breaks the regularity of the wage series. A number of mines have been unable to furnish particulars of annual earnings; we have therefore had to make extracts showing the total number of day-jobs done and the total wages paid, and have thus worked out an average daily wage.

The Calculation of Averages.

Average annual earnings have been computed, on the one hand, for the iron-mines, and on the other hand, for all mines. We are not publishing any special average of daily earnings, as the latter have mainly to be calculated from the annual earnings and, as far as their trend is concerned, differ but little from the averages of annual earnings. In the case of two of the mines (B 1 and B 3) there are only short series recorded with particulars as to the daily wage, and these series are not included in the averages. To give some idea as to the representativeness of the averages, we quote only the number of series in the average for the iron mines. In order to arrive at the number of series in the average for all mines we have only to add 2 series representing the Falu Mine and 3—7 series representing the Ämmeberg Zinc-Mine. For the period 1860—1869

110 MANUFACTURING AND MINING

the ore-mine average thus covers 4 series (from concerns B 2, C and G), during 1870—1901 5—7 series (from concerns B 2, C, D and H), during 1902—1910 8—10 series (from concerns A, C, D, E, F and H), and during 1910—1913 only 3 series (from A and C). As far as 1914 is concerned, there are no data as to annual earnings at the iron mines. From the above it will be seen, then, that the number of series is small throughout the entire period and that one concern is often substituted for another.

CHAPTER V.

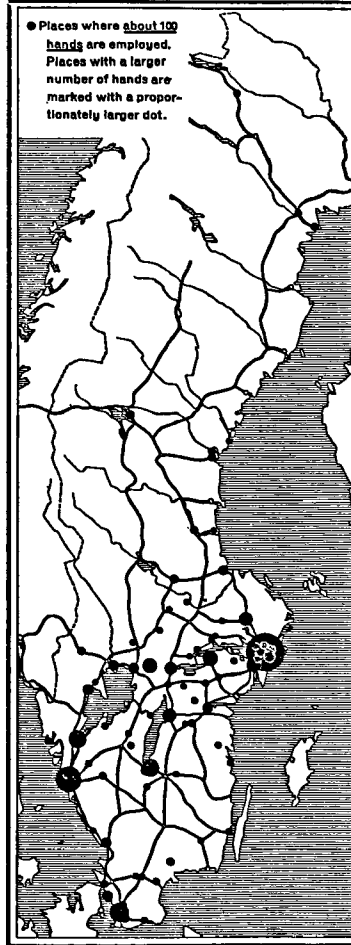
METAL MANUFACTURING AND ENGINEERING.

THE concerns in these two branches of industry employ a considerable number of workers; in 1913 there were about 13,000 workers engaged in the former group and 34,000 in the latter, corresponding to about 12 % and 36 % respectively of the total number of workers within the industrial group mining and metal industry, and about 4 % and 11 % respectively of the total number of workers registered in the Board of Trade's report on industry.¹ Metal manufacturing comprises the manufacture of wire, chains, nails, bolts, spades, files, axes, knives, scissors, locks, etc., that is to say, products that are to a great extent to be regarded as consumers' goods, whereas the engineering industry comprises all kinds of machinery and entails rather a production of capital goods. This line of demarcation is however not definite, partly because metal manufacturing includes capital goods or products that are used for the manufacture of capital goods, such as rivets, bolts, nuts, and because engineering works are also large-scale producers of consumers' goods, such as kitchen grates, bicycles, telephones.

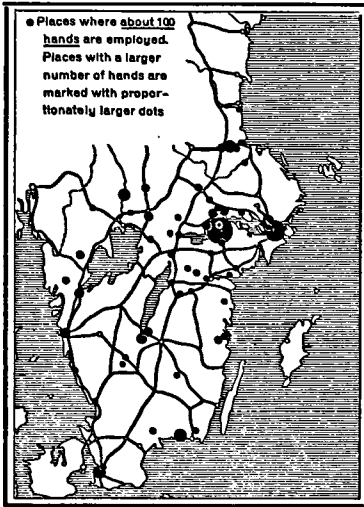
Moreover the concerns engaged in one of these branches often produce a large number of different articles which come under the head of both these two and several other branches of industry. From our point of view, the fact that these two industrial branches are similar in their use of a common raw material — iron — is of greater im-

¹ Industri. Berättelse för år 1913, published by the Board of Trade in Sveriges officiella statistik.

The Engineering Works. 1924.
(Right.)



The Metal Manufacturing Industry. 1924. (Left.)



portance than these minor dissimilarities in their finished products. Thus not only are they both dependent upon the supply and prices of the same raw material, but also the technical processes employed in the manufacture of their products, are comparatively quite similar so that to a large extent the same occupations exist in both industrial branches. Moreover, the fact that on the whole they have a common trend of wages justifies their being combined in one common group.

The factories belonging in this group are scattered all over the country. There is however a fairly large number of concerns concentrated in Stockholm and in Eskilstuna. Eskilstuna is the centre of the metal manufacturing industry, having 45 factories and employing 2,600 workers, or 15 % of the total number of industrial establishments and 19 % of the total number of workers engaged in this branch of industry in 1913. In the same year Stockholm had 74 engineering works employing 6,000 workers, corresponding to 13 % of the total number of workshops and 15 % of the total number of those employed in engineering works.

Selection of Concerns.

Wage material has been compiled from 16 concerns engaged in the branches of industry in question. Besides this material, there are available wage data concerning machinists at a number of ironworks and sawmills, but these are accounted for under the main industry of their respective concerns. The following concerns are represented in the investigation during the years stated below ("*e.w.*" means engineering works, and "*m.m.*" metal manufacturers):

			<i>Period:</i>	
A.	Carl Gustav's Stad's Small Arms Factory	e. w.	Eskilstuna	1876—1910
B.	Eskilstuna Ironware Manufacturing Company (Tunafors)	m. m.	"	1878—1913
C.	A File Works	m. m.	—	1860—1914
D.	E. A. Berg Manufacturing Company	m. m.	Eskilstuna	1903—1914
E.	The Locksmiths' Company	m. m.	"	1882—1914
F.	Munktell's Engineering Works	e. w.	"	1895—1910

		<i>Period:</i>
G.	A Manufacturing Works m. m.	Eskilstuna 1906—1914
H.	F. A. Stenman, Locksmiths m. m.	• 1886—1914
I.	Bolinder's Engineering Works e. w.	Stockholm 1885—1905
K.	L. M. Ericsson Telephone Company e. w.	• 1895—1909
L.	Motala Engineering Works e. w.	Motala 1860—1903
M.	An Engineering Works e. w.	County of 1880—1914 Värmland
N.	Lindholmen-Motala Company e. w.	Gothenburg 1883—1914
P.	Alfa Engineering Works e. w.	Stockholm 1901—1903
R.	The Bolt Manufacturing Company, Hallstahammar m. m.	County of 1876—1910 Västmanland
S.	Gunnebo Foundry and Manufactur- ing Company m. m.	County of 1887—1910 Kalmar

Eskilstuna is thus comparatively well represented, whereas the number of concerns elsewhere, particularly in Stockholm, is inadequate for illustrating the general trend of wages at the places mentioned. Averages have been worked out for all concerns from Eskilstuna, that is to say, representing the famous Eskilstuna industry and thus mainly embracing concerns engaged in the metal manufacturing branch, further averages for all concerns combined, and also averages for all concerns apart from those in Eskilstuna. These latter are mainly engineering works.

Selection of Occupations.

The available wage material is, generally speaking, not in a very detailed form. The extract of wages for each worker often consists merely of a total representing his earnings for the entire year. Frequently no distinction is made between piece-work wages and time-wages. On the other hand, the number of selected workers is seldom less than 4 and often amounts to 6 or even 10. Moreover, as was pointed out above, the occupations represented are in the main of quite a similar character. The most representative occupations are tool-makers, vice-hands and smiths, together forming 16 series. Further, such occupations have been selected as turners, joiners, moulders, sheet-iron workers, etc., all of which occupations may be regarded as fairly similar in quality and as representative of the skilled

workers. Unskilled workers are, unfortunately, but poorly represented, so that it has not been possible to work out any special average for them. The monographs may, however, afford some idea of the trend of wages of the unskilled workers.

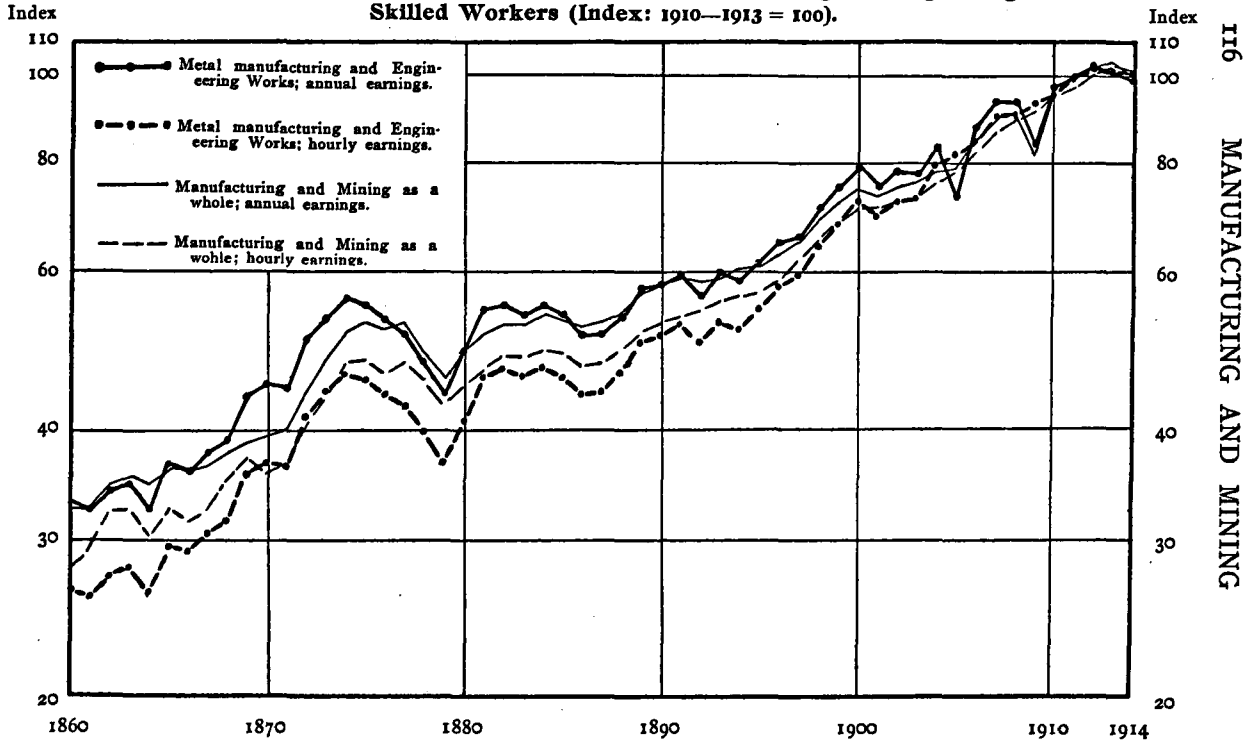
Annual and Hourly Earnings.

Averages of these different series, including a calculated hourly earnings average (see p. 119 on hours of work), are given in the following table.

Table 10. Annual Earnings (in kronor) and Hourly Earnings (in öre) at Metal Manufacturing and Engineering Works; Skilled Workers 1860—1914.

Year	Annual earnings			Hourly earnings; all concerns	Year	Annual earnings				Hourly earnings; all concerns
	Concerns in Eskilstuna	Other concerns	All concerns			Concerns in Eskilstuna	Other concerns	All concerns	All concerns	
1860	—	549	512	14.6	1890	953	851	901	28.2	
61	—	550	500	14.3	91	1070	823	924	29.1	
62	—	568	526	15.1	92	997	791	876	27.7	
63	—	568	533	15.3	93	980	875	926	29.4	
64	—	567	502	14.5	94	981	851	910	29.0	
65	—	600	565	16.3	95	990	910	954	30.6	
66	—	588	555	16.1	96	1034	961	1001	32.2	
67	—	616	581	16.9	97	1085	961	1021	33.1	
68	463	635	600	17.4	98	1201	1016	1102	36.0	
69	586	690	674	19.7	99	1239	1079	1155	37.9	
1870	582	717	693	20.3	1900	1298	1159	1229	40.6	
71	575	710	686	20.1	01	1192	1122	1163	38.6	
72	726	774	775	22.8	02	1235	1175	1213	40.6	
73	806	812	827	24.4	03	1266	1142	1204	40.5	
74	834	852	864	25.5	04	1333	1251	1294	44.0	
75	851	823	848	25.1	05	1157	1117	1128	45.5	
76	851	786	820	24.3	06	1344	1419	1362	46.9	
77	851	733	791	23.5	07	1405	1556	1452	50.3	
78	805	675	738	22.0	08	1423	1516	1451	50.6	
79	741	618	677	20.3	09	1264	1365	1292	52.0	
1880	815	699	754	22.7	1910	1544	1450	1504	53.2	
81	918	773	842	25.4	11	1567	1520	1546	55.0	
82	913	803	855	25.9	12	1621	1530	1582	56.8	
83	864	805	832	25.3	13	1651	1417	1557	56.2	
84	901	815	854	26.0	14	1638	1388	1535	55.8	
85	871	789	827	25.3						
86	821	752	787	24.2						
87	857	738	792	24.4						
88	840	802	829	25.7						
89	897	861	889	27.7						

**Chart 6. Annual and Hourly Earnings at Metal Manufacturing and Engineering Works;
Skilled Workers (Index: 1910—1913 = 100).**



116 MANUFACTURING AND MINING

The general cyclical movements are very clearly seen in the three annual earnings averages (as the hourly earnings are calculated on the basis of the total average of annual earnings they show the same variations as the latter). A strong rise in wages began in 1871 amounting to 26 % in the case of all concerns, but after 1875 there followed an almost equally violent fall in wages — as much as 20 % between 1875 and 1879. There was then a rapid recovery, the annual earnings from 1879 to 1882 increasing by 26 %, after which there was again a slight fall during the general depression that occurred in the middle of the eighties. As already mentioned, the latter half of that decade was marked by rising wages, followed by a fairly constant wage level during the first half of the nineties. Then a strong rise set in, concomitant with the industrial revival in Sweden in the last years of the century. The annual earnings increased between 1894 and 1900 by no less than 35 %. The succeeding depression was reflected in a slight fall in wages up to the year 1901, after which they rose 21 % between 1903 and 1907 (the break in the curve in 1905 is due to shorter hours of work *per annum* owing to a lockout in the engineering industry). After 1907 there occurred no noteworthy wage fluctuations (the general strike took place in 1909); after 1910 the averages are not as reliable as before.

Hours of Work.

It has already been mentioned that the hourly earnings averages are estimated throughout, as generally there are no exact data regarding the hours of work.

Standard hours of work are, however, as a rule indicated approximately for each concern and different periods, but the data are somewhat vague. In the case of two concerns only (B and M) is the number of hours stated for each worker and year permitting an exact calculation of the average hourly earnings.

Averages of the standard working hours per week for the concerns represented have been calculated for each

year; these averages are published below in Table 11. The trend thus shown is naturally somewhat irregular owing to the incorporation of additional concerns and the withdrawal of others.

In the Board of Trade's special enquiry into the labour conditions in the engineering industry (1898, 1901) details are given as to standard working hours per week for the years 1874—1900, for 53 different engineering works.¹ Averages have been struck from these data for each year and are also published below. According to the Report of the Workers' Insurance Committee of the year 1888², the average net number of working hours per day in 1885 in the metal industry was 10.7 hours and in the machine-making and the shipbuilding industry 10.9 hours (65.4 hours per week). According to the Board of Trade's Enquiry in 1911 into the length of working hours in industry and trade, the standard working hours per week during the years 1905—1906 for adult male workers in the iron- and steel-manufacturing industry was 58.8 hours and for engineering works 57.9 hours.³ These figures tally with the averages for concerns represented in the present enquiry, which for the years in question show 64 hours and 58 hours respectively, and with the averages for concerns in the Board of Trade's enquiry, which are 64.² for 1885.

Guided by these various data, we have constructed an adjustment curve for the standard working hours per week, and the adjusted figures obtained are reproduced in the table.

Prior to 1874 and after 1906 the amount of data available is less and the series becomes less reliable. After 1906 the following procedure has been used. By comparing the average annual earnings and the average hourly earnings taken from the material furnished by the Engineering Works Association (the material is described in detail

¹ Undersökning av den mekaniska verkstadsindustrien i Sverige, Del I och II. Arbetsstatistik III och IV. Stockholm 1901—1904.

² Arbetareförsäkringskommitténs betänkande, III, Statistiska undersökningar. Stockholm 1888—89.

³ Arbetstidens längd inom industri och hantverk i Sverige. Arbetsstatistik A: 10. Stockholm 1911.

below) in 1906 and 1914, it seemed likely that the hours of work were shortened during that period by 5—6 %. On the basis of the Social Board's wage statistics (by comparing the index numbers for annual earnings and hourly earnings) we estimated 2 700 hours as representing the approximate annual working hours in these industries in 1913.

Using these several sources of information, we arrived at the results published in the following table.

Table 11. Standard Hours of Work per Week at Metal Manufacturing and Engineering Works 1860—1914.

Year	Concerns represented in the present enquiry	According to the Board of Trade's enquiry	Estimated hours of work	Year	Concerns represented in the present enquiry	According to the Board of Trade's enquiry	Estimated hours of work
1860	71	—	70.0	1890	61	63.5	64.0
61	71	—	69.8	91	61	63.1	63.6
62	71	—	69.7	92	60	63.1	63.3
63	71	—	69.5	93	60	62.8	63.0
64	71	—	69.4	94	60	62.8	62.7
65	71	—	69.2	95	60	62.8	62.4
66	71	—	69.1	96	60	62.4	62.1
67	71	—	68.9	97	60	62.5	61.7
68	71	—	68.8	98	60	61.5	61.3
69	71	—	68.6	99	60	61.3	61.0
1870	71	—	68.4	1900	59	60.6	60.6
71	71	—	68.3	01	59	—	60.2
72	71	—	68.1	02	58	—	59.8
73	71	—	67.9	03	58	—	59.4
74	70	67.0	67.7	04	58	—	58.8
75	68	66.9	67.6	05	58	—	58.6
76	68	66.3	67.4	06	58	—	58.1
77	68	65.9	67.2	07	58	—	57.7
78	68	65.1	67.0	08	57	—	57.3
79	68	62.6	66.8	09	57	—	56.9
1880	67	64.2	66.5	1910	57	—	56.5
81	67	64.6	66.3	11	57	—	56.2
82	67	64.7	66.1	12	57	—	55.7
83	67	65.1	65.9	13	57	—	55.4
84	67	64.2	65.7	14	57	—	55.0
85	64	64.2	65.4				
86	64	63.4	65.1				
87	63	63.2	64.8				
88	62	63.2	64.5				
89	62	63.7	64.3				

With the aid of the results shown above, the trend of the average hourly earnings has been calculated by dividing the average annual earnings (the index number) for the entire country by the hours of work per week $\times 50$. The short-time variations will obviously often be misleading because of the large variations that occur in the hours of work *per annum* (overtime, suspension of work, etc.). Now, we find that the hourly earnings' series runs on the whole parallel to the annual earnings' series, although with a different secular trend, whereas in reality its course is undoubtedly more regular.

The Calculation of Averages, Components and Weights.

Table 10 shows the averages of annual earnings in 1) concerns in Eskilstuna, 2) other concerns, 3) all concerns as a whole.

The average for *the Eskilstuna industry* relates to 8 concerns, and covers a maximum of 14 series, though the number varies considerably. For the years 1868—1874, the average comprises only 1 series (4 file-cutters from C), for 1876 are added 2 series from A and for 1878 2 series from B. In 1882, a series of locksmiths from E is included and in 1886 2 series from H (tool-makers and smiths), so that the averages for the period 1886—1894 comprise 8 series and 39—43 workers. From 1895 2 further series are added (vice-hands and threshing-machine fitters from F), from 1903 a further 2 series (tool-makers and emery grinders from D) and from 1906 2 series from G (tool-makers and "semi-skilled" workers¹), the averages for the period 1895—1902 thus covering 10 series and 51 workers, 1903—1905 12 series and 59 workers and 1906—1910 14 series and 69 workers. After 1910, the number of series falls off, 1911—1913 being represented by 10 and the year 1914 by 8.

The different series have been allotted different weights according to the size of the concerns and the nature of the

¹ "Semi-skilled" workers in the metal manufacturing and engineering industry (= "tempo-arbetare") are such workers as have only to learn certain special hand-grips, proficiency in which can easily be acquired in three or four months.

series (number of selected workers, homogeneity, length, etc.). The series from concerns A and B and, to a lesser extent, C and F have acquired predominant importance when weighted and combined, on account of the length and satisfactory quality of the series. They have been allotted a weight total of 33, whereas the aggregate weight is 41. The index series has been adjusted so as to make it agree, within a couple of kronor, with the series of annual earnings directly computed for the period 1902—1910. The measure of agreement is very good from 1880, the maximum deviation being 5 %. From 1880 backwards the deviations widen steadily, reaching a maximum in 1874, the directly computed average being 22 % above the index number. There is a deviation between the average, and the index number even after 1910, the maximum being reached in 1913 with the index number 6 % above.

The averages for *the entire country* include, besides the Eskilstuna concerns, a maximum of 8 other concerns and 14 other series. In the following comments, the averages for Eskilstuna are denoted by "the Eskilstuna-series", those for other concerns by "the outside-of-Eskilstuna-series", and those for the entire country by "the all-concerns-series". The number of series in the Eskilstuna-series is indicated in brackets. During the period 1860—1875, the outside-of-Eskilstuna-series comprises 3 series and 12 selected workers only; the all-concerns-series comprises 4 series and 16 selected workers. In 1876, there is added to the outside-of-Eskilstuna-series one series from concern R, in 1880 2 series from concern M and in 1883 one series from N. During the period 1876—1877, the all-concerns-series represents the average of 7 series (4) and 42 workers, in 1878—1880 9 series (4) and 50 workers, in 1880—1884 11—13 series (6—7) and 52—57 workers. From 1885 onwards 3 series are added from I and from 1887 2 series from S in the outside-of-Eskilstuna-series, thus making the all-concerns-series in 1886 comprise 18 series (10) and 96 workers, and in 1887—1894 20 series (12) and 116 workers. In 1895 and 1898, 2 series are added from K, but as these

comprise all the workers engaged in the respective occupations (tool-makers and pressers) the number of workers involved is not taken into account. During the period 1895—1902 the all-concerns-series comprises 23—24 series (13—14), and in 1903 26 series (14) and 130 workers. From the year 1904 the series from L, and from 1906 those from I, drop out. From 1906 to 1909, the all-concerns-series average is based on 22 series (8) and 105 workers, of which 69 belong to the Eskilstuna concerns. From 1910 onwards, series from concerns M and N only are represented in the outside-of-Eskilstuna-series, while in the all-concerns-series there are 13 series (no less than 10 of which are from the Eskilstuna concerns) and 50 workers.

The concerns A, B, I, L and M are included in the averages with comparatively large weights representing a weight of 59 out of an aggregate weight of 105. Only such averages as have been corrected with the aid of the chain index are published. The index series has been adjusted to be uniform with the direct 1904 averages for both the outside-of-Eskilstuna-series and the all-concerns-series. In 1885—1904, the index numbers and direct averages agree very closely as far as the outside-of-Eskilstuna-series is concerned, the maximum difference being 3.5 %. During the period 1860—1879 the index curve lies below the average curve by a constant percentage of about 7, whereas after 1904 the index curve lies about 10 % above the average curve. As regards the all-concerns-series, there is a very close agreement between index numbers and direct averages during the period 1880—1914, with a maximum difference of 5 % and the index curve generally about 2 % above. From 1860 to 1879, the index curve lies below the average curve at a constant percentage of 8.

The three series of averages in Table 10, thus commented on, follow one another very consistently. If the averages for 1873 represent 100, the following index numbers are obtained:

	1873	1888	1902	1910
The Eskilstuna-series	100.0	104.2	153.2	191.6
The outside-of-Eskilstuna-series	100.0	98.8	144.7	178.6
The all-concerns-series	100.0	100.2	146.7	181.9

The similarity of the trend is evident from the last three lines of the table on page 126. The only period during which the series show any marked difference is 1886—1891. The Eskilstuna-series reaches its maximum height in 1891, but the outside-of-Eskilstuna-series does so as early as 1889. The Eskilstuna-series rises 30 % between 1886 and 1891 and the outside-of-Eskilstuna-series 17 % between 1887 and 1889, though by 1891 it has fallen 4 %. The course thus followed by the Eskilstuna-series is due largely to the particularly strong rise in wages at concern A between 1890 and 1891. During the period 1903—1907, the outside-of-Eskilstuna-series shows a far stronger rise in wages than the Eskilstuna-series, chiefly on account of concern M. The Eskilstuna-series, moreover, attains a somewhat higher value in 1908 (1.4 %). After 1910 the course is far more irregular, particularly in the case of the outside-of-Eskilstuna-series, which is then an average of three series only.

Kinetic Dispersion.

We may determine how far the trend of the annual earnings is reliable by comparing the percentage change in wages for the different series on which the averages of annual earnings, published in Table 10, are built up.¹

Starting with the Eskilstuna-series, periods of interest from the cyclical point of view have been selected for purposes of comparison, namely 1877—1879, 1879—1881, 1888—1891, 1895—1900, 1900—1901, 1901—1908, 1908—1910, in all of which the average series indicates wage maxima or minima. Furthermore, a number of periods indicating the secular trend have been taken into account, viz. an average for the years 1880—1882 compared with

¹ The hourly earnings are disregarded, as they are worked out from the annual earnings.

an average for the years 1907—1910 (excluding 1909), and, further, the period 1895—1910. Longer periods cannot suitably be investigated, as far too few series could be taken into account.

Percentage Variations in Annual Earnings of the Eskilstuna Series between the Years stated below (+ increase, — decrease).

(The letters denote the different concerns, the figures in the same column the various series from each concern.)

	1877/1879	1879/1881	1888/1891	1893/1900	1900/1901	1901/1908	1908/1910	1880—1882/ 1907—1910	1895/1910
A 1	+ 2	+14	+43	+17	± 0	+11	+19	+ 66	+54
2	—14	+14	+48	+29	— 2	± 0	+17	+ 63	+47
B 1	—12 ¹	+26	— 4	+45	— 8	+28	— 1	+ 58	+71
2	—11 ¹	+33	+23	+30	—10	+ 3	+ 7	+ 36	+30
C	—19	+35	+36	+39	— 8	— 6	+22	+ 40	+47
D 1	—	—	—	—	—	+ 9 ¹	+38	—	—
2	—	—	—	—	—	+29 ¹	+16	—	—
E	—	—	+ 5	+22	—15	+51	— 2	+147 ⁴	+55
F 1	—	—	—	+28	—13	+37	— 4	—	+48
2	—	—	—	+44	—13	+60	— 2	—	+97
G 1	—	—	—	—	—	+17 ³	+ 7	—	—
2	—	—	—	—	—	+ 6 ³	+14	—	—
H 1	—	—	+15	—	—15	+72	+10	—	+63
2	—	—	+14	+37	—25	+48	± 0	—	+51
Average	—13	+24	+27	+31	— 8	+19	+ 9	+ 65	+56

¹ 1878/1879. — ² 1903/1908. — ³ 1906/1908. — ⁴ 1882/1910.

It will be seen from the table above that the trend of wages for some of the short periods lacks in uniformity, but this is often due to the fact that the periods chosen do not always coincide with the rising or falling periods of the individual series, which may have been shifted backwards or forwards a year or two. The decline of wages between the years 1877 and 1879 is practically uniform except for the tool-makers' series from concern A. The insignificant rise in that series is doubtless to be ascribed to the selection of workers, since there were equal numbers of workers with rising and with falling wages. The rise in wages in 1879—1881, which applies throughout — though not in a very pronounced way to A — is in general not succeeded by any

fall in the annual earnings, these latter being constant or having a gradually falling tendency towards 1885, after which the drop in wages becomes accelerated. The annual earnings are on an average 9 % lower in 1888 than in 1881, and the percentage applies pretty well throughout, although the limits of the period of falling wages vary a good deal. The minima and maxima for the different series do not entirely coincide with those for the average earnings in 1888 and 1891 respectively, which accounts for the lack of uniformity in the rise between 1888 and 1891. Thus, the series from B had already reached a minimum by 1886, the tool-makers' wage rising by 33 % up to 1889, and the smiths' by 38 % up to 1890. The rise in wages of the locksmiths in E occurs between the years 1886 and 1890, with a total rise of 29 %. Due allowance being made for these time lags, we find that a universal rise in wages of, on an average, 30 % takes place at the close of the eighties up to 1890 or 1891. After the wages have reached their peak in 1890 or 1891, there is a general wage reduction for the following year, amounting to: series A 1 12 %, A 2 16 %, B 1 5 %, B 2 13 %, E's 3 %, and C's wages, where the peak is not reached until 1892, falling 6 %; H's wages, on the other hand, drop very slightly only. Up to 1895 the annual earnings of the different series is fairly constant, but from that year (though in the case of A and B the rise first becomes pronounced in 1897) there takes place the general rise in wages that goes on until the close of the nineties, and which is of about the same extent throughout the different series. The small increase in A 1 is due to the fact that, in contrast to the other concerns, A 1's minimum and maximum wage occur in 1896 and 1899, between which years there is a rise of 30 %. The decline of wages between 1900 and 1901 is common to all series, but, as usual, it is less pronounced in A. The violent fall in blacksmiths' wages from H (25 %) is due to the fact that these workers were chiefly engaged in piece-work, and piece-work earnings are more variable than time wages. The rise of 19 % in the average annual earnings between 1901 and 1908

is apparently caused by considerable lack of uniformity in the movement of the components. This is partly due to the fact that at some of the concerns the wage maximum was reached as early as in 1907, whereupon a fall of wages generally took place up to 1908. This applies to A, where there is a rise in wages of 17 % in the case of tool-makers and 8 % in that of vice-hands between 1901 and 1907. By 1908 the annual earnings have fallen 5 % and 8 % respectively. At C there is a two months' strike in 1908. The wage maximum for that concern is reached in 1907, the wages rising 8 % as from 1901. At D, too, where the series commence in 1903, 1907 is the peak year, the rise from 1903 being 27 % and 33 %. The smaller rise shown at concern G is due to the fact that the material furnished covers only the period from 1906 onward, and the rise has accordingly been calculated as between the years 1906 and 1908. The series from H are not reliable, owing to numerous replacements of workers.

Upon consideration of the above remarks, then, we find that from the beginning of the present century until 1907 or 1908 a general rise in wages of, on an average, about 20 % took place. This was interrupted by a break in the curve in 1905 affecting several concerns (the result of a lockout in the engineering industry). This rise was succeeded, in the case of certain concerns, by a reduction of the annual earnings up to 1908, but during 1909 they fell as the result of a serious strike. Between 1908 and 1910 there was again a substantial rise in wages. The percentage for C is too high owing to the suspension of work in 1908; if instead it is calculated from 1907, it works out at 7 %. The wages of some of the concerns (E and F) were on about the same level in 1908 as in 1910, but, generally speaking, the annual earnings went on rising, although on a widely differing scale, which may be accounted for by the fact that 1908 does not represent the wage maximum for all the series. After 1910 the wages apparently had no common tendency; some continued to rise until the year 1914, some until 1912, while others fell during the period up to 1911 or 1912.

The percentages covering longer periods are on a far more constant level. An average of the annual earnings in 1880, 1881 and 1882 is compared with a similar average for the years 1907, 1908 and 1910. (The rise of 65 % in the average during this period applies not only to the percentages in the same column but has also been biased by other shorter series, which cover some part of the same period.) Moreover, in order to enable a comparison between several series, a shorter period has been selected, viz. 1895—1910. With but a few exceptions, the percentages are on a very uniform level. The relatively low figures relating to series B 2 (blacksmiths) are probably due to special causes (see monograph). The substantial rise (147 %) in the wages of the locksmiths (E), as calculated between the years 1882 and 1910 is no doubt due mostly to the fact that during the eighties their level of wages was comparatively very low. They earned between 500 and 600 kronor *per annum*, whereas the workers in other concerns earned wages varying between 700 and 1000 kronor; as the table shows, the greater part of the process of adjustment took place prior to 1895. The abnormal rise shown in F 2 (threshing-machine fitters) is due mainly to deficient material.

In order to be able to judge the reliability of the variations in the *average for all concerns*, we have in part selected periods other than those applied to the Eskilstuna industry, coinciding with the more pronounced maximum and minimum points of the wage-curve. Thus, percentages have been calculated for all the series represented in the average for the periods 1871—1874, 1875—1879, 1879—1882, 1882—1886, 1886—1891, 1894—1900, 1900—1901, 1903—1907, as well as two "secular" periods, viz. — an average of the annual earnings for the years 1880, 1881 and 1882 compared with an average of the annual earnings for the years 1901, 1902 and 1903 and the period 1895—1910.

Supplementary to what has already been said concerning the Eskilstuna industry, the following observations may be made. The stronger rise shown by C during

Percentage Variations in Annual Earnings for all Series between the Years stated below (+ increase, - decrease).

(The letters denote the different concerns, the figures in the same column the various series from each concern.)

	1871/1874	1875/1879	1879/1882	1882/1886	1886/1891	1894/1900	1900/1901	1903/1907	1880—1882/ 1901—1903	1895/1910
A 1	—	+ 5 ¹	+ 8	+ 1	+31	+17	± 0	+14	+41	+54
2	—	-17 ¹	+15	+ 1	+50	+27	+ 2	+ 7	+52	+47
B 1	—	—	+23	-15	+11	+44	- 8	+10	+33	+71
2	—	—	+35	-14	+35	+25	-10	+ 8	+27	+30
C	+45	-18	+37	-24	+24	+49	- 1	+ 1	+40	+47
D 1	—	—	—	—	—	—	—	+27	—	—
2	—	—	—	—	—	—	—	+33	—	—
E	—	—	—	+11	+26	+29	-15	+35	+89 ⁷	+55
F 1	—	—	—	—	—	+28 ⁴	-13	- 3	—	+48
2	—	—	—	—	—	+44 ⁴	-13	+32	—	+97
H 1	—	—	—	—	+27	+16	-15	+54	—	+63
2	—	—	—	—	+21	+45	-25	+27	—	+51
I 1	—	—	—	—	- 4	+56	- 7	—	+57 ⁸	—
2	—	—	—	—	+42	+50	+ 3	—	+64 ⁸	—
K 1	—	—	—	—	—	—	+ 1	+30	—	—
2	—	—	—	—	—	+37 ⁴	+ 4	+26	—	—
L 1	+12	-25	+23	- 3	- 5	+41	+ 3	—	+25	—
2	+20	-23	+ 7	+ 7	- 8	+25	- 8	—	+46	—
3	+28	-37	+34	- 6	-12	+32	-13	—	+19	—
M 1	—	—	+44 ⁸	± 0	+ 1	+33	- 2	+55	+42	+72
2	—	—	+33 ⁸	+ 4	+ 5	+34	+14	+68	+82	+86
N	—	—	—	—	—	+22	+ 1	+13	—	+34
R	—	- 8 ¹	+18	- 2	+ 7	+21	-18	+38	+19 ⁸	—
S 1	—	—	—	—	± 0 ⁸	+21	- 9	+ 2	—	—
2	—	—	—	—	+12 ⁸	+18	- 5	+ 6	—	+36
<i>Average for concerns in:</i>										
<i>Esikilstuna</i>	+45	-13	+23	-10	+30	+32	- 8	+11	+40	+56
<i>Elsewhere</i>	+20	-25	+30	- 6	+ 9	+36	- 3	+36	+51	+59
<i>Entire country</i>	+26	-20	+26	- 8	+17	+35	- 5	+21	+46	+58

the period 1871—1874 is somewhat doubtful owing to the heterogeneity of the material (see further monograph C, p. 397). The fall in wages up to 1879 applies practically throughout to concern A. The less pronounced fall in R is due to the fact that there the decrease in wages occurred in 1876—1878 and amounted to 17 %, but sub-

¹ 1876/1879. — ² 1880/1882. — ³ 1887/1891. — ⁴ 1895/1900. — ⁵ 1885/1904. — ⁶ 1880/1901. — ⁷ 1882/1903.

sequently the annual earnings rose 10 % up to 1879. The annual earnings in all the series rise after the year 1879, but not invariably up to 1882, there being a variation generally between 1881 and 1884, though no marked maximum is reached in any particular year. The less pronounced rise in L 2 (joiners) is due to the interruption in the rise in 1881, though the rise was resumed and continued up to 1884, the total increase being 16 %. The fall of 8 % between 1881 and 1886 is general throughout the series. This is due to the fact that the fall in wages was reckoned from the year 1882, whereas the wage maximum year varied considerably. In the case of A this does not occur until 1887 (and even then it is not very marked), after which both series suffered an average fall of 9 %. The wages in E show strong variations from year to year, though on the whole there is a marked tendency to rise even in the eighties. L 2 likewise shows a rise in wages during this period, but here the maximum is reached in 1884, and the annual earnings fall 6 % up to 1887. Generally speaking, then, a slight fall in the annual earnings occurred in the middle of the eighties. The wage maximum reached in 1891 does not apply to all series. With regard to the Eskilstuna concerns, maximum points are reached, as pointed out above, in each of the years 1889, 1890 and 1891. The maximum for I 1 was already reached by 1889, a rise of 17 % having taken place from 1886. As to L 1, the annual earnings touch their highest level in 1890, and those of L 2 and L 3 in 1889, the rise from 1887 representing 14, 17 and 27 % respectively. M's highest level is reached in 1888—1889, with a rise from 1885 of 13 %. The annual earnings of the workers at R reach a low record in 1887, between which year and 1890 there occurs a rise of 22 %, this rise continuing uninterrupted, though at a considerably reduced pace, up to 1895. The rise in wages during the latter half of the nineties is strongly marked in all series, the percentages being fairly consistent. There are some exceptions to the general reduction of wages that takes place in 1900—1901, but they are unimportant, except for the rise of 14 % shown by

M 2, due apparently to an increased amount of piece-work and overtime. As to the rise that takes place between 1903 and 1907, it may be observed that it applies to all series, although sometimes the phase in which it occurs differs slightly; quantitatively, however, the strength of the rise varies considerably. The wages of the selected workers from C are constant during this period. F 1 experiences a fall of 4 %, due to a break in 1907; during the period 1903—1908 the annual earnings go up 17 %. In series M 1 the rise in wages continues until 1908, a total rise of 73 % being recorded as from 1903.

The percentages covering the "secular" periods show an even distribution, apart from the above-mentioned peculiarly divergent course taken by E and the doubtful series F and M 2, which exhibit wider deviations from the average. These series, it should be noted, are not weighted heavily in the combined average.

Finally, the following figures show the dispersion in absolute height of the different series around the averages. In 1884, 13 series are represented in the average for the whole country (the figures below apply throughout to the all-concerns-series). Of these 13 series, 9 fall within a 15 % deviation from the average. The lower and upper limits are represented by 505 kronor (E) and 990 kronor (C). By 1894, the number of the series has increased to 18, and of these 11 fall within a 15 % deviation from the average, and 15 within a 20 %. The wages vary between 682 kronor (S 2) and 1 314 kronor (I 2). Out of the 22 series included in 1904, 10 fall within a 15 % deviation, but 18 series fall within a 25 % deviation. The limits are marked by 896 kronor (S 2) and 1 601 kronor (K 2), that is to say, as in 1894, by a concern situated in the provinces (Gunnebo) and one in Stockholm (L. M. Ericsson). In 1910, the series number is 20, of which 13 show less than a 15 % deviation from the average and 16 less than a 25 %. The lowest annual wages here are 966 kronor (S 2) and the highest 2 051 kronor (D 1).

The annual earnings of the different series thus show a fair degree of concentration around the average.

Comparisons with other Wage Data.

In order to determine how far the averages afford a conception of the mean wage level for the whole country some further information may be derived from other sources.

The enquiry, cited above, by the Board of Trade into the engineering industry in Sweden¹, covers the year 1898 as to Part I and the year 1901 as to Part II. From Table 24 (Pt. I) and Table 25 (Pt. II), which give the average annual income of adult full-time workers (yearly workers) engaged on certain skilled specialized work and different kinds of labour, we have selected certain occupations (moulders, smiths, sheet-metal workers, engine-fitters, machine-workers, joiners and carpenters), the averages of which are comparable with the averages in Table 10. The average annual earnings in respect of 3 274 skilled workers throughout the country in 1898 was 981 kronor, and for 3 651 skilled workers in 1901 1 081 kronor, while the corresponding figures in Table 10 are 1 097 kronor and 1 163 kronor. The averages in Table 10 are thus in 1898 11.8 % above, and in 1901 7.6 % above, the averages according to the Board of Trade enquiry. The difference is doubtless due largely to the different localization of the concerns that are represented in the two averages. If the figures for Eskilstuna alone are compared, a better agreement is obtained. In 1898 207 skilled workers in Eskilstuna earned on an average 1 145 kronor, and in 1901 they earned 1 175 kronor, according to the Board of Trade's investigation. The corresponding figures according to Table 10 are 1 203 kronor and 1 193 kronor, i. e., they exceed the Board of Trade's figures by 5.1 and 1.5 % respectively. It is hardly worth while comparing the development of wages between these two years, as the latter investigation is concerned with entirely different enterprises in each of the two years in question.

The extensive wage material accumulated by the Swedish Engineering Works Association has been compiled for the

¹ See note 1 on p. 116.

present investigation in a manner described in detail in Chapter XIII, p. 269, and covers the years 1903—1925. Here, the type of skilled workers chosen has been tool-makers, machine-workers, moulders, vice-hands and sheet-metal workers. The annual earnings have been compiled in respect of the years 1904, 1906 and 1910—1925, with the exception of 1920. No investigation was made into the hourly earnings in 1907. The figures reproduced here for purposes of comparison are the average annual earnings and average hourly earnings of the entire country during the period 1903—1914. These averages refer only to a limited number of concerns and occupations. Averages covering all workers employed in concerns that were members of the Swedish Engineering Works Association have been calculated by the Association from 1910 onwards. The results as far as regards skilled workers are published in the following table.

Year	Hourly earnings			Annual earnings	
	According to the Swedish Engineering Works Association's statistics	Selected workers from the Swedish Engineering Works Association's statistics	According to Table 10	Selected workers from the Swedish Engineering Works Association's statistics	According to Table 10
1903 . . .	—	40.5	40.5	—	—
1904 . . .	—	41.9	44.0	1101	1294
1905 . . .	—	38.0	45.5	—	—
1906 . . .	—	42.6	46.9	1191	1362
1907 . . .	—	—	50.3	—	—
1908 . . .	—	47.3	50.6	—	—
1909 . . .	—	46.7	52.0	—	—
1910 . . .	49.4	46.9	53.2	1314	1504
1911 . . .	49.8	48.4	55.0	1332	1546
1912 . . .	51.5	50.9	56.8	1454	1582
1913 . . .	53.7	50.7	56.2	1487	1557
1914 . . .	55.6	53.7	55.8	1533	1535

Between 1904 and 1910, the hourly earnings in the second column rose 12 % and the hourly earnings in the third column 21 %. The corresponding percentages for the annual earnings in the two last columns work out at 19 % and 16 % respectively. After 1910, as has been pointed out above,

the figures in Table 10 are doubtful. The percentage increases between the years 1910 and 1914 represented by the hourly earnings as per the three first columns work out at 13 %, 14 % and 5 % respectively, while the percentages representing the annual earnings in the two last columns are respectively 17 % and 2 %.

The first point to note is that the hourly and annual earnings recorded by the Association do not directly correspond to one another, as the enquiry made into the hourly earnings involved a far greater number of concerns, so that it is not possible to determine from the ratio between annual and hourly earnings to what extent the working hours were shortened. Further, the material furnished by the Association deals with different concerns from those represented by the data on which the results in Table 10 are based. In the averages given in the second and fourth columns Stockholm and Gothenburg works predominate, while there are no Eskilstuna works concerned in the enquiry into annual earnings, one however being represented in the averages of hourly earnings. On the other hand, the Eskilstuna concerns predominate in the third and fifth columns. Nevertheless, the close agreement between the different columns in the table above in the years 1903 and 1914 is striking.

CHAPTER VI.

STONE, CLAY AND GLASS.

THE production within this industrial group is of such a heterogeneous character that a common treatment of wage data would be of little value and the computation of a general average of earnings for the whole group misleading. This is especially the case when, as in the present enquiry, wage material has not been obtained from a large number of concerns covering the whole field but is restricted to a comparatively small part of the industry.

We have confined our study to a few (6) of the more important and representative establishments for which a large body of wage material has been collected, and, the results are presented in special monographs.

The concerns selected are engaged in the following branches of industry: coal mining and brickworks (Höganäs-Billesholm); lime quarries, cement works and brick kilns (Scanian Cement Works [Annetorp limestone quarries, Limhamn cement works, Lomma cement and brick works] and the Klagstorp limestone quarries and cement works), china manufactory (Gustavsberg) and the glass industry (Kosta glass works and Eda glass works). We have unfortunately not been able to obtain data from the most important branch of the group, the quarrying, rough-hewing and crushing of stone, which in 1913 employed close on 30 % of the total number of workers in these industries. Three of the concerns are situated in Skåne (Scania), one in Småland, one in the neighbourhood of Stockholm and one in Värmland.

As the concerns in question appear to have but little in common in the way of either raw materials, technical processes, products, localization or markets, it seems hardly worth while computing a common average for them all.

By way of summary the following table shows the percentage variations of the annual earnings computed for the concerns in question between the years in which common wage-movements of a more striking nature took place, and also periods of some length.

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease).

	1870/ 1877	1877/ 1879	1896/ 1899	1896/ 1907	1901/ 1907	1865/ 1905
<i>Höganäs-Billesholm</i>						
Hervers	+ 98	—24	+31	+94	+27	+150
Hauliers	+138	— 9	+63	+44	— 8	+189
Brickmakers	+ 74	—32	+ 9	+37	+21	+112
<i>Scania Cement Works</i>	—	— 2	+39	+71	+30	—
<i>Gustavsberg China Factory</i>						
Potters	+ 29	—25	+24	+50	+26	+ 84
Oven-men	+ 28	—40	+24	+38	+22	+ 65
Outdoor workers	+ 41	—17	+33	+60	+26	+ 45
<i>Kosta Glass Works</i> ¹	+ 23	—24	—	—	+15 ²	+ 80
<i>Eda Glass Works</i>	—	—	— 5	—	—	—

Generally speaking, we find that wages move in the same direction during the periods chosen and along lines which are comparable with other branches of industry. The degree of variation, however, differs very considerably even within the individual concerns. Above all, the percentages covering the longest period (1865—1905) show a strong dispersion. The wide dispersion in the trend of the series is also a good reason for not computing a common index for the concerns investigated in this industrial group.

The wage series belonging to these industries will therefore, as already mentioned, be found in the monographs on the different concerns pp, 407—435.

¹ The averages for different occupations at Kosta are not published here, owing to the extremely wide divergence in the trend of wages, shown by the different occupations in their relation to one another.

² 1902/1907.

CHAPTER VII.

WOOD PRODUCTS.

THE concerns represented in this industrial group belong chiefly to the sawmill industry. From this industry material has been collected relating to 22 works; from other branches within the industrial group in question material has been obtained for a few isolated concerns only. The present chapter will therefore deal mainly with the sawmill industry, this being not only the best represented but also incomparably the most important branch within the group.

The Water-driven Sawmills.

The water-driven sawmills will be treated only in monographs, partly because of the different technical conditions under which they work, and partly owing to the difference in their geographical location.

The water-driven sawmills have been gradually losing their importance as a factor in the industry, and during the later decades those in operation were few and generally of little account. In most cases they were run for a part of the year only, so that the wages earned at these sawmills cannot be compared with the earnings of workers at other mills.

Moreover, geographically the water-driven mills stand in a category by themselves. Only a very few of them have been situated in Norrland, the centre of the modern sawmill industry; most of the more important water-driven mills have been located in Central Sweden, in many instances being run in conjunction with some ironworks.

The water-driven sawmills from which wage data have been collected and commented on in special monographs below are the following:

	<i>County:</i>	<i>Years:</i>
A. Hellefors	Örebro	1865—1910
B. Mo	Västernorrland	1864—1878
C. Robertsfors	Västerbotten	1880—1909
D. Silvhytteå-Stjernsund	Kopparberg	1865—1907

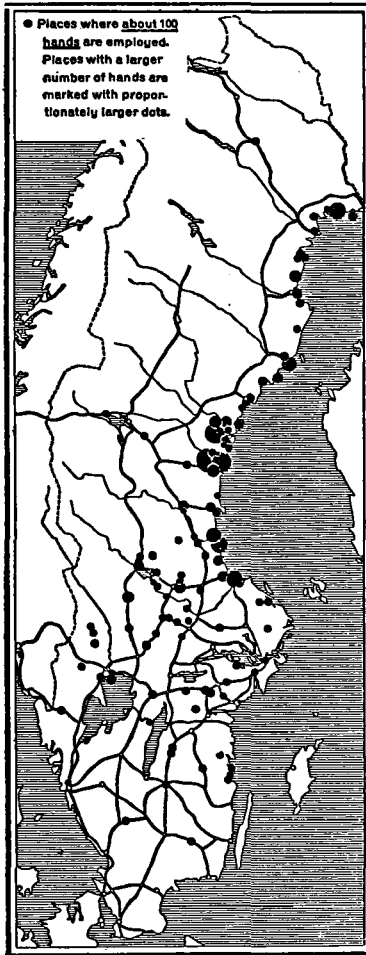
No common average has been worked out for these mills. Owing to the seasonal character of their production the series are generally speaking not of much value.

The Steam-driven Sawmills.

The more important and modern part of the sawmill industry thus consists not of the water-driven but of the steam-driven sawmills. The introduction of the steam-sawmill around 1850 marked the beginning of modern technique in the sawmill industry, which was one of the essential factors in the subsequent development of this industry and its central position in Sweden's industrial life. The industrial revolution in Sweden during the sixties and the seventies was closely bound up with this development of the sawmill industry which very soon became Sweden's most important export industry.

It was not only the above-mentioned technical changes in production but also the abolition of internal legal restrictions and of export duties, as well as the general international growth of the free trade movement, especially in England, where the increase in the import of wood products was remarkable, that led in the beginning of the sixties to the foundation of the Swedish sawmill industry as a modern large-scale export industry. Moreover, the lowering of the costs of transport made it possible to exploit the rich natural resources in Sweden's forests, especially those in the northern parts of the country.

This rapid development of the Swedish sawmill industry, which started, as we have just said, in the sixties, reached its height in the beginning of the seventies, being interrupted by the crisis of 1874—1875 and the still more serious setback in 1879. The eighties witnessed a further expansion, and during the nineties production reached the scale that it has maintained ever since.

The Sawmill Industry. 1924.

The technical processes that were developed at the sawmills in the course of the seventies and eighties remained more or less unaltered until the first decade of the present century, when, *inter alia*, speedier and finer-bladed sawframes were introduced and more highly technical apparatus came to be employed in the timberyards. Also the technical processes used in the various occupations do not appear to have altered appreciably after the seventies. As to earlier years, the reader is referred to the monograph on the Sund Works (p. 453).

Selection of Concerns.

Throughout the entire period the Swedish sawmill industry has been concentrated for the most part in Norrland, and it is in that part of Sweden that the majority of the important steam-sawmills are established. In 1913, according to the Board of Trade's report on industry, the number of workers engaged at the Norrland sawmills represented 56 % of the aggregate number of workers in the sawmill industry, which in its turn comprised about 12 % of all the industrial workers in Sweden.¹ In contrast to the sawmills in the rest of the country, those in Norrland have produced primarily for export, the value of the timber exports from Norrland representing during the period under review 70—80 % of the entire value of the Swedish export of timber.² Moreover, the sawmill industry, in conjunction with the allied cellulose industry, has been the dominant factor in the industrial life of Norrland. As far as wage conditions are concerned, therefore, the steam-sawmills of Norrland form a suitable unit, and our enquiry into the wages at the sawmills has been confined to them. There are two steam-sawmills of importance in adjacent provinces, represented by one or two brief wage series, and these have appropriately been grouped with the steam-sawmills of Norrland.

¹ *Industri*, published by the Board of Trade in Sveriges officiella statistik.

² *Handel*, published by the Board of Trade in Sveriges officiella statistik.

The following concerns are represented in the study of the wages at steam-driven sawmills during the years stated below.

	<i>County:</i>	<i>Years:</i>
E. Domsjö	Västernorrland	1882—1925
F. Lugnvik	"	1876—1914
G. Skönvik	"	1889—1913
H. Sund	"	1862—1910
I. A medium-sized sawmill situated on the river Ängermanälven, Härnösand shipping district	"	1867—1914
K. A medium-sized sawmill, Härnösand shipping district	"	1890—1913
L. Ala	Gävleborg	1870—1910
M. Domnarfvet	Kopparberg	1903—1910
N. Furuögrund	Västerbotten	1899—1913
O. One of the largest Swedish sawmills	Gävleborg	1890—1926
P. Mo	Västernorrland	1881—1893
Q. Nyvik	"	1884—1908
R. Salsåker	"	1900—1910
S. Skutskär	Uppsala	1903—1911
T. Stenmyran	Västernorrland	1890—1910
U. A large sawmill, Härnösand shipping district	"	1894—1899
V. A medium-sized sawmill, Sundsvall shipping district	"	1883—1909
X. A medium-sized sawmill on the coast	Västerbotten	1891—1914

Selection of Occupations.

The following are the principal occupations at the sawmills. Sorters or measurers sort out the timber for various uses before it is conveyed to the saw (skilled work). Sawyers have a highly skilled job, which consists of ensuring that during the process of sawing as many boards as possible can be got out of each log. Sawyers' helpers assist the sawyer in inserting and withdrawing the timber etc. at the saw-frames (semi-skilled work). Edgers and edgers' helpers have a task similar to that of the two last-mentioned occupational categories (highly and semi-skilled work respectively). Sorters (from the sawmill) sort the planks, when sawn, for further treatment (semi-skilled work). Plank-, board- and waste-carters and slab-drawers convey the products and waste from the mill (unskilled work). Plank-pilers or pile-makers have very heavy unskilled work to perform, carrying planks up on to the wood-

piles in the timberyards. Special physical qualifications are required for this job. At some concerns these workers actually receive higher wages than the sawyers, and, in view of the peculiar nature of the occupation, they are not directly comparable with unskilled workers in other industries. Adjusters see that on leaving the mill the boards are of certain standard dimensions and firstclass quality (skilled work). Plank-loaders are typical unskilled workers who load the boards on to vessels. They are employed in their occupation during the shipping season only.

It is customary to distinguish between the sawmill and the timberyard, although certain occupations are concerned sometimes with the one and sometimes with the other department. This differentiation however does not appear to be of essential importance from the point of view of wages, so that generally speaking we have disregarded it, considering only the quality of the work performed. As representatives of each of the two categories skilled workers and unskilled workers, we have selected one occupation, for which series have been worked out for all concerns wherever it has been possible to do so. These series have also served as a basis for calculating the average of each individual concern. Where the material has permitted, series have also been worked out relating to other occupations within the industry, but it is only in the case of a few concerns that the majority of the occupations has been represented. These are embodied, together with the typical occupations, in an average of all workers combined. The sawyers' occupation has been selected to represent the skilled workers, but the averages comprise also a couple of series showing the earnings of edgers, whose job is very similar to that of the sawyers. The plank-pilers' occupation has been selected to represent the unskilled workers. These two occupations have been chosen in consideration of the fact that they existed at all sawmills throughout the entire period, also because the workers are to a fairly large extent employed throughout the year and their qualifications are practically the same during the entire period. It would certainly have been of interest to compare the trend of

wages of skilled workers with that of unskilled workers of a more normal type, but, from the points of view just mentioned, the other unskilled occupations do not lend themselves to any comprehensive analysis.

Annual, Daily and Hourly Earnings at the Sawmills.

The series of averages for the sawmill-workers cover annual and daily earnings. The annual earnings series includes only those workers that have been employed at the sawmills the whole year round. The season and seasonal earnings (see below p. 148) have been dealt with only in the case of a couple of concerns, which have been able to submit a particularly large body of material; this is discussed in the monographs on concerns E and I. Daily earnings can as a rule be calculated directly from the primary dates, or else it has been possible in some cases to estimate them with a fair degree of reliability. As a matter of fact, particulars regarding earnings are generally recorded week by week, so that when necessary it has been possible, to make an approximate estimate of the days of work operative for the individual workers by comparing different wage periods and different workers. In some series the only known factor is the standard daily earnings on sawmill work, in others, again, we know only the total daily earnings, including, that is to say, extra wages earned outside the workers' regular employment, while in a few cases both are known. An average has been struck for each of these series. Finally, we have obtained a series of averages for hourly earnings by dividing the average of standard daily earnings by the daily hours of work, computed approximatively with the aid of data published in the official statistics. These computations are published below in Table 12, where more detailed information is given concerning the hours of work.

It will be seen from the scattered data that are available concerning the wages at the sawmills prior to the eighties, and which are reproduced in Table 12 and in the various monographs, that a substantial rise in wages occurred during the first half of the seventies. This rise was interrupted by the crisis that developed in the sawmill in-

Table 12. Annual (in kronor), Daily (in kronor) and Hourly (in öre) Earnings of Workers in the Sawmill Industry 1867-1914.¹

Year	Annual earnings			Total daily earnings			Standard daily earnings			Standard hourly earnings		
	Sawyers	Plank- pliers	All workers combined	Sawyers	Plank- pliers	All workers combined	Sawyers	Plank- pliers	All workers combined	Sawyers	Plank- pliers	All workers combined
1867	544											
68												
69	699											
1870	689			3.20			4.17			35.3		
71	743			3.01			3.86			33.6		
72	850			3.20			4.36			38.2		
73							4.74			41.6		
74	970									55.4		
75	787						4.01			35.5		
76	820			3.13			4.18			37.0		
77	853			3.54			4.53			40.1		
78	806			3.34			3.90			34.8		
79	540			3.08								
1880	727			2.98			2.74	2.76		24.7	24.9	
81	624			3.19			3.02	3.10		27.2	27.9	
82	717			2.98			3.43	2.93		30.9	26.4	
83	684			3.09			3.28	3.05	3.05	29.8	27.7	27.7
84	709		690	2.90			3.06	3.00	2.94	27.8	27.3	26.7
85	689		679	2.82		2.68	3.14	3.08	3.02	28.5	28.0	27.5
86	689	825	668	2.78	3.41	2.63	3.04	3.01	2.92	27.6	27.4	26.5
87	702	786	668	2.79	2.96	2.56	3.00	2.89	2.84	27.3	26.3	25.8
88	719	847	698	2.87	3.13	2.68	3.10	3.02	2.97	28.2	27.5	27.0
89	852	933	809	3.25	3.53	3.08	3.37	3.33	3.14	30.6	30.3	28.5
1890	820	856	744	3.09	3.26	2.85	3.17	3.24	3.01	28.8	29.5	27.4
91	787	855	731	2.99	3.19	2.82	3.11	3.20	2.97	28.3	29.1	27.0
92	772	858	727	3.00	3.10	2.83	3.23	3.30	3.08	29.4	30.0	28.0
93	795	907	753	3.05	3.39	2.93	3.17	3.28	3.05	29.1	30.1	28.0
94	829	928	775	3.08	3.45	3.00	3.25	3.32	3.12	29.8	30.5	28.6
95	814	929	773	3.09	3.41	2.98	3.22	3.29	3.07	29.8	30.5	28.4
96	858	994	814	3.20	3.65	3.07	3.39	3.35	3.20	31.7	31.3	29.9
97	866	945	813	3.30	3.60	3.14	3.40	3.62	3.29	32.1	34.2	31.0
98	872	1036	846	3.23	3.70	3.13	3.49	3.82	3.36	33.2	36.4	32.0
99	922	1035	879	3.30	3.56	3.17	3.52	3.81	3.48	33.8	36.6	33.5
1900	958	1115	910	3.46	3.89	3.34	3.63	4.01	3.56	35.2	38.9	34.6
01	941	1038	886	3.44	3.80	3.30	3.50	3.76	3.44	34.0	36.5	33.4

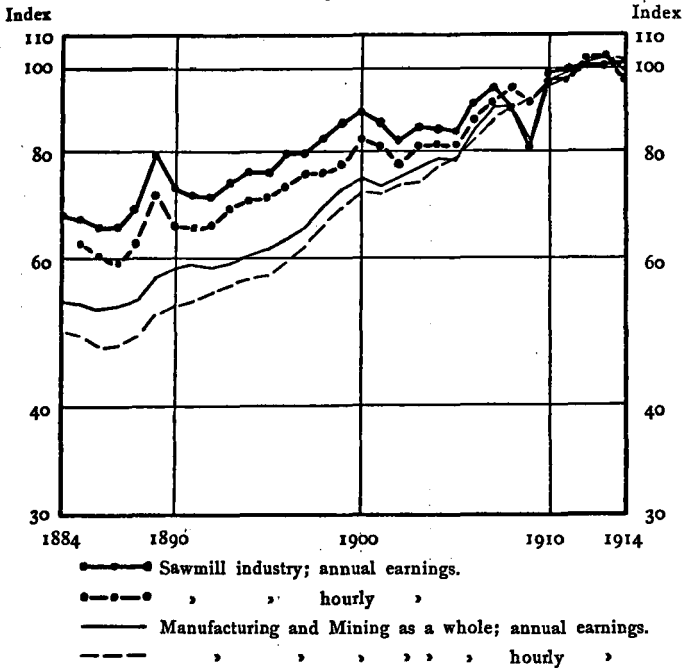
¹ The series in Table 12 have been obtained by means of an extended use of the chain index method; when no components have been common to the averages for two years in succession, the index has been corrected by finding the relation to the index for subsequent years in respect of those components that occur in the earlier of the two above-mentioned consecutive years. In the earlier years in which such a correction has been made the components are few in number, with the result that the index numbers for those years are of limited value.

Table 12 (cont.). Annual (in kronor), Daily (in kronor) and Hourly (in öre) Earnings of Workers in the Sawmill Industry 1867—1914.

Year	Annual earnings			Total daily earnings			Standard daily earnings			Standard hourly earnings		
	Sawyers	Plank-pliers	All workers combined	Sawyers	Plank-pliers	All workers combined	Sawyers	Plank-pliers	All workers combined	Sawyers	Plank-pliers	All workers combined
1902	896	975	836	3.28	3.53	3.12	3.45	3.85	3.42	33.8	37.7	33.5
03	947	1015	873	3.43	3.67	3.23	3.54	3.88	3.50	35.0	38.4	34.7
04	947	987	866	3.42	3.60	3.21	3.59	3.91	3.59	35.9	39.1	35.9
05	932	1013	862	3.42	3.70	3.21	3.60	4.02	3.62	36.0	40.2	36.2
06	994	1083	932	3.58	3.92	3.44	3.81	3.89	3.69	38.1	38.9	36.9
07	1034	1087	969	3.73	3.90	3.56	4.05	4.00	3.88	40.9	40.4	39.2
08	999	1007	917	3.94	3.92	3.67	4.00	4.05	3.88	40.8	41.3	39.6
09	890	966	828	3.80	3.87	3.54	4.00	4.10	3.87	40.8	41.8	39.5
1910	1087	1128	1015	3.99	3.94	3.74	4.05	4.36	4.04	41.3	44.5	41.2
11	1092	1150	1017	3.98	4.01	3.74	4.11	4.90	4.17	41.9	50.0	42.6
12	1075	1157	1024	4.11	4.15	3.90	4.18	5.12	4.37	42.7	52.2	44.6
13	1078	1146	1024	4.23	4.29	4.01	4.33	5.21	4.44	44.2	53.2	45.3
14	1078	1305	1031	3.92	3.96	3.72	4.37	5.37	4.53	44.6	54.8	46.2

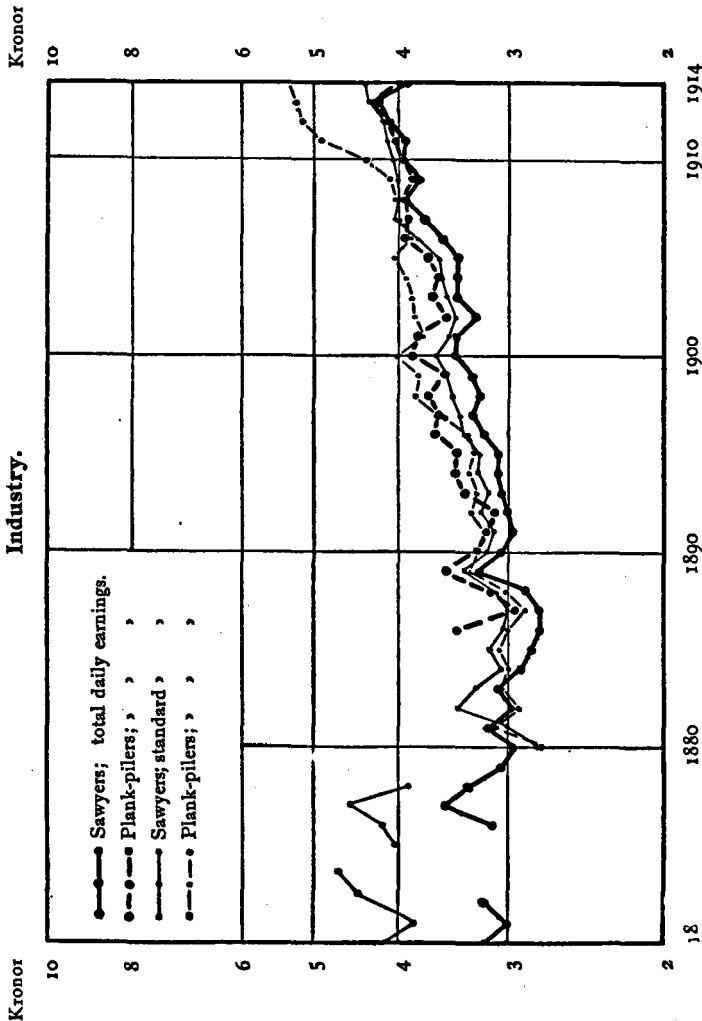
dustry towards the middle of that decade. Then followed a recovery up to 1877, though in 1877—79 there again occurred a heavy fall in wages. The depression in 1879 having passed, wages once more showed a rising tendency up to 1880, and maintained an unaltered nominal level throughout that decade. During the period 1888—1889 a sudden rise set in, representing for all workers combined 16, 15 and 6 % respectively in the annual, total daily and standard daily earnings. There was a slight reaction in 1889—1892 (10, 8 and 5 %), followed by an uninterrupted rise during the remainder of the nineties. Between 1892 and 1896 the increase in the annual earnings and the total daily earnings amounted to 12 and 11 % respectively, while the standard daily earnings rose only 4 %. In 1898—1900, on the other hand, the standard daily earnings experienced a sharp rise, whereas the other two series rose only 8 and 7 % respectively. The decline in 1900—1902 is considerable in the case of annual earnings (8 %) and total daily earnings (7 %), but less marked in the standard daily earnings (4 %). During the boom period that followed, the total daily earnings reached their peak in 1908 — one year later than

Chart 7. Annual and Total Hourly Earnings of Workers in the Sawmill Industry. (Index: 1910—1913 = 100.)



the annual earnings, while in the standard daily earnings after 1907 only a cessation in the growth is discernible. (Unlike the other averages, the standard daily earnings of the plank-pilers show some reduction in 1905—1907.) On the other hand, the annual earnings and the total daily earnings proved more variable. The rise in the different series was as follows: annual earnings 12 % (1905—1907); total daily earnings 14 % (1905—1908); standard daily earnings 7 % (1905—1907). For the whole period 1890—94/1904—08 the rise in the nominal wages of all series combined amounted to 22—23 %. Apart from the decline in annual and total daily earnings in connection with the general strike in 1909, the rise in wages during the period 1907—1909 is uninterrupted. For the annual and

Chart 8. Total and Standard Daily Earnings of Workers in the Sawmill Industry.



total daily earnings the rise in wages between the periods 1904—08 and 1910—14 represents 12 %, and for the standard daily earnings 15 %. During the 20-year period 1890—94/1910—14 the wages in the three series showed an increase of 37, 32 and 41 % respectively.

Generally speaking, the cyclical variations in the series for the standard daily wages are far less pronounced. The more distinct tendency of the annual earnings to reflect the cyclical variations may be explained by the fact that during a boom period the work at the sawmills goes on for a greater number of days in the year. Although certain incidental factors, such as weather and water conditions, may temporarily affect the length of the period during which the mills are working, it has nevertheless proved to be distinctly susceptible to cyclical variations. The greater sensitiveness to cyclical variations exhibited by the total daily earnings is due to the fact that in periods of depression they include a greater amount of lower-paid extra labour than in periods of prosperity. Repairs and improvements are generally postponed from good times to bad times.

A comparison of the trend exhibited by the different averages shows that it is very similar for skilled and unskilled labour:

Percentage Variations in Annual and Daily Earnings between the Years stated below (+ increase, — decrease).

	1888/1889	1889/1892	1892/1896	1898/1900	1900/1902	1905/1907	1890—94/ 1904—08	1904—08/ 1910—14	1890—94/ 1910—14
<i>Annual earnings</i>									
Sawyers	+18	— 9	+11	+10	— 6	+11	+23	+10	+35
Plank-pilers . . .	+10	— 8	+16	+ 8	—13	+ 7	+18	+14	+34
<i>All workers</i> . . .	+16	—10	+12	+ 8	— 8	+12	+22	+12	+37
<i>Total daily earnings</i>									
Sawyers	+13	— 8	+10 ^a	+ 7	— 5	+15 ^a	+19	+12	+33
Plank-pilers . . .	+13	—12	+16 ^a	+ 5	— 9	+ 6 ^a	+16	+ 7	+24
<i>All workers</i> . . .	+15	— 8	+11 ^a	+ 7	— 7	+14 ^b	+18	+12	+32
<i>Standard daily earnings</i>									
Sawyers	+ 9	— 6 ¹	+ 7 ²	+ 7 ⁴	— 5	+13	+20	+10	+32
Plank-pilers . . .	+10	— 3 ¹	+ 2 ²	+20 ⁴	— 4	± 0	+22	+26	+53
<i>All workers</i> . . .	+ 6	— 4 ¹	+ 5 ²	+11 ⁴	— 4	+ 7	+23	+15	+41

¹ 1889—1890. — ² 1892—1897. — ³ 1893—1896. — ⁴ 1896—1900. —
⁵ 1905—1908.

Here, manifestly, contrary to what has been the case in other industries, the secular trend of the wages of the plank-pilers, representing the unskilled workers, has not increased more than those of the skilled workers. The standard daily earnings 1904—08/1910—14 constitute an exception to this, but the index series for the plank-pilers is here based on three series only, two of which show a very substantial rise in particular during the period 1910—1912. This is clearly attributable to the fact that, as already indicated, the plank-pilers are in a class by themselves among the unskilled workers, and even at an earlier period were on a wage level equal to, or even higher than, that of the skilled workers. As to the other unskilled workers, however, considerable relative increases in their wages are observable (see the monographs).

Seasonal Variation in the Sawmill Industry.

Particularly in the early decades of the period in question the sawmill industry was a definitely seasonal industry, the season being determined by floating and shipping conditions. On the more important rivers of Norrland and on the River Dalälven the floating generally began in the middle or beginning of May and ended in the beginning of October or the middle of November. Before the construction of the present extensive system of floating-ways the floating season was still further limited owing to the fact that only the brief period of spring-floods was utilized. The shipping of timber had to cease as soon as the harbours became ice-bound, which generally occurred in November or December.

The usual practice at the beginning of the period investigated seems to have been for the sawing to be carried on during two different periods. The so-called summer-sawing generally commenced in May, when the floated timber began to arrive, continuing until the end of the shipping season. Before the freezing of the rivers, the remaining unsawn timber was rolled on to the shore, and at the beginning of the next year the second sawing period, the so-called winter-sawing, took place, continuing until some

time in April. Thus the sawing lasted for a total of nine months. In the summer production was more even and intensive and then there was often a change over to double shifts. The duration of the work in the timberyard generally followed the changes in the production at the saw.

During the shipping season in the autumn the number of workers had to be considerably increased in order to be able to finish the loading. The employment at the saw and in the timberyard thus varied considerably during the year. Seasonal unemployment was in some degree limited, by the concentration of repair jobs and casual work, to the periods when the work at the saw and in the timberyard was at a standstill. Only a small number of workers could however be employed in this way during the whole of the year. Of the seasonal workers generally only a certain number remained on the spot when they became unemployed. Most of them had their homes in the surrounding district, but it also happened that workmen from very remote parts of the country found their way to the sawmill districts during the sawing season. Some of these seasonal workers owned small farms in their native district, which were looked after by their families during their absence. Others were occupied in forestry work during the winter. Many of them returned year after year and thus constituted a regular staff of seasonal workers. They usually came to the sawmill district without having assured themselves beforehand of the possibility of getting work.

The time during which the mills were running was however gradually extended, and in the nineties the sawing went on in favourable years practically throughout the year, work being suspended for at the most one month. This development is shown in the following table, in which is published an average representing the sawing season for sawyers employed in seven concerns from which data relating to the sawing season are available, covering the years 1889—1912.¹

¹ The chain index method has been employed, the index number in 1906 being taken to equal the average. The difference between the index series and the average series is slight.

Year	Number of working days per annum	Year	Number of working days per annum
1889	191	1901	260
90	227	02	245
91	239	03	264
92	236	04	243
93	239	05	231
94	229	06	257
95	236	07	250
96	258	08	238
97	253	09	190
98	253	1910	263
99	273	11	241
1900	262	12	233

This table shows that in adverse years the sawing season was considerably shortened, as for instance in 1901, 1902 and 1905. Maxima occur one year before the corresponding maxima reached in the annual earnings, as will be seen from a comparison with Table 12.

The seasonal character of the sawmill industry was also counteracted by another development. The practice of introducing double shifts during the summer months only gradually came to an end, and nowadays where double shifts are employed the system is operative all the year round. In spite of these changes the seasonal character of the work has not yet been abolished, and the summers are still marked by more extensive and regular work. According to an enquiry published in the report of the Royal Committee on Unemployment,¹ for the years 1925—1927, the number of workmen employed at the sawmills varied on an average in the following way (the yearly average 1925—1927 = 100):

Jan.	Feb.	March	April	May	June
75.9	77.8	80.8	82.6	98.1	111.8
July	Aug.	Sept.	Oct.	Nov.	Dec.
115.6	118.1	116.9	112.9	108.8	100.2

¹ Arbetslöshetsutredningens betänkande I: Arbetslöshetens omfattning, karaktär och orsaker. Stockholm 1931, p. 340.

Hours of Work.

Particulars obtained from the different sawmills as to the number of hours of work per day are in general too scanty to be used for calculating the hourly earnings at each concern and only the average of annual and daily earnings can be regarded as quite reliable. In order, however, to make it possible to draw a comparison with other industries, a general estimate of the average number of hours of work per day has been made with the aid both of data obtained in the present enquiry and of particulars gathered from various published sources. On the whole these various data have shown very close agreement. The estimate based on them relates to the regular work at the saw and is therefore directly applicable only to the series of standard daily earnings, the rest of the series referring also to extra work, for which it is impossible to estimate the daily working time — which in any case has been very irregular. The trend of the total number of hours of work has, however, probably been the same and it has therefore been possible to use the same data in order to calculate the series of total hourly earnings for sawmill workers which is included into the general average for manufacturing and mining (Tables 1 and 3).

The first available account of the average number of hours of work at the sawmills refers to 1885. According to an enquiry of the Royal Committee of 1888 on Industrial Workers' Insurance¹ the average number of hours per day in the sawmill industry, excluding intervals for meals, was in that year 11. This enquiry embraced about 11,000 sawmill workers from 408 concerns, i. e. about 60 % of the total number of sawmill workers in Sweden. Out of 2,217 workers, 420 had a 9-hour, 421 a 10-hour, 970 an 11-hour and 285 a 12-hour working day. An estimate of the trend of hours of work during the preceding years 1865—1885 is based upon certain data obtained as a result of the present enquiry and upon the following considerations: At

¹ Arbetareförsäkringskommitténs betänkande III. Statistiska undersökningar. Stockholm 1888—89.

some concerns the work was carried on in single, and at others in double shifts. Where the men worked in single shifts, the working hours were in earlier years generally 12 *per diem*, for instance, from 6.00 a. m. to 8.00 p. m., with two hours off for meals and rest. But where they worked in double shifts, in the course of the 12-hour shift there were generally two intervals lasting altogether $1\frac{1}{2}$ —2 hours,¹ so that the working time was then only 10—10 $\frac{1}{2}$ hours *per diem*. As the working time *per diem* on double shifts was thus shorter than on single shifts and working in double shifts seems to have come more into use during the period 1865—1885, the working time must no doubt have been somewhat shortened during this period. But there is also another reason for this supposition. The hours of work varied even at the same sawmill at different seasons of the year. Thus during the winter at some mills the period was cut down to 7 or 8 hours from 10 to 12 hours in summer. As already mentioned, during the first years of the period starting from 1865, very little sawing was done in the winter. The time spent on sawing was afterwards extended more and more in the winter months. This change in the sawing season would likewise contribute towards the gradual reduction in the average hours of work *per diem* during the beginning of the period. In view of these considerations, supported by our present data, it has been found appropriate to let the series of average hours of work *per diem* decrease somewhat from 1865 to 1885.

The next statement refers to 1892,² when according to a report on the employment of children in factories the average time worked by the sawmill workers was likewise estimated at 11 hours (intervals not included). (Among the

¹ Two hours has generally been the time stated by the establishments concerned in this enquiry. According to a report from Sundsvall in 1879, however, these intervals were considerably shortened. The sawtenders used to take their meals in the sawhouse, consuming their food as quickly as they could in order to spend the time in sharpening and adjusting the sawblades etc. At I an extra piece-work wage was paid for such work, while according to the collective agreements in force at Kramfors in 1907, it formed part of the piece work done at the saw.

² Betänkande angående minderårigas användande i arbete vid fabrik, hantverk eller annan hantering. Stockholm 1892.

12,400 sawmill workers whom the enquiry concerned, about 650 workers had 9 hours, about 3,000 10 hours, about 3,000 11 hours, about 1,000 11 1/2 hours and about 4,300 12 hours.) During the period 1895—1902 there seems to have been a general shortening of the hours of work, perhaps under pressure from the trade union movement, which was just then making rapid progress. Our data show that there was a general reduction in the hours of work during this period in those concerns which in earlier years had had a particularly long working day. According to statistics published by the Sawmills and Timberyards Workers' Association in 1898,¹ the number of working hours at that time seems to have been reduced as a rule to 10 *per diem*, though in a fairly large number of cases it appears to have been 11, 11 1/2 and 12 hours. These figures are confirmed by data from 1898 obtained from the archives of Ströms works regarding a number of sawmills. From the year 1905 there are no reports quoting more than 10 hours a day. At the concerns selected for this enquiry, and according to an enquiry made by the Board of Trade² in that year, the average number of hours of work was 10, intervals not included, and 12, intervals included. Only 6 % of the workers worked for a net period of 11 hours, and hardly 1 % for more than 11 hours. In 1909 a collective agreement was reached between the Sawmills and Timberyards Workers' Association and the Sawmills Association establishing a 59-hours' working week, i. e. on an average 9.8 hours a day or 10 hours on five weekdays plus 9 hours on Saturday.³ The next period in which there is a general reduction of the hours of labour is 1917—1921. In 1917 the Sawmills Association and the Sawmills and Timberyards Workers' Association reached an agreement on the establishment of a 9 1/2 hours' average working time per

¹ Redogörelse för de norrländska sågverksarbetarnas löneförhållanden enligt uppgifter insamlade av Sågverks- och brädgårdsarbetareförbundet. Stockholm 1898.

² Arbetstidens längd inom industri och hantverk i Sverige. Arbetsstatistik A: 10. Stockholm 1911.

³ Kollektivavtal mellan Sågverks- och brädgårdsarbetareförbundet och Sågverksförbundet. Gävle 1909.

day or 7 hours on Saturday and 10 hours on the other weekdays.¹ Finally, the legal 8-hour day has been in force since 1920. By interpolation we have obtained the following series of daily working hours, which has then been applied to the averages representing the standard daily earnings in order to calculate hourly earnings.

Table 13. Estimated Number of Hours of Work at the Sawmills 1865—1920.

Year	Number of hours per day	Year	Number of hours per day	Year	Number of hours per day
1865	11.7	1885	11.0	1905	10.0
66	11.7	86	11.0	06	10.0
67	11.7	87	11.0	07	9.9
68	11.6	88	11.0	08	9.8
69	11.6	89	11.0	09	9.8
1870	11.5	1890	11.0	1910	9.8
71	11.5	91	11.0	11	9.8
72	11.4	92	11.0	12	9.8
73	11.4	93	10.9	13	9.8
74	11.3	94	10.9	14	9.8
75	11.3	95	10.8	15	9.7
76	11.3	96	10.7	16	9.6
77	11.3	97	10.6	17	9.5
78	11.2	98	10.5	18	9.3
79	11.2	99	10.4	19	9.0
1880	11.1	1900	10.3	1920	8.0
81	11.1	01	10.3		
82	11.1	02	10.2		
83	11.0	03	10.1		
84	11.0	04	10.0		

Wage Systems.

A fixed daily wage-rate seems to have been the usual form in which wages were paid in the sawmill industry in early days, but from the seventies the system of paying wages on a piece-work basis was generally adopted. The monographs on the H and I steam-sawmills contain an account of one or two different transitional forms which were

¹ Kollektivavtal mellan Sägverks- och brädgårdsarbetareförbundet och Sägverksförbundet att gälla 1917, 1918, 1919 etc. For night-shifts the maximum was fixed at 50 hours per week in 5 consecutive shifts. This agreement appears to have been conformed to by the sawmills outside the Sawmills Association.

applied in the sixties. It is estimated that nowadays on an average as much as 90 % of the wages are paid for piece-work, which takes up 85 % of the working time.¹

As to the piece-work system, there was generally fixed a certain basic piece-work rate for every 100 logs sawn at the mill. Those workers who cooperated in one way or other in the sawing of these logs received a certain percentage of this piece-work rate. Usually the wage-rate paid to sawyers was equal to the basic piece-work rate at the saw, wherefore the basic rate was also termed the sawyers' piece-work rate. This piece-work system was operative for the majority of the workers at the sawmill. In cases where the system was applied during the earlier years of the period under review, all workers had an equal share in the sawyers' piece-work rate, but in later years there was a good deal of differentiation between them. Sometimes the plank-pilers' piece-work was estimated on similar lines. In most cases, however, they were paid according to the number of boards piled, a specific wage for different dimensions. This piece-work wage was payable either to the individual worker or to a whole group (called a "gang") usually comprising 9 or 10 men, who divided the wages between them. In exceptional cases it was also a practice to pay a time-wage for regular work in the sawmills, as for instance to sorters.

During the slack season the resident sawmill-workers were, as already mentioned, partly employed on various other jobs, the payment for which was generally in the form of a time-wage. The daily earnings were then much lower than those earned at the sawing. Nevertheless, these extra earnings often represented a considerable portion of the annual earnings in the earlier years but, with the gradual extension of the sawing period over a greater and greater part of the year, they have become less important.

For overtime and extra work on Sundays or holidays those concerns that are covered by this enquiry have not at any time paid increased wage-rates either at time-wage work or piece-work.

¹ Skogsbruk och skogsindustrier i norra Sverige. Norrländskt Handbibliotek X. Uppsala 1925.

Insofar as the workers engaged in one occupation have had the same number of hours of work at the saw *per annum*, the only possible difference that may arise in their annual earnings has been a result of sundry extra earnings. Moreover, the relation between the various workers' share in the sawyers' piece-work total has in a number of concerns remained unaltered during the greater part of the period under review, so that it has been possible to limit the task to compiling data relating to certain selected occupations. The number of series presented might seem scanty considering the importance of the industry, but for the reasons given above each one of them can generally be regarded as representative of a very large number of workers.

Benefits in Kind.

As a rule, the concerns in the sawmill industry have given the workers free housing. This applies both to those concerns that have developed out of the industrial establishments of the early days and those that came into existence during the period of rapid expansion in the sawmill industry in the seventies and eighties, when the sawmills were often established in localities where otherwise no housing accommodation was available.¹ It was laid down in the collective agreement of 1907 that the benefits in kind were to be payable in money if the workers so desired. But at the concerns involved in this enquiry the workers have retained their benefits in kind even after the date mentioned.² There are indications in the reports that in some quarters in early days the dwellings were in a rather poor condition. This was especially the case in the Sundsvall district, in which barracks were erected

¹ It is stated in a report on the wage conditions of the sawmill workers in Norrland, based on statistics compiled in 1898 by the Sawmills and Timberyards Workers' Association, that all workers had free housing accommodation. Redogörelse för de norrländska sågverksarbetarnas löneförhållanden enligt uppgifter insamlade av Sågverks- och brädgårdsarbetareförbundet. Stockholm 1898.

² Even in 1919 80 % of 26,000 workers had free housing according to a report on the activities of the Swedish Sawmill Workers' Association. Berättelse över Svenska Sågverksindustriarbetareförbundets verksamhet. Gävle 1920.

to house up to 32 families, with a large number of people living in each room. Special arrangements were made for the housing of seasonal workers. In some cases the workers permanently residing in the district were obliged to take these seasonal workers into their own homes upon payment of a certain rent, a system that caused a good deal of inconvenience. In other cases the seasonal workers were housed in special barracks, where they all lived together and catered for themselves.¹ The sawmill-workers obtained free firewood, consisting of waste products from the sawmills. Up to the time when this wood waste began to be utilized for the manufacture of wood-pulp, this benefit cost the concern practically nothing. There were in addition other benefits in kind allowed, such as free medical services, special schools for the workers' children, etc. All these benefits have not been taken into account in working out the wage averages, since estimates of their value would prove extremely uncertain, and such error as may arise as a result of their exclusion is comparatively small when the kinetic method is employed.

The Calculation of Averages, Components and Weights.

The number of series and workers involved in the sawyers' averages are approximately the same in the averages of annual and daily earnings. In certain years, however, the standard daily earnings' average includes one or two more components than the other two. The number of series and the number of workers in the average of annual earnings are given below.

Years	Number of series	Total number of workers
1865—1882	1—2	3—5
1883—1888	3—4	about 8
1889	6	27
1890	8	37
1891—1909	9	about 42
1910	8	about 40
1911—1912	6	about 40
1913—1914	4	17—20
1915—1926	1	5

¹ *Treffenberg*, Arbetarestrejken i trakten av Sundsvall år 1879. Härnösand 1880.

In two of the components of the annual and total daily earnings' average and in four components of the standard daily earning's average only one worker is taken into account, as all the workers within the occupation earned the same amount, thanks to the system of joint piece-work described above.

The averages for plank-pilers, who represent the unskilled workers in the sawmill industry, are probably not quite so reliable as the sawyers' averages. For one thing, they comprise a smaller number of complete series. Indeed, it has been more difficult to secure complete data concerning this occupation, owing to the fact that, as mentioned above, these workers were in most cases working under a special piece-work system, which had no connection, as the other occupations had, with the "sawyers' piece-work rate." This means that the working hours quoted as being operative for the other workers, counted in "sawing-turns", on the basis of which the sawing piece-work wage was apportioned between these workers, do not invariably correspond to the plank-pilers' working hours. When no exact particulars as to time have been available, it has been possible to estimate the number of working days from the number of "sawing-turns", but this estimate is necessarily somewhat uncertain. When, as was usually done, the piece-work wage has been paid to the workers individually, the earnings of the specified workers have naturally varied more widely than in the case of the sawyers, and it has consequently been more difficult to select representative workers. When, on the other hand, the piece-work rate has been common to an entire gang of workers, the number of workers in the gang has not been known.

The number of components that go to make up the annual earnings' average for plank-pilers will be seen from the following figures:

Year	Number of series
1889	3
1890—1893	5—6
1894—1899	6—7
1900—1910	7—9
1911—1912	5
1913	3
1914	2

The number of components is the same in the total daily earnings' average, while the average of standard daily earnings contains one or two series less. The number of selected workers in the primary series varies considerably. If the workers have shared the sawing piece-work wage or worked on a group-payment system, it has been necessary to select one worker only. When, on the other hand, the wage has been payable to each worker individually, it has been necessary to select a greater, varying number of workers.

The averages for all sawmill-workers comprise a larger number of series than those comprised in the averages described above. Prior to 1885, however, the available components are so few that it has not been considered worth while carrying the averages further back. An obvious weakness in these averages is that they are made up of components of very varied quality.

The number of series contained in the averages is as follows:

	Annual earnings	Total daily earnings	Standard daily earnings
1885—1888	4—7	4—7	4—6
1889	15	14	13
1890	19	16	20
1891—1893	20—22	18—20	18—21
1894—1899	20—25	17—22	20
1900—1910	24—28	19—24	16—21
1911—1913	13—21	13—21	9—12
1914	12	12	5

The weights for these averages have been determined by the quality of the components and the size of the different concerns. The level of the direct averages in 1906 has been taken as the base for the index number, as in that year the averages comprise the greatest number of workers. Generally speaking, there is almost complete agreement between the index numbers and the direct averages. An exception is the sawyers' averages prior to 1880. The differences between the index numbers and the direct averages during those years are respectively about 10, 10 and 30 % for the annual, total daily and standard daily earnings. In the first years, however, the index numbers and the

direct averages developed along quite parallel lines, and they then suddenly approach one another at the close of the seventies, when a large number of new wage series begin.

The Kinetic Dispersion.

It will be seen from the table on page 147, showing the percentage changes in the individual series for sawyers, that the trend of annual earnings is quite uniform. A somewhat less close uniformity is found in the trend of the components of the average of standard daily earnings. During the period of prosperity prevailing about the year 1907, the highest point is reached by the average of annual earnings in that year. Two of its components, however, do not reach the peak until the year 1908, which with one exception applies also to all the total daily earnings, while as to standard daily earnings the rise in four series out of nine does not reach the maximum in 1907, but continues up to as late as 1909 or 1910.

Percentage Variations in the Sawyer's Annual Earnings between the Years stated below (+ increase, - decrease).

(The letters denote the different concerns.)

	1888/1889	1889/1893	1893/1896	1898/1900	1900/1902	1905/1907	1890—94/ 1904—08	1904—08/ 1910—14	1890—94/ 1910—14
F	—	- 8	+ 8	+10	-16	+ 6	+28	+ 9	+40
G	—	—	—	+18	— ²	- 1	+20 ⁷	—	—
I	+21	- 5	+11	+15	- 8	+32	+20	+17	+41
K	—	—	+ 9	+ 7 ²	- 6	+ 7	+30	—	—
L	+16	- 2 ¹	+14 ³	- 3	- 6	+11 ⁸	+18	—	—
O	—	—	+19	—	-12	+22	+25	+ 8	+34
P	+18	- 1	—	—	—	—	—	—	—
R	—	—	—	—	-13	+23	—	—	—
V	—	-23	+ 9	+ 7	+ 8	+ 3	+38	—	—
X	—	—	—	+22	- 4	+22	+23 ⁸	+43 ⁹	+76 ⁶

For the components making up the averages for plank-pilers the trend of wages has proved as uniform as in the case of the sawyers, this applying particularly to the

¹ 1889/1892. — ² 1892/1896. — ³ 1898/1899. — ⁴ 1900/1903. — ⁵ 1905/1908. — ⁶ 1891—94/1904—08. — ⁷ 1893 missing. — ⁸ 1913 missing.

boom in 1900, when the percentage changes are found to be very uniform.

In order to examine the degree of homogeneity in the trend of the average for all workers, we have calculated the dispersion of the numbers showing the wage relatives of the components for different periods around the corresponding numbers for the averages. As far as all these periods are concerned, the individual components vary, with extremely few exceptions, in the same direction as the average. In certain periods, moreover, there is a strong concentration of the percentages in question around the percentages for the average.

Taking the annual earnings, we find that during the period 1888—1889 the deviation of 6 out of 7 components from the wage relative for the average is less than 10 % thereof, and in 1889—1892 the percentage of 10 out of 13 components fall within 10 %. The rise up to the year 1900 is very uniform: during the period 1892—1896 out of 15 components 9 fall within a 3 %, 12 within a 5 %, and 14 within a 10 % deviation, while during the period 1898—1900, out of the relatives in respect of 19 series, 12 come within a 3 %, and 15 within a 10 % deviation. In the succeeding period, when the cyclical tendency was downward, the components followed suit: among 26 components the deviation of the relatives from the index of averages is 3 % in the case of 10, less than 5 % in that of 15 and less than 10 % in that of 21 components. During the boom in 1905—1907 the dispersion becomes wider: 8 series show a deviation of more than 10 percent from the annual earnings, which indeed correspond to the annual earnings, show practically the same deviation in the cyclical variations. For the series from 1893 to 1896 10 components account for a number of less than 3 %. During 1897—1900 only 10 out of 17 components are included in the general strike. In 1902 the corresponding figures for the board of wages are 10 out of 17 series, while in 1905—1907 the deviation is 10 % from the percentage for the case of the other averages. For the year 1910. There

the secular trend, which has been computed from a comparison between certain 5-year averages, is based on only a small number of components occurring throughout the entire periods. The dispersion in the secular trend of annual earnings is relatively small. In 1890—94/1904—08 the deviation of 7 out of 19 components occurring throughout the period is less than 3 %, that of 12 components is less than 5 % and that of 15 components is less than 10 %. In 1904—08/1910—14 out of 13 components 8 fall within 5 % and 10 within 10 %. In the period 1890—94/1910—14 out of 12 components 6 show a deviation of less than 5 %, the rest from 5 % up to 25 %, and all these wider deviations are positive. The dispersion of total daily earnings is similar. During the period 1890—94/1904—08 the figures representing the percentage growth of standard daily earnings show a deviation of less than 10 % in the case of 10 out of 12 components. Only one or two components in this series are used throughout the entire period 1890—1914.

As might be expected in such homogeneous series as the sawyers' averages, the absolute dispersion of the components is not wide as will be seen in the following calculations. In the annual earnings' average, the deviation from the average in 1895 is for 8 out of 9 series less than 14 %, and in 1906 for 6 out of 9 series less than 11 %. Among the components that enter into the standard daily earning's average in 1895, 7 out of 9 series are within 11 %, and in 1906 the same proportion within 8 % and 8 out of 9 series within 12 %. The corresponding dispersion for the average is somewhat wider. The deviation from the average is within 20 % for the average annual earnings' average, 6 out of 7 components in 1895 and in 4 series out of 6 in 1906.

κ	—	12
ν	—	16
x	—	18

For the components. In averages composed of wages piers the trend of wagtions as the average for all sawmill-case of the sawyers, that the absolute dispersion must be qualitatively uniform averages for xers. This is indeed evident from

¹ 1889/1892. — ² 1892/1896
³ 1905/1908. — ⁴ 1891—94/1904—

the following table showing the number of series having the quoted percentage deviations from the average.

Percentage of deviation from the average	Number of series			
	Annual earnings		Standard daily earnings	
	1895	1906	1895	1906
0—10	11	16	9	8
10—15	4	3	4	5
15—20	5	2	1	2
20—30	4	3	6	3
30—	1	5	1	1

Averages for Concerns F, I and K.

The sawmills of Norrland are concentrated around the mouths of the principal rivers in separate sawmill districts. The Härnösand district (named after the shipping port) lies along the River Ångermanälven, in the Ångermanland section of the Västernorrland County. This district is one of the largest; the quantity of sawn and planed timber exported through the Härnösand customs office in 1875, 1885 and 1895 amounted according to the report of the Board of Trade on foreign trade¹ to about $\frac{1}{6}$ of the country's entire export of that commodity. As the material collected from this district is especially extensive and valuable, an average has been worked out covering the years 1885—1914 for the concerns situated there. In this investigation four concerns are represented from this district, namely F, I, K and U. The series from the last-mentioned sawmill have, however, not been included in the average as they include so few years.

For the earlier years there are no accounts of wages are at till 75 kr. The number of workers in the Härnösand district; only 007 number of workers in the county of Västernorrland is about 1000. According to the first available statement in 1870. There were 1000.

¹ Utrikes handeln, published by the Board of Sweden's officiella statistik.

² Fabriker och hantverk. Berättelse för år 1910. There were 1000.

Assuming that the number of workers was distributed in the county in the same proportion as the production of timber,¹ the number of those employed in the Ångermanland section, in which the Härnösand district was the predominant industrial centre, would work out at over 5,000. The total number of workers at the three sawmills included in the average was about 500. These concerns would thus represent close to 10 % of the entire number in Ångermanland and at least that percentage in the Härnösand district. The sawmills were among the largest in the Härnösand district at that time. The occupations that are represented comprise about $\frac{1}{5}$ of those employed in the concerns. The averages are also quite representative as to the number of selected workers in relation to the total number of workers at the concerns in the occupations represented:

	Number of selected workers	Number of workers in the occupations represented
Skilled workers	14	27
Semi-skilled workers	9	25
Unskilled workers	18	54
<i>All workers</i>	41	106

For each concern separate averages have been computed for skilled, semi-skilled and unskilled workers. The skilled workers' group comprises sawyers, edgers, boxboard sawyers, boxboard trimmers and boxboard pilers, the semi-skilled workers' group: sawyers' helpers and edgers' helpers, and the unskilled workers' group: plank-pilers, plank-carriers, loaders, board-carriers and carters. Those few series that have not been included in the averages are accounted for in the text and the special monographs. They have either exhibited the trend which indicates a change in the quality of the work selected or they have embraced only a few

¹ 1892. — * Befallningshavandes femårsberättelser 1896—1900 (The 1908. — * 1891—92 parts of the Lords Lieutenant 1896—1900).

years. For the weights used in these series see the monographs.

In the averages for the whole district the averages for the individual concerns have been assigned the same weights for the following reasons. Firstly, the concerns compare well with one another in regard to the occupations represented and the quality of the series. Secondly, a comparison with the number of workers at the different concerns from the years 1890 and 1894 shows that the difference in the size of the concerns is but slight:

Concern:	Number of workers:	
	in summer	in winter
F	170	120
I	190	70
K	140	75

The averages of skilled, semi-skilled and unskilled workers show close correspondence in their cyclical movements, and have about the same percentage expansion from year to year. The secular trend, too, are similar the averages of semi-skilled and unskilled workers approaching the averages of skilled workers — the first mentioned from a difference of 13 % in 1887—1893 to an average difference of 8 % in later years. The margin between the earnings of semi-skilled and skilled workers narrows down from 23 % in earlier years to 21 % in later years. The earnings of unskilled workers are thus about 10 % higher than the earnings of semi-skilled workers during the early period, and about 13 % higher during the later period.

A comparison with the cross-section from concern I would indicate that the average for all workers is about on a level with the earnings of semi-skilled workers. The average for this group in 1890—1895 is 600 kronor. Between 1895 and 1900 the wages rise 30 % to 775 kronor, and during the period 1901—1905 they are about 700 kronor, then rising 18 % in 1906 and 1907 to 825 kronor, but falling again during 1908 and 1909 (the year of the general strike) to 700 kronor. From 1910 onwards the wages are about 875 kronor, having thus risen about 45 % from the period 1890—1895 to the period starting in 1910. There is a

Table 14. Annual and Daily Earnings (in kronor) of Sawmill Workers in the Härnösand District 1885—1914.

Year	Annual earnings				Standard daily earnings				Total daily earnings			
	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers
1885	595	477	—	—	—	—	—	—	2.64	2.09	—	—
86	608	493	—	—	—	—	—	—	2.64	2.13	—	—
87	617	514	557	—	—	—	—	—	2.47	2.10	—	—
88	667	525	563	2.62	—	—	—	—	2.59	2.17	—	—
89	799	670	713	3.16	—	—	—	—	2.98	2.61	—	—
1890	739	587	648	2.84	2.40	2.77	2.72	2.72	2.26	2.52	2.52	2.52
91	730	590	638	2.78	2.23	2.57	2.71	2.71	2.25	2.48	2.48	2.48
92	713	577	640	2.87	2.26	2.62	2.69	2.69	2.26	2.48	2.48	2.48
93	758	601	675	3.08	2.32	2.70	2.85	2.85	2.39	2.72	2.72	2.72
94	754	626	705	3.03	2.32	2.68	2.84	2.84	2.49	2.84	2.84	2.84
95	751	614	683	2.97	2.26	2.61	2.95	2.95	2.47	2.91	2.91	2.91
96	817	655	742	3.10	2.36	2.73	3.13	3.13	2.55	2.98	2.98	2.98
97	837	677	770	3.16	2.62	3.03	3.17	3.17	2.67	2.97	2.97	2.97
98	856	721	797	3.33	2.70	3.12	3.19	3.19	2.61	2.90	2.90	2.90
99	942	756	848	3.31	2.69	3.14	3.24	3.24	2.70	3.06	3.06	3.06
1900	921	769	853	3.42	2.82	3.30	3.27	3.27	2.89	3.16	3.16	3.16
01	858	717	815	3.17	2.59	3.05	3.12	3.12	2.65	2.98	2.98	2.98
02	832	667	764	3.12	2.48	2.93	2.98	2.98	2.52	2.97	2.97	2.97
03	910	734	851	3.31	2.70	3.21	3.20	3.20	2.63	3.11	3.11	3.11
04	872	715	801	3.38	3.12	3.70	3.12	3.12	2.66	3.02	3.02	3.02
05	876	718	821	3.38	2.97	3.47	3.25	3.25	2.74	3.14	3.14	3.14
06	944	766	860	3.59	3.02	3.57	3.43	3.43	2.90	3.37	3.37	3.37
07	1001	819	908	3.87	3.19	3.75	3.54	3.54	2.98	3.40	3.40	3.40
08	925	751	838	3.93	3.33	3.91	3.64	3.64	3.08	3.50	3.50	3.50
09	870	703	753	4.08	—	—	3.65	3.65	3.13	3.43	3.43	3.43
1910	1036	857	958	3.76	—	—	3.66	3.66	3.10	3.50	3.50	3.50
11	1056	880	978	—	—	—	3.72	3.72	3.16	3.59	3.59	3.59
12	1053	890	997	3.91	—	—	3.97	3.97	3.41	3.83	3.83	3.83
13	1020	848	989	4.05	—	—	3.94	3.94	3.44	3.82	3.82	3.82
14	1069	893	1065	3.92	—	—	3.92	3.92	3.51	3.74	3.74	3.74

very close agreement between the trend of the averages for the Härnösand district and the averages for the whole sawmill industry (Table 14).

The averages are completely homogeneous both for the concerns and for the occupations represented during the period 1890—1911. K is not included in 1889 and for that year I alone is represented. It should be pointed out, however, that in both the I and the F series there is a peak in 1889, preceded by a substantial rise from 1888 and followed by a decline to 1890. In the series relating to

daily earnings on piece-work at the saw, I only is represented in the highly skilled group and K is included only up to 1903. K is not included up to 1902 in the total daily earnings' series.

The amount of dispersion around the averages is extremely small, both as regards the absolute wage amounts and the annual variations. The wages at I however show somewhat stronger cyclical variations, while the wages at K are more constant.

It may be mentioned that the trend of the series from the concern U conforms to the trend of the averages, though the wages of the skilled workers at this concern are about 15 % above the corresponding wages at the other concerns.

CHAPTER VIII.

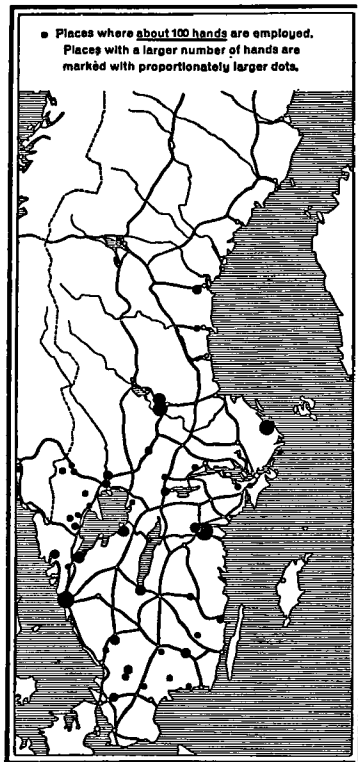
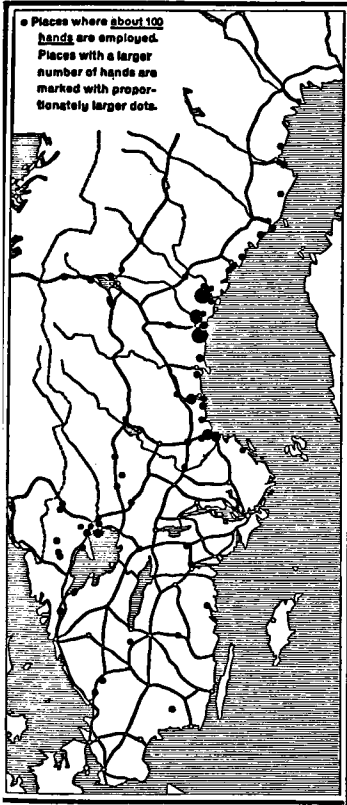
WOOD-PULP.

COMPARED with other Swedish industries, the wood-pulp industry was late in developing into importance. The first mechanical wood-pulp mill was founded at the end of the fifties and at the beginning of the seventies the production of chemical pulp commenced. But it was not until the following decades that the conditions for a more extensive production were created through technical improvement and the extension of the market. In the beginning of the nineties the industry had attained a position of considerable importance and employed 3,500 workers, and during this decade the number of workers doubled. In 1913 there were, according to the Board of Trade's report on industry,¹ 12,300 workers employed representing about 3.4 % of the country's industrial workers. The wood-pulp industry has been located almost exclusively in the country districts. Along with the rapid expansion of the industry the centre of gravity has shifted. In earlier years the most of the concerns were located in South and Central Sweden, but in later years the pulp industry in Norrland has developed more rapidly. As a result, Norrland's share of the quantity of wood-pulp produced in the country has increased from about 25 % in 1896 to nearly 50 % in 1910.¹

¹ *Industri*, published by the Board of Trade in *Sveriges officiella statistik*.

The Wood-Pulp Industry. 1924.

The Paper and Cardboard Industry. 1924.



Selection of Concerns.

As this shifting of the centre of gravity did not take place until the close of the period under review, particularly around the year 1907, our investigation was concerned mostly with mills established in other parts of the country, where it was possible to obtain more extensive wage series. Generally speaking, these concerns are smaller than those engaged in the large scale industry in Norrland. The county of Värmland is, towards the close of the period under review, also to some extent under-represented. Furthermore no wage data have been obtained for the factories producing mechanical pulp although this was the process first introduced. In this chapter thus, only the chemical pulp mills are dealt with.

The concerns selected are:

	<i>County:</i>	<i>Years:</i>
A. Delary	Kronoberg	1897—1910
B. Ed	Kalmar	1894—1913
C. A medium-sized sulphite mill	—	1893—1915
D. Bergvik	Gävleborg	1903—1909
E. Billerud	Värmland	1886—1914
F. Fredriksberg	Kopparberg	1899—1910
G. Gustafsors	Älvsborg	1895—1910
H. Konga	Kronoberg	1898—1914
I. Kramfors	Västernorrland	1908—1909
K. Skutskär	Uppsala	1903—1911

The Occupational Groups.

The wage data have been extracted from the concerns' payrolls. They generally contain particulars as to the number of hours of work, so that the hourly earnings in most cases can be calculated directly. The different concerns have provided series the composition of which varies considerably. The best (relating to Delary, Ed, Billerud, Konga and Kramfors) comprise 3—4 workers; the series from concern C, Bergvik and Fredriksberg comprise only one or two workers each, but are numerous and support one another. The information collected from the two remaining concerns is of a more or less summary

nature: from Gustafsfors random samples for certain wage-periods, and from Skutskär cross-sections, i. e. intermittently calculated averages for all workers. According to the Wood-pulp Association's statistics¹, of the workers employed in 1911 in sulphite and sulphate mills belonging to the Association about 60 % were unskilled workers. Compared with these figures, the unskilled workers are considerably under-represented in our investigation, but allowance must be made for the greater difficulty involved in making up full-year workers' series for unskilled workers whose work is often irregular. Of the skilled workers it is primarily the highly skilled cooks' and machine-tenders' wage figures that have been compiled, and of the unskilled workers primarily the hands at the chipping machines and also the barkers. The last mentioned occupation has undergone technical reorganization at some mills during the period under review, involving the replacement of manual labour by mechanical labour. At Billerud the work was done by hand, at Bergvik it was done by machinery during the whole period under review.

The General Trend of Wages.

The averages of unskilled workers are of far lower value than those of skilled workers. This will be further discussed below. They are therefore underweighted in the averages of all workers combined, as compared with the relative number of unskilled workers in the industry. These averages are thus not quite representative but they may afford some idea of the course followed by the general trend of wages earned by the wood-pulp workers, where the occasional variations are of minor importance.

Table 15 illustrates the very rapid increase of wages in the wood-pulp industry during this period, in conjunction with the industry's remarkable progress, referred to above. Thus, between 1895 and 1913, the annual earnings of the

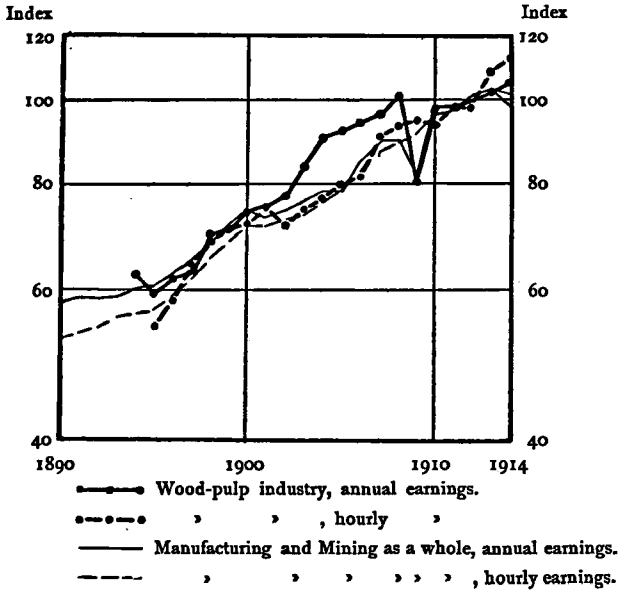
¹ Den svenska cellulosaindustriens utveckling och nationalekonomiska betydelse. Festschrift utgiven av Svenska Cellulosaföreningen. Stockholm 1918.

Table 15. Annual Earnings (in kronor) and Hourly Earnings (in öre) in the Wood-pulp Industry 1886—1915.

Year	Annual earnings			Hourly earnings		
	Skilled workers	Unskilled workers	All workers	Skilled workers	Unskilled workers	All workers
1886	—	549	—	—	—	—
87	—	622	—	—	—	—
88	—	658	—	—	—	—
89	—	677	—	—	—	—
1890	—	652	—	—	—	—
91	—	660	—	—	—	—
92	—	716	—	—	—	—
93	733	—	—	—	—	—
94	826	749	814	—	—	—
95	774	730	774	22.8	18.9	22.3
96	832	712	804	23.9	23.6	23.9
97	851	733	824	25.9	27.7	26.4
98	973	724	906	27.6	28.9	28.0
99	976	756	919	28.7	30.1	29.1
1900	1036	763	962	29.6	28.8	29.5
01	1037	800	979	31.1	30.6	31.0
02	1055	835	1004	29.5	29.1	29.4
03	1163	877	1094	30.7	29.7	30.5
04	1260	928	1180	31.6	31.3	31.5
05	1283	935	1198	33.0	31.6	32.7
06	1302	991	1228	33.9	31.9	33.5
07	1332	1018	1258	37.9	32.7	37.1
08	1394	1054	1313	39.6	33.2	38.5
09	1085	891	1043	40.1	33.5	39.0
1910	1333	1096	1281	39.1	34.4	38.4
11	1325	1092	1276	41.1	36.3	40.3
12	1325	1129	1292	41.3	36.6	40.6
13	1397	1115	1329	46.5	37.0	44.4
14	1445	1126	1367	48.2	38.1	46.0
15	1464	1157	—	47.9	37.8	—

skilled workers rose 80 % and the hourly earnings 104 %. The increase was particularly strong during the periods 1895—1898 and 1904—1908, that is to say, it coincided with the periods of general prosperity experienced in other branches of industry. On the whole, however, the cyclical movements of the wage series are not very prominent. A comparison between the annual and hourly earnings series reveals the greater degree of rigidity characterizing the latter. There is an almost complete conformity between the trends of annual earnings for skilled and unskilled

Chart 9. Annual and Hourly Earnings of Workers in the Wood-pulp Industry. (Index: 1910-1913 = 100.)



workers. The trend of the hourly earnings for these groups of workers is also quite similar up to 1898, but from that point hourly earnings of the unskilled workers rise less rapidly than those of the skilled workers, the annual normal growth being 2.5 and 4.0 % respectively. This may be explained partly by the fact that the unskilled workers are engaged to a greater extent on a time-wage basis, and partly by the fact that skilled workers in certain quarters in recent years have had a smaller number of hours of work per day.

Hours of Work.

For technical reasons, most of the work at wood-pulp mills must go on continuously, so that those engaged in the actual production of wood-pulp have to work in shifts. During the period in question 12-hour shifts have been

the usual practice, but in exceptional cases other shifts have been employed, e. g. 8-hour shifts. The shift-system has differed somewhat in different concerns in accordance with the arrangement for Sunday work and the changing of shifts. There was no Sunday work whatever at six of the concerns involved in the investigation. Where there has been Sunday work, the practice has been to change shifts every alternate or every third Sunday, so that either the one set of workers carried out a double shift or else both sets worked one-and-a-half shifts. Elsewhere the shifts changed every quarter. Generally the workers on shift had no fixed intervals for meals or rest during their 12-hour shift. The hourly earnings are therefore computed on the basis of the gross number of working hours. The 8-hour shifts, on the other hand, represented the net working hours, which in this case served as a basis for calculating the hourly earnings. The shortening of the hours of work apparent in a few series as a consequence of the transition from a 12-hour shift to an 8-hour shift has therefore been somewhat greater than actually occurred without yet considerable altering the trend of the averages. Men on repair-work and outdoor jobs did not work in shifts, their working day being usually 12 hours, with two hours' fixed interval. In their case, therefore, the hourly earnings have been computed on a basis of 10 hours' work *per diem*.

The number of days worked *per annum* by most of the workers involved in this enquiry was close on 300, varying somewhat according to whether any work was done on Sundays or not. "Working day" in this case, however, is actually identical with shift, which may extend over two days of the week, as for instance Saturday and Sunday. The particulars of working days *per annum* are therefore not directly comparable with particulars that merely relate to day-work.

Wage Systems.

Both time- and piece-work-wages and, usually, a combination of both forms, have been in practice. Pure piece-work was on the whole performed only by outdoor workers

and skilled workers for whom it was possible to gauge the performance of the individual (e. g., barkers employed in E made 80—90 % of their annual earnings on piece-work). In early years pure time-wages were paid to a number of those working in shifts, but in later years there has been introduced generally a combined system of time-wage and piece-work wage, very much resembling a wage-system common at the ironworks, from which it is probably derived. Besides the fixed time-wage, piece-work earnings were paid either on the basis of the entire output of the mill or, more commonly, on the basis of the amount by which the output exceeded a certain fixed quantity. This piece-work wage was called a bonus, reward for industry, etc. The bonus has in several quarters exhibited a substantial relative rise. At concern C, for instance, the sulphur-burners' bonus represented the following percentage proportion of the annual earnings: in 1897—1902, 3 %; in 1903—1909, about 9 % (pure piece-work in 1910 and 1911); in 1913—1915, 20—50 %. The trend was similar at H: in 1901—1906, 12—15 % and in 1908—1914, 30—50 %. Higher wages were paid for work done on Sundays, in one case (B) 25 %, and in another case (H) 50 %.

Benefits in Kind.

In three cases the workers have had free or practically free housing accommodation (1.25—1.50 kronor per month). In another case they obtained housing and firewood at prices 50 % below those prevailing in the open market; otherwise there are no known benefits in kind. The benefits have thus varied from one concern to another, but evidently have not been operative to any considerable extent and probably have had no influence on the trend of wages.

The Calculation of Averages, Components and Weights.

The chain index method has proved very useful in this study, where we have had to deal with a number of short series

falling within different periods. In determining the weights the principles described in Chapter II have been followed. As mentioned above, the great majority of the employees selected have been skilled workers. The weights that have been allotted to them in the averages of all workers combined make up a weight-total that is twice to four times as large as the aggregate weights applied to unskilled workers. This average is therefore not quite representative, the skilled workers predominating throughout. The separate average that has been drawn up for the skilled workers is on the contrary quite representative, while the unskilled workers' average is based on far too small a body of material to possess any great value.

The average for annual earnings of skilled workers covers the period 1893—1915, the average of hourly earnings starting two years later. For the unskilled workers the average series for annual earnings covers the period 1886—1915 and the series showing the hourly earnings the period 1895—1915. The figures for the earliest and the latest years are, however, somewhat uncertain, and the averages for all workers combined have therefore only been computed for the period 1894—1914. The averages for skilled workers comprise: in 1893—1894, 2—4 series; in 1895—1898, 5—7 series; in 1899—1902, 13 series; in 1903—1909, 20—24 series; in 1910, 17 series; in 1911—1914, 6—12 series; and in 1915, 3 series. The unskilled workers' average annual earnings comprise: prior to 1897, 1—3 series; in 1897—1907, 4—7 series; in 1908—1909, 10 series; in 1910—1913, 5 series, and in subsequent years 1—2 series. The unskilled workers' average of hourly earnings is usually based on 1 or 2 series less than that of annual earnings. The calculations cover the greatest number of concerns in 1908, in which year the index numbers have been equalized with the directly computed average. As to the skilled workers' annual earnings, the raised index number is in close conformity to the directly calculated average. The former is alternatively somewhat higher and somewhat lower, though between 1897 and 1906 it averages consistently 6 % higher. The difference between the raised

index number and a directly computed average is considerable in the case of the corresponding hourly earnings. Only in the years 1907—1909 do the index and the direct average coincide; otherwise the former is higher than the latter throughout the whole period — averaging in 1895—1906 10 % higher and in 1910—1915 as much as 25 % higher. During the former period the difference is accounted for by an increase in earnings at H in 1906—1908, which has not been included in the raised index series. The more substantial difference in 1910—1915 is due to the simultaneous dropping out of several series from concerns D, G and I, where the earnings were high. With unskilled workers too, the difference is very great in 1898—1907, the index being on an average 20 % higher, mainly because the concerns G and I are included in 1908, but are missing for certain years during this period. Otherwise the deviation remains within 10 % of the average.

Absolute and Kinetic Dispersion.

Before we proceed to discuss the uniformity of the wage trend, a few figures may be quoted to illustrate the concentration of the earnings around the average. The table given below shows the maximum and minimum earnings as well as the percentage deviations from the average for the different series for the year 1908.

	Number of series	Max.	Min.	Of which the following numbers deviate from the average by				
				0—10%	10—20%	20—30%	30—40%	over 40%
<i>Skilled workers</i>								
Annual earnings (kronor)	24	1766	891	11	6	4	3	—
Hourly earnings (öre) . . .	24	54	24	5	6	6	7	—
<i>Unskilled workers</i>								
Annual earnings (kronor)	10	1438	627	—	2	4	3	1
Hourly earnings (öre) . . .	8	42	20	2	1	3	2	—

The table shows that the maximum is double the minimum for skilled workers and more than double for unskilled workers. The concentration around the average is good as far as the annual earnings of the skilled workers are concerned, but not so good in the case of their hourly earnings. The unskilled workers' series, on the other hand, are heterogeneous in this respect.

As to the kinetic dispersion, percentages have been computed for the variations in the earnings represented by the series included in the averages. These percentages are given in the table on the next page.

The trend of annual earnings for skilled workers in 1892—1895 is based exclusively on a couple of series from B. After that period the average shows an uninterrupted rise up to 1908. The rise during 1895—1898 is particularly strong (26 %), due mainly to the series from C, where a new factory was built in 1894, but the movement proceeds in the same direction in the series from A, which were added in this year. The rise continues uniformly, though retarded in 1898—1900 to 6 %; two series now show some decline. Up to 1902 the average is practically unaltered, but it rises steeply during 1902—1904 (advancing during these years no less than 22 %). At concern A we find a particularly heavy rise of 34—43 % in 1898—1900 in connection with the building of a new factory. At concern F there were some interruptions in the production in 1901 and 1902. The annual earnings continue to rise slightly during 1904—1906 (3 %) and somewhat more strongly during 1906—1908 (7 %), making a total rise during the period 1904—1908 of about 11 %. Actually, however, some decline is apparent in certain series in 1904—1906, those at D, for instance, falling on an average about 8 %, and at A on an average 4 %, while others rise in 1904—1906 29 % (average for B). The heavy percentage increase for concern H in 1904—1908, resulting from a substantial rise in 1906—1908, does not affect the average calculated by chain index, because the data contain no particulars for 1907. Right up to 1908, then, the average earnings reveal an uninterrupted rise with exceptions among the

Percentage Variations in Annual and Hourly Earnings between the Years stated below (+ increase, - decrease)

(The letters denote the different concerns, the figures in the same column the various series from each concern.)

	Annual earnings					Hourly earnings				
	1895/ 1898	1898/ 1900	1900/ 1904	1904/ 1908	1910/ 1914	1895/ 1901	1901/ 1902	1902/ 1908	1910/ 1908	1914/ 1910
A 1	—	+ 1	+ 34	+ 4	—	—	—	+ 13	± 0	—
2	—	+ 3	+ 43	+ 5	—	—	—	+ 15	± 0	—
3	—	+ 8	+ 21	+ 11	—	—	—	+ 30	+ 5	—
B 1	+ 9	+ 5	+ 9	+ 35	—	+ 11	—	+ 42	- 15	+ 11 ¹
2	+ 3	+ 6	+ 18	+ 34	—	+ 10	+ 1	+ 60	- 15	+ 14 ¹
3	+ 5	+ 11	+ 11	+ 48	+ 31 ¹	—	—	—	—	—
C 1	—	—	—	+ 5	—	—	—	+ 14	—	—
2	+ 45	+ 5	—	9	2	+ 15	+ 68	20	+ 11	- 11
3	+ 29	+ 3	+ 4	+ 5	+ 8	+ 21	+ 4	+ 11	—	7
4	—	—	—	+ 14	+ 13	+ 40	+ 3	+ 3	± 0	—
5	—	—	—	+ 4	—	+ 39	—	+ 9	+ 13	± 0
6	—	—	—	+ 3	- 4	—	—	+ 8	+ 14	+ 26
D 1	—	—	—	—	1	—	—	—	—	—
2	—	—	—	—	+ 8	—	—	—	—	—
3	—	—	—	—	+ 14	—	—	—	—	—
E 1	- 6	+ 12	+ 9	+ 22	+ 7	—	—	—	—	—
F 1	—	+ 19 ^a	+ 15	+ 5	—	+ 23 ^a	—	+ 11	—	3
2	—	+ 8 ^a	+ 12	+ 10	—	+ 19 ^a	—	+ 8	+ 13	± 0
3	—	+ 14 ^a	+ 12	+ 40	—	+ 24 ^a	—	+ 8	+ 48	- 2
4	—	- 1 ^a	+ 34	+ 3	—	+ 20 ^a	± 0	+ 11	- 10	—
G	—	—	—	—	—	+ 25	—	+ 16	+ 29	+ 15
H 1	—	+ 7	+ 11	+ 62	- 4	—	—	+ 3	+ 67	- 8
2	—	- 13	+ 9	+ 39	- 7	—	± 0	+ 36	+ 2	± 0
3	—	—	+ 24	+ 44	+ 11	—	—	—	—	—
4	—	- 10	+ 61	+ 57	± 0 ¹	—	—	+ 79	- 9	—
K 1	—	—	—	+ 8	—	—	—	—	- 13	—
2	—	—	—	+ 17	—	—	—	—	+ 3	—
3	—	—	—	+ 22	—	—	—	—	+ 5	—
<i>Averages:</i>										
Skilled work- ers	+ 26	+ 6	+ 22	+ 11	+ 8	+ 36	- 5	+ 34	- 1	+ 23
Unskilled workers	- 1	+ 5	+ 22	+ 14	+ 3	+ 62	- 5	+ 14	+ 4	+ 11

components which have already been pointed out in the case of some concerns where a minimum level of annual earnings was reached in 1906. All series except those

¹ 1910—13. — ^a 1899—1900. — ^b 1899—1901.

from concern F, however, show 1908 as the peak year. In F the rise was interrupted in 1906, and during 1906—1908 the earnings fell on an average 9 % for F₁ and F₂. F₃ reaches its maximum in 1907, but it seems that a change probably took place in the qualifications of the workers in this series in 1906—1907; moreover, the series relates to one worker only. The effects of the general strike in 1909 are apparent in the series from all concerns except A. During the subsequent period 1910—1915 there is, as mentioned above, a considerable falling-off in the number of series. Only C is represented throughout the entire period, while H is represented through 1914, and B through 1913. The trend of development is different in different series even in the same concern, a fact that makes the rise of 10 % in the average during 1910—1915 uncertain.

The average of hourly earnings is made up of practically the same components as the average of annual earnings. Only one series (G) was added here during the period 1895—1910. In view of its composition, therefore, it possesses the same relative value during the different years as the annual earnings average. Apart from the less reliable data for the earliest and latest years, the average makes on the logarithmic scale an almost rectilinear ascent, and adjusted shows an increase of about 4 % from year to year. We find the average hourly earnings rising somewhat more steeply during the periods 1895—1898, 1906—1908 and 1912—1914, and more gradually in 1901—1902 and 1908—1910. Taken as a whole, the component series also exhibit the same steady tendency, with a few exceptions. The C series rise somewhat more steeply in 1895—1899, when the maximum is reached, the average rise being about 40 %. At F the peak is very distinctly reached in 1901. In series G the increase amounts to 32 % during the period 1898—1901. The decline in 1901—1902 predominates but is not uniform. The subsequent rise in the hourly earnings was especially noticeable during 1906—1908, when it amounted to 17 %, or about double the adjusted average rise during the period, in certain cases it is even more conspicuous. This

particularly applies to concern D, where there was an average increase for the three series of 47 %, and concern B, where the average expansion recorded for the period 1902—1908 was 51 %, as compared with 34 % as measured by the average. As in the case of the annual earnings average, here too we find that the strong average rise of 43 % in 1906—1908 recorded for the series H 1 and H 2 has had no effect upon the trend of the index, owing to the fact that there is a gap in these series in 1907. The trend exhibited by concern F differs somewhat. Here, as in the case of the annual earnings, the maximum was already reached by 1906, and two series (F1 and F2), in which the maximum was reached in that year, show an average fall during the period 1906—1908 of 6 %. The decline of the average in 1908—1910 was very largely caused by the B series, which falls off by no less than 15 %. Most of the other series (11 out of 15) follow suit, though generally in a lesser degree. During the final period 1910—1914 the few series that remain show a uniform trend. The substantial rise of 58 % recorded by H1 occurs in connection with the transition from the 12-hour to the 8-hour shift in that concern. As indicated above, the 12-hour shift included intervals of unknown length for meals and rest, though not exceeding two hours, whereas the 8-hour shift represents the net number of working hours without any intervals for meals etc., so that the rise in 1912—1913 must be somewhat excessive.

As already indicated, the average of the earnings of unskilled workers is of far less value than the other averages, primarily owing to the paucity of the series, but also to their inferior quality. We have already enumerated the components. The poorer quality of the series is due to the fact that most of them comprise workers that have been selected from such categories as "sundry workers" and "outdoor workers", which are by their very nature somewhat heterogeneous (see monographs A and B). Several of these workers, moreover, were only employed on temporary jobs, such as log-rolling etc. (see monograph B).

Up to 1892 there is in the annual earnings' average of

unskilled workers only one series, though it is of high quality (from concern E). During 1894—1898 the index maintains an almost constant level. This may also be said of the series from B and E, in which there is only a slight drop, while those from A and C rise in a corresponding degree. After that period the average advances uninterruptedly up to 1909, although up to 1900 there is a slight rise of only 5 %. During the following period the average annual earnings rise more steeply, in 1900—1904 as much as 22 %. All components are involved in this movement, particularly H4, which in the previous period had experienced an abnormal decline, but which now went up 61 %. From 1904 to 1908 the average again moves at a somewhat slower pace, rising 14 % during that period. The B3 series now shows a particularly heavy rise — 48 %, while E, which however had already reached its maximum in 1907, goes up 22 % and H4 57 %. At the same time, as in the other averages, the expansion of the series from concern H in 1906—1908 does not affect the trend of development. F4, on the other hand, rises only 3 %; in this case, as in that of the other series from this concern, the maximum had already been reached in 1906 (1904—1906: + 9 %; 1906—1908: — 5 %). After the strike in 1909 the variations in the average are small (the rise in 1914—1915 is caused by series C6 alone).

The hourly earnings' average for unskilled workers includes the same series as the annual earnings' average, with the exception of B4 and E. The heavy rise of 53 % in 1895—1898 is caused by series C5, which advances 46 % during the period 1895—1897. After a minor decline in 1901—1902 there follows, as in the case of the skilled workers, a smooth exponential increase, which is even more regular than in the case of the skilled workers, though the progress from year to year is only about 3 %. Two series, F4 and H4, show however a decline of 10 and 9 % respectively during the years 1908—1910. As before, the considerable rise in H4 in 1906—1908 has not been taken into account.

It will be seen from the above observations that on

account of the wide kinetic dispersion the basis on which these general averages have been calculated is in certain respects not quite satisfactory. On the other hand, the wage data furnished by several of the concerns is of considerable value, and will be specifically dealt with in the monographs.

CHAPTER IX.

PAPER; BOOK-PRINTING AND BOOK-BINDING.

IN the official Swedish statistics the paper and the printing and book-binding industries belong to the same industrial group. In reality there is of course a very slight connection between these different industries and it would serve no reasonable purpose to give their combined average earnings. The only reason for bringing them together in this chapter is the lack of wage material from the book-printing and book-binding industries, which makes it impractical to publish the scanty data relating to them separately.

I. THE PAPER INDUSTRY.

The Swedish paper industry has had a long history. Up to the sixties the papermills had concentrated their attention on the home market. The export and the import of paper were of but little importance and offset each other. During the later part of that decade, however, the exports began to expand, and during the following years became more and more pronounced. At the same time the consumption on the home market enormously increased, thus contributing to the growth of the industry. This growth was made possible by the development of the wood pulp production, which was often integrated with the paper industry. According to the Board of Trade's Report on Industry in 1913 the workers employed in the paper industry had reached a total of 11, 250¹, i. e. about 3 % of the total number of industrial workers in the country.

¹ Industri. Berättelse för år 1913, published by the Board of Trade in Sveriges officiella statistik.

PAPER; BOOK-PRINTING AND -BINDING 185

Along with this development there was a strong tendency to a concentration of concerns and the number of papermills actually somewhat diminished. Most of the workers (in 1913 87 %) were employed in factories situated in country districts.

Selection of Concerns.

The paper industry is located almost entirely in the southern part of the country (cf. map, p. 169) and the present study has been chiefly confined to certain of the more important papermills in the southernmost and western parts of Sweden. The selected concerns are:

	<i>County:</i>	<i>Years:</i>
A. Klippan	Kristianstad	1860—1914
B. Lessebo	Kronoberg	1860—1914
C. Munkedal	Göteborg och Bohus	1880—1909
D. Munksjö	Jönköping	1865—1910
E. Delary	Kronoberg	1898—1901
F. Koppom	Värmland	1893—1910
G. Lilla Edet	Älvsborg	1908—1912
H. Nykvarn	Stockholm	1898—1912
I. A large papermill in the middle of Sweden	—	1909—1912
K. A middle-sized papermill in the South of Sweden	—	1899—1910

The computation of averages has been confined to the series from the four first mentioned concerns, these wage series being of especially high value and covering a long sequence of years. Among these concerns Klippan and Lessebo originated from old-established hand-made paper mills. The manufacture of hand-made paper is still carried out on a small scale, but the present investigation treats only of the machine-production of paper. Munkedal and Munksjö, on the other hand, were founded when the wood-pulp industry was first started, and have been continuously engaged in papermaking by machinery only. All are comparatively large concerns, the number of workers varying in 1896 between 270 and 470. The wage series from the other concerns (E—K) are not sufficiently long and complete to warrant their incorporation in the average computation. Moreover, several of these papermills are situated out-

side the geographically uniform group formed by the four concerns named above. Generally speaking, however, the wage series from these papermills show a striking agreement with the averages computed for the four first mentioned concerns and thus confirm the reliability of these averages.

Selection of Occupations.

The compilation of wage series of the four concerns included in the average has been confined to skilled workers actually engaged in running the machinery: machine-tenders, backtenders, foremen at the beaters, ordinary beatermen, grinders, cutters and firemen. All these are quite skilled occupations, listed above approximately in the order of qualification. The machine-tenders and foremen at the beaters have assumed a kind of real foremanship but have not been excluded except in cases where they have gone over to a fixed monthly wage. The occupations that have been selected for representation throughout the series are machine-tenders and ordinary beatermen.

As Table 16 indicates, the annual and hourly earnings' averages show very similar fluctuations. The discussion of the trend of earnings has therefore, when not otherwise stated, been confined to one of them, namely, the annual earnings.

Throughout the sixties the wage level shows no change. Then follows the typical boom in the beginning of the seventies. The rise is strongest in 1872—1874 but continues at a less rapid pace up to 1877, which is a peak year for Munksjö. Lessebo, on the other hand, starts falling from 1875 and Klippan from 1876, while the hourly earnings at Lessebo continue to rise in 1875—1878 (12 %) and do not begin to fall until after the latter year. Following a decline of 10 % in 1877—1879, the wage level remains fairly stabilized until 1884, when a slight fall sets in. As will be seen from the table on p. 191, the course is somewhat different in different concerns. Subsequently, from 1886 up to 1892 the average number rises 26 %. The rise at Lessebo begins as early as in 1884, that at Munkedal not until 1889. As to the hourly earnings, there

PAPER; BOOK-PRINTING AND -BINDING 187

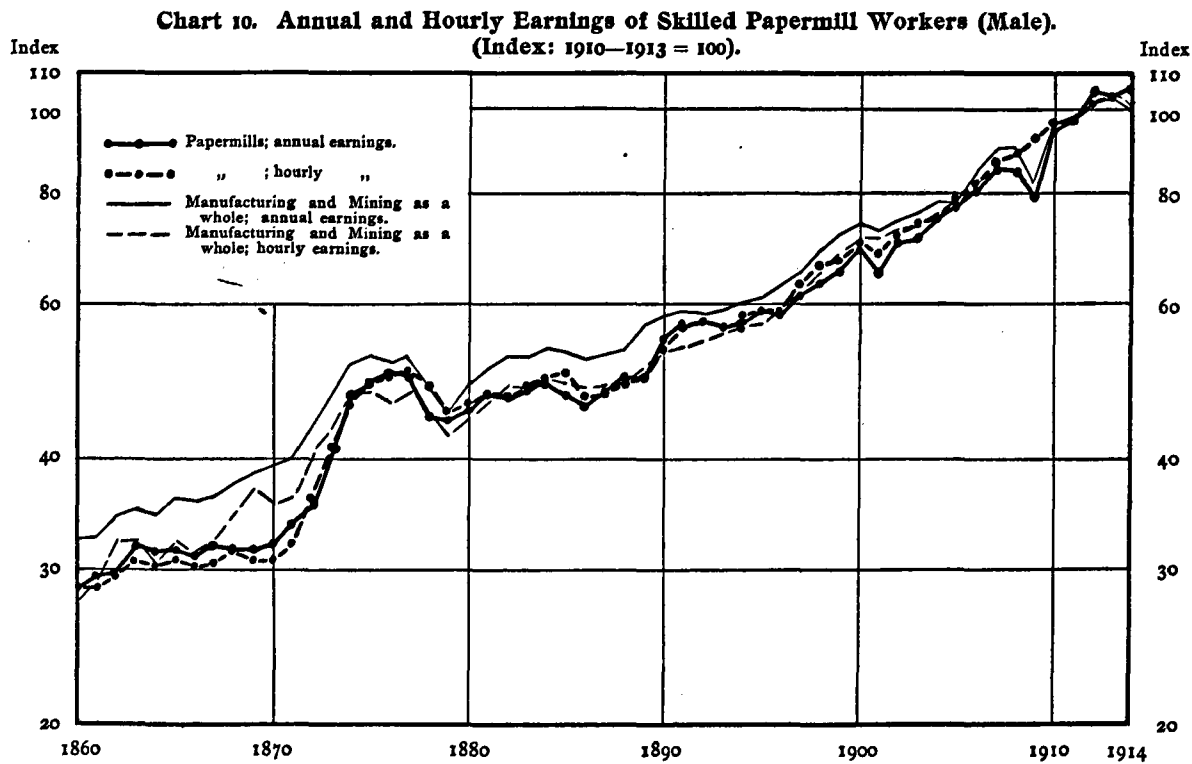
Table 16. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Skilled Papermill Workers (Male) 1860—1914.

Year	Annual earnings	Hourly earnings	Year	Annual earnings	Hourly earnings
1860	373	9.8	1890	700	18.1
61	381	9.8	91	739	19.2
62	383	10.0	92	750	19.6
63	411	10.5	93	736	19.3
64	408	10.5	94	748	19.8
65	409	10.5	95	763	20.1
66	402	10.3	96	757	20.1
67	414	10.4	97	800	21.7
68	413	10.7	98	826	22.5
69	412	10.5	99	847	22.9
1870	415	10.5	1900	901	24.0
71	439	10.9	01	846	23.4
72	461	12.3	02	913	24.5
73	539	14.1	03	930	25.2
74	611	15.8	04	966	25.6
75	634	16.5	05	1005	27.0
76	648	16.8	06	1047	27.9
77	641	17.1	07	1114	29.9
78	581	16.4	08	1109	30.4
79	575	15.6	09	1033	31.8
1880	588	15.8	1910	1228	32.9
81	614	16.2	11	1259	32.9
82	607	16.2	12	1354	34.5
83	612	16.5	13	1337	35.6
84	635	16.8	14	1366	36.0
85	618	17.0			
86	596	16.0			
87	624	16.3			
88	640	16.6			
89	643	16.9			

is no marked rise in all series until 1889. After a decline of about 2 % up to 1893 the annual earnings undergo no change until 1896, after which they rise 19 % up to 1900. After a decline of 6 % up to the year 1901 the average rises heavily during the next six years, and most strongly (15 %) during the period 1904—1907. Subsequent to 1907 the strong rise in the annual earnings is interrupted, while the hourly earnings continue their ascent (20 % during the period 1907—1914). After the strike the annual earnings rise uniformly in 1910—1912, the average going up 10 %.

Hours of Work.

All workers included in the average were on shifts. The work was generally performed in 12-hour shifts, but no



work was done on Sundays. It seems as if there were no fixed intervals for meals¹, and they have not been allowed for in the calculations. Only certain outdoor workers and the handicraftsmen were day-workers.

Benefits in Kind.

The extent to which benefits in kind were used varied considerably. In most cases the workers seem to have been provided with free housing; when only a part of the workers at a concern had free housing the others were compensated in money. In certain cases the workers were allotted a plot of ground for the cultivation of potatoes and were provided with fuel at a low price,

Wage Systems.

A time-wage, usually based on a daily wage rate, has been general. One concern however employed a combined system of time-wage and piece-work wage (see monograph D). Overtime has been fairly extensive. According to collective agreements in the paper industry concluded in about the year 1907, and which are dealt with in a Board of Trade enquiry², the only overtime work for which those working in shifts usually received higher pay was that performed on Sundays, when a 50—100 % increase was allowed.

The Calculation of Averages, Components and Weights.

The four concerns included in the averages have furnished on the whole very complete information from their payrolls, as to earnings and hours of work, so that it has not been necessary to make any supplementary estimates. Thanks to the completeness of the material, the earnings can easily be checked. Each series relates to two selected workers; in one or two of the series that are not homo-

¹ It is noteworthy, however, that earnings on overtime have sometimes been estimated on the basis of $\frac{1}{10}$ th of the regular earnings on work done per single shift.

² Kollektivavtal angående arbets- och löneförhållanden i Sverige. Arbetsstatistik A: 5, published by the Board of Trade. Stockholm 1911.

geneous this has proved insufficient for obtaining quite reliable results.

In computing the averages for the wage series relating to the four papermills the chain index method has been applied. The raised index tallies closely with the direct average except prior to 1865 and after 1908. Munksjö is not included in the average for these years, this making the index average during those periods 10—20 % higher than the direct average. The average comprises the following numbers of series during the periods stated: 1860—1864: 6 series, 1865—1879: 10 series, 1880—1889: 13 series, 1890—1909: 13—14 series, 1910: 9 series and 1911—1914: 7 series. The divergence between the lowest and the highest annual earnings is 75 % in 1865, 89 % in 1885 and 158 % in 1905 of the lowest earnings. In the year 1865, when cross-sections were made, the deviation from the average was more than 10 % for all series, 20—30 % for 4 series and more than 30 % for 3 out of the 9 series, while in 1905, out of 14 series, 5 series showed a deviation from the average of less than 10 %, 3 of 10—20 % and 3 of more than 30 %. The absolute dispersion is thus wide, but this has been taken into consideration when determining the weights.

As the monographs show, the trend of wages is on the whole very uniform in the individual concerns. In order, then, to demonstrate the uniformity of the trend exhibited by the components of the average it is necessary only to compare the trend of the averages for the four concerns, and this has been done for certain typical periods in the table given on next page. The percentages covering these variations are published only for annual earnings; the percentages relating to the average hourly earnings are reproduced in the last line of the table.

The kinetic dispersion is manifestly quite satisfactorily small in regard to these periods, as indeed it is also for other periods.

PAPER; BOOK-PRINTING AND -BINDING 191

Percentage Variations in Annual and Hourly Earnings between the Years stated below (+ increase, — decrease).

(The letters denote the different concerns.)

	1870/1874	1877/1879	1884/1886	1888/1892	1896/1900	1900/1901	1904/1907	1860-1864/ 1880-1884	1880-1884/ 1900-1904	1860-1864/ 1900-1904
<i>Annual earnings</i>										
A	+76	- 8	- 9	+12	+25	- 2	+22	+82	+38	+151
B	+36	- 3	+ 3	+12	—	- 3	+ 2	+44	(+84) ¹	+165
C	—	—	-11	+25	+15	-17 ¹	+12	—	+52	—
D	+32	-17	- 5	+18	+18	- 1	+22	—	+46	—
<i>Average</i>	+47	-10	- 6	+17	+19	- 6	+15	+56	+49	+133
<i>Hourly earnings</i>										
<i>Average</i>	+50	- 9	- 5	+18	+19	- 3	+17	+61	+51	+142

2. BOOK-PRINTING AND BOOK-BINDING.

These branches of industry are represented by the following two book-printing offices and one book-bindery in Stockholm:

A. Bonnier's Book-Printing Office	Stockholm	1860—1900
B. Hæggeström's Book-Printing Office	,	1864—1916
C. Åkerdahl's Book-Bindery	,	1898—1916

As already mentioned, the available material is far too scanty to be regarded as representative for the industry as a whole.

No averages of earnings for all the works combined have been worked out, the series being too heterogeneous. The results of the compilation are given for each concern separately, in the form of monographs².

Hereunder is added a table showing the basic piece-wage rates for Swedish flat-bed type-setting and the minimum hourly and weekly wages at hand-type-setting, as laid down in the collective agreements for the book-printing offices in Stockholm.

The general trend of the wage series derived from different sources agree fairly closely, also during short periods (the business cycles), while the quantitative size of the movements — particularly for the longer periods — do not. Thus, between 1865 and 1900 the annual earning of com-

¹ Restriction of output in 1901. — ² Uncertain values 1902—04. —
³ See p. 498.

Table 17. The Trend of Wages for Hand-Type-Setting at the Book-Printing Offices in Stockholm according to Collective Agreements 1890—1913.

Year	Basic piece-wage for Swedish flat-bed type-setting per 1,000 letters ¹		Minimum wage per hour (estimated ²)		Minimum wage per week	
	Kronor	Index	Öre	Index	Kronor	Index
1890	31	100	36	100	22	100
91	31	100	36	100	22	100
92	31	100	36	100	22	100
93	31	100	36	100	22	100
94	31	100	36	100	22	100
95	31	100	36	100	22	100
96	31	100	39	108	22	100
97	31	100	39	108	22	100
98	35	113	40	111	23	105
99	35	113	40	111	23	105
1900	35	113	40	111	23	105
01	40	129	45	125	25	114
02	40	129	45	125	25	114
03	40	129	50	139	25	114
04	40	129	50	139	27	123
05	40	129	50	139	27	123
06	40	129	50	139	27	123
07	40	129	50	139	27	123
08	43	139	56	156	30	136
09	43	139	56	156	30	136
1910	43	139	56	156	30	136
11	43	139	56	156	30	136
12	43	139	56	156	30	136
13	43	139	56	156	30	136

positors at Bonnier's increased by about 70 %, whereas those at Hægström's went up over 100 %. If, in order to compare the figures with the collective agreements, we take the period 1890—1900, the percentage rise in respect of the different series from Bonnier's comes to 47, 58 and 37 % respectively, and from Hægström's to 12 %, this latter figure corresponding closely to that of the collective agreements. This applies also to subsequent years, the wages of compositors at Hægström's between 1890 and 1913 rising 31 %, and the minimum weekly wage, according to the above table, rising 36 %.

¹ For "petit", "borgis" and "corpus" bodies.

² The normal working time per week was 60 hours up to 1896, 57 hours up to 1901, 56 hours up to 1903 and 54 hours up to 1913.

CHAPTER X.

FOOD PRODUCTS.

THIS industrial group comprises a very large number of concerns — no less than 3088 in the year 1913 — and one third of the total number of working-places registered in the industrial statistics. In the same year there were employed about 36,000 workers, representing about 10 % of the total number of industrial workers in the country in that year.

The group embraces concerns of a very heterogeneous character. In regard to neither raw material nor technique is there much in common between a tobacco factory and a brewery or a flour mill. The common point of contact is to be found on the side of demand, since all products manufactured within each branch of industry are consumers' products. The average-series of wages published below should therefore be of interest as showing the typical movement of wages in industries producing consumers' goods in contrast to industries producing capital goods. Another important point of similarity between the concerns in this group is the fact that they cater almost exclusively to the home market, the difference between such industries and the large exportindustries being one of the most important features of the Swedish labour market.

Selection of Concerns.

Wage particulars have been collected and compiled from the following 14 concerns for the years mentioned below:

	<i>County:</i>	<i>Years:</i>
A. Arlöf Sugar Factory	Malmöhus	1883—1914
B. Hasslarp Sugar Factory	"	1887—1913
C. Hälsingborg Sugar Factory	"	1892—1914
D. Landskrona Sugar Factory	"	1861—1914
E. Göteborg Sugar Factory	Gothenburg and Bohus	1889—1912
F. Hälsingborg Grinding-Mill	Malmöhus	1886—1914
G. Upsala Grinding-Mill	Uppsala	1875—1914
H. Örebro Biscuit Factory	Örebro	1911—1925
I. Hamburger Brewery	City of Stockholm	1895—1925
K. Pripp Brewery	Gothenburg and Bohus	1868—1910
L. Ljunglöf Snuff Factory	Stockholm	1850—1905 ¹
M. Pellerin's Margarine Factory in Gothenburg	Gothenburg and Bohus	1905—1910
N. United Swedish Cannery in Gothen- burg	"	1899—1912
O. A chocolate and confectionery fac- tory	—	1899—1910

Of the many branches within this industry a small number only are represented, but they are the most important ones. As a rule only one or two concerns have been selected from each of these branches. The wage series of individual concerns obviously cannot indicate the general trend of wages for their respective branches, and we therefore present the results in the form of monographs. Only in the case of the sugar industry, which is represented by five concerns, has it been possible to make a special study of wage conditions in the branch as a whole. The wage series from the other concerns enter directly into a general average for all enterprises concerned in the enquiry in order to illustrate the development of wages in the food products industry as a whole.

Selection of Occupations.

The occupations in different concerns vary considerably and it has been impossible to compile statistics for the same occupational groups in all the concerns in question. The wage documents of some of the concerns, moreover, contain no particulars whatever as to occupation. The averages are therefore composed of figures relating to workers having very different qualifications. For further particulars concerning the nature of the work, the number

¹ With interruptions.

of selected workers in different groups, etc., the reader is referred to the monographs.

The General Trend of Wages in the Food Products Industry.

Averages for the food products industry have, as mentioned above, been calculated for the annual and hourly earnings of male and female workers irrespective of occupation, and are published below in Table 18. These averages often apply to figures having a very wide dispersion owing to the heterogeneous nature of the material (differences in localization, industries, occupations, etc.). Nevertheless, the resultant series showing the development of wages should, it seems, afford a fairly good idea of the degree in which, and the rapidity with which, the wages in this branch of industry have changed. This is primarily due to the fact that the dispersion of wage-variations from one period to another has been small.

Substantial rises in annual earnings take place during the periods: 1870—1877, 1883—1890, 1895—1900 and 1904—1907. It can hardly be said that any setbacks occurred. The reduction in wages in 1875—1876 applies only to D. As far as male workers are concerned, the only essential reduction in wages occurred in 1877—1878 (7 %), and is based on only 3 out of 6 series. Otherwise, the male workers suffered practically no reductions in wages, either annual or hourly. Their wages show a tendency to stagnate or fall slightly during the first half of the eighties, the first half of the nineties and some years at the beginning of the present century only. The curve of annual earnings for female workers follows a less consistent course, due entirely to their more variable and irregular working hours. It is nevertheless obvious that the women's wages have increased more rapidly than those of the male workers. Between the years 1890 and 1910 the former's went up 103 % and the latter's 66 %. The steady development of the hourly earnings proceeds without any appreciable interruptions. (As pointed out below, however, the hourly earnings are unreliable.)

Table 18. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male and Female Workers in the Food Products Industry 1861—1914.

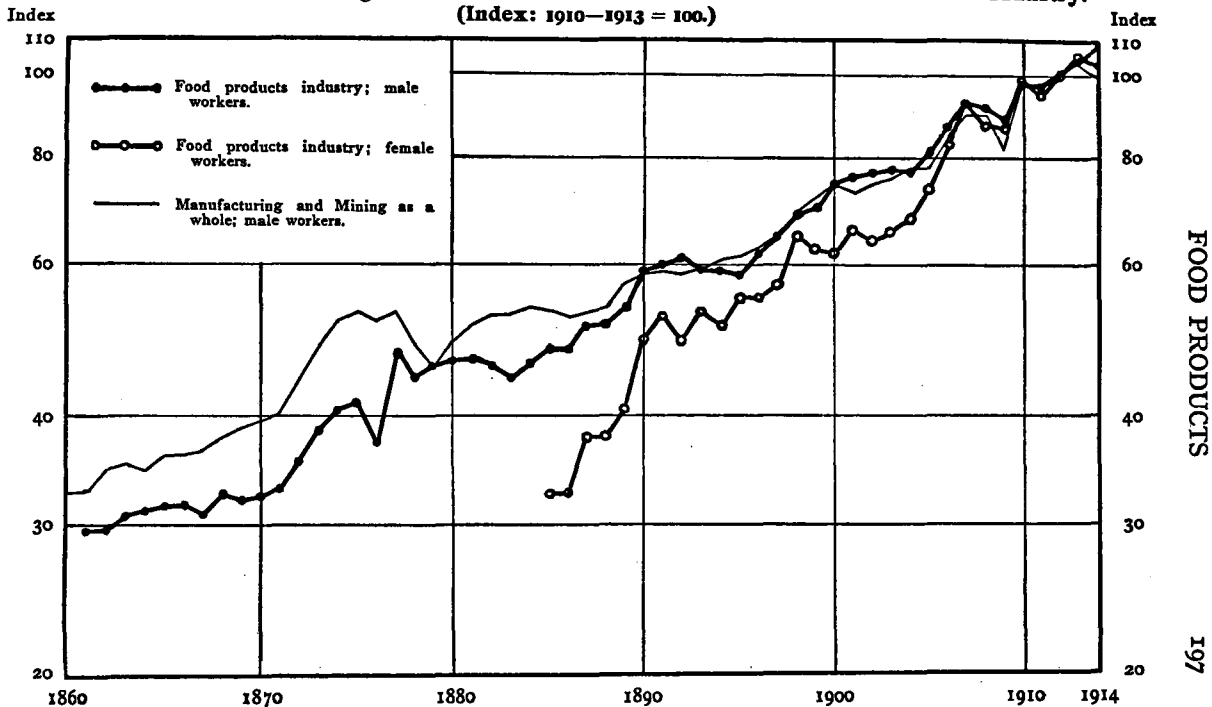
Year	Annual earnings		Hourly earnings		Year	Annual earnings		Hourly earnings	
	Male workers	Female workers	Male workers	Female workers		Male workers	Female workers	Male workers	Female workers
1861	381	—	13.1	—	1890	764	421	20.4	12.3
62	383	—	13.1	—	91	775	450	21.9	12.7
63	397	—	13.6	—	92	786	420	22.3	12.7
64	403	—	13.7	—	93	769	455	23.4	13.2
65	407	—	13.9	—	94	766	438	23.3	13.0
66	409	—	13.9	—	95	759	476	23.5	13.8
67	401	—	13.8	—	96	803	475	24.5	14.5
68	423	—	14.3	—	97	847	491	26.2	15.1
69	415	—	14.1	—	98	891	556	27.1	16.1
1870	419	—	14.4	—	99	909	541	28.0	15.3
71	428	—	14.4	—	1900	970	534	29.0	15.5
72	459	—	15.7	—	01	989	571	29.4	16.4
73	501	—	17.2	—	02	997	555	30.3	16.8
74	526	—	18.0	—	03	1007	567	30.4	17.0
75	539	—	17.9	—	04	997	586	30.7	17.6
76	483	—	16.5	—	05	1054	638	32.3	18.1
77	619	—	19.4	—	06	1134	723	33.7	19.5
78	578	—	18.0	—	07	1204	801	35.3	21.4
79	595	—	18.3	—	08	1191	753	37.7	23.4
1880	601	—	18.5	—	09	1149	748	38.8	25.6
81	605	—	18.6	—	1910	1268	855	39.6	26.6
82	595	—	18.5	—	11	1257	818	39.3	26.1
83	578	—	17.8	—	12	1310	863	40.5	26.5
84	597	—	18.5	—	13	1356	910	41.1	27.5
85	622	279	18.5	—	14	1426	904	42.8	27.9
86	623	279	18.5	—					
87	661	327	18.7	—					
88	663	327	18.7	8.8					
89	696	350	19.0	9.4					

Hours of Work.

According to the Board of Trade's enquiry into the length of working hours in industry in 1911¹, the average net hours of labour *per diem* in the food products industry in 1885 and 1905—1906 were 10.9 and 10.1 hours respectively. That is to say, the working hours were shortened between these periods by 7.3 %. A comparison between the growth

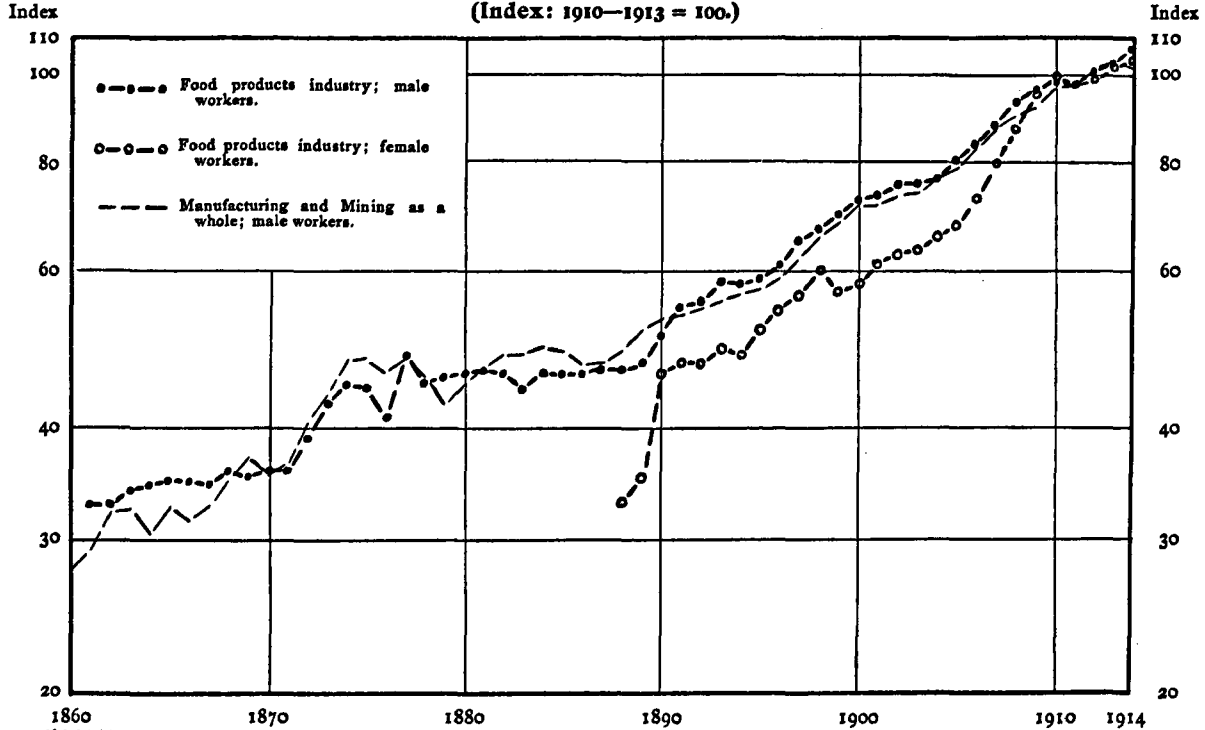
¹ Arbetstidens längd inom industri och handverk i Sverige. Arbetsstatistik A: 10. Stockholm 1911.

Chart 11. Annual Earnings of Male and Female Workers in the Food Products' Industry.
 (Index: 1910-1913 = 100.)



FOOD PRODUCTS 197

Chart 12. Hourly Earnings of Male and Female Workers in the Food Products' Industry.
 (Index: 1910-1913 = 100.)



of the annual and the hourly earnings of male workers shown in Table 19 for that period gives about the same result. Between 1890 (from 1885 the hourly earnings are far too uncertain) and 1910 the annual earnings increased by 66 % and the hourly earnings by 94 %, which implies a shortening of the number of hours *per annum* by about 14 %. In regard to female workers, it would appear that their working hours have been shortened to a less extent. Between 1890 and 1910 their annual earnings are increased by 103 % and hourly earnings by 116 %, implying a shortening of the hours of work by 6 %. The ordinary number of hours worked *per diem* is reported generally as 10—10.5 hours.

Benefits in Kind.

Benefits in kind do not seem to play any considerable part in the earnings of the workers at the concerns belonging to this industrial group. In one concern only (I) was free housing accommodation given, the majority of the concerns being situated in or in the close vicinity of towns. At some concerns the workers were allowed specified quantities of the concern's own products (beer, biscuits, etc.) and at several concerns were entitled to free medical attendance and medicine.

The Construction of Averages, Components and Weights.

In the average annual earnings for male workers are included skilled and unskilled workers from the three "combined" sugar factories,¹ the sugar refineries in Landskrona and Gothenburg, two breweries, one grinding-mill, one chocolate factory, one margarine factory, one snuff factory and one cannery. Not all wage series and concerns are represented each year, the number varying considerably from year to year. In 1861—67 the averages com-

¹ The sugar factories A, B and C consist of both raw-sugar mill and refinery, a kind of sugar factory which in the following will be called "combined sugar factories."

prise only 3 series from D (12 selected workers), in 1868 K appears, in 1877 are added transport workers and smiths from E (the average will be found to comprise 6 series and 16 workers in 1878). In 1879 another series from K is added. From the year 1880 the series from D cease, in 1883 appear the "combined" sugar factories' unskilled workers and in 1888 their skilled workers, although up to 1893 they are represented by series from A only. The two series from F are included in the averages as from 1886 (in 1888 there are 8 series and 14 workers included in the average), from 1895 I, 1899 O, 1900 N and 1901 tobacco-workers from L. For this latter year the average is made up of 19 series and 50 selected workers. In 1905 one series is added from M, and in 1906 three again from D. In 1906 the average embraces 22 series and 59 workers. The number of series and workers is kept at about this figure up to 1910, after which a substantial reduction takes place. By 1912 the series from K, L, M and O have disappeared, and the average is for 47 workers only. By 1913 the series from E and N also disappear, and in 1914 the only series left are those from A, C, D, F and I, totalling 9 series and 27 workers. The chain index method has been used for combining the different series, and the chain index series has been raised to the level of the direct average series for 1905.

As the hourly earnings of the male workers could not be calculated to cover all the series, the averages of hourly earnings apply to a smaller number of concerns than the annual earnings. It has not been possible to determine the hourly earnings of mill-hands at F up to the year 1907, nor for workers at K, L, and O. Nevertheless, the average hourly earnings obtained in this way are comparable with the average annual earnings, since the latter remains practically the same, even if these concerns that cannot supply data as to hourly earnings are excluded altogether from the calculation of the average annual earnings. This is seen from the following table:

Year	Average annual earnings embracing all series	Average annual earnings corresponding to the average hourly earnings
1888	663	654
1901	989	1010
1906	1134	1138
1907	1204	1214

The average earnings for female workers are based upon far fewer concerns and workers. For annual earnings, there is available only scattered information prior to 1885 from K and L. During 1885—1887 the averages concern the female bottlers from K (1 selected worker) only, in 1888 appears A, in 1892 C, in 1896 I, in 1897 B, and in 1899 N, so that the average after that is made up of 6 series, where I is represented by all the female workers employed in that concern. In 1906 D and M are added, so that 8 series are included in the average. In 1911 one series is taken in from H, and at the same time K and M go out. By 1914 only 5 series are left.

The average hourly earnings for female workers must be accepted with reserve. A maximum number of 6 series form the averages for the years 1906—1910. Up to 1899 the averages are made up exclusively of the "combined sugar factories", in 1899 N is added, in 1906 D and M, and in 1911 H. These average earnings have no constant ratio to the average annual earnings. During the period 1905—1908 they are on an average 22 % above the average annual earnings, which, is made up of the same components as the average of hourly earnings.

On account of their relatively large numbers and the satisfactory quality of the statistical material furnished, the sugar factories are given large weights in the averages. Usually their combined weight amounts to one-half of the total weights, whereas they employed only about 22 % of the total number of workers engaged in the food products industry in 1913.

The index numbers have been adjusted to a level with the direct average for 1906, as indicated above. As regards the annual earnings of male workers, the differ-

ence between the raised index numbers and the direct calculated averages is small between the years 1880 and 1914, the maximum difference being 8 % (1914), but in general it is only about 2 %, and the index number is lower. Prior to 1880 the difference is greater, the index number being fairly constant at 11 % below the direct average. The male workers' hourly earnings show a very close agreement between the periods 1861—1880 and 1895—1914 (3 %). Between 1880 and 1881, however, the direct average drops heavily owing to the fact that the series from D, with their relatively high hourly earnings, cease altogether, and for the two succeeding years there remain only 2 series from concern E. Selected smiths at D earn nearly double as much as smiths at E. The index number therefore lies no less than 25 % above the direct average for 1881, though subsequently this difference steadily diminishes and becomes negligible after 1894. In regard to female workers, the difference between index series and average series for all years is fairly small (although for certain individual years it amounts to 10 % for annual earnings), the index number being sometimes above and sometimes below the direct average.

Kinetic and Absolute Dispersion.

The variations in the wages are shown in the following table, which indicates the uniformity of the trend of wages.

Separate averages have been drawn up for the three "combined sugar factories", since the earnings in the respective occupations are on a fairly uniform level, the development of wages is similar, and the series extend over practically the same period of years. A further reason is that these concerns have been able to divide their male workers into skilled and unskilled categories.

Looking first at the development of the male workers' wages, the annual earnings series in 1870—1875 is made up of 3 series only from D and one from K, but there is a consistent rise, averaging 28 % for the former concern and of 29 % for the latter. The next period of rising wages

Percentage Variations in Annual Earnings between the Years stated below (+ increase, - decrease). Male Workers.

(The letters denote the different concerns, the figures in the same column the various series from each concern.)

	1883/ 1892	1892/ 1895	1895/ 1901	1904/ 1907	1908/ 1912	1895/ 1910
A 1	+42 ¹	-22	+56	+12	-17	+61
2	+24 ¹	-12	+33	-1	-4	+45
3	+50	-7	+11	+11	-1	+57
B 1	—	—	+17 ^a	+23	+3	+61 ^a
2	—	—	+6 ^a	+31	+20	+45 ^a
3	—	—	+7 ^a	+31	+16	+55 ^a
C 1	—	+3 ^a	+23	+41	+25	+81
2	—	+2 ^a	+22	+20	+29	+54
D 1	—	—	—	—	+45	—
2	—	—	—	—	+30	—
3	—	—	—	—	+27	—
E	—	-7	+36	± 0	+4	+73
F 1	+19 ^a	+1	+23	+34	+15	+54
2	+21 ^a	+1	+12	+12	+17	+36
I	—	—	+56	+24	+1	+77
K 1	+9	+8	+35	+17	—	+69
2	+10	± 0	+26	+18	—	+68 ^a
M	—	—	—	+11 ^a	—	—
N	—	—	—	+22	+1	—
O 1	—	—	-3 ⁷	+23	—	—
2	—	—	-17	+28	—	—
Skilled workers in "combined sugar factories" ¹	+33 ^a	-10	+31	+25	+9	+70
Unskilled workers in "com- bined sugar factories" ¹	+50	-4	+17	+21	+14	+61
<i>Average</i>	+36	-3	+30	+21	+10	+67

is reflected in all series, though with different potency, the wages of workers at the sugarmills, as often appears to be the case, exhibiting stronger variations. The stagnation of the annual earnings seems to have been fairly general during the first half of the nineties. The more pronounced drop in wages at A is due to shorter working hours, whereas the hourly earnings are fairly constant. The negative tendency apparent in K1 may be fortuitous, as the series comprises only a single worker. As in the case of other industries, the rise in wages during the latter half of the nineties is both pronounced and

¹ 1888/1892. — ² From 1898. — ³ 1893/1895. — ⁴ 1886/1892. — ⁵ 1895/1909. — ⁶ 1905/1907. — ⁷ 1899/1901.

uniform. The rise of 56 % in the annual earnings of smiths at A is due to a lengthening of the working hours. The hourly earnings went up 29 %. The smaller rise shown by the series from B may be caused by the shorter period that had to be selected. Workers in concern O experienced a reduction in their annual earnings between the years 1899 and 1901. In the case of a number of concerns it will be seen that the wage curve reaches its maximum height in 1899 or 1900, followed by a minor reduction in wages up to 1901, and this may have occurred also to O. Even the substantial rise in the annual earnings at I is due largely to longer working hours (overtime increased sevenfold as from 1897). The growth of wages between 1904 and 1907 is remarkably steady, except in the case of concerns A and E. In A the wage maximum was not reached until the year 1908, the rise as from 1904 being 23, 10 and 32 % respectively. This delay is noticeable in several of the concerns (I, K and N). In E a strike occurred in 1907, but the rise up to 1908 was as much as 17 %. From 1907 to 1908 the annual earnings are more or less constant, but the hourly earnings show a continued rise at an even more rapid tempo than before (7 %). The percentages for the period 1908—1912 show a strong dispersion. The drop in wages at A is due for the most part to the above-mentioned shortening of the working hours, but the hourly earnings also fell slightly. At B an adjustment of the wages of the three selected occupations took place at this period, the carpenters' and unskilled labourers' earnings being brought up almost to the level of the smiths'. The remarkably rapid rise in the wages of brewery-workers at I practically ceases altogether after 1908, but they had then reached a far higher wage level than the other series (about 40 %). The averages covering the period 1895—1910 are extraordinarily uniform and establish the mean variation of 67 %. Concern G, which is not included in the averages, records about the same rise in annual earnings (64 % between the years 1895 and 1914). The growth of hourly earnings is likewise uniform, as will be seen from the summary given below covering the same period (1895—1910):

A.			B.			C.		E.	F.	I.
1.	2.	3.	1.	2.	3.	1.	2.			
+70	+59	+80	+61	+57	+61	+71	+68	+108	+62	+64

The deviation shown by concern E is due to an occasional reduction of wages in 1895 owing to replacement of workers in the series. From 1896 the rise amounts to 74 %. The average rise of the hourly earnings between 1895 and 1910 was 68 %, which differs only very slightly from the rise of the annual earnings (67 %), and indicates that no radical shortening of working hours took place during this period.

Percentage Variations in Annual Earnings between the Years stated below (+ increase, - decrease). Female Workers.

(The letters denote the different concerns.)

	1894/1901	1904/1907	1906/1910	1895/1910
A	+ 30	+ 27	+ 15	+ 84
B	+ 26 ¹	+ 34	+ 37	+ 102
C	+ 21	+ 24	+ 39	+ 46
D	—	—	+ 40	—
I	+ 22 ²	+ 55	- 12	+ 55
K	+ 35	+ 42	+ 42	+ 99
M	—	—	+ 31	—
N	+ 16 ³	+ 30	+ 36	+ 96 ⁴
Workers in "combined sugar factories"	+ 25	+ 28	+ 30	+ 69
Average	+ 30	+ 37	+ 18	+ 80

The average earnings of female workers are of considerably less value because of the small number of series included. The strong rise in the annual earnings in 1888—1891 is entirely due to workers at A, whereas the wages at K were constant. The period of increasing wages, 1895—1901, which is distinctly noticeable in the case of male workers, is here somewhat lacking in uniformity. The only radical rise took place in 1896—1898, when the female workers'

¹ 1898/1901. — ² 1896/1901. — ³ 1899/1901. — ⁴ 1900/1910.

annual earnings at A went up 41 %, at C 22 %, at I 19 % and at K 1 %. The wages at I went on rising until 1899 and at K until 1902, while the wages at the other concerns dropped slightly. The variations in wages are very irregular right up to 1904, when a more general rise in earnings began. As in the case of the male brewery workers at I, the women's wages at the same concern rose with abnormal rapidity up to 1907, but they subsequently stagnated, and even declined. At the second brewery (K), also, a strong rise in wages took place. The fall that occurred in 1908 or 1909 and the rise up to 1910 are also general. The lowering of the average of annual earnings in 1910—11 is not due to any tendency common to all the concerns, the annual earnings at the concerns B, I and N having risen during that period.

As might be expected with averages of such different concerns and occupations, the dispersion in the *absolute* height of the wage level is pretty considerable. In 1879, when the annual earnings of male workers is made up of 7 series, their values vary between 475 and 860 kronor, and only 4 of the series fall within a 15 % deviation from the average. In 1900, among 18 wage series the annual earnings ranged between a maximum and a minimum value of 1310 and 730 kronor. But the concentration around the average is nevertheless quite satisfactory, no less than 12 of the series falling within the limits marked by a 15 % deviation from the average. In 1910 the dispersion seems to be the same, although the annual earnings vary within narrower limits, 1583 and 1000 kronor. Out of 21 series in that year 14 fall within the same limits of deviation.

As is generally also the case in regard to the kinetic variations, the absolute dispersion of the hourly earnings is less than that of the annual earnings. In 1906 the hourly earnings of 16 series form the basis of the average, and they vary, it is true, between such widely different figures as 28.8 and 42.8, but the concentration must nevertheless be regarded as relatively strong, since in 14 of the series the values fall within a 15 % deviation from the average.

In 1910 the hourly earnings vary between 34.² and 50.8 (the latter figure applies in both cases to the Stockholm concern I), and no less than 16 out of the 17 series represented show hourly earnings that fall within a 15 % deviation from the average hourly earnings.

As to the dispersion of the annual earnings of female workers, it may be noted that in 1900 they varied between 363 and 815, and in 1910 between 706 and 1063 kronor. The width of the limits is due to the fact that the upper limit represents the wages of the female brewery-workers at I, who throughout earned considerably more than any other workers represented. The annual earnings of the rest of the series are fairly well concentrated, but owing to their paucity it is hardly worth while working out a special average for them.

The homogeneity of the female workers' hourly earnings is fairly good, in consideration of the fact that no details as to hourly earnings were supplied by I. Thus, in 1910 6 reports varied within such narrow limits as 24.4 and 29 öre.

The Trend of Wages in the Sugar Industry.

At the beginning of this chapter it was observed that the material collected allowed special treatment of only one of the many branches of which the food products industry consists, namely the sugar industry. Before proceeding to the monographs, we shall now present this special study, using of course the same data from the sugar factories as before but compiled with the view of showing the trend of wages in that branch as a whole.

Of the above-mentioned sugar factories (A, B, C, D, E) the first four are all situated in the County of Malmöhus. Around the year 1910 75% of the country's beet-cultivation and raw-sugar production, and about $\frac{1}{8}$ of its sugar refining, were concentrated within that county. The sugar factories A, B and C consist of both raw-sugar mill and refinery; they are "combined sugar factories" (see note on p. 199). The other two are refineries only.

For each individual concern series have been worked out

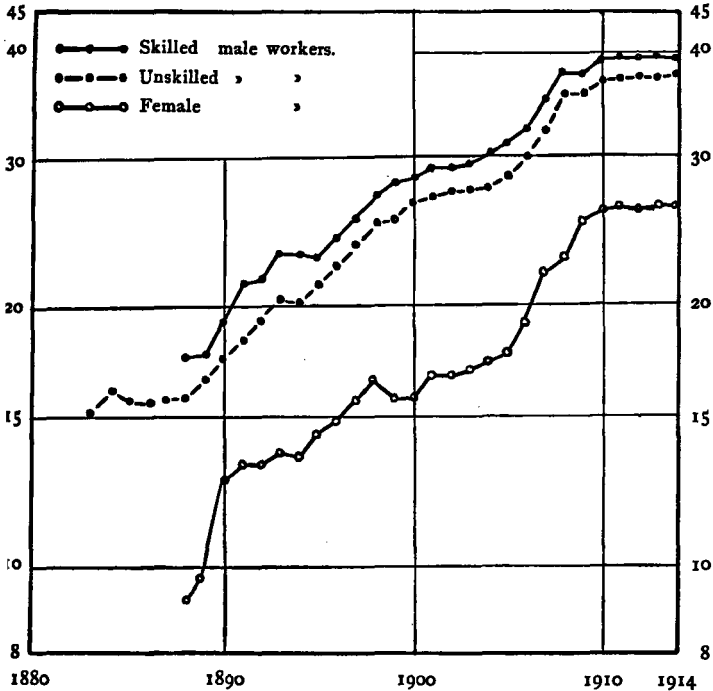
Table 19. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Skilled and Unskilled and Female Workers at the "Combined Sugar Factories" 1883-1914.

Year	Annual earnings			Hourly earnings		
	Skilled male workers	Unskilled male workers	Female workers	Skilled male workers	Unskilled male workers	Female workers
1883	—	525	—	—	15.1	—
84	—	570	—	—	16.0	—
85	—	621	—	—	15.8	—
86	—	612	—	—	15.8	—
87	—	628	—	—	15.8	—
88	666	660	300	17.6	15.8	9.1
89	729	715	328	17.7	16.6	9.7
1890	828	777	413	19.3	17.6	12.7
91	866	754	447	21.6	18.5	13.1
92	884	786	411	21.9	19.4	13.1
93	843	765	448	23.2	20.6	13.6
94	843	744	428	23.2	20.4	13.4
95	793	756	459	23.0	21.4	14.2
96	847	815	465	24.1	22.6	14.9
97	939	856	480	25.7	24.0	15.6
98	947	855	551	27.2	25.1	16.6
99	936	844	503	28.2	25.7	15.8
1900	1004	915	485	28.8	26.8	15.8
01	1039	886	533	29.4	27.1	16.7
02	1008	870	502	29.5	27.5	16.8
03	1060	919	509	29.9	27.9	17.0
04	1072	908	535	30.7	28.0	17.5
05	1173	910	543	31.6	28.9	17.9
06	1212	964	598	32.9	30.3	19.4
07	1345	1095	686	35.6	32.9	22.2
08	1220	1069	632	38.0	36.0	23.1
09	1226	1054	695	38.8	36.6	25.5
1910	1348	1216	778	39.6	37.4	26.1
11	1303	1187	748	39.6	37.6	26.6
12	1324	1215	761	39.7	37.9	26.3
13	1348	1258	775	39.7	37.8	26.6
14	1372	—	746	39.7	38.2	26.5

for skilled workers (smiths, stokers machinists, carpenters, etc.), unskilled workers and female workers. From these series averages have been struck for all "combined factories", and are presented in Table 19.

The most characteristic feature of the trend of the wages of the three groups is the remarkable parallelism between the wages of the skilled and unskilled workers, and also the manner in which the annual earnings of the female workers rapidly catch up with those of the male workers.

**Chart 13. Hourly Earnings of Male Skilled and Unskilled
Workers and Female Workers at the Combined Sugar Factories.**



The hourly earnings of the skilled and the unskilled workers move almost entirely parallel to one another, with a slight tendency for the unskilled workers' wages to rise more rapidly. Between the years 1890 and 1910 the hourly earnings of the skilled workers increased by 105 %, and those of the unskilled workers by 113 %. The annual earnings move more irregularly because of the variability in the working hours (for stoppages of work see monographs). The corresponding percentages for these earnings work out at 63 and 56 %. The annual and hourly earnings of the female workers increase during the same period by 88 and 106 %. Thus, the women's hourly earnings developed parallel to those of the skilled and unskilled male

workers, but the women's annual earnings rose far more rapidly than the male workers' annual earnings. This indicates a more substantial shortening of the annual working hours of male workers. The male workers' hours have been shortened by about 20 %, but the female workers' by only 5 %. Around the year 1890 the male workers worked sometimes more than 4000 hours *per annum* (due chiefly to the large amount of overtime work, especially in the height of the "kampanj" season, see below), while the women worked 3200—3300 hours. In 1910 the men worked about 3300 hours and the women 3000 hours *per annum*.

Otherwise, the development of wages is remarkable for its uniformity. The annual earnings are, it is true, somewhat irregular on account of occasional stoppages, but the hourly earnings proceed with all the greater regularity. Accelerations in the rise of wages occur between the years 1889—1893, 1895—1901 and 1905—1908. No violent setbacks ever occur. In no case do the hourly earnings show any significant decrease. The stagnation of wages after 1908 is noteworthy. For a more detailed study of the development of wages the reader is referred to Table 19 above and the accompanying text.

The averages for skilled workers up to 1893 comprise only 2 series (from A) and 4 selected workers, from 1894 to 1896 3 series (from A and C) and 8 selected workers, and from 1897 2 series from B are added, the average thus comprising 5 series and 13 selected workers. For the year 1914, however, there are no particulars concerning B. Each of the averages for unskilled workers and female workers cover, for the period 1883—1893, 1 series (from A) and 2 selected workers, for 1894—1896 2 series (from A and C) and 6 selected workers, and for 1897—1913 3 series and 10 selected workers (from A, B and C). The weights have generally been selected in such a way that each of the three concerns are represented in the averages by the same weight. In one or two cases it has been necessary to make corrections by means of chain index numbers.

Averages have been calculated both for annual and for hourly earnings. Hourly earnings in the earlier years

(up to about 1900) have generally been obtained with the aid of a stated number of working days during the year and the ordinary number of working hours per day, besides which, overtime has usually been given in hours. Particulars obtained from the concerns regarding ordinary working hours per day are in general not quite certain and rather summary, so that the trend of hourly earnings may not always be quite correct. The short variations, on the other hand, should be correct, since here for the most part the number of days and overtime come into play. Subsequently the working time was given in hours, in conjunction with the transition from payment per day to payment per hour. For piece-work, which was never used in a large scale, it has usually been necessary to estimate the hours of work. For B, the hourly earnings have had to be calculated as from 1907 (see monograph).

At factory C the workers are in general on a higher wage level than those engaged in corresponding occupations at A and B; the annual earnings of workers at A show a falling-off, as compared with those of the workers at B and C, from 1905 onwards. This latter circumstance appears to be due primarily to the fact that the working time became shorter there than at the other factories.

This is verified by a study by the Swedish Employers' Association's Statistical Bureau for the year 1912.¹ A calculation on the basis of the figures given in that publication shows that the average annual working time for male workers at A was 2989 hours, but 3297 at B, and for female workers the corresponding figures were 2654 and 3151. The hourly earnings will also be found to be on a more uniform level.

The averages in Table 19 tally with the corresponding figures in respect of the "combined sugar factories" according to the Swedish Employers' Association's statistics for 1912.

¹ Meddelanden från Svenska Arbetsgifvareföreningens statistiska byrå. 1913. Stockholm 1914.

Comparison of Earnings at the "Combined Sugar Factories" in the Year 1912 according to Table 19 and to the Swedish Employers' Association's Statistics for the Same Year.

	Skilled male workers			Unskilled male workers			Female workers		
	Number of workers	Annual earnings, kronor	Hourly earnings, öre	Number of workers	Annual earnings, kronor	Hourly earnings, öre	Number of workers	Annual earnings, kronor	Hourly earnings, öre
1) According to Table 19	12	1324	39.7	9	1215	37.9	10	761	26.3
2) According to the Swedish Employers' Association's statistics	155	1354	42.7	224	1180	37.9	14	830	28.7
1) in percentage of 2)	—	98	—	93	—	100	—	92	—

The Raw-Sugar "Kampanj" and its Influence on Wage Conditions and Working Hours.

As already mentioned, sugar production consists of two main processes, the production of raw sugar and the refining process. The latter process is extended over the whole year, but the former is a highly seasonal industry, its high season, the so-called "kampanj", coinciding with the harvesting of the beet crop in the autumn, starting usually during the first half of October and lasting until the end of December. The length of the "kampanj" is very variable and may sometimes extend right into the following year. It is often succeeded by an "efter-kampanj", which however is not of the same markedly intensive type.

This relatively short and very intensive season in one part of the production being naturally very important for the working conditions within the industry, available material from two "combined sugar factories" B and C has been compiled for certain working years and calendar years in order to illustrate the effect of the "kampanj" on the number of workers, wage conditions and working hours. Particulars as to the number of workers, the total wages paid, and sometimes the total number of working hours, have been obtained from the wage-books for each

wage period, i. e. the week. By this means it has been possible to work out the average weekly earnings and in some cases the hours of work per week during all the weeks of the year. The commencement of the "kampanj" can always be discerned from the sudden and substantial rise in the number of workers. The periodical divisions in the following table have been selected in view of the variations in the number of workers, the "kampanj" being assumed to have proceeded during the weeks in which the number of workers was at its maximum. These periods vary with the establishments and occupations involved, and generally speaking do not coincide with the "kampanj's" as indicated in official statistics.

Variations in the Number of Workers and the Weekly Earnings in the Raw Sugar Industry during Different Yearly Periods.

(Data relating to off-seasonal sections of the years under enquiry are taken to equal 100.)

	Number of workers in			Weekly earnings in		
	off-season	"kampanj"	"after-kampanj"	off-season	"kampanj"	"after-kampanj"
<i>Concern B.</i>						
1898—99 Male workers . . .	100	214	179	100	120	109
" Female workers . . .	100	786	786	100	122	122
1905 Unskilled male workers . .	100	445	—	100	158	—
" Stokers and machinists . .	100	400	—	100	135	—
" Iron-workers	100	100	—	100	145	—
" Female workers	100	1500	—	100	173	—
1908—09 All workers	100	276	211	100	133	115
<i>Concern C.</i>						
1905 Unskilled male workers . .	100	190	—	100	127	—
" Stokers and machinists . .	100	137	—	100	112	—
" Smiths and iron-workers . .	100	114	—	100	129	—
" Female workers	100	130	—	100	96	—

The "kampanj" is marked by a striking rise in the weekly earnings. As is explained in greater detail in the monographs, this course is due primarily to variations in the length of the time of work. Whereas during the rest of

the year the employees worked normally six days of the week, they usually worked seven days every other week during the "kampanj". It is principally the amount of overtime that increases during the "kampanj", and often the ordinary hours of labour per day as well. But there are also other, contributory causes to the rise in earnings during the "kampanj". For instance, piece-work is often usual during the "kampanj", but not during other sections of the year. Although the average daily and hourly wage does not increase at the outset of the "kampanj" owing to the inclusion of a large number of less qualified workers, a substantial rise in the daily and hourly wage is frequently observable for the permanent workers — whose earnings appear in the series of selected workers — to be followed by a drop again at the close of the "kampanj".

CHAPTER XI.

THE TEXTILE INDUSTRY.

THE textile industry forms one of the more important groups in Swedish manufacturing. In 1912 the value added by manufacturing in the textile and clothing industry represented 12.5 % of the entire Swedish manufacturing, and the number of employees (43,600 workers) represented 14 %. According to a special enquiry undertaken by the Board of Trade¹, the textile industry in earlier years held a predominant position in Swedish manufacturing. The value added by manufacturing of the products in the textile industry represented about 53 % of that of the entire manufacturing industry in the year 1850, though it should be noted that neither the iron industry, which had approximately the same value added by manufacturing as the rest of industry put together, nor the sawmills industry were at that time included in the totals. Since then the textile industry has made great progress, especially after 1890, though not at the same rate as the other branches of industry, so that relatively speaking it has shown a retrograde movement.

The principal industries in the textile field are the wool and cotton branches, the values added by manufacturing in 1912 being respectively 35 and 29 % of those of the entire textile industry. Out of the total number of workers the wool industry employed in the same year 11,167, or 32 %, and the cotton industry 13,528, or 39 %. The total amount of wages paid to the factory hands were apportioned as

¹ Textil- och beklädnadsindustrien. Specialundersökning av Kommerskollegium. Stockholm 1914.

follows: 39 % to the cotton factories and 33 % to the wool factories. On an average per worker, therefore, the wage is somewhat lower in the cotton industry than in the wool industry, which appears to be due to the fact that female labour is employed on a comparatively larger scale in the former branch. Out of the 43,607 workers employed in the textile and clothing industry in 1912, 11,452 were men and 23,303 were women of over 18 years of age, while 2,955 were boys and 5,897 were girls under 18 years of age.

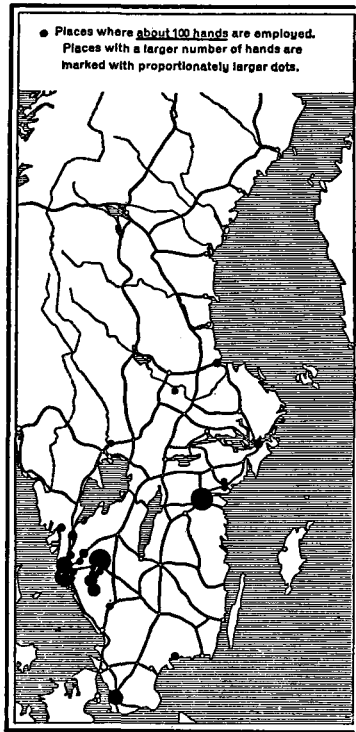
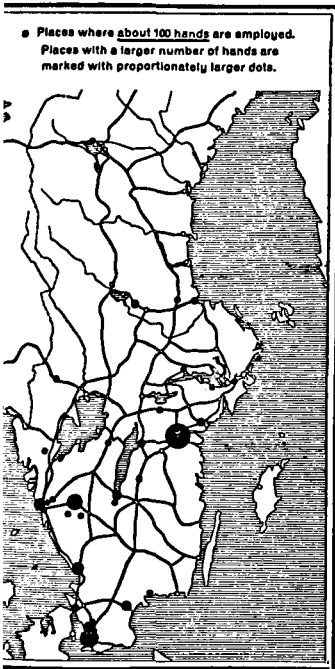
The textile industry is concentrated in certain districts. From early times Norrköping has been a centre of the country's wool industry. On an average for the years 1906—1910, 24 % of the manufacturing value of textiles was produced from that locality. Next came Malmö and Borås, producing 16 and 12 % respectively. The cotton industry has since early times had its principal seat in Älvsborg County (Borås and adjoining county districts), where it has grown steadily through the home industries that are extensively carried on there. During the period 1906—1910 there were produced in that county 35 % of the country's entire output of cotton yarn and textiles, almost half of which (15 % of the total) came from Borås. Of the towns, however, Norrköping was easily first in regard to the cotton industry as well, its total manufacturing value representing 18 % of the whole. The third town in order of importance in this respect was Gothenburg, producing 9 %. The country districts within the Gothenburg and Bohus County produced during the years 1906—1910 13 % of the total manufacturing value of cotton products and 10 % of the wool products.

Selection of Concerns.

Wage data have been furnished by the following 15 concerns during the years stated (W denotes that the concern is engaged in the wool industry and C that it is engaged in the cotton industry):

The Woollen Industry. 1924.

The Cotton Industry. 1924.



	<i>County:</i>	<i>Years:</i>
A. The Drufvefors Weaving Mills, Borås (C)	Älvsborg	1907—1925
B. The Rydboholm Mills, Rydboholm and Viskafors (C)	"	1865—1896 & 1906—1914
C. The Stigen Woollen-spinning and Woollen-weaving Mills, Färgelanda (W)	"	1896—1915
D. The Uddebo Knitting Mills, Uddebo (W)	"	1887—1926
E. The Norrby Cotton-spinning Mills, Borås (C)	"	1880—1901
F. The Gamlestaden Cotton-spinning and Cotton-weaving Mills, Gothenburg (C)	Gothenburg and Bohus	1860—1926
G. Claes Johansson & Co.'s Weaving Mills, Mölndal and Mölnlycke	"	1890—1911
H. A Cotton-spinning Mill, near Gothenburg (C)	"	1865—1901 & 1907—1925
I. P. Ericsson & Company, Gothenburg	"	1897—1906
K. A Woollen-spinning and Yarn-spinning Mill	"	1897—1912
L. The Levanten Dyers Company, Almedal	Gothenburg and Bohus	1893—1905
M. The Drag Woollen-spinning and Woollen-weaving Mills, Norrköping (W)	Östergötland	1877—1904
N. The Gävle Cotton-spinning and Cotton-weaving Mills, Strömsbro (C)	Gävleborg	1854—1915
O. The Holma-Helsingland Linen-spinning and Linen-weaving Mills in Forsa	"	1901—1911
P. A. Ferd. Sjöberg & Company, Gävle (W)	"	1890—1912

Älvsborg County with its 5 concerns and Gothenburg and its neighbourhood with 6 concerns are relatively well represented, whereas from Norrköping it has only been possible to procure wage material from one concern. It would of course be very interesting to strike special averages for Älvsborg County and Gothenburg, but partly the number of selected concerns is too small for the purpose, and partly the trend of wages at the concerns within each of the districts exhibits no common features, and no essential differences from other district. We have therefore only computed averages for all concerns combined.

For the same reason we have not differentiated between the wool and the cotton industry. No special tendencies are observable in the development of the wage series within these different branches; moreover, according to the statistics compiled by the Swedish Textile Manufacturers' Association, the difference between the hourly earnings of the two branches is very slight (see Chapter XIII

p. 274). The occupations that we have usually selected for our purpose, namely, male and female spinners, weavers and dyers, are common to and the most important in both the wool and the cotton industry. The differences in qualification that exist are not of very great importance. The one vital difference lies in the entirely different character of the raw material, and this may give rise to certain divergences. For instance, during the first half of the sixties the American Civil War put the Swedish as well as other European cotton factories almost completely out of action, while the wool industry was not so affected. Such cases are however exceptional, and the common factors that affect both industries alike and which consist in similar technique and the satisfaction of similar needs seem to be the determining factors. The general averages, then, cover 5 wool factories, 6 cotton factories, 1 linen-spinning and weaving mill, concern L, which is engaged in bleaching, dyeing and the finishing processes of both cotton and wool, and concern I, which manufactures awnings, tarpaulins, tents etc.

Selection of Occupations.

In the great majority of cases the occupations chosen have been: male and female spinners and weavers, male dyers and finishers, and also, although not so frequently, female winders and seamstresses, etc. These occupational groups are found — possibly with the exception of seamstresses — throughout most concerns and during the entire period under review, and as a rule they contain a comparatively large number of workers, as will be seen from the figures given below, based on the wage statistics of the Swedish Manufacturers' Association for the year 1910, covering the textile factories belonging to the Association.

	Spinners		Weavers		Dyers		All workers	
	Male	Female	Male	Female	Male	Female	Male	Female
Wool factories	57	49	153	609	81	3	691	1309
Cotton factories	56	206	11	1195	128	12	667	2380

General Trend of Wages and Kinetic Dispersion.

The average annual and hourly earnings for these occupations at the textile factories concerned are given below in Table 20.

Table 20. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male and Female Workers in the Textile Industry 1865—1914.

Year	Annual earnings		Hourly earnings		Year	Annual earnings		Hourly earnings	
	Male workers	Female workers	Male workers	Female workers		Male workers	Female workers	Male workers	Female workers
1865	364	225	10.8	7.0	1890	534	358	16.6	12.2
66	340	243	10.8	7.7	91	543	362	16.9	12.3
67	342	231	10.9	7.6	92	539	354	17.5	12.1
68	343	211	10.8	7.0	93	540	360	17.3	12.2
69	344	213	10.7	7.2	94	585	376	18.1	12.6
1870	344	239	10.8	7.3	95	592	376	18.1	13.0
71	359	267	11.3	8.2	96	605	379	18.6	13.5
72	361	275	11.3	8.3	97	638	390	19.6	13.5
73	398	269	12.1	8.3	98	668	431	21.4	14.6
74	449	303	13.3	9.1	99	684	445	22.1	15.0
75	487	286	14.5	9.2	1900	651	442	22.0	15.3
76	484	299	14.7	9.0	01	682	434	23.2	15.1
77	489	306	14.9	9.6	02	712	448	24.1	15.3
78	444	259	15.1	9.4	03	698	459	23.3	15.5
79	411	251	14.1	9.3	04	691	466	23.7	16.0
1880	464	276	14.1	9.4	05	759	495	24.8	16.9
81	480	301	15.0	9.6	06	820	520	26.6	17.8
82	514	297	15.7	10.0	07	835	550	28.0	19.1
83	530	300	15.7	10.1	08	846	551	28.2	19.3
84	522	318	15.5	10.5	09	838	554	29.6	20.3
85	523	314	16.0	10.5	1910	892	573	29.8	20.8
86	507	306	16.0	10.5	11	941	596	31.3	21.3
87	511	327	16.2	10.8	12	1009	627	33.2	23.0
88	519	349	16.3	11.4	13	1030	650	34.6	22.8
89	523	365	16.3	11.9	14	978	613	34.1	22.2

As will be seen from the table, the general wage series are mobile, being quite distinctly influenced by cyclical changes. In order to examine closer the general course of the textile wages and also to determine how far uniform tendencies in the general series are attributable to variations in the different series of which they are composed, a comparison has been made between the percentage variations of the different series and the general

Chart 14. Annual Earnings of Male and Female Workers in the Textile Industry.

(Index: 1910-1913 = 100.)

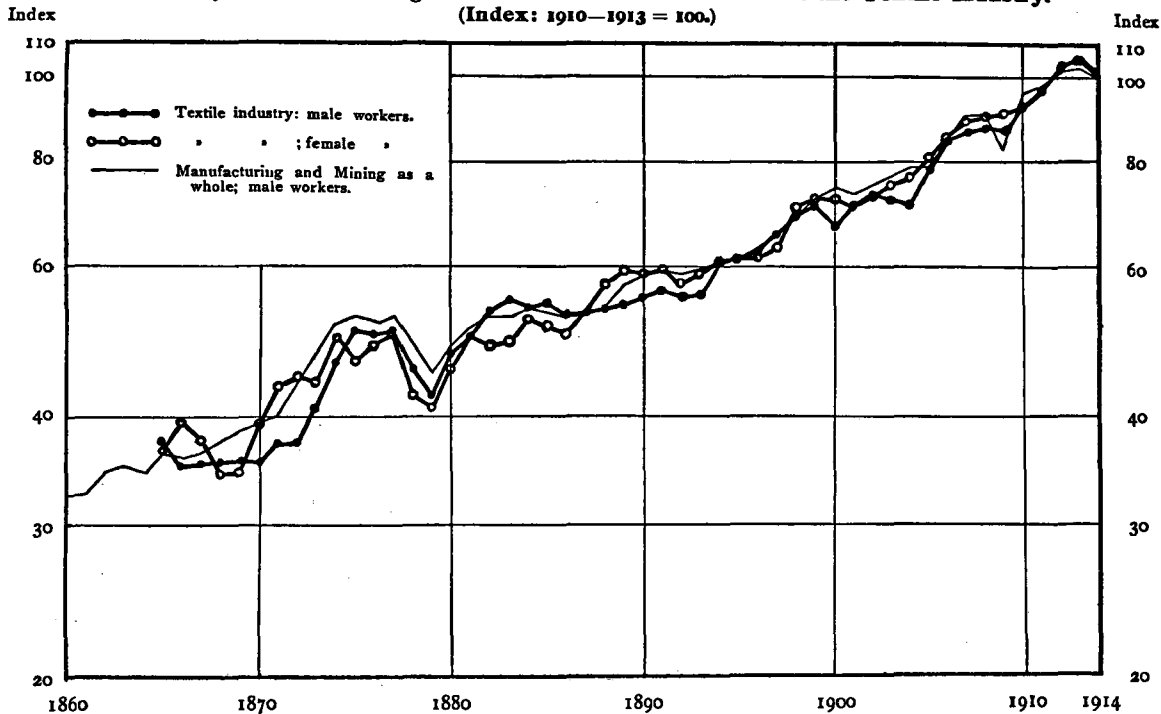
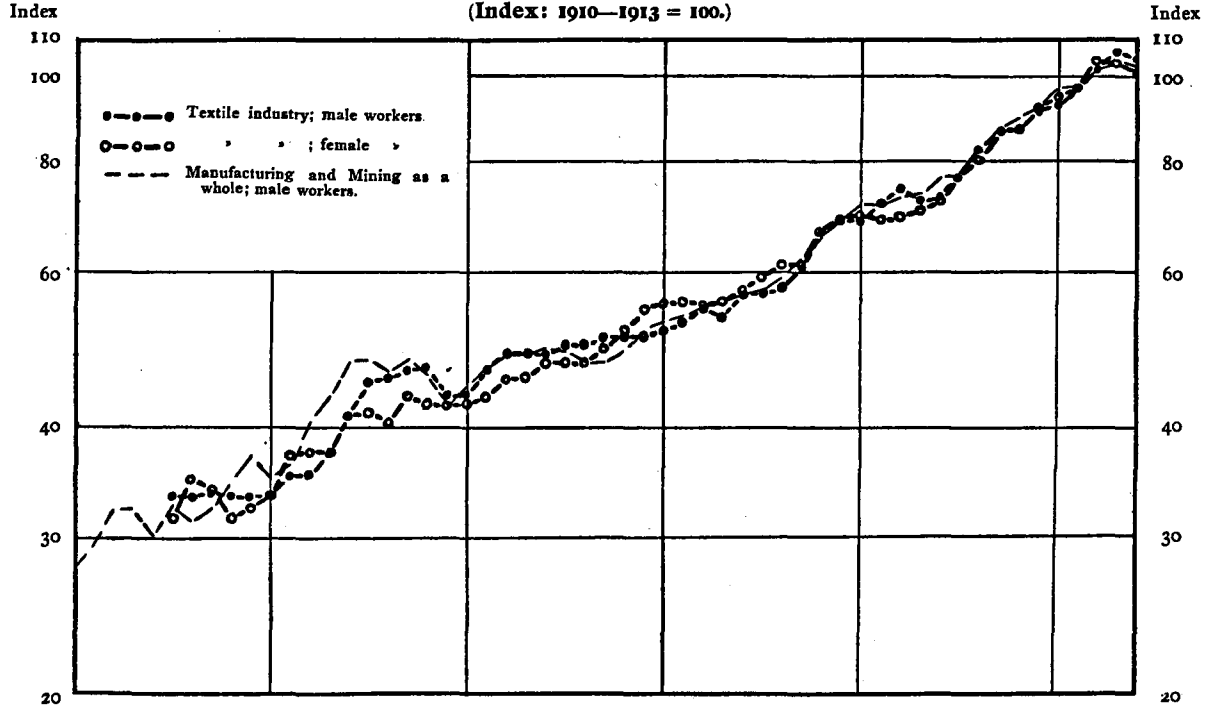


Chart 15. Hourly Earnings of Male and Female Workers in the Textile Industry.
 (Index: 1910—1913 = 100.)



THE TEXTILE INDUSTRY

223

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease).

(The letters denote the different concerns, the figures various series from each concern.)

	1869/1875	1877/1879	1886/1889	1894/1899	1900/1902 ¹	1904/1907	1908/1913	1870-72/ 1912-14	1890-92/ 1907-08
<i>Male workers</i>									
B 1	+36	8	± 0	—	—	—	+ 8	+190	+ 85
2	+36	1	9	—	—	—	+ 7	+230	+ 92
C 1	—	—	—	—	+ 8	+50	+25	—	—
2	—	—	—	+10 ³	+20	+24	+11	—	—
3	—	—	—	+10 ³	+ 9	+18	+11	—	—
D	—	—	+ 4 ⁵	+30	+14	+12	+25	—	+ 76
F	+54	—3	+14	—6	+17	+30	+47	+174	+ 42
G	—	—	—	+28	+ 7	+24	+35 ⁶	—	+ 60
H	+43	-22	+ 4	+19	—	+23 ⁴	+15	+128	+ 43
I	—	—	—	—	+ 6	+13 ⁵	—	—	—
L	—	—	—	—4	+ 4	—	—	—	—
M 1	—	—	—	+23	+11	—	—	—	—
2	—	—	—	—2	+ 7	—	—	—	—
N	+37	-31	+ 1	+41	+16	+17	+17	+133	+69
O P	—	—	—	+16	+ 2	+ 4	—12	+ 7 ⁶	+ 66
<i>Average</i>	+42	-16	+ 3	+17	+ 9	+21	+22	+184	+ 56
<i>Female workers</i>									
A	—	—	—	—	—	—	+18	—	—
B	+62	+18	—1	—	—	—	+ 8	+193	+117
C 1	—	—	—	—	—	—	+38	—	—
2	—	—	—	—	+ 6	+69	+24	—	—
D	—	—	—2 ⁵	+30	+ 2	+ 9	+19	—	+ 37
F 1	+30	+ 5	+34	+21	+ 3	+41	+ 6	+ 66	+ 40
2	—	—	—	+ 1	-10	—3	+52	—	—
G	—	—	—	+18	+ 7	+19	—	—	+ 52
H 1	+29	-16	+14	+21	—	+31 ⁴	+17	+189	+ 69
2	+15	-14	+35	+ 2	—	+52 ⁴	+13	+177	+ 42
I	—	—	—	—	+ 5	—5 ⁵	—	—	—
K 1	—	—	—	—	+ 3	+24	+14 ⁷	—	—
2	—	—	—	—	+15	+ 5	+18 ⁷	—	—
L	—	—	—	-10	+ 2	—	—	—	—
M	—	—	—	+ 4	+ 1	—	—	—	—
N 1	+34	-44	+31	+11	+ 2	+21	+12	+112	+ 25
2	+41	-31	+15	+21	—4	+14	+17	+105	+ 49
O 1	—	—	—	—	+12	+18	+27 ⁶	—	—
2	—	—	—	—	—	+37	—2 ⁵	—	—
P	—	—	—	+11	—5	+33	+ 5 ⁷	—	+ 77
<i>Average</i>	+34	-18	+19	+18	+ 3	+18	+18	+142	+ 54

¹ The percentages in this column apply to 1900—1902 as regards male workers and to 1901—1902 as regards female workers.

² 1887/1889. — ³ 1896/1899. — ⁴ 1901/1907. — ⁵ 1904/1906. — ⁶ 1908/1911. — ⁷ 1908/1912.

series in the course of certain interesting cyclical periods. In exceptional cases in which special series do not exist within the periods selected, the percentages have been computed for the nearest coinciding period, this being indicated in a note.

The variations in the annual earnings only are published. The hourly earnings exhibit, on the whole, the same variations, which however show slightly narrower dispersion owing to the fact that one variable factor, the hours of work, is eliminated.

The period 1869—1875 is characterized in the textile, as in most other industries, by a steep rise in wages (the strongest in fact during the whole period under review) for both male and female labour. The men's annual earnings rose 42, their hourly earnings 36 %, the women's annual earnings 34 and their hourly earnings 28 %. The latter's wages showed a strong rising tendency from as early as 1870, while the men's wages did not start rising until 1872. The increase in men's wages consists of a very uniform rise in the different series. The women's rise in wages is less marked and also less uniform. The rise of 62 % in the women's wages at B is due to the short annual working time which afforded a considerable measure of elasticity when trade conditions improved. In 1869 they worked 132 days and earned 89 kronor, but in 1874 they worked 236 days, their earnings amounting to 174 kronor, while the hourly earnings rose only 12 %. In series H₂, the rise amounted to only 15 %, but continued up to the year 1876, the total increase from 1869 being 31 %.

The years after the middle of the seventies up to 1879 are, as always, marked by a strong reduction in wages, although of very different strength, as the tables show. Whereas the men's annual earnings fell 16 % and the women's 18 %, the hourly earnings were reduced by only 5 and 3 % respectively. The wages of the male workers at B continue to fall until 1880 (4.5 %), but still relatively slightly. The women workers at concern B, whose earnings fluctuate considerably owing to the variations in

their hours of work, have a fall in wages up to 1879 of 6 % from the peak year 1876 and a drop of 3 % in their hourly earnings from 1877, in spite of the increase of 18 % in the annual earnings during the period 1877—1879. The more pronounced fall in annual earnings at N in the case of both men and women workers is mostly due to the shortening of the hours of work, for the hourly earnings fell only about 10 %. Little attention should be paid to different trend in the series relating to concern F, as they are based on very summary data, and are assigned a relatively low weight in the averages.

After 1879 the earnings show a marked recovery throughout, the average rise being 29 % in 1879—1883 for men workers, and 19 % in 1879—1881 for women workers. As usual, the hourly earnings show less mobility, rising during the same respective periods 11 % for the men and 9 % for the women.

This rise in wages is succeeded by a period of stagnation, with a slight falling tendency in 1886. At the close of the eighties up to about 1890 it is generally possible to observe a distinct rise in wages (see for instance the engineering works), closely connected with the improvement in trade conditions. A similar rise took place in the wages of the women textile workers (19 %) between the years 1886 and 1889, after which the annual earnings remained fairly constant until about the middle of the nineties. The male textile workers' annual earnings, on the other hand, developed very slowly, the rise being only 3 % during the period 1886—1889 and 3 % between 1889 and 1893. The women's hourly earnings went up 13 % during the period 1886—1889, and the men's 2 %. The women workers' series from B and D in the county of Älvsborg proved an exception to the rise in wages at the close of the eighties, their wages keeping a constant level up to the middle of the next decade. The stronger rise shown by series H 2 (female slubbing-frame tenders and drawing-frame tenders) was the result of their going over to a piece-work system.

From the middle of the nineties (here reckoned from

1894) a general rise in wages sets in, ceasing about 1899. The men's annual earnings rose 17 % and the women's 18 %, and the hourly earnings showed a rise of respectively 22 and 19 %. This applies to most series and is due to a general shortening of the regular hours of work *per diem*. Thus, while the annual earnings of the tricot knitters at D rose 30 %, the rise in the hourly earnings is 52 %, the corresponding figures for the women workers being 30 and 51 %. The contraction of the annual earnings at L is due to a shortening both of the number of hours of work *per diem* and the number of days *per annum*; the men's hourly earnings went up 11 % and the women's 4 %. The strong increase in the earnings of men in the bleach-works and dye-works at concern N is accounted for by the fact that during this period the purely time-work system was replaced by a purely piece-work system, at the same time that the annual working time was shortened to 2,900 hours from 3,500 hours. The annual earnings were increased by 41 % and the hourly earnings by no less than 71 %. No such change took place in the case of the women workers¹, and the rise in the hourly earnings was only a few per cent. stronger than that of the annual earnings. Little attention need be paid to the deviations shown by concerns F, L and M, as the wage data furnished by these concerns are of poorer quality and the variations from year to year are occasionally fairly wide.

After 1899 there was a fairly general minor reduction in the annual earnings, chiefly due to a shortening of the annual working time, whereas the hourly earnings were more constant, or else actually continued to rise, although at a slower pace. The men's annual earnings dropped 5 % up to the year 1900, only to rise again later, while the women's annual earnings went on falling until 1901 (2.5 %).² The trends of the different series, however, lack

¹ N 1 shows the wages of women spinners working on a time basis for the whole period and N 2 the wages of women weavers, who already before this period had been engaged for the most part on piece-work.

² Note also the different periods selected in regard to male and female workers in the Table on p. 223.

uniformity, some of them interrupting the rise experienced in the nineties as early as in 1899 and others continuing to rise until as late as 1902 or 1903. The men's annual and hourly earnings reach a fresh maximum in 1902, with a rise of 9.4 and 9.5 % respectively from 1900. This rise is unusually uniform in both the components that make up the averages. The women's wages, after reaching their bottom level in 1901, rose the next year, though only 3 %, and this rise was not interrupted, as in the case of the men, by a fall, but continued at a slackening pace until 1904.

From that year the increasing improvement in trade conditions was reflected in a more rapid rise in wages, and this went on until 1907. The men's annual earnings during the period 1904—1907 rose 21 %, and their hourly earnings 18 %, while the women's annual earnings rose 18 % and their hourly earnings 19 %. This upward swing applies to all component series, though in different degrees. The strong rise in the wages of spinners at C was due to their taking up piece-work in 1905 and possibly also to the abolition of the free housing benefit. The sub-normal rise in the spinners' wages at P, on the other hand, is due to a minor contraction in wages in 1906—1907, and the maximum was reached in 1908, the total increase since 1904 being 18 %. A number of the series reach higher values in 1908, but on the whole the advance in wages had stopped by then. As in the case of the spinners at C, the substantial increase in the wages of the women weavers in the same concern is accounted for by the introduction of piece-work. The strong rise in the wages of the women workers at H is largely attributable to unusually short working hours in 1901, the hourly earnings thus rising 22 and 35 % respectively.

As to the strong rise in wages during the period 1904—1907, it is to be observed that this was not followed, as in the case of earlier rises, by any reduction in wages. Both annual and hourly earnings seem to have been more or less constant between 1907 and 1908, and in 1908—1909 there was a fairly uniform and distinct increase in

the hourly earnings (5 % for both men and women workers), although the annual earnings showed a tendency to decline concomitant with the suspension of work during the general strike in 1909.

After 1909 there again occurs a marked period of rising wages, the annual earnings advancing in 1910, 1911 and 1912 6—7 % *per annum* for the men and 3—5 % for the women workers. There was also a general increase in annual earnings up to 1913, though on a smaller scale. Taken all in all, the result was that between 1908 and 1913 the men's annual earnings went up 22 %, and their hourly earnings 23 %, and the women's annual and hourly earnings went up 18 %. At B the rise in wages was comparatively slight throughout, and at G it was relatively strong. The latter abnormal rise is due primarily to an increased amount of overtime work, while the average hourly earnings on ordinary working time increased by 23 % in the period 1908—1911. The drop in the annual earnings of the male workers at P can be accounted for by the fact that 1908 is the peak year for this establishment. Between 1913 and 1914 there takes place here, as in several other branches of industry, a general reduction in wages, amounting to 5 and 6 % in the men's and women's annual earnings and to 2 and 3 % respectively in their hourly earnings.

For an examination of the secular trend we have compared an average of the annual earnings in the years 1870, 1871 and 1872 with an average for the years 1912, 1913 and 1914, and also an average for the briefer period covered by the years 1890, 1891 and 1892 with an average for 1907 and 1908. The trend in the different concerns varies fairly widely during the longer period. The annual earnings of the men workers at B have increased about 200 %, compared with an increase of just over 100 % at H and N. The rise in the women workers' annual earnings was likewise most rapid at B, but they also increased nearly 200 % at H. This lack of uniformity in the wage development is reflected in the dispersion of the wages. In the years around 1870, for instance, the male workers at B earned about 300 kronor *per annum*, whereas those at N earned nearly 500

kronor, i. e., the workers at N earned about 67 % more than those at B. In 1913 the dyers at B earned 814 kronor, and the printers 1,121 kronor, while the bleachers and dyers at N earned 1,178 kronor — a maximum difference of only about 22 %. The same applies to women workers. The women at B earned in 1870 about 150 kronor *per annum*, those at H 200 kronor, but at N they earned 250—300 kronor and at F close on 400 kronor. In 1913 the same series' annual earnings varied between 457 and 661 kronor. The percentages for the shorter of the periods investigated are considerably more steady. At B however the women's wages in particular rose far more rapidly, a movement which here too can be regarded as a leveling-up tendency. Around the year 1890 their pay was only 185 kronor, which is not much more than half the average, 360 kronor. The more rapid rise in the wages at P is likewise the result of the sub-normal wage level in 1890 (300 kronor).

The relation between the wages of male and female labour during the different periods will be seen from the following comparative figures.

Relation between the Wages of Male and Female Workers (average of women's wages = 100).

	1865—74	1875—86	1887—96	1897—1914
Annual earnings	147	167	152	155
Hourly earnings	145	155	141	148

Hours of Work.

While the annual earnings of the male workers have increased at a somewhat more rapid pace than the female workers', the contrary is the case in regard to the hourly earnings, implying that the women's hours of work were shortened more rapidly than the men's. The number of hours *per annum* ranged around 3,200 for both sexes in 1870, in 1890 the number of working hours was the same in the case of the male workers, but by then the women's hours of work had fallen to about 3,000. In 1905

—14 the men's annual working time was about 3,000 hours and the women's about 2,700 hours.

The concerns have generally furnished particulars of the standard hours of work per week or day during various periods, and for these figures the reader is referred to the monographs. It may be said here by way of summary that, generally speaking, the ordinary daily working-time varied between 11 and 12 hours up to about 1890, after which it was reduced to 10 hours. After 1900 the workers at some of the concerns were allowed shorter hours on Saturdays, so that on the average they were working between 9 and 10 hours a day at the time of the introduction of the eight hour day in 1920. According to the Board of Trade's Enquiry into the length of the hours of labour in industry and trade in Sweden¹, the average net working time *per diem* within the textile industry was 11 hours in 1885 and 10.3 hours in 1905—1906. These figures are in approximate agreement with those given above. It should be observed that the extent to which the hours of labour were shortened in the case of male and female workers differs considerably.

Wage Systems.

The weavers, both male and female, were in 1910 engaged almost exclusively on piece-work, while the male and female spinners worked for both a time wage and a piece-work wage, though mostly the latter. The dyers were engaged almost entirely on time-work. This applies generally to the workers included in the wage series. Thus, the male and female weavers and female winders are almost invariably piece-work employees, the dyers and, generally, the finishers and spinners (both male and female) worked on a time-wage basis, with however some of piece-work, the proportion depending upon the season. There was relatively more time-wage work in the earlier years, the piece-work system being in general adopted

¹ Arbetstidens längd inom industri och hantverk i Sverige. Arbetsstatistik A. 10. Stockholm 1911.

at the close of the nineties or immediately after the turn of the century. Generally speaking, those engaged on piece-work earned more than those working on a time-wage basis, but the difference on the whole does not appear to be considerable, so that the occupations represented may be regarded as being more or less of a homogeneous character.

Benefits in Kind.

The benefit of free housing, or sometimes of dwellings leased at a low rent, was operative at 7 of the 15 concerns involved in the investigation. Usually free firewood was also included in the benefit. It was generally concerns situated in a town that did not allow their workers free accommodation. The textile workers in Gothenburg and Gävle, for instance, did not, as a rule, live rent-free. We have made no allowance for any benefit in kind that may have been granted them.

The Wage Material.

The wage material is, in part, of a somewhat summary character. The reason for this has often been that from the point of view of wage statistics the book-keeping methods employed have left much to be desired. It has also frequently been difficult to find workers who have been long enough in the service of the concern. Many of the series comprise only two workers. There are one or two concerns that have recorded only the regular or normal daily or weekly earnings during the different periods, but otherwise it has been possible to obtain the annual earnings direct, either by aggregating the earnings for each wage period, or else using the summaries of the individual annual earnings. Generally, data regarding working time have been entered in the wage records in days or hours. Particulars of the time spent on piece-work have sometimes been lacking, but it has usually been possible to estimate the time fairly accurately.

The Computation of Averages, Components and Weights.

The averages published in Table 20 include 15 concerns and also, in each of the annual earnings' averages during the period 1890—1894, 2—3 series, taken from Key-Åberg's enquiry regarding the wages and housing conditions of workers in the textile industry in Norrköping.¹

The male workers' annual earnings' series includes a maximum of 13 series, viz. for the years 1894, 1896 and 1903—1904. The number of selected workers varied in those years between 27 and 31, though it should be noted that the number of workers in the series from concern M has not been taken into account, as the wage data from that concern are presented in a different form from the others'; nor have we taken into account the number of workers in the other Norrköping series based on the Key-Åberg enquiry.

The number of series varies, however, considerably. From 1865 the average covers 3 series (from concerns B and H), in 1866 1 series from F and in 1869 1 series from N are added, so that during the period 1869—1884 the number of series is 5 and the selected workers 15. In 1885—1887 there are in addition 2 series from M, from 1887 1 series from D and from 1890 1 series from G and 1 from P; also in 1890—1894 2 series are added from Norrköping. In 1893 1 series is added from L, and in 1894 2 series from M, so that during the period 1890—1912 the averages cover 10—13 series and 27—34 workers (excluding the Norrköping concerns), but there is also a constant change of series and concerns during different parts of the period. The only concerns that have been represented throughout the greater part of the period under investigation (1865—1914) are B, F, H and N (5 series). During the years 1913—1914 the averages cover only 9 series.

The averages of hourly earnings for male workers include the same series as the corresponding annual earn-

¹ *K. Key-Åberg, Inom textilindustrien i Norrköping sysselsatta arbetares lönevillkor och bostadsförhållanden. Skrifter utgivna av Lorenska Stiftelsen. Stockholm 1896.*

ings' series. A portion of the hourly earnings are computed on the basis of the standard number of working hours recorded per day or week and the number of working days (sometimes estimated) *per annum* (concerns D, F and M).

There are more series for female workers than for male workers. The average includes a maximum of 17 series and 57 selected women workers during the period 1907—1908. During the period 1865—1886 the averages cover 6 series and 21 workers (concerns B, F from 1869, H and N). During the succeeding years are added series from D (1887), G and P (1890) and so forth, with the result that by the year 1890 the number of series has grown to 12 and the number of workers (excluding the Norrköping series) to 32. From that time up to 1912 the number of series varies between 12 and 17, in 1913—14 it is 11. As in the case of the male workers, the concerns represented throughout are B, F, H and N (6 series). What has been said above regarding the series of hourly earnings of male workers applies also to the series of hourly earnings of female workers, except that it has not been possible to compute the hourly earnings at concern P. As, however, concern P is everywhere assigned relatively little weight, its absence from the average has no disturbing effect of hourly earnings.

In the choice of weights there has been no reason to differentiate to any great extent between the different series. Nevertheless, higher weights have been assigned to the series from concerns B, G, H, K and N, as they are of a somewhat better quality, and are generally more important and more representative than the other concerns. The same weights are applied to the annual as to the hourly earnings. Care has been taken to see that the different concerns appear as far as possible, with approximately the same relative weight in the averages of male and female workers.

The index numbers for the annual and hourly earnings of both men and women workers have been raised to the same level as the direct averages for the year 1896, when the

best and most representative series are included. As far as the series of annual earnings of male workers is concerned, the index series accords closely with the direct averages during the period 1880—1896, the average difference being about 1.5 %, whereas during the years 1869—1879 the index number is about 5 % below, and previously to that 8 % above, the direct average. Subsequent to 1896, the difference widens, reaching its maximum in 1904, when the index series is 10.5 % below the average series. After 1910 the difference again becomes negligible. In the series of hourly earnings of male workers, the difference between index series and average series is likewise small, the maximum value being 11 % in 1905. From 1865 to 1893 the index number is slightly above (on an average about 4 %), and from the latter year up to 1912 it is about 5 % below, the average series; in 1912—1914 it is at a slightly higher level. With regard to the annual earnings of female workers, the difference between index series and average series prior to 1890 is wide, the former being 16 % above the latter. After that the difference is slight, being generally 2 %, though the maximum is 9 %. As in the case of the series of annual earnings the index numbers of hourly earnings of female workers prior to 1890 are considerably above the averages, the margin being fairly constant (about 12 %). During the period 1906—1914 the index numbers are about 4 % above. In the case of all these four average series the index numbers and the direct averages move parallel to one another, except between those exceptional years in which there is a strong change of components in the latter. The deviations between index series and average series are never so wide as to render likely the existence of serious errors in the index method that has been used for the construction of Table 20.

The Absolute Dispersion of the Wage Series.

As already pointed out above, the annual earnings are widely divergent each year, though tending towards

the same level as the years go on. In 1886 the annual earnings of the male workers vary between 337 and 650 kronor, those of the female workers between 198 and 368 kronor. In 1896 the minimum and maximum earnings were respectively 426 and 844 kronor for male workers and 204 and 550 kronor for female workers. There were 5 out of 13 series within a 15 % deviation from the average (605 kronor) in the case of the men and 7 out of 12 series within the same deviation from the average (381 kronor) in the case of the women. In 1904 the men's annual earnings ranged between 498 and 991 kronor and the women's between 240 and 610 kronor. Within the same deviation from the respective direct averages (771 and 480 kronor) 7 out of 13 of the men's series fell and 9 out of 15 of the women's series.¹ In 1910 the annual earnings of the men varied between 641 and 1,148 kronor and those of the women between 393 and 654 kronor. 7 out of 12 of the male workers series fall within a 15 % deviation from the direct averages (917 kronor) and 9 out of 17 of the female workers series (543 kronor). The dispersion of the hourly earnings is more irregular and not always narrower. The dispersion each year is thus considerable. The maximum earnings are about double the minimum earnings, although the relative difference is found to narrow down somewhat in the course of time. The absolute level of the average as an expression for the average wage level is therefore of doubtful value.

From a comparison of the Swedish Textile Manufacturers' Association's wage statistics (cf. Chapter XIII, p. 274) covering the whole of the textile industry for the year 1910 and corresponding figures from Table 20 the following results are obtained:

¹ If the deviation is calculated in regard to the male workers from the published index number, we find that only 31 % of the series come within the same limits on account of the index number's deviation from the direct average.

According to:	Annual earnings kronor		Hourly earnings öre	
	Male workers	Female workers	Male workers	Female workers
1) the Swedish Textile Manufacturers' Association's statistics . . .	972	649	33.9	23.4
2) Table 20	892	573	29.8	20.8
1) in percentage of 2)	109	113	114	113

The figures from the Swedish Textile Manufacturers' Association's statistics thus exceed the figures in Table 20 by a fairly constant and relatively low percentage. Notwithstanding the remarks above, this seems to show that the wage series in Table 20 might possess also a certain value as indicating the absolute level of wages during different years.

CHAPTER XII.

LEATHER AND RUBBER; CHEMICAL INDUSTRY.

THE concerns dealt with in this chapter are, generally speaking, in no way closely allied to one another, neither as regards the character of their raw materials nor their products or technical processes. We, however, computed some averages covering the wages in all these different concerns partly to ensure that the trend of wages presents no fundamental deviations from other industrial groups, but primarily, in order to simplify the calculation of the general averages which are published in Chapter III.

Each of the branches comprising the leather, hair and rubber goods industries and the chemical industry is relatively small. In 1913 they employed 12,835 and 14,398 workers respectively, representing 3.6 % and 4.0 % of the total number of industrial workers in the country.

Selection of Concerns.

Particulars of wages have been obtained from four leather factories (A, B, C and D), one boot and shoe factory (E), one rubber goods factory (F), besides from nine concerns within the chemical industry engaged in various forms of manufacture such as stearine, soap, superphosphates, copperextraction, sulphuric acid, nitro-glycerine, matches and vinegar. The following concerns are represented:

	County:	Years:
A. Ehrnberg Leather Factory, Simrishamn . . .	Kristianstad	1898—1914
B. Lilljedahl Leather Factory, Sölvesborg . . .	Blekinge	1876—1914
C. L. A. Matton Leather Factory, Gävle . . .	Gävleborg	1860—1913
D. Lindgren Leather Factory, Karlstad . . .	Värmland	1906—1909
E. A Boot & Shoe Factory	Malmöhus	1901—1913
F. Hälsingborg Rubber Factory, Hälsingborg	"	1892—1927
G. Liljeholmen Stearine Factory	Stockholm City	1901—1915
H. Zadig Soap Factory, Malmö	Malmöhus	1866—1908
I. Flora Chemical Works, Gävle	Gävleborg	1890—1899
K. Reymersholm Superphosphate Factory, Hälsingborg	Malmöhus	1899—1929
L. Reymersholm Copper Works, Hälsingborg	"	1901—1926
M. Stockholm Superphosphate Factory, Gädd- viken	Stockholm	1884—1910
N. The Nitroglycerine Factory	Stockholm City	1870—1915
O. Jönköping Match Factory, Jönköping . . .	Jönköping	1903—1927
P. The Scanian Vinegar Works, Perstorp . . .	Kristianstad	1889—1905

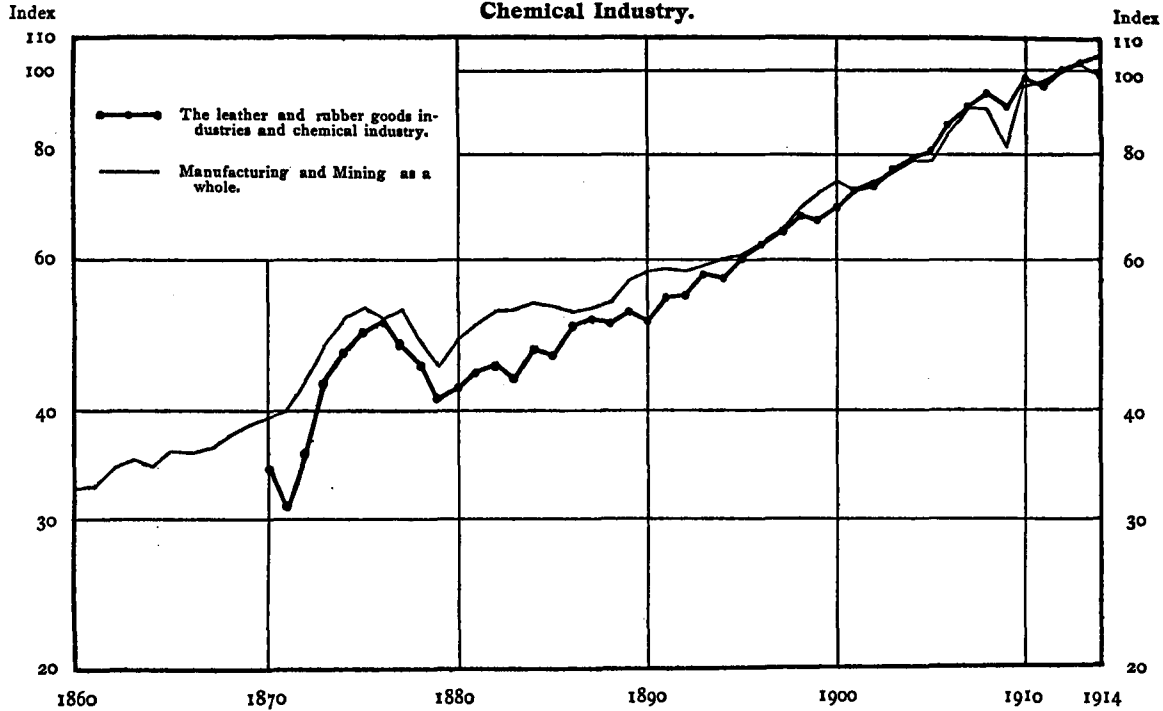
The General Trend and Kinetic Dispersion of Wages.

Averages of wages for the establishments dealt with in this Chapter have been computed from the year 1870. They relate only to the annual earnings of male workers, as the number of series relating to hourly earnings and to female workers is far too small for such a general average. The general averages are given in Table 21 below.

Table 21. Annual Earnings of Male Workers in the Leather and Rubber Goods Industries and the Chemical Industry 1870—1914.

Year	Kronor	Year	Kronor	Year	Kronor
1870	437	85	590	1900	881
71	390	86	636	01	923
72	451	87	651	02	935
73	553	88	645	03	980
74	595	89	660	04	1011
75	632	1890	647	05	1023
76	644	91	691	06	1098
77	609	92	696	07	1145
78	575	93	736	08	1194
79	528	94	733	09	1156
1880	543	95	775	1910	1259
81	565	96	797	11	1230
82	575	97	815	12	1271
83	555	98	861	13	1311
84	600	99	852	14	1331

Chart 16. Annual Earnings of Male Workers in the Leather and Rubber Goods Industries and Chemical Industry.



The averages of annual earnings for these concerns exhibit an extremely regular upward tendency throughout the period 1879—1914, and hardly any substantial cyclical movement. The usual "hump" in the wage curve in the seventies recurs here, but it is formed by only two series (H and N). Some slight acceleration can be observed in the trend between the years 1894 and 1901 and again between 1905 and 1908, but the divergence between these periods and the adjacent periods is inconsiderable. In the table given below the trend exhibited by the concerns represented has been compared during these periods and a longer period 1893—1913.

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease).

(The letters denote the different concerns, the figures in the same column various series from each concern.)

	1894/1901	1905/1908	1893/1913
A 1	+ 26 ¹	+ 4	+ 54 ²
2	+ 16 ¹	+ 20	+ 77 ²
B 1	+ 24	+ 14	+ 55
2	+ 18	+ 3	+ 48
C	+ 39	+ 13	+ 134
D	—	+ 16 ²	—
E	—	+ 16	—
F 1	+ 24	+ 28	+ 154
2	+ 23	+ 18	+ 52
G 1	—	+ 30	—
2	—	+ 25	—
3	—	+ 9	—
H	— 2	+ 29	—
K	—	+ 8	+ 33 ⁴
L	—	+ 23	—
M	+ 16	—	—
N	+ 17	+ 3	+ 28
O	—	+ 20	—
P	+ 16	—	—
<i>Average</i>	+ 26	+ 17	+ 78

During the periods chosen, then, the rise in wages is of varying strength, particularly for the period 1893—1913.

¹ 1898/1901. — ² 1898/1913. — ³ 1906/1908. — ⁴ 1899/1913.

In the individual series there frequently occur peaks in the wagecurve, usually not very pronounced, which are as a rule cancelled out owing to their occurring in different years in the different series. Thus, in every year between 1899 and 1904 a wage maximum is reached in one series or another, with the consequence that no maximum is shown in the average. If we compare the factories in the leather trade, which constitute a more homogeneous group, we find that even in their case the development is very divergent. During the period 1901—1910, in which all the concerns are represented, the annual earnings at A were increased for journeymen by 12 % and for unskilled workers by 47 %, at B 1 and 2 by 23 % and 4 % respectively, at C by 61 % and at E by 43 %. The heavy rise in wages at C was not unique. Summary details of wages obtained from a boot and shoe factory at Vänersborg, but not published here, indicate that there too a rise occurred in annual earnings amounting to 72 % during the same period.

The Computation of Averages, Components and Weights.

Up to the year 1887 the averages comprise only 3 to 4 series (from concerns B, C, H and N). From 1888 to 1892 they embrace in the main 8 series (concerns B, C, H, I, M, N and P) and 34 selected workers. In 1893 concern F comes in, in 1898 A, in 1899 K and in 1901 E and G, so that up to 1913 the averages apply to 16—18 series and about 130 selected workers. It should be noted that for those concerns where we had constructed series containing all workers (cross-section series), such series have been taken to represent only 5 selected workers, in this total of 130. By 1914 the number of series has dropped to 13.

As regards weighting, the industrial groups leather and rubber products and the chemical industry are allotted approximately the same total weight. The index number and the direct average are based on the year 1904. The difference between the index number and the direct average is insignificant (a maximum of 6 %) throughout the entire period from 1894 onwards, but for the earlier years the index number is about 15 % below the average.

Absolute Dispersion.

The absolute dispersion is very wide. In 1893 the annual earnings range between 627 and 900 kronor, and 7 out of 9 series fall within a deviation of 15 % from the average annual earnings. In 1904 the annual earnings vary between 650 and 1541 kronor, and only 5 out of 17 series fall within the same deviation from the average. In 1913 the limits are 893 and 1875 kronor, 6 out of 15 coming within a 15 % deviation from the average.

We therefore consider the average for the concerns quoted here as not representative, although the body of concerns in question exhibit a very homogeneous general wage trend. The averages published in this chapter are useful only as components of more general averages.

Because of the character of the material, details regarding hours of work, wages of female workers, hourly earnings etc. can be more adequately discussed in monographs for the different concerns.

CHAPTER XIII.

TREND OF WAGES IN MANUFACTURING AND MINING 1913—1930.

The Official Wage Statistics 1913—1930; Sources and Methods of Compilation.

SINCE the year 1919 the Social Board has published annual statistics of wages in manufacturing and mining, building trades, municipal works, trade and communications.¹ In 1918 the concerns from which the material was collected were asked to give corresponding wage data for previous years back to 1913, the official wage statistics thus covering the whole period from 1913. As will be noticed later on, however, the published statistics of the earlier years are not always as detailed as those of later years.

These statistics are necessarily in a somewhat summary form, since their main purpose is to keep authorities and the public informed regarding the current development of the wage level and rapid publication is essential. As already mentioned, however, the object of the Institute's enquiry has been to investigate only the general trend of wages in Sweden, and for that purpose the official statistics have proved to be quite sufficient for the period they cover; hence a special investigation by the Institute for that period seemed superfluous.

It remains to be seen whether the sources and methods of compilation of the official statistics are adequate for our purposes, i. e. a continuation of the wage series for 1860—1913 published in Chapter III.

¹ 1919—1928 in the review of the Social Board, *Sociala Meddelanden*, and from 1929, together with other current wage statistics in a special annual volume entitled *Lönestatistisk årsbok för Sverige* (Year Book of Wage Statistics).

Reverting then, to the discussion in Chapter II, we find that the official Swedish wage statistics are based neither on individual primary data nor on data regarding representative, selected workers in different occupations — the method used by the Institute as described in detail above. The method used for the official statistics is that already mentioned in Chapter II p. 17, namely, to extract from the wage records the total sum paid out in wages during the year in question, the total working time in days during the year, the number of day-jobs during the year in addition to the working hours, and the average number of workers per day¹; all these data given separately for men, women and non-adults. The average hourly or daily earnings and annual earnings are then obtained by dividing the total sum of earnings by the total working time and the average number of workers.

This method has already been discussed in Chapter II. Here only a few remarks regarding the comparability of our wage series and the official wage statistics will be added.

The method of calculating the average number of workers may lead to a systematic error in the official statistics. This average, being based not on individual data but on the total number of workers employed each pay-day — i. e. as a rule once a week — divided by the total number of pay-days during the year, is lower than the number of workers actually employed. Only if there were no changes in the personnel and all workers had been at their jobs during the whole year would the averages thus calculated and the real number of employed workers tally. As the average number of workers in the official statistics is for this reason lower than the real number of employed workers, the average yearly income in the official statistics will be somewhat higher than the real one. This is particularly the case in regard to industries of a markedly seasonal character or those employing casual labour. The average

¹ The average number of workers is found by aggregating the number of employees on each pay-day during the year, adding together the figures obtained and then dividing the total by the number of pay-days.

annual income is therefore not published in the official statistics for those industries.

These difficulties do not however seem to make the official wage statistics incomparable with the wage series of the Institute, as the wages of the selected workers on which the latter are built mainly refer to the income of workers in steady employment at the same concern throughout the whole year, which is also the case with the official wage statistics.

One of the main differences between the wage series constructed by the Institute and the official statistics is the difference in the scope of the wage data.

In 1930 the official wage statistics related to 5,478 concerns and 368,427 workers. Nearly 67 % of the workers in manufacturing and mining are represented. In the earlier years the number of enterprises sending in wage data and the proportion of the workers concerned were far smaller. The increase in the number of concerns and workers included in the statistics has of course made the latter more representative and reliable, but on the other hand it has changed the basis of the statistics in a manner that might make them less representative for the real movement of the wage level during the whole period. It is also possible that not only the inclusion of new concerns but also the dropping out of concerns previously included (the participation of the concerns is voluntary) can detract from the homogeneity of the material for different years. A concern in which the wage level is specially high may also happen to expand and augment the number of its workers, thereby unduly influencing the average wage during the year in question. Such disturbances can undoubtedly influence the average of a smaller group and thus cause a break in the statistical series, giving a false impression of the real development of wages within the whole group. But in the case of larger groups of concerns — e. g. a branch of industry — disturbances of this kind have a very slight effect on the averages, and where averages refer to the whole field of manufacturing and mining these disturbances may be entirely disregarded.

The Royal Commission on Unemployment has in its report¹ very carefully examined the official wage statistics from this point of view also, and has come to the same conclusion, after having controlled the material, *inter alia* by compiling separate wage series for concerns from which data have been collected without interruptions throughout the whole period.

The effect of differences in the cost of living or in the character of the market — as regards sheltered industries and industries subject to international competition — upon the wage level in special districts and industries and their influence upon wage averages has been investigated in detail by the Social Board. An investigation of this kind in regard to earlier times is naturally out of the question owing to lack of material.

The most serious defect in the official wage statistics consists, as already explained in Chapter II, in the method used for collecting wage data, and is caused by the variations in the composition of the staff of workers. This defect can be partially remedied by the expedient of differentiating as far as possible between the wages of men, women and non-adults.² A separate series for the wages of adult men will better lend itself to comparison with the wage series compiled in the preceding chapters. The changes in the proportions between other groups of workers included in the official statistics — as e. g. skilled and unskilled workers — cannot be ascertained.

The "cross-sections" for the average earnings of *all* workers combined within the occupations and concerns in question, which have been computed for certain years in order to supplement and control the wage statistics compiled by the Institute, show that, generally speaking, the wages of the selected workers are generally 5 % above those of the cross-sections.³ As the method of striking these "cross-sections" very much resembles that used in the official statistics, the above-mentioned defect in the latter does not seem to

¹ Arbetslöshetsutredningens Betänkande I, Ch. IX.

² Cf. below p. 254 and table 24.

³ See Chapter II, p. 30.

invalidate a comparison between the official statistics for the period 1913—1930 and the wage series of the Institute for the period 1860—1913.

Trend of Wages 1913—1930.

The summarized result of the continuous official wage statistics is published in Tables 22 and 23. Table 22 gives the average annual income of adult male and female workers within such large branches of industry as are not specially subject to seasonal fluctuations in hours of work and conditions of employment. Thus there has not been included in the above-mentioned table any annual income from the mineral and stone industry or from the building trades, for the reasons stated above; the annual incomes from the power, light and water services and municipal undertakings, as well as laundries, have also been excluded. Table 23 gives the average hourly income. Data for 1914—1915 on the annual income of both sexes are missing; the hourly income figures are only available for adult male workers for the years 1913, 1920—1930, and for adult female workers from 1921. It is to be observed that the hourly income of the male workers for 1913 and 1920 is calculated on the basis of supplementary material available at the Social Board, but the figures are probably as reliable as those from the other years accounted for.

The average annual income of adult male workers, which in 1913 amounted to 1241 kronor, had by 1930 increased to 2,850 kronor, corresponding to a rise of 130 %. During the war years the money wages increased constantly. The peak was reached in 1920, when the annual income of the male workers amounted to 3,607 kronor. Thus the rise in wages between 1913 and 1920 is equivalent to 191 %. During 1921—1923 the annual income has been very much reduced. Between 1920, when the annual income reached its peak, and 1923 the decrease in wages amounts to 31 %. During the period 1924—1930 the annual income of the male workers rose constantly except in 1928, which showed a small reduction as compared with the year be-

Table 22A. Average Annual Earnings (in kronor) of Adult Male Workers within the Different Branches of Industry in 1913 and 1916—1930.

Year	Mining and metal manufacturing	Wood products industry	Paper and graphic industries	Food products industry	Textile and clothing industry	Leather hair, and rubber goods industries	Chemical industry	Trade and commodity stocks	Communications	All industrial groups ¹
1913	1314	974	1297	1370	1114	1267	1164	1231	1211	1241
1916	1586	1127	1505	1598	1326	1430	1399	1490	1463	1479
1917	1910	1366	1799	1913	1532	1882	1633	1780	1677	1773
1918	2623	1953	2518	2587	1917	2419	2320	2421	2723	2502
1919	3207	2551	3076	3447	2714	3219	3043	3066	3692	3186
1920	3465	3355	4002	3837	3491	4007	3450	3725	4044	3607
1921	3150	2734	3219	4258	2723	3303	2985	3777	3615	3303
1922	2431	1874	2424	3236	2296	2514	2252	3218	2867	2570
1923	2299	2015	2330	2854	2282	2662	2314	2936	2848	2482
1924	2537	2187	2557	2945	2244	2645	2400	2932	2806	2592
1925	2586	2132	2550	3120	2204	2621	2549	2835	2928	2651
1926	2717	2176	2688	3224	2271	2517	2641	2912	3018	2707
1927	2767	2250	2739	3209	2299	2593	2696	2959	2987	2753
1928	2673	2187	2475	3196	2276	2576	2643	3013	3007	2697
1929	2908	2301	2849	3276	2269	2510	2740	3063	3180	2846
1930	2872	2304	2834	3289	2309	2651	2747	3071	3135	2850

fore, reflecting the extensive labour disputes that occurred that year.

An examination of the development of the annual income within the different industrial groups, reported in Table 22, reveals the existence of considerable differences. The increase in wages for communications (159 %), trade and commodity stocks (149 %) is thus particularly high, whereas in the textile and clothing industry and leather, hair and rubber goods industries it is only 107 and 109 %.

In order the more clearly to illustrate the variations in the nominal wages during different phases of the period 1913—1930, there has been worked out in the table given on p. 252 the percentage change in the wages of adult male industrial workers. In both annual and hourly wages

¹ In addition to the industrial groups specified in the table there are also included in this column: mineral and stone industry (1913—1924), building trades (1913—1925), power, light and water services (1913—1924), municipal undertakings, building trades (1925—1930), and laundries (1923—1930).

Table 22 B. Average Annual Earnings (in Kronor) of Adult Female Workers within the Different Branches of Industry in 1913 and 1916—1930.

Year	Mining and metal manufacturing	Wood products industry	Paper and Graphic Industries	Food products industry	Textile and clothing industry	Leather hair, and rubber goods industries	Chemical industry	Trade and commodity stocks	All industrial groups ¹
1913	647	566	682	738	642	738	609	618	651
1916	792	768	817	843	726	855	741	775	755
1917	957	795	950	1026	793	1002	873	883	854
1918	1204	1203	1216	1418	965	1250	1051	1286	1113
1919	1750	1437	1505	1820	1618	1832	1502	1778	1634
1920	1993	1859	2056	2173	2169	2525	1792	2497	2136
1921	1917	1718	1836	2348	1673	1927	1450	2264	1820
1922	1558	1360	1428	1762	1463	1510	1245	1920	1498
1923	1537	1318	1512	1650	1454	1600	1241	1780	1490
1924	1555	1438	1544	1716	1467	1537	1278	1754	1519
1925	1673	1522	1559	1822	1429	1604	1442	1772	1539
1926	1734	1529	1641	1844	1461	1576	1466	1823	1567
1927	1757	1601	1633	1896	1503	1651	1494	1853	1601
1928	1834	1623	1604	1916	1509	1577	1547	1900	1614
1929	1843	1521	1687	1955	1519	1560	1639	1866	1637
1930	1895	1512	1649	1943	1572	1636	1594	1771	1662

there are fairly wide divergences observable in the course of development within different branches of industry. Annual wages have doubled in the mining and metal manufacturing industries as well as in the wood products industry between 1913—1918, whereas in the textile and clothing industry the annual wages have increased by only 72 %. During the period 1918—1920, however, the annual wages in the last-mentioned branch of industry show the strongest tendency to rise (82 %). As compared with 1913, the annual wages up to 1920 have shown the greatest increase in the wood products industry (244 %), the leather, hair and rubber industries (216 %) and the textile and clothing industry (213 %). On the other hand, the smallest rise recorded is that in the mining

¹ In addition to the industrial groups specified in the table here are also included: mineral and stone industry (1913—1925), power, light and water services (1913—1924), building trades (1921—1923), and laundries (1923—1930).

Table 23 A. Average Hourly Earnings (in öre) of Adult Male Workers within the Different Branches of Industry in 1913 and 1920—1930.

Year	Mining and metal manufacturing	Mineral and stone industry	Wood products industry	Paper and graphic industries	Food products industry	Textile and clothing industry
1913	48	39	41	45	45	39
1920	167	144	153	170	173	157
1921	163	144	134	155	179	132
1922	116	94	95	108	139	100
1923	109	97	98	108	118	96
1924	112	99	98	107	123	97
1925	116	103	99	111	131	99
1926	119	104	98	115	137	97
1927	121	94	101	115	134	97
1928	121	95	102	119	135	98
1929	125	97	105	120	138	98
1930	127	98	104	123	138	99

Year	Leather, hair and rubber goods industries	Chemical industry	Building trades	Trade and commodity stocks	Communications	All industrial groups ¹
1913	46	41	56	41	42	45
1920	175	154	184	164	170	165
1921	165	166	228	161	156	163
1922	120	115	157	139	127	118
1923	116	107	144	124	123	112
1924	116	110	168	124	121	114
1925	118	112	168	122	125	118
1926	116	112	159	124	132	119
1927	118	112	162	123	130	120
1928	119	113	162	126	131	122
1929	118	115	177	128	131	125
1930	122	119	195	131	143	128

¹ In addition to the industrial groups specified in the table here are also included: power, light and water services (1920—1924), municipal undertakings, building trades (1913, 1925—1930), and laundries (1923—1930).

Table 23 B. Average Hourly Earnings (in öre) of Adult Female Workers within the Different Branches of Industry in 1921—1930.

Year	Mining and metal-manufacturing	Mineral and stone industry	Wood products industry	Paper and graphic industries	Food products industry	Textile and clothing industry	Leather, hair and rubber goods industries	Chemical industry	Trade and commodity stocks	All industrial groups ¹
1921	102	83	83	99	110	86	108	97	102	96
1922	73	57	77	75	87	68	76	74	90	73
1923	69	59	65	69	75	65	74	67	82	69
1924	71	55	69	70	79	66	73	67	80	70
1925	75	60	68	69	83	66	75	68	76	71
1926	79	63	69	74	85	66	75	69	78	72
1927	80	59	72	70	86	67	76	69	77	72
1928	82	61	74	72	84	68	75	70	78	73
1929	82	66	69	74	86	68	75	71	81	74
1930	86	67	69	74	86	70	79	74	78	75

and metal manufacturing (164 %) and in the food products industry (180 %). During the period 1920—1923 the annual wages were heavily reduced, the average fall amounting to 35 %. After that period up to 1930 they have a steadily rising tendency, except in the case of the leather, hair and rubber industries and the textile and clothing industry. The development of the hourly wage has been more or less similar to that of the annual wage with the exception of certain industries and periods in which disputes or other causes have disturbed the natural adjustment of the annual wages to the course followed by the hourly wages. Between 1913 and 1920 the annual wage rose on an average 187 %, whereas the hourly wage increased by no less than 262 %. The cause of this incongruity between annual and hourly wages is to be attributed mainly to the Hours of Labour Act which came into force in 1920.

¹ In addition to the industrial groups specified in the Table here are also included: power, light and water services (1921—1924), building trades (1921—1924), and laundries (1923—1930).

MANUFACTURING AND MINING

Percentage Variations in Annual and Hourly Earnings of Adult Male Workers between the Years stated below (+ increase, - decrease).

	1913/ 1918	1918/ 1920	1913/ 1920	1920/ 1923	1923/ 1925	1925/ 1927	1927/ 1929	1929/ 1930
<i>Annual earnings:</i>								
Mining and metal manu- facturing	+100	+32	+164	-34	+12	+7	+5	-1
Mineral and stone industry . .								
Wood products industry	+101	+72	+244	-40	+6	+6	+2	+0
Paper and graphic industries . .	+94	+59	+209	-42	+9	+7	+4	-1
Food products industry	+89	+48	+180	-26	+9	+3	+2	+0
Textile and clothing industry . .	+72	+82	+213	-35	-3	+4	-1	+2
Leather, hair and rubber goods industries	+91	+66	+216	-34	-2	-1	-3	+6
Chemical industry	+99	+49	+196	-33	+10	+6	+2	+0
<i>All industrial groups¹</i>	+97	+46	+187	-35	+9	+5	+4	+0
<i>Hourly earnings:</i>								
Mining and metal manu- facturing	—	—	+248	-35	+6	+4	+3	+2
Mineral and stone industry . .	—	—	+269	-33	+6	-9	+3	+1
Wood products industry	—	—	+273	-36	+1	+2	+4	-1
Paper and graphic industries . .	—	—	+278	-36	+3	+4	+4	+3
Food products industry	—	—	+284	-32	+11	+2	+3	+0
Textile and clothing industry . .	—	—	+303	-39	+3	-2	+1	+1
Leather, hair and rubber goods industries	—	—	+280	-34	+2	+0	+0	+3
Chemical industry	—	—	+276	-31	+5	+0	+3	+3
<i>All industrial groups¹</i>	—	—	+262	-34	+5	+3	+3	+2

On the whole, the annual income of the female workers developed in the same direction as that of the male workers. Between 1913 and 1930 the annual income rose from 651 to 1,662 kronor. The increase in the annual income, which thus amounts to 155 %, is considerably higher than that of the male workers. The figures indicating the increase in the annual income are remarkably high for female workers in mining and metal manufacturing (193 %), trade and commodity stocks (187 %), the wood products industry (167 %), the food products industry (163 %) and the chemical industry (162 %). The leather, hair and rubber goods industries show the least increase

¹ Standardized on the basis of the distribution of the number of workers in 1913 over the different branches of industry within the purely manufacturing industries.

(122 %). Within all branches of industry the female workers' annual income has risen in percentage more than the corresponding income of the male workers.

The far more substantial increase in hourly earnings, is due to the reduction of working hours.

According to the collective agreements of 1914—1917, the length of the hours of work did not vary very widely during the four years of the War. In 1918, on the other hand, a marked reduction in the number of working hours occurred, and still more conspicuous was the tendency to reduce the hours of work in the collective agreements concluded in 1919. Since the year 1920 the hours of work were legally restricted to 48 hours per week in industry, trade and in certain branches of the transport business (the most important exception to the application of this law is agriculture). This reduction in the number of working hours varied widely in different branches of activity. On an average, however, it seems that there was a reduction of about 15 % in comparison with 1917, as, according to the investigations carried out by the Committee on Hours of Labour the average number of working hours in industry and trade was then 56.4 per week.

The hourly income of male workers, reported in Table 23, shows an increase of 184 % between 1913 and 1930. During the years 1921—1923 the hourly income decreased, but after that period it constantly rose from year to year. Thus the rise in the hourly income from 1923 up to 1930 amounts to 16 öre, corresponding to about 14 %. On comparing the development of the hourly income within the different industrial groups wide deviations are observed. The greatest increase from the pre-war period up to 1930 occurred in the building trades (248 %), communications (240 %), trade and commodity stocks (220 %), and the food products industry (207 %). In all the industrial groups just mentioned the hourly income has more than trebled. On the other hand, the increase has been least in the mineral and stone industry (151 %), the wood products industry (154 %), and the textile and clothing industry (154 %).

A comparison of the hourly earnings within the various industrial groups for the period after the War shows a relatively low wage level for the mineral and stone industry, the textile and clothing industry and the wood products industry, but a high level for workers engaged in the building trades, communications and the food products industry. The dissimilarity of the nominal wage level is probably partly caused by the difference in cost of living for the industrial workers at different places.

The hourly income of adult female workers is considerably lower than that of the male workers. In the year 1930 the income amounted to 75 öre, compared with 128 öre for the men. During the period 1923—1930 the increase in the hourly income for the female workers was about 9 % (for men 14 %). The hourly income is on a low level for women in the mineral and stone industry, the wood products and the textile industries, whereas it is comparatively high in the mining and metal manufacturing and the food products industries.

In order to get a better view of the development of the wages of industrial workers in Sweden after 1913, a table is given below showing the calculations made by the Social Board regarding the income per worker, men, women and non-adults, per year, day and hour. The published index numbers are standardized averages, and the fluctuations in the composition of the primary material relating to male and female workers and non-adults have been eliminated.

While, then, the yearly income per worker has increased by 133 % from the pre-war period up to 1930, the hourly income has increased by 186 %. This divergence is attributable among other things to the restriction of the working hours to 48 a week, as laid down in the Act of 1919.

Moreover, the index series show that up to and including 1918 the increase in the daily as well as in the hourly wages was smaller than the increase in the cost of living, indicating that during this period the corresponding real wages were lower than the wages for the basic year 1913, but that from 1919 the opposite has been the case. Further,

Table 24. Index of Nominal and Real Earnings of Workers per Year, Day and Hour, 1914—1930 (1913=100).

Year	Nominal			Real			Cost of living
	annual earnings	daily earnings	hourly earnings	annual earnings	daily earnings	hourly earnings	
1914	100	102	105	98	100	103	102
1915	107	108	108	93	94	94	115
1916	120	120	118	92	92	91	130
1917	143	146	145	88	90	90	162
1918	200	207	213	89	92	95	225
1919	256	266	283	98	102	108	261
1920	294	309	368	109	115	137	269
1921	271	305	363	112	127	151	241
1922	208	223	263	107	114	135	195
1923	202	213	250	114	120	141	177
1924	211	214	255	121	123	147	174
1925	216	220	263	123	125	149	176
1926	220	223	265	128	130	154	172
1927	224	223	268	131	130	157	171
1928	220	225	272	129	132	159	171
1929	231	232	278	137	137	164	169
1930	233	241	286	142	147	174	164

the annual income has had a similar development. When, therefore, the three real wage series had once again passed the wage level of the base year (1913), they continued to rise throughout the remaining period with the sole exception of the year 1922, when the fall in prices brought the real wages back to much the same level as in 1920.¹

Combining the Wage Series of the Institute and the Official Statistics.

The above description of the sources and methods used in compiling the official wage statistics shows that they differ in many respects from those used by the Institute, but that the differences are generally not such as would render invalid a comparison between the wage series of the Institute for the period 1860—1914 and the official statistics for the period 1913—1930.

¹ See *Myrdal, Cost of Living*, pp. 149—191 for a description and analysis of the cost-of-living calculations made by the Social Board.

The difference most difficult to bridge is undoubtedly the disparity in the scope of the material. It is therefore necessary, first of all, to eliminate from the official statistics as far as possible those categories of workers that are not represented in the wage series of the Institute. Data relating to non-adults and workers not employed in manufacturing and mining have for this reason been removed from the official wage series. Wage data for eight industrial groups remain: mining and metal manufacturing, mineral and stone industry, wood products industry, paper industry, food products industry, textile and clothing industry, leather, hair and rubber goods industries, and chemical industry — that is to say, the same groups as those represented in the series of the Institute. The number of adult workers employed in those groups in 1913 was 117,519 or 59.4 % of all workers included in the official statistics for that year. Of these, 97,783 were men and 19,736 women.

A comparison between the series of the Institute and the official statistics for special industrial groups is not possible, as the averages for special groups are less reliable; the differences between the two kinds of statistics are far more conspicuous in separate industrial groups and the scope of the different groups is not always the same.

It is thus only the averages of all groups as a whole that can be made comparable for the two periods, and the averages of the different groups must therefore be weighted and combined to form an average for all industrial groups.

In 1913 the relative distribution among the different industrial groups was as follows:

	Men	Women
Mining and metal manufacturing	45	6
Mineral and stone industry	9	2
Wood products industry	12	1
Paper industry	14	7
Food products industry	8	10
Textile and clothing industry	5	58
Leather, hair and rubber goods industries	2	5
Chemical industry	5	11
Total	100	100

On the basis of the earnings, as given in Tables 22 and 23, with weights appropriate to the relations between the different industrial branches as shown by the above distribution, an average income for men as well as for women has been calculated for each year. Similar weights have been applied to the data for 1860—1914 on the basis of data from the industrial statistics as to the distribution of the numbers of workers within the different branches of industry in the years 1910—1913.

The average income for men and women obtained by this method has then been weighted and combined according to the distribution of the sexes as it was in the year 1913. Table 25 shows the result of these calculations. For lack of information concerning the size of the income per hour during 1914—1919, the table contains instead the average daily income from the years for which data have been available. The index series, with the year 1913 as base, illustrate the development of the nominal as well as of the real wages. For calculating the real income the cost-of-living index compiled by the Social Board has been used.

If income index numbers, calculated as above described, are compared with the corresponding index numbers for all the workers and industrial branches covered by the official wage statistics, the increase in wages from the time immediately preceding the War up to 1930 will be seen to have been somewhat lower in manufacturing and mining than in the total industrial labour-market. Thus the rise in the yearly income within manufacturing and mining is 125 %, while the corresponding rise for all the industrial groups and categories of workers included in the wage statistics is 133 %. The rise in the wages of female workers (149 %) is considerably greater than for the male workers. The yearly income for all the above eight industrial groups has increased on an average by 128 % from 1913 to 1930, 124 % for men and 147 % for women, while the corresponding figures for all the industrial groups and for all workers irrespective of sex and age, amount to 141 %. The hourly income of male workers has increased by 167 %. The real value of the yearly income

Table 25. Index of Nominal and Real Earnings of Adult Workers in Manufacturing and Mining in 1913 and 1916—1930.

(The index numbers are standardized on the basis of the distribution of the number of workers according to industrial groups and sex in 1913.)

Year	Annual earnings						Daily earnings						Hourly earnings	
	Nominal			Real			Nominal			Real			No-	Real
	Men	Women	Both	Men	Women	Both	Men	Women	Both	Men	Women	Both	menal	al
1913	100	100	100	100	100	100	100	100	100	100	100	100	100	100
1916	119	115	118	92	88	91	120	116	119	92	89	92	—	—
1917	143	131	141	88	81	87	147	139	146	91	86	90	—	—
1918	197	164	191	88	72	85	204	195	202	91	87	90	—	—
1919	248	248	248	95	95	95	258	257	258	99	98	99	—	—
1920	287	323	293	107	120	109	302	329	307	112	122	114	362	135
1921	254	267	256	105	111	106	293	314	297	122	130	123	349	145
1922	192	224	197	98	115	101	208	243	214	107	125	110	247	127
1923	186	223	192	105	126	108	—	—	—	—	—	—	238	134
1924	200	225	204	115	129	117	—	—	—	—	—	—	242	139
1925	203	228	207	115	130	118	—	—	—	—	—	—	249	141
1926	212	233	216	123	135	126	212	229	215	123	133	125	256	149
1927	214	239	218	125	140	127	213	233	216	124	136	126	256	150
1928	206	241	212	120	141	124	215	236	219	126	138	128	258	151
1929	221	245	225	131	145	133	219	239	222	130	141	131	262	155
1930	220	249	225	134	152	137	224	247	228	137	151	139	267	163

for men has increased by 34 %, while the real value of the hourly income has increased by 63 %.

The averages of all industrial groups for 1860—1914 do not include any wages of female workers. For the sake of comparability it has therefore been necessary to eliminate altogether from the series for 1913—1930 the wage data for female workers and to construct out of the official statistics of that period an average wage for adult male workers in the afore-mentioned industrial groups.

Since, as already stated, there are some gaps in the statistical wage series after 1913, it has been necessary, to estimate certain yearly and hourly income series. This has been comparatively easy, as regards the yearly income, the only gaps in the official statistics occurring in 1914 and 1915. The increase over the 1913 level for all workers and industrial groups amounts in 1916 to 20 %, according

to Table 24. The corresponding figure showing the increase for male workers only in manufacturing and mining during the same period is 19 % according to the data given in Table 25. The increase from 1913 to 1916 thus being almost identical in the two series, it seems possible to use the figures showing the increase in Table 24 as a base in estimating the yearly income for adult male workers within the industrial groups in question during 1914 and 1915. This income would then be 1,233 kronor in 1914 and 1,319 kronor in 1915. It is considerably more difficult to construct the income per hour for male workers within these industrial groups during 1914—1919, as data for these years are missing in the official wage statistics. From 1913 up to 1920 the hourly income for all the workers and branches of industry according to Table 24 rose by 268 %, while the corresponding figures on Table 25, for male workers in manufacturing and mining are 262 %. With regard to the comparatively similar development of the wages during the War period, it seems possible to assume that the increase in the nominal income for the male workers in question has developed in about the same way as for the other categories of workers and industrial groups. It has therefore seemed admissible to construct the hourly income of male workers in manufacturing and mining on the basis of the figures in the above-mentioned Table 24. Calculations, made for control purposes, on the basis of the daily and yearly earnings show that the calculation of the hourly income from 1914 to 1919 is comparatively satisfactory. It should be emphasized, however, that the wages calculated in this way are quite approximate, the intention being merely to show the general trend. The money wages have also been converted into index numbers, the years 1910—1913 being taken as a base. The index series showing the real wages per year and hour have been obtained by dividing the index series of nominal wages by the cost-of-living index for the period 1830—1930 compiled at the Institute.¹

¹ *Myrdal*, *The Cost of Living in Sweden 1830—1930*, Stockholm 1933.

MANUFACTURING AND MINING

Table 26. Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in Manufacturing and Mining as a whole 1860—1930.

Year	Annual earnings				Hourly earnings				Cost-of-living index
	Social Science Institute	Social Board	Nomi- nal wage	Real wage	Social Science Institute	Social Board	Nomi- nal wage	Real wage	
			1910/13 = 100				1910/13 = 100		1910/ 13 = 100
1860	414	—	32.6	38.8	11.8	—	27.8	33.1	84.1
61	416	—	32.7	37.3	12.4	—	29.2	33.3	87.6
62	439	—	34.5	38.3	13.6	—	32.1	35.7	90.0
63	446	—	35.1	41.1	13.7	—	32.3	37.8	85.5
64	439	—	34.5	42.1	12.8	—	30.2	36.9	81.9
65	458	—	36.0	44.0	13.8	—	32.5	39.7	81.8
66	456	—	35.9	42.5	13.3	—	31.4	37.2	84.4
67	460	—	36.2	40.4	13.8	—	32.5	36.3	89.6
68	476	—	37.5	40.5	14.8	—	34.9	37.6	92.7
69	490	—	38.6	44.2	15.7	—	37.0	42.3	87.4
1870	501	—	39.4	47.0	15.0	—	35.4	42.2	83.8
71	509	—	40.0	46.6	15.4	—	36.3	42.3	85.9
72	558	—	43.9	49.1	17.3	—	40.8	45.6	89.4
73	609	—	47.9	49.6	18.4	—	43.4	45.0	96.5
74	653	—	51.4	51.5	20.2	—	47.6	47.6	99.9
75	668	—	52.6	53.0	20.3	—	47.9	48.3	99.2
76	656	—	51.6	51.8	19.6	—	46.2	46.4	99.6
77	668	—	52.6	53.1	20.3	—	47.9	48.3	99.1
78	617	—	48.5	52.4	19.3	—	45.5	49.1	92.6
79	576	—	45.3	52.1	18.0	—	42.5	48.9	86.9
1880	621	—	48.9	53.5	19.0	—	44.8	49.0	91.4
81	646	—	50.8	54.3	19.8	—	46.7	49.9	93.6
82	664	—	52.2	57.3	20.5	—	48.3	53.0	91.1
83	663	—	52.2	57.6	20.5	—	48.3	53.3	90.6
84	681	—	53.6	61.4	20.8	—	49.1	56.2	87.3
85	675	—	53.1	63.8	20.7	—	48.8	58.7	83.2
86	662	—	52.1	65.9	20.1	—	47.4	59.9	79.1
87	668	—	52.6	68.9	20.2	—	47.6	62.4	76.3
88	684	—	53.8	68.1	20.7	—	48.8	61.8	79.0
89	725	—	57.0	69.0	21.9	—	51.7	62.6	82.6
1890	741	—	58.3	69.1	22.4	—	52.8	62.6	84.4
91	748	—	58.9	67.7	22.8	—	53.8	61.8	87.0
92	744	—	58.5	68.5	23.1	—	54.5	63.8	85.4
93	754	—	59.3	72.3	23.7	—	55.9	68.2	82.0
94	766	—	60.3	77.5	23.9	—	56.4	72.5	77.8
95	779	—	61.3	77.4	24.2	—	57.1	72.1	79.2
96	805	—	63.3	80.5	25.1	—	59.2	75.3	78.6
97	829	—	65.2	80.4	26.3	—	62.0	76.4	81.1
98	879	—	69.2	81.4	27.9	—	65.8	77.4	85.0
99	917	—	72.1	81.2	29.1	—	68.6	77.3	88.8
1900	947	—	74.5	83.1	30.4	—	71.7	79.9	89.7
01	933	—	73.4	83.8	30.4	—	71.7	81.8	87.6
02	949	—	74.7	84.6	31.0	—	73.1	82.8	88.3
03	968	—	76.2	84.9	31.3	—	73.8	82.2	89.8
04	997	—	78.4	88.4	32.4	—	76.4	86.1	88.7

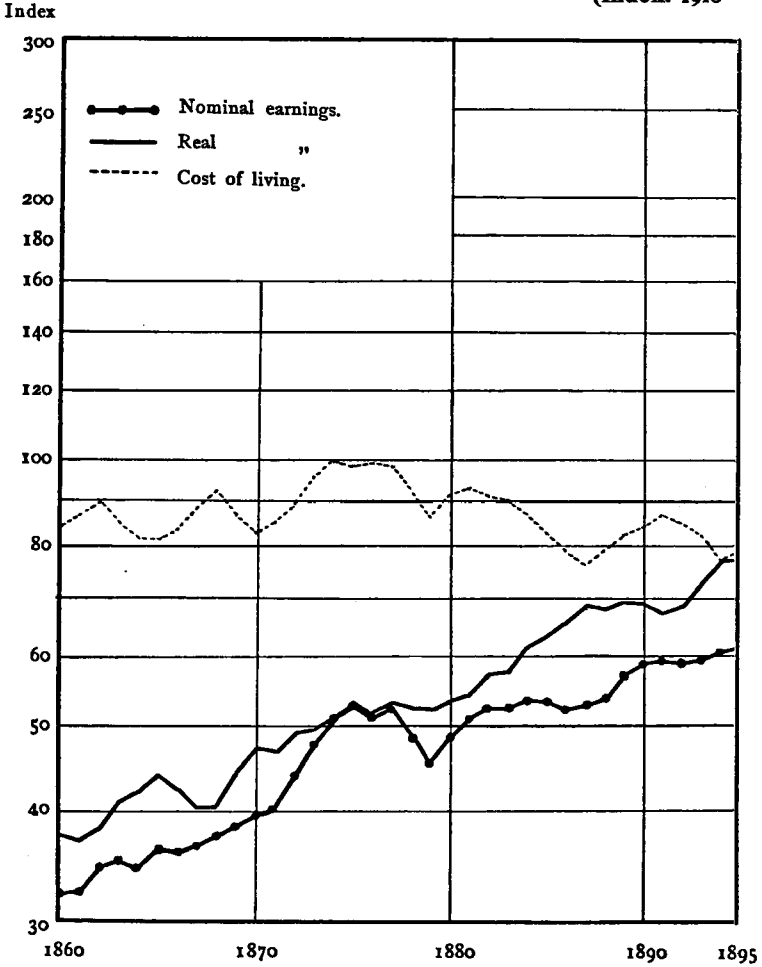
Table 26 (cont.). Average Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in Manufacturing and Mining as a whole 1860—1930.

Year	Annual earnings				Hourly earnings				Cost-of-living index
	Social Science Institute	Social Board	Nominal wage	Real wage	Social Science Institute	Social Board	Nominal wage	Real wage	
			1910/13 = 100				1910/13 = 100		1910/13 = 100
1905	995	—	78.3	86.4	33.4	—	78.8	87.0	90.6
06	1086	—	85.4	92.3	35.2	—	83.0	89.7	92.5
07	1147	—	90.2	92.8	37.2	—	87.7	90.2	97.2
08	1146	—	90.2	91.4	38.1	—	89.9	91.1	98.7
09	1042	—	82.0	83.8	39.1	—	92.2	94.3	97.8
1910	1230	—	96.8	99.0	40.9	—	96.5	98.7	97.8
11	1246	—	98.0	101.7	41.5	—	97.9	101.6	96.4
12	1293	—	101.7	98.9	43.1	—	101.7	98.9	102.8
13	1313	1233	103.3	100.2	43.9	44.9	103.5	100.4	103.1
14	1263	1233	99.4	95.1	43.4	45.8	102.4	98.0	104.5
15	—	1319	103.8	86.5	—	48.5	114.4	95.3	120.0
16	—	1469	115.6	85.3	—	53.0	125.0	92.2	135.6
17	—	1760	138.5	81.0	—	65.1	153.5	89.8	171.0
18	—	2427	191.0	80.2	—	94.3	222.4	93.3	238.3
19	—	3050	240.0	87.1	—	123.5	291.3	105.7	275.5
1920	—	3535	278.1	100.3	—	163.2	384.9	138.9	277.2
21	—	3123	245.7	103.5	—	156.6	369.3	155.5	237.5
22	—	2363	185.9	96.5	—	111.5	263.0	136.6	192.6
23	—	2292	180.3	100.8	—	106.6	251.4	140.6	178.8
24	—	2464	193.9	108.4	—	108.6	256.1	143.2	178.8
25	—	2505	197.1	108.2	—	112.3	264.9	145.4	182.2
26	—	2605	205.0	116.9	—	114.5	270.0	154.0	175.3
27	—	2629	206.8	119.1	—	114.7	270.5	155.8	173.6
28	—	2539	199.8	114.6	—	115.6	272.6	156.3	174.4
29	—	2742	215.7	124.9	—	118.4	279.2	161.7	172.7
1930	—	2714	213.5	127.5	—	120.1	283.3	169.1	167.5

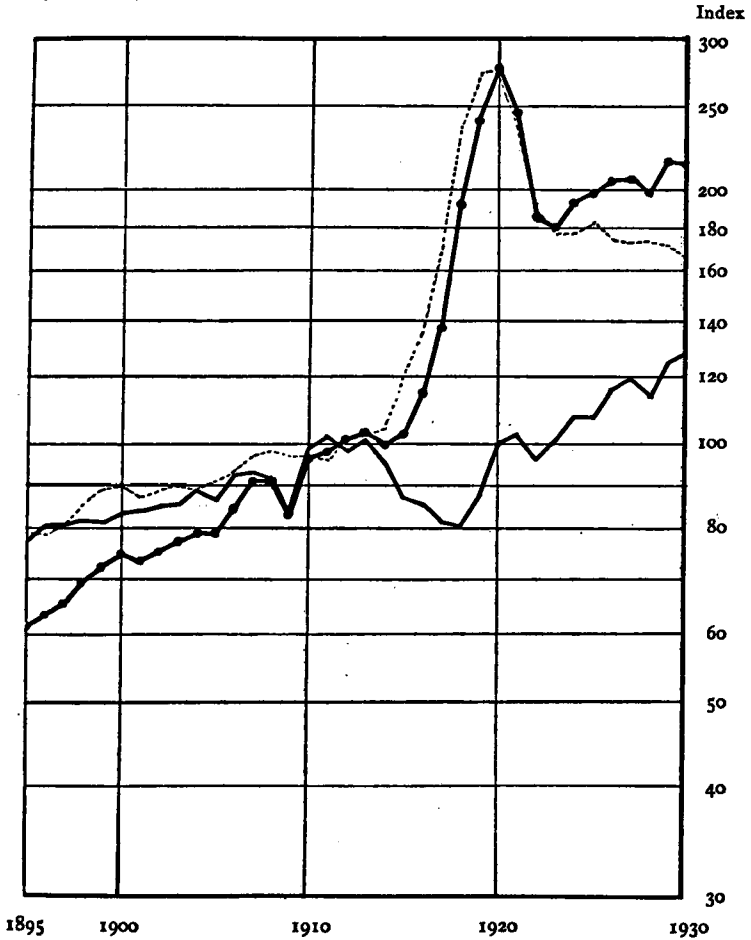
The average wage series for the period 1913—1930, resulting from these calculations, are given in Table 26 together with the average wage series for the period 1860—1913 in order to show the general movement of the wage level in Swedish industry during the entire period 1860—1930.

The above discussion of the sources and methods used in constructing the different series has led us to the conclusion that, even after all the efforts made to overcome and to modify the influence of differences in material and methods of compilation which may hinder the comparability of

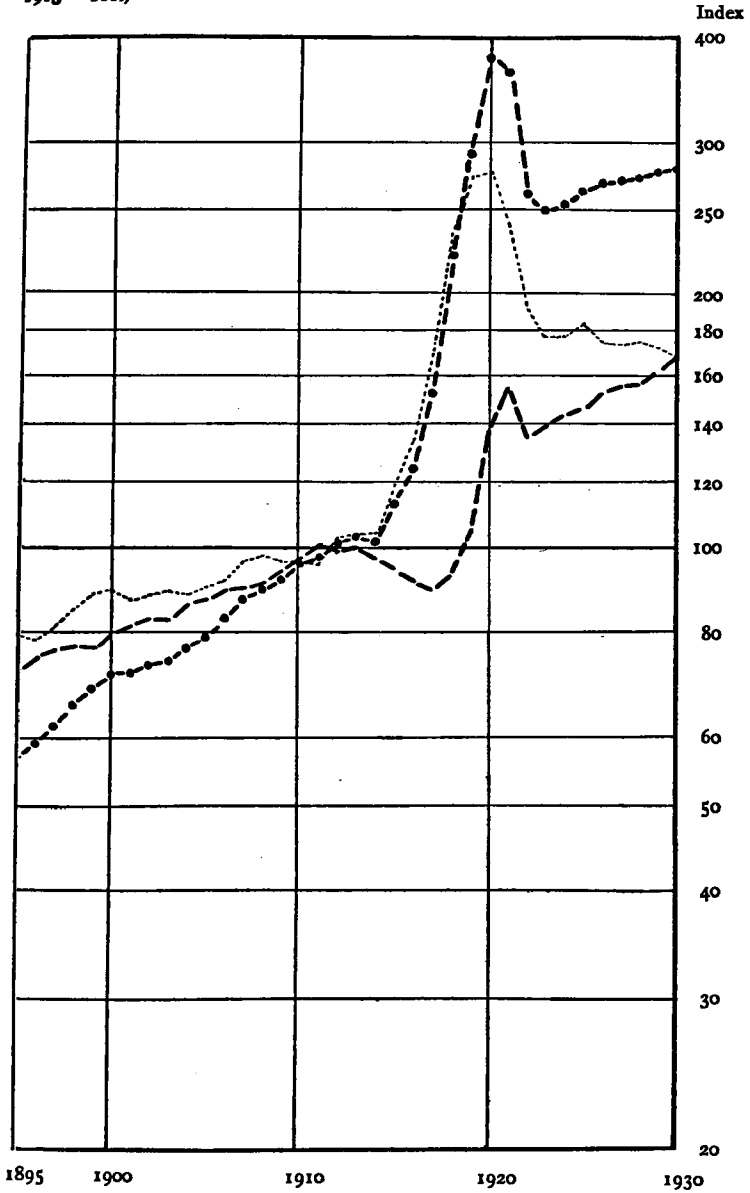
Chart 17. Nominal and Real Annual Earnings of Male
(Index: 1910—



Workers in Manufacturing and Mining as a whole 1860—1930.
1913 = 100.)



Workers in Manufacturing and Mining as a whole 1860—1930.
 1913 = 100.)



the combined series, the latter can give only a general knowledge of the movement of industrial wages during the period in question. As has been shown above, each series is in all probability representative of the general movement of the wage level during the period for which it has been constructed. It is less certain whether the combined series reflect the true relative position of the wage level as between the two periods. There always remains, even in the reconstructed series, the possibility of a lack of comparability arising from the fact that the wage series of the Institute are compiled from wages of selected workers, while the official statistics embrace all adult male workers within the categories included. Furthermore the former series are compiled from material derived from a far smaller number of concerns than the latter, and the weights have not always been the same when constructing the averages.¹

During two years, 1913 and 1914, the combined series overlap, and this affords a certain, though very narrow, basis for control and further discussion of the question just raised.

The yearly income according to the average constructed from the wage series of the Institute is for the year 1913 1,313 kronor, and according to the average from the official wage statistics 1,233. The difference is thus 80 kronor, i. e. the latter average is 6 % below the former. In 1914 the average of the Institute's series is 1,263 kronor and the average of the official statistics 1,233, the latter being, however, derived from calculations described on p. 259 and therefore more uncertain. In both cases the difference is very small. It is probably not an accident that the figure 6 % almost coincides with the 5 % by which the wages of the selected workers generally exceed those of the "cross-sections"² the latter being, as mentioned above, calculated in about the same way as

¹ The different ways of weighting are however not important when the movement of the series weighted together is so uniform as is the case with the series constructed by the Institute. Cf. Chapter III, p. 47-49.

² Cf. Chapter II, p. 30.

the wages in the official statistics. If the only difference between the total averages from the official statistics and those compiled from the wage series of the Institute is that the latter exceed the former by about 6 %, the margin of error would be very small indeed. From a general knowledge of the two series and the material from which they are constructed, this seems rather probable. The agreement between the hourly income series is also very close for the two years, this income being in 1913 in the Institute's series 43.9 öre and in the series constructed from the official statistics 44.9 and in 1914 in the former series 43.4 and in the latter series 45.8 öre.¹ The averages for the hourly income are however not so reliable in the former series as the averages for the yearly income.²

It follows from what has just been said that there does not seem to be any serious objection to combining the two series, but that the combined series can only be used as a very general index of the movement of the industrial wage level in Sweden during the period 1860—1930 and not as an exact measure of the absolute wage level for each year.

¹ For the calculation of this figure, which is not very reliable, cf. above p. 258, 259.

² Cf. Chapter II, p. 34.

SUPPLEMENTARY STUDIES BASED ON THE WAGE
STATISTICS OF EMPLOYERS' ASSOCIATIONS.

As a complement to the wage statistics derived from the Social Board's publications we have compiled and analysed similar statistics from employers' associations of certain industrial groups (ironworks, engineering works and the textile industry). These generally give the information required in a more detailed form and moreover commence at an earlier period. On this account they also make possible a more thorough comparison with our own wage series (cf. pp. 131 and 235). Owing to the dissimilarity of the wage material it has, however, been impossible to make such a comparison for the ironworks.

I. Ironworks.

The data published here are based on the figures representing ~~ston wages~~ reported by the Ironmasters' Association of Sweden. The annual, half-yearly and quarterly reports drawn up by that Association contain the average hourly earnings for different occupations and concerns: it should be noted that on the whole these reports refer only to piece-work. Since however about 70 % of all work at the ironworks is performed at piece-work rates, the data should afford a good idea of the trend of the average hourly earnings on all the work performed.

In 1909 the hourly earnings are based on the figures for the months of May—July only; during the period 1910—1920 they cover the entire year, with the exception of 1916, when they are based on the first three quarters, and 1917, when they are based on the second half of the year only. In the years 1921—1924 the averages refer to one quarter only, and in subsequent years to one half-year. The consequence is that the averages for those years in which the available figures cover only a part of the year are less representative, particularly during those years in which the monthly variations in wages are appreciable.

Col. 13, Table 27 (average for all workers), like the preceding columns, shows only the hourly earnings paid in cash. From 1919 the Ironmasters' Association's statistics give also the average hourly earnings of all workers, including benefits in kind and high-cost-of-living bonus; these are published in Col. 14. The benefits in kind consist mainly of cheaper or rent-free housing accommodation and fuel and milk at reduced prices or free of charge.

In calculating the hourly earnings in Col. 14 regard has been taken to these benefits by adding to the wage total the difference between local prices and actual cost. These benefits did not play any important rôle until the period of rapidly rising prices, but then the fairly constant prices maintained by the works caused a systematic difference between local prices and the works' prices. A comparison between the pre-war figures and those for the years from 1919 onwards is thus possible but the result is somewhat uncertain.

The Social Board's figures, reproduced in Col. 15 and 16, are averages for the group iron-, steel- and copper-works and do not correspond exactly to the Ironmasters' Association's statistics. The wages are, however, in close agreement. According to the Association, the average hourly earnings increased by 265 % between 1913 and 1920 and the level in 1918 was 34 % lower than that of 1920. The corresponding figures according to the Social Board are 263 % and 30 %.

The trend of wages for the different occupations indicate that the wages of the less qualified workers rose more rapidly than those of the more highly qualified workers. Thus, the hourly earnings of the low-paid calciners between 1909 and 1920 increased by 303 %, and workers in the blast-furnace 260 %, while during the same period those of the highly qualified melters rose only 179 % and the heaters' 195 %. After 1920 the trend of wages becomes more uniform, the hourly earnings of *all* the occupations mentioned here being 20—30 % lower than in 1920. As in the case of the selected workers' series, the top-fillers' hourly earnings in the early years considerably exceeded those of the other workers in the blast-furnace. From 1916 onward however, this difference completely disappears.

II. Engineering Works.

The abundant material in the records of the Swedish Engineering Works' Association contains *inter alia* particulars of the individual worker's occupation, earnings and the number of hours worked *from* the year 1903 on. We have selected a few only of the larger and more typical occupations, thereby gaining a greater degree of homogeneity in the averages and at the same time reducing the work of compilation. We have selected a representative group of unskilled workers and from among the skilled workers we have chosen the following occupations: moulders, vice-hands, machine-workers and tool-makers. In our calculations of the hourly earnings we have included all the workers within the respective occupations, but in computing the annual earnings we have only taken into account those employees who

Table 27. Hourly Money Earnings

Year	1	2	3	4	5	6	7	8
	Blast-furnaces				Lanca- shireworks	Open-hearth works		
	Keepers	Top- fill- ers	Cal- ciners	All workers	All workers	Melters	Ladle- men	All work- ers
1909	35.5	41.4	29.6	33.5	38.8	64.0	44.9	42.3
1910	35.4	42.7	30.3	35.0	49.2	64.6	45.3	43.6
11	36.2	42.9	30.3	35.0	50.6	63.4	44.5	42.1
12	37.0	44.4	30.4	35.5	51.5	66.4	46.4	43.6
13	39.0	45.7	31.5	37.1	53.0	67.2	47.3	44.8
14	40.0	45.5	32.0	37.5	54.3	68.3	48.2	45.8
15	43.4	47.2	34.6	40.1	56.6	70.2	49.5	47.3
16	53.4	52.8	39.5	46.5	59.5	74.3	52.7	50.4
17	78.8	75.4	64.6	70.1	75.6	92.7	72.0	68.4
18	89.3	84.2	70.2	80.0	83.4	97.3	76.3	74.4
19	91.1	87.6	76.8	83.0	85.3	111.8	88.2	84.4
1920	127.1	122.7	119.3	122.0	138.5	178.8	141.5	136.7
21	88.9	86.2	82.6	86.0	96.4	126.1	101.4	97.7
22	82.2	79.9	73.8	78.6	93.7	124.3	96.9	92.2
23	86.5	83.2	76.0	81.4	96.1	126.4	99.2	95.8
24	92.1	88.9	81.4	86.8	95.3	132.1	104.8	100.2
25	97.2	92.9	83.3	90.5	98.2	135.1	106.8	103.0
26	97.5	95.7	87.8	93.4	96.7	136.1	107.5	103.1
27	96.9	95.9	86.0	92.6	98.2	139.3	110.9	105.7

have worked more than 11/12ths of the period during which the works have been in operation, a variable factor for different years.

We have also concentrated on a small number of engineering works (17), which are situated in different parts of the country and may be regarded as representative. For these concerns the hourly earnings have been compiled. The annual earnings have been compiled only for 9 of these concerns; the averages of annual earnings and of hourly earnings are therefore not directly comparable. As a rule the average annual earnings are less reliable; this applies particularly to the unskilled workers.

The 4 skilled workers' series and the 1 unskilled workers' series, have been worked out for each of the individual concerns and combined into averages for Stockholm, Gothenburg, the rest of the country and the entire country. Stockholm is represented by 4 of the more important engineering works, though only 3 are included in the averages of annual earnings. The Gothenburg series are based on 2 large works. The number of fullyear workers in the averages for skilled workers generally varies between 150 and 200 and the number of unskilled workers between 30 and 40. There is naturally a greater number of workers included

SUPPLEMENTARY STUDIES

(in öre) at the Iron Works 1909—1928.

Year	9	10	11	12	13	14	15	16
	Rolling-mills				All ironworks			
					according to the Ironmasters' Association		according to the Social Board	
	Heaters	Rollers	Catch- ers	All workers	Money earnings	Earnings incl. ¹ benefits in kind	Annual earnings (kronor)	Hourly earn- ings
1909	56.5	45.5	42.6	43.0	40.3	—	—	—
1910	59.0	47.6	44.2	44.8	42.4	—	—	—
11	59.4	45.8	43.2	42.2	41.2	—	—	—
12	60.5	48.1	44.2	43.1	42.1	—	—	—
13	62.4	51.4	46.2	45.2	43.8	—	1173	41.0
14	63.0	51.7	45.6	45.5	44.4	—	—	—
15	68.4	56.1	49.6	49.2	47.1	—	—	—
16	71.7	58.5	54.1	52.6	49.7	—	1446	—
17	92.0	79.7	72.1	72.4	71.5	—	1769	—
18	95.0	81.7	74.0	76.0	77.4	—	2661	—
19	106.2	93.8	84.2	86.3	85.7	123.3	3019	—
1920	166.4	150.1	136.5	139.4	118.0	159.9	3276	149.0
21	110.4	97.1	93.3	91.9	92.3	116.0	2359	120.0
22	105.4	93.2	83.7	87.8	86.7	97.1	1944	93.0
23	112.1	98.2	89.6	93.9	90.3	100.7	1600	91.0
24	115.3	100.1	93.0	96.7	94.6	99.1	2146	94.0
25	118.8	102.7	96.3	99.6	97.4	102.1	2272	100.0
26	120.6	105.6	99.1	101.3	98.9	103.7	2296	100.0
27	120.0	105.3	97.3	101.0	99.4	104.4	2366	102.0
28	—	—	—	—	100.7	105.5	2455	104.0

in the averages of hourly earnings. The skilled workers group comprises, besides the ordinary occupations, the important sheet-metal-workers' group. The group «Other works» comprises engineering works at Motala, Jönköping, Lund, Köping, Uppsala, Arboga, Norberg, Sala, and elsewhere, altogether 11 concerns. The average number of full-year employees among the skilled workers is 112. The figure representing the average annual earnings of the unskilled workers in the last-mentioned group is too unreliable and is not published. For the same reason we do not publish the unskilled workers' average annual earnings at all selected works.

Col. 14—16 give the hourly earnings of all adult male workers (aged 21—59 years) employed at concerns that are members of the Association. In 1910 the number of workers represented was about 30,000 and in 1928 about 55,000. This increase in the number of workers must, of course, affect the results of the wage statistics.

¹ High-cost-of-living bonus included during the years 1919—1923.

MANUFACTURING AND MINING

Table 28. Annual Earnings (in kronor) and Hourly

1	2	3	4	5	6	7	8	9	10
Year	Stockholm				Gothenburg		Other works		
	Annual earnings		Hourly earnings		Hourly earnings		Annual earnings Skilled workers	Hourly earnings	
	Skilled workers	Unskilled workers	Skilled workers	Unskilled workers	Skilled workers	Unskilled workers		Skilled workers	Unskilled workers
1903	—	—	51.8	44.3	—	—	—	31.6	26.1
04	1354	—	54.4	47.2	31.0	22.4	963	32.7	27.4
05	—	—	48.9	43.5	30.7	25.4	—	34.6	27.2
06	1457	—	51.0	41.2	34.3	27.1	1048	37.1	29.1
07	—	—	—	—	37.1	28.4	—	—	—
08	—	—	59.2	45.4	38.0	28.8	—	40.1	30.2
09	—	—	60.9	47.6	39.9	28.4	—	39.0	31.3
1910	1567	1219	59.5	48.6	40.8	29.3	1112	39.3	31.8
11	1623	1234	62.5	49.8	40.1	29.3	1160	42.1	31.6
12	1774	1322	64.9	51.7	42.8	30.3	1222	43.8	32.4
13	1759	1282	62.6	49.5	46.8	31.5	1290	45.5	33.4
14	1734	1210	64.0	50.1	49.4	32.4	1343	48.4	34.6
15	1907	1263	66.6	49.7	52.7	36.3	1420	50.3	34.5
16	2079	1382	73.3	52.6	61.2	40.9	1586	55.8	37.4
17	2442	1590	86.2	57.3	74.9	51.8	1931	65.7	45.3
18	3432	2500	118.9	88.0	112.5	86.2	2674	91.6	71.6
19	4146	3403	159.8	126.3	161.9	115.7	3303	123.5	100.2
1920	—	—	233.1	189.9	207.5	162.3	—	159.9	130.4
21	4266	3800	207.1	178.9	183.6	151.8	2937	142.2	119.7
22	3374	2892	139.4	125.3	131.9	111.6	2240	102.5	81.3
23	3213	2672	134.5	111.1	129.6	108.8	2305	98.2	77.6
24	3229	2772	134.6	110.9	134.4	112.7	2449	101.5	75.6
25	3183	2794	140.7	113.4	137.7	115.8	2208	102.9	77.3

In the last two columns of the table we publish the average earnings of male workers in the engineering industry, as computed by the Social Board. After 1922 the agreement between the average hourly earnings as calculated by the Engineering Works' Association and the Social Board is very close, but in 1913 and 1920 the Association's figures are respectively 8 and 9 % higher than the Social Board's, and in 1922 the Social Board's figure is 6 % higher than the Association's. The Association's statistics relate to a far larger number of workers — 55,000 in 1928 as compared with the Social Board's 32,000. The rise in the annual earnings in Col. 11 and 17 is parallel. Taking 1913 as a base we find that the index numbers for 1921 and 1925 work out according to Col. 11 at 258 and 203, and according to Col. 17 at 252 and 198. The hourly earnings according to the Social Board and of the skilled workers in selected concerns according to our own

Earnings (in öre) at Engineering Works 1903—1928.

1	11	12	13	14	15	16	17	18
Year	All selected works			All Workers				
				according to the Engineering Works Association			according to the Social Board	
	Annual earnings Skilled workers	Hourly earnings		Hourly earnings			Annual earnings	Hourly earnings
		Skilled workers	Unskilled workers	Skilled workers	Other workers	All workers		
1903	—	40.5	36.8	—	—	—	—	—
04	1101	41.9	37.4	—	—	—	—	—
05	—	38.0	32.8	—	—	—	—	—
06	1191	42.6	32.2	—	—	—	—	—
07	—	—	—	—	—	—	—	—
08	—	47.3	37.3	—	—	—	—	—
09	—	46.7	36.9	—	—	—	—	—
1910	1314	46.9	37.5	—	—	46.8	—	—
11	1332	48.4	38.4	—	—	47.0	—	—
12	1454	50.9	40.1	—	—	48.3	—	—
13	1487	50.7	40.4	53.7	46.1	50.8	1329	47
14	1533	53.7	42.0	55.6	46.9	52.2	—	—
15	1665	56.0	41.6	58.4	48.6	54.6	—	—
16	1862	62.7	45.6	64.9	54.0	60.2	1606	—
17	2281	74.3	52.4	76.7	63.0	70.9	1886	—
18	3168	103.6	80.4	109.7	94.4	103.5	2524	—
19	3607	142.6	112.5	146.9	127.0	138.2	3197	—
1920	—	195.3	163.4	197.8	175.5	187.2	3429	172
21	3830	173.4	152.5	177.0	158.0	168.0	3349	167
22	2964	122.1	109.6	125.0	111.0	119.0	2728	126
23	2892	119.0	103.4	120.0	106.0	114.0	2518	112
24	3093	123.4	106.5	124.0	109.0	117.0	2703	116
25	3017	126.7	109.4	126.0	112.0	119.0	2626	118
26	—	—	—	129.0	114.0	121.0	2741	119
27	—	—	—	129.0	115.0	122.0	2768	120
28	—	—	—	132.0	117.0	124.0	2847	122

computation (Col. 12), likewise appear to show a parallel trend. With 1913 as the base the 1920 and 1925 index numbers according to Col. 12 work out at 385 and 250, and according to Col. 18 at 366 and 251. The wages of unskilled workers, on the other hand, reveal an entirely different trend, the index numbers for the same two years being respectively 404 and 271.

These percentages clearly reflect the substantial increase in the earnings of the unskilled workers as compared with the skilled workers. This is also observable in the case of the other averages. As regards Stockholm, the hourly earnings of skilled and unskilled workers seem to move quite parallel, the former about 23 % higher than the latter, but this is due to the fact that one of the concerns, included in the average records, has relatively high earnings

in the case of the unskilled workers and is more heavily weighted during the pre-war years than in subsequent years. In the other concerns the hourly earnings of the skilled workers were 30—45 % above those of the unskilled workers before the war, and in 1925 15—25 % above. This is clearly observable in the annual earnings, as the first-mentioned concern is not included in that average. In 1910 the skilled workers' annual earnings exceeded those of the unskilled workers by 29 %, in 1920 by 25 %, and in 1925 by 14 %.

The ratios in 1905—06, 1914—15, 1920 and 1924—25 between skilled and unskilled workers' hourly earnings (unskilled workers, earnings = 100) were in Gothenburg 125, 150, 128 and 119, and in the other works 126, 140, 124 and 133. The increased divergence between skilled and unskilled workers' wages during the years immediately prior to the War and up to 1915 or 1916 is apparently characteristic for most concerns. The rise in the wages of unskilled workers seems in general to have set in later, but then to have developed all the more rapidly.

III. The Textile Industry.

The Swedish Textile Manufacturers' Association has compiled a series of wage statistics which cover the period 1909—1920 and which from the year 1914 includes all workers who have been employed by members of the Association. In 1914 the statistics related to 20,444 workers, representing 73 % of the total number of textile workers in the country (28,182) — a proportion that remained more or less constant in subsequent years. In the years prior to 1914 the statistics related to 8—10,000 workers. For 1909 data are available for the months of April, May and June only.

The wage statistics of The Textile Manufacturers' Association comprise average annual and hourly earnings in a particularly detailed form. Thus, the figures are grouped under the headings male, female, and non-adult workers, and further under different branches (woollen industry, cotton industry etc.), and within these branches under different departments (spinning-mills, weaving-mills, finishing-works), sub-divided into piece-work and time-work and into various occupations (textile-workers proper, foremen, special workers and spinners, weavers, dyers). In the course of years there has been a good deal of reorganisation and re-grouping, but the above data are included for most years, sometimes specified in greater detail, sometimes in less. From 1922 the Association's statistics have been incorporated in the the Swedish Employers' Association's report on workers' wages. Beginning from the last quarter of 1922 the data are for quarters. There are no wage data at all for the year 1921.

Table 29 A. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Male Workers in the Textile Industry 1909—1928.

Year	Annual earnings			Hourly earnings			According to the Social Board	
	Woollen industry	Cotton industry	All branches	Woollen industry	Cotton industry	All branches	Annual earnings	Hourly earnings
							All branches	
1909	—	—	—	32.9	34.7	33.7	—	—
1910	991	934	972	33.9	33.1	33.9	—	—
1911	949	939	943	33.1	33.5	33.3	—	—
1912	967	1008	986	33.7	33.7	33.7	—	—
1913	1010	1043	1027	34.2	34.8	34.6	1010	35
1914	1002	945	977	34.3	33.1	33.9	—	—
1915	1152	1069	1091	36.2	35.0	35.6	—	—
1916	1233	1134	1174	39.3	37.3	38.3	1202	—
1917	1413	1327	1362	47.4	46.8	47.0	1389	—
1918	1941	1932	1902	69.2	67.3	67.6	1752	—
1919	2880	2831	2816	102.7	100.4	100.0	2597	—
1920	3287	3216	3233	140.5	137.1	137.7	3232	146
1921	—	—	—	—	—	—	2519	123
1922	—	—	—	—	—	—	2120	93
1923	—	—	—	—	—	—	2129	90
1924	—	—	—	—	—	—	2096	91
1925	—	—	—	—	—	—	2013	92
1926	—	—	—	—	—	—	2103	91
1927	—	—	—	—	—	—	2146	91
1928	—	—	—	—	—	—	2123	92

The following table gives averages for male workers over 21 years of age and female workers over 18 years of age engaged in the woollen and cotton industry and all branches thereof without division into different sections (mills) and occupations. Where earnings have been recorded on piece-work and time-work but not in terms of a weighted average of the two, it has occasionally been necessary to make estimates based on the number of those engaged at a time-wage rate and those engaged at a piece-work rate. The wages in the different sections (spinning-mill, weaving-mill and finishing-works) show an exactly parallel trend, and the difference in wage level is inconsiderable. There are differences in the wages of the different occupations, but the averages are often based on a very small body of material. In the two last columns we reproduce for purposes of comparison the Social Board's figures for the branches spinning-mills, weaving-mills, etc. within the textile and clothing industry.

The trend of wages in the woollen industry and in the cotton industry has on the whole been parallel, the annual earnings of the male workers in the woollen industry being on an average

Table 29 B. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Female Workers in the Textile Industry 1909—1928.

Year	Annual earnings			Hourly earnings			According to the Social Board	
	Woollen industry	Cotton industry	All branches	Woollen industry	Cotton industry	All branches	Annual earnings	Hourly earnings
							All branches	
1909	—	—	—	22.8	23.0	22.8	—	—
1910	688	634	649	24.2	23.2	23.4	—	—
1911	649	643	634	23.5	23.8	23.4	—	—
1912	662	674	663	24.3	24.1	24.0	—	—
1913	691	702	690	25.2	25.1	26.0	649	23
1914	666	668	660	24.8	24.3	24.1	—	—
1915	736	718	717	26.5	25.6	25.6	—	—
1916	774	767	771	28.6	27.2	27.6	723	—
1917	878	827	852	33.3	33.2	33.1	772	—
1918	1216	1145	1188	48.4	45.5	46.5	900	—
1919	1747	1749	1735	66.7	64.8	65.4	1615	—
1920	2216	2212	2204	98.6	97.7	97.3	2084	97
1921	—	—	—	—	—	—	1565	84
1922	—	—	—	—	—	—	1378	64
1923	—	—	—	—	—	—	1387	62
1924	—	—	—	—	—	—	1409	63
1925	—	—	—	—	—	—	1315	62
1926	—	—	—	—	—	—	1375	62
1927	—	—	—	—	—	—	1413	63
1928	—	—	—	—	—	—	1411	64

2.6 %, and their hourly earnings 1.3 %, above the corresponding wages in the cotton industry. The corresponding percentages for female workers are 1.7 and 2.1 %, the wages in the woollen industry again being the higher. To judge from the summaries published in the Swedish Employers' Association's quarterly reports, the percentages are practically the same after 1922. If we compare the trend of wages for male and female workers in 1913—1920 as recorded by the Swedish Textile Manufacturers' Association (T) with that recorded in the Social Board's statistics (S) we obtain the following results (the figures for 1913 = 100):

Annual earnings				Hourly earnings			
Male		Female		Male		Female	
S	T	S	T	S	T	S	T
320	315	321	319	417	398	422	374

SUPPLEMENTARY STUDIES

277

We find, therefore, that the data from the Social Board and from the Association show a similar trend in the annual earnings. Here, as in the other industrial series there is a far stronger rise in the wages of female than of male workers. The hourly earnings do not agree so closely, this doubtless being largely due to the fact that the Social Board estimated the hourly earnings in 1913 and 1920, whereas the Association's figures are exact.

MONOGRAPHS

19—811480. *Wages in Sweden.*

IRON, STEEL AND MINING (CHAPT. IV).

I. IRON AND STEEL.

A. Bofors Ironworks.

The Bofors Ironworks is situated in the district of Karlskoga in the County of Örebro. The history of the works dates back to the middle of the 17th century. In 1873 it was taken over by the Bofors-Gullspång Company and acquired its present name in 1919.

Wage series have been computed for workers in the blast-furnace, open-hearth, Lancashire works and rolling-mills. Up to 1883 the annual earnings refer to "blast-furnace years" covering the period $\frac{1}{11}$ — $\frac{9}{10}$. The last two months of 1883 are not included. From the year 1884 the earnings are for calendar years.

For the workers in the blast-furnace, as also for the other groups, individual extracts of their annual earnings covering the years 1875—1925 have been taken from the concern's books. The blast-furnace at Bofors was erected in 1873, but it is only from the year 1875 that material is available for the purposes of compilation. Series have been worked out relating only to the occupational groups that are most representative of the blast-furnaces: keepers, top-fillers and calciners. Each series comprises 2—3 workers and shows a marked degree of homogeneity. During the period 1915—1923 a high-cost-of-living allowance was paid to the workers in money, and these payments are thus included both in the published annual earnings and in the earnings per hour. Since 1918 a record has been taken of the number of hours of work performed by each individual worker, thus enabling the exact computation of the hourly earnings as from that year. The figures have been weighted and averaged for the blast-furnace workers.

The open-hearth is represented by the occupational groups melters, pitmen and gas-makers. Each of the series, all of which cover the years 1901—1925, relate to 2 workers. As in the case of the blast-furnace workers, records of the hours of work are avail-

able for the years 1918—1925, and the hourly earnings have been worked out on that basis. A high-cost-of-living allowance was paid during the same years as in the case of the blast-furnace workers. In the melters' wage curve there appears a break in 1918 that is not apparent in the other occupational groups, and is undoubtedly due entirely to the fact that both workers were replaced at the same time. Between 1917 and 1918 the annual earnings of the two selected workers fell on an average 32 %. In the next year, 1919, two additional workers were included, and at the same time the annual earnings increased by 104 %. It will be seen from the tables that in 1918—1919 the hourly earnings of the melters likewise show a substantial rise, 91 %, while the rise in the average for the other two occupational groups works out at only 22 %.

The wage series relating to Lancashire melters covers the annual earnings of 3—4 foremen. Particulars are available dating as far back as 1867, but according to information received from the works, up to 1894 the earnings include also the pay and upkeep of 1—3 assistants, and the series is therefore only published as from the last-mentioned year up to 1914, when the forge was closed down. The works has estimated the value of these assistants' upkeep at 300 kronor *per annum*. There is as a rule no material difference in the wage level of the different workers included from the year 1894, so that the series may be regarded as quite homogeneous.

As to the workers in the rolling-mills, wage series have been computed in respect of the occupational groups: foremen, heaters and rollers. These workers are said to have paid out of their money earnings a money wage to a number of boys. However, they did not provide for the boys' keep. This arrangement seems to have continued until 1893. Particulars are available as from 1869, but they are only published as from 1894. Like the other workers, the employees in the rolling-mills were also in receipt of a high-cost-of-living allowance during the years 1915—1923. The series, each of which comprises 2—3 workers, show as a rule a high degree of homogeneity. It would appear that, as in the case of the open-hearth, in 1913, 1914, 1915, 1916 and 1917 operations in the rolling-mills were suspended from time to time. As it is not known how far this closing down of works was general in the industry as a whole, the gaps in the earnings have been filled in so as to cover the entire year. For 1915 details are lacking in regard to heaters, and the two rollers were at work for only half the year. As far as the foremen are concerned there is no record that their hours of work were curtailed during these years.

From the year 1918 the working time has been incorporated in the primary material, and from it we have computed the hourly earnings. Below will be found a summary of the hourly earnings in 1918—1925 in respect of the different occupational groups.

Table 30. Hourly Earnings (in öre) of Workers at Bofors in 1918—1925.

Year	Blast-furnace				Open-hearth			Rolling-mill		
	Keepers	Top-fillers	Calldners	Average	Melters	Pitmen	Gas-makers	Foremen	Heaters	Rollers
1918	101.4	83.3	93.5	92.7	89.9	92.2	97.7	148.8	132.1	120.0
1919	130.7	122.5	115.0	122.7	171.5	116.8	114.4	181.7	155.9	140.3
1920	177.3	154.2	148.0	159.8	211.4	167.7	154.8	220.6	196.9	176.1
1921	169.3	155.5	143.4	156.1	252.6	175.3	155.5	180.4	183.0	160.6
1922	136.3	123.4	110.5	123.4	172.4	134.4	130.3	135.8	135.5	111.4
1923	92.8	96.6	94.0	94.5	157.7	111.6	102.5	143.2	126.2	116.9
1924	100.7	99.9	99.4	100.0	172.6	120.2	112.7	137.2	120.1	102.3
1925	100.4	98.3	99.5	98.7	175.9	115.0	115.3	126.8	117.4	101.1

According to information obtained from the works, up to 1908 all the employees were in receipt of benefits in kind, consisting of free dwelling, money allowance for firewood and right to a potato plot, all valued at a total of 150 kronor *per annum*.

All the workers included in the statistics are employed in shifts. The normal number of hours worked by blast-furnace workers was 84 per week, there being two alternate shifts up to 1906. In the following year three shifts were introduced, resulting in each employee working 56 hours per week. The top-fillers, however, constituted an exception, as for a long time previously they had been working on a three-shift system. It is not known when this group changed over from two to three shifts. Concerning the other workers included in the investigation it is simply stated that they worked 78 hours a week, but this does not of course apply to the entire period in question. Those engaged on day-jobs worked, from the beginning of the period investigated, 72 hours a week, from about 1880 61 hours, from 1897 57 hours and from 1921 48 hours.

Table 31. Annual Earnings (in kronor) of Workers in the Blast-Furnace and Open-Hearth at Bofors 1875—1925.

Year	Blast-furnace				Open-hearth			Foremen
	Keepers	Top-fillers	Calciners	Average	Melters	Pitmen	Gas-makers	
1875	846	839	761	794	—	—	—	—
76	775	790	700	747	—	—	—	—
77	847	748	729	768	—	—	—	—
78	799	753	673	732	—	—	—	—
79	812	777	689	749	—	—	—	—
1880	822	745	662	731	—	—	—	—
81	791	749	631	710	—	—	—	—
82	833	839	700	778	—	—	—	—
83	963	696	644	750	—	—	—	—
84	1096	804	714	849	—	—	—	—
85	1074	831	715	851	—	—	—	—
86	795	665	578	665	—	—	—	—
87	765	675	572	657	—	—	—	—
88	880	659	580	688	—	—	—	—
89	933	597	592	691	—	—	—	—
1890	992	648	631	754	—	—	—	—
91	938	617	576	691	—	—	—	—
92	912	598	559	671	—	—	—	—
93	879	624	578	677	—	—	—	—
94	872	608	620	689	—	—	—	1094
95	823	604	554	645	—	—	—	1126
96	766	554	538	608	—	—	—	1195
97	933	650	640	727	—	—	—	1176
98	950	701	640	746	—	—	—	1029
99	999	711	682	781	—	—	—	987
1900	993	752	728	811	—	—	—	1275
01	1043	852	755	865	1760	730	958	1052
02	996	899	709	845	1680	818	876	1113
03	964	775	694	794	1773	956	1032	1244
04	1224	959	883	1002	2275	1106	1159	1330
05	1079	873	860	926	2337	1161	941	1067
06	1456	1094	1068	1186	2212	1348	1420	1344
07	1470	1153	1051	1200	2356	1877	1460	1431
08	1393	1119	1006	1149	2295	1429	1253	1460
09	1389	1194	1210	1257	2364	1402	1223	1180
1910	1404	1237	1255	1292	2454	1416	1461	1654
11	1349	1316	1193	1273	2598	1585	1465	1447
12	1475	1367	1316	1376	2881	1692	1471	1506
13	1551	1382	1358	1420	2586	1614	1374	1390
14	1406	1375	1387	1389	2263	1535	1384	—
15	1573	1526	1499	1533	2801	1901	1528	—
16	1397	1597	1258	1417	2802	1956	1863	—
17	2449	2123	2113	2228	3286	2340	2320	—
18	2931	2372	2620	2641	2238	2842	2707	—
19	3763	3431	3256	3483	4562	3526	3133	—
1920	3953	3865	3789	3869	4239	3653	3701	—
21	4280	4146	3855	4094	4397	3575	3851	—
22	2289	2489	2050	2276	2169	2573	2025	—
23	1077	1349	1238	1221	1835	1209	1326	—
24	2853	2752	2659	2755	3849	2212	2826	—
25	2833	2632	2625	2697	3591	1866	2589	—

Table 32. Annual Earnings (in kronor) of Workers in the Rolling-Mills at Bofors.

Year	Foremen	Heaters	Rollers
1894	1577	1228	732
95	1387	1020	678
96	1375	1028	750
97	1499	1080	862
98	1597	1132	921
99	1775	1370	1019
1900	1535	1304	923
01	1452	1047	878
02	1259	1089	945
03	1445	1170	1001
04	1570	1243	1066
05	1587	1266	1106
06	1671	1320	1140
07	1671	1333	1167
08	1691	1337	1031
09	1176	884	872
1910	1585	1304	1309
11	1762	1428	1250
12	1828	1518	1311
13	1956	1564	1166
14	2397	1327	1177
15	2421	—	1451
16	2326	2319	1760
17	3069	2706	2240
18	2966	2918	2810
19	4138	3818	3511
1920	4344	3743	3449
21	3018	3259	2637
22	1990	1453	1195
23	1436	1304	1224
24	2557	2028	1753
25	2980	2566	2115

B. Domnarfvet Ironworks.

Domnarfvet is situated in the district of Stora Tuna in Dalecarlia. These ironworks, the largest of their kind in Northern Europe, were founded in the middle of the seventies by the "Stora Kopparbergs Bergslag" concern.

Extracts have been taken from the wage records in respect to blast-furnace, open-hearth, steel foundry, rolling-mill, manufacturing forge, engineering workshops, and also in respect to all stonemasons, carpenters, and unskilled workers in the building department.

As regards the blast-furnace workers, wage series have been

computed according to two different methods: firstly, series relating to keepers, top-fillers and calciners (4—5 selected workers in each), and secondly, for purposes of comparison, series made up of all workers: 6—8 keepers, 15—34 top-fillers and 4—14 calciners, the latter series however not starting until 1903, whereas the selected workers' series begins in 1897.

Data concerning all workers have been derived from wage reports drawn up for the Stora Kopparbergs Bergslag's wage statistics, which do not date further back than 1903, and which record the average earnings per month and the number of workers each month. The average annual earnings have been obtained by multiplying the average monthly earnings by the number of months of the year during which work went on. The averages thus computed for *Domnarfvät* do not reveal a worker's actual average earnings. The fact is that the number of workers often varied greatly from month to month, so that only a minor number of employees was working throughout the twelve months that have served as a basis for calculating the annual earnings. However, averages computed on this basis may be useful for comparison with those for the selected workers. Whenever there has been a period of suspension of work the fact has been recorded in the material.

As to the selected workers, only the annual earnings have been furnished for each worker concerned. As however no worker was employed throughout the year, the time worked has been given in months and the gaps filled up.

The three occupational groups were weighted, the selected workers' series and the all workers' series being taken separately. When combining the former series we have used as weights the total number of workers within each occupational group for each year. These weights have been derived from the series relating to all workers combined and are consequently available only from 1903. In 1897—1903 the weights are constant and have been computed on the basis of the numbers subsequent to 1903. The agreement between the annual earnings of the selected workers and those of all workers combined is very good. On an average the latter exceed the former by 1 %.

The open-hearth works are represented by the occupational categories melters (4—8 workers), gas-makers (5—9 workers) and crane-tenders (2—4 workers). The selected groups embrace all workers. Owing to the wide difference in the levels of wages these groups have not been combined into one.

The steel foundry has supplied two wage series: moulders (12—39) and assistants (16—63), both series embracing all workers. The moulders' earnings are as a rule about 70 % higher than the assistants'.

For workers in the rolling-mills, as for blast-furnace workers, series have been drawn up for both selected workers and all

workers combined within a number of typical occupational groups. Thus in the blooming-mill, rails rolling-mill, thick plate rolling-mill, thin plate rolling-mill, wire-mill, rod-mill, fine and medium rolling-mill, medium rolling-mill, blooming universal and rails rolling-mill (the latter department being the result of an amalgamation of the blooming-mill and the rails rolling-mill, and having started working in 1909) all workers have been selected from the occupations rolling-mill foremen, heaters and rollers. The annual earnings of the respective occupational categories within the different departments have been weighted and combined, as the difference in their wages is not very great. In this way the foremen series has been made to comprise 18 workers, the heaters' series 28—32 workers and the rollers' series 88—97 workers.

The selected workers' series, which begins as early as 1892, embraces only the occupational categories rolling-mill foremen (4—6 workers) and rollers (2—6 workers). If we compare the series composed of all the workers with those composed of the selected workers we find that in 1903—1910 the average earnings of all foremen exceed those of the selected workers by, on an average, 5 %. On the other hand, just the opposite is the case with the rollers, the selected workers' earnings here exceeding the average earnings of all rollers by an average of 7.5 %. During these years the tendency is the same for all series.

We have had to form separate series for all blacksmiths (8—11 workers) and sledge-hands (6—10 workers) in the blacksmith's shop. The blacksmiths' series is almost consistently 100 % higher than the sledgers' series.

To represent the engineering workshops we have selected all vice-hands (27—67 workers) and engineers (25—29 workers). As the tables show, these two series run pretty well together. During these years the engineers earned on an average 15 % more than the vice-hands. These two series have been weighted and combined to form an average, which is thus made up of the annual earnings of 52—95 workers.

Finally, as already mentioned above, there are wage series for the following occupational categories in the building department: stonemasons (8—89), carpenters (8—46) and unskilled workers (7—100), all categories embracing all the workers combined. Stonemasons and carpenters are on about the same wage level and have been weighted together. Comparing this series with the unskilled workers' series we find that there has been a distinct narrowing of the margin between skilled and unskilled workers' wages.

The unskilled workers' annual earnings in per cent. of the skilled workers'

1903	77
1904	78
1905	71
1906	81
1907	80
1908	88
1909	83
1910	87

The benefits in kind consisted of free dwellings comprising 1 room or 1 room and kitchen, and also free potato patch, during the period 1892—1906. After 1906 rent was paid at the rate of about 50 % of the local rent.

There are no particulars whatsoever as to the hours worked *per annum* and *per diem*.

Table 33. Annual Earnings (in kronor) of Blast-Furnace Workers at Domnarvet Ironworks 1897—1910.

Year	Keepers		Top-fillers		Calciners		Averages	
	A	B	A	B	A	B	A	B
1897	1079	—	924	—	735	—	883	—
98	1237	—	1081	—	888	—	1039	—
99	1184	—	1081	—	933	—	1046	—
1900	1202	—	1095	—	971	—	1069	—
01	1059	—	1029	—	833	—	963	—
02	1113	—	1092	—	924	—	1035	—
03	1109	1156	1144	1215	916	921	1051	1096
04	1226	1226	1203	1213	944	935	1108	1107
05	1265	1382	1164	1276	950	1037	1095	1199
06	1332	1339	1236	1231	1058	1027	1189	1176
07	1299	1321	1272	1269	1049	1009	1208	1197
08	1181	1186	1297	1269	1170	1106	1254	1224
09	862	972	903	890	717	816	883	900
1910	1274	1296	1206	1188	1362	1539	1230	1237

A) Selected workers.

B) All workers.

Table 34. Annual Earnings (in kronor) in Different Departments at Domnarfvet Ironworks 1892—1910.

Year	Open-hearth			Steel foundry		Building department			
	Melt-ers	Top-fillers	Crane-tenders	Mould-ers	Assi-stants	Stone-masons	Car-pen-ters	Aver-age	Unskil-led workers
1903	1826	816	770	1278	681	811	785	790	607
04	1747	785	834	1354	767	839	910	876	685
05	1876	857	755	1378	816	1084	949	1038	737
06	1929	952	841	1524	877	1043	1044	1043	851
07	2114	1048	899	1614	970	1122	1094	1113	888
08	2117	1213	975	1702	1044	1122	1147	1135	997
09	1551	807	881	1270	680	743	804	783	648
1910	2192	1389	1628	1672	956	—	1234	1234	1067

Year	Rolling - mill					Engineering workshops		
	Foremen		Heaters	Rollers		Engin-eers	Vice-hands	Average
	A ¹	B ¹	B ¹	A ¹	B ¹			
1892	1138	—	—	849	—	—	—	—
93	1092	—	—	826	—	—	—	—
94	1185	—	—	844	—	—	—	—
95	1283	—	—	912	—	—	—	—
96	1464	—	—	1059	—	—	—	—
97	1468	—	—	1154	—	—	—	—
98	1571	—	—	1274	—	—	—	—
99	1634	—	—	1320	—	—	—	—
1900	1540	—	—	1234	—	—	—	—
01	1309	—	—	1101	—	—	—	—
02	1445	—	—	1177	—	—	—	—
03	1563	1565	1362	1285	1035	1043	992	1015
04	1576	1666	1431	1206	1094	1119	996	1045
05	1684	1685	1439	1293	1097	1122	969	1031
06	1799	1868	1590	1333	1210	1243	1102	1153
07	1846	1919	1608	1409	1251	1410	1172	1242
08	1668	1753	1503	1258	1171	1499	1209	1299
09	1137	1289	1082	773	803	1030	883	935
1910	1987	2197	1874	1286	1492	1441	1278	1360

¹ A) Selected workers.

B) All workers.

Year	Blacksmiths' shop		Year	Blacksmiths' shop	
	Black-smiths	Sledge-hands		Black-smiths	Sledge-hands
1903	1229	603	1907	1495	704
04	1271	650	08	1560	751
05	1287	649	09	1108	577
06	1370	671	1910	1576	756

C. *Elfsjöhyttan Ironworks.*

The forge at Elfsjöhyttan, in the mining district of Filipstad, Värmland County, belonged, until it was closed down in the autumn of 1896, to the Hellefors Works. In 1867 the works adopted the system of accounting per calendar year instead of per "blast-furnace year". The earnings recorded for 1867 thus cover a period of 14 months, for which allowance has been made in the calculations.

Extracts have been made from the wage records for 1—2 workers in each of the following occupational groups covering the period 1867—1896: keepers, top-fillers and calciners; and as the wage series show the same tendency and the wages are on about the same level, these series have been combined into one, the resultant blast-furnace series involving 5—6 workers.

The benefits in kind consisted of free housing, free potato patch and free firewood.

No details are available in the wage records of the works as to the number of hours worked *per annum*. We have obtained from the Board of Trade's statistical department information concerning the time the blast-furnace was working each year and the annual output of iron produced. If we compare the working period and the production with the wage series, we find, as usual, a strong correlation between the level of wages on the one hand and the operating period and production on the other. During the period of depression at the close of the seventies, however, the case was quite different. Between 1877 and 1878 the output increased slightly over 20 %, due entirely to a longer operating period in 1878. The quantity of iron produced per day was in fact practically constant throughout the period 1867—1896. The average wages however went down about 10 % during the same period, and this decline must therefore be due to a fall in the piece-work rate. The same applies to the year 1879. The earnings showed a further decline; the operating period was the same as in the previous year, viz. 365 days, so that a further fall in the piece-work rate must have taken place. In 1880 and 1881 the earnings again declined. This however was due in the first place to a shorter operating period, but it may also have been caused by a decline in the piece-work rate, though this cannot be gathered from the available material as it has been impossible to divide up the annual earnings into income earned on pig-iron production and that earned on other work.

The number of hours of work *per diem* in the case of all occupational groups included was 12. Keepers and top-fillers worked in two alternating shifts, each shift lasting 6 hours. Calciners likewise worked in two shifts, but the length of each shift was 8 hours.

Table 35. Number of Days in Operation, Output of Iron (in Tons), Number of Workers and Annual Earnings (in kronor) at Elfsjöhyttan 1865—1896.

Year	Number of days (of 24 hours) in operation	Output of iron in tons	Number of workers	Average annual earnings, kronor
1865	173	1376	—	—
66	142	1057	—	—
67	156	1239	3	364
68	202	1879	4	375
69	265	2407	4	413
1870	274	2709	5	471
71	262	2754	4	504
72	319	3287	6	732
73	307	3107	5	672
74	324	3466	6	757
75	303	3169	5	754
76	336	3370	6	802
77	292	3160	5	660
78	365	3828	6	606
79	365	3790	5	563
1880	315	3392	5	492
81	227	2366	5	432
82	276	2842	5	535
83	233	2464	5	489
84	364	3608	5	622
85	365	3711	5	609
86	303	3678	5	580
87	247	2447	5	428
88	366	3837	5	508
89	305	3165	5	492
1890	254	2691	5	508
91	294	3195	5	516
92	311	3357	5	506
93	312	3296	5	593
94	364	3760	5	535
95	303	3706	5	536
96	210	2153	5	468

D. Hellefors Ironworks.

From the Hellefors Ironworks, situated in the County of Örebro, wage series are available relating to workers in the open-hearth, Lancashire works, foundry and rolling-mill.

Up to 1892 the workers' earnings have been taken from the account books of the works, after that year from payrolls, one for each department and month. Extracts have been taken from the wage data covering the period 1865—1911. As in earlier times the earnings etc. of helpers and members of families were booked to the

account of the head of the family, and no distinction was made between the latter's earnings and those of the other members of the family, we have had to exclude the first years covered by the wage series. The reorganization of the financial year took place at these works during 1867, with the result that that year comprised 14 months, for which due allowance has been made here.

The open-hearth is represented by the occupational categories melters, ladlemen and transport workers. This department first started work in 1885 and the melters' wage series begin as from that year, the other workers' series commencing in 1886. The melters' series relates to 2 workers. Up to 1893 the series is not very homogeneous, there having been statistically unsatisfactory replacements among the workers in the series. Thus, from 1888 a worker is added whose earnings exceed the other's by 26 %. In 1891, the last year in which this highly paid worker is included in the series, his earnings are 35 % above the other's, but in the following year he is replaced by another worker, and the earnings of the two workers thenceforth included are on the same level. In 1897 both workers are replaced by others, the wages of the new workers being practically on the same level. At the same time the average earnings show a rise of 14 %. Whether this increase is due to a difference in the standard of the new workers as compared with their predecessors, or whether there has been a real increase in wages, it is impossible to determine.

In the ladlemen's series, which is published as from 1889, there are two workers. In 1897 both workers are replaced, their successors' average earnings being 16 % higher. The homogeneity is good throughout. The transport workers' series (1—2 workers) covers the period 1891—1908.

Wage material for Lancashire melters is available from the year 1865, but owing to the impossibility of distinguishing between helpers' earnings and masters' earnings the earlier years have been excluded from our calculations; the series is published as from 1874. Each master has been responsible for the keep of two helpers. The concern allowed the master 150 kronor per year for the keep of each helper up to 1880, when the sum was reduced to 75 kronor; it remained 75 kronor up to 1888, when the system was abolished. These sums have been deducted from the master's earnings. The money wages were paid to the helpers direct. The masters' earnings include cow-fodder allowance, as a rule amounting to 90 kronor *per annum*. The Lancashire forge at these works was closed down in 1891 and the wage series cease in 1890. The divergence between the earnings of the two workers involved varies considerably (maximum, in 1886, 39 %, minimum, in 1879, 2 %), so that the representativeness of the series is questionable.

The foundry is represented by a moulders' series. Such scattered

details as are available concerning the moulders' earnings clearly reveal the influence of the prosperity that prevailed in the middle of the seventies, when their wages rose steeply. Thus, their annual earnings increased from 922 kronor in 1870 to 1 382 kronor in 1873, and two years after, in 1875, they were as high as 1 553 kronor, representing a rise of no less than 68 % since 1870. After this peak year, 1875, the earnings dropped rapidly to 1 047 kronor in 1877 and 888 kronor in 1879, involving a decline of 43 % between 1875 and 1879. From 1886 averages of the annual earnings of 1—2 moulders are published.

As representatives of the rolling-mill we have selected the categories foremen, heaters and rollers. Up to 1874 the foremen maintained a helper, whose earnings cannot be distinguished from his master's. During the period 1874—1886, the years for which the series is published, the average annual earnings are computed from the earnings of two workers whose wages are in close agreement. The fall of 21 % in wages up to 1887 is due in part to the addition of a third worker with a smaller annual income, and in part to a real decrease of 15 % in the annual earnings of the two other workers. During the following years the series includes 3—4 workers and is on the whole homogeneous both as regards the level and the trend of their wages. Heaters' (2—5) and rollers' (1—2) annual earnings are published as from 1880 and 1878 respectively, and the series are good.

A cross-section has been drawn for the year 1890 for the annual earnings of all workers, both those directly engaged in the producing and refining of iron and those employed in certain other occupations, such as electricians, engineers etc., also sawmill hands. Averages have been struck for the workers in each department, for all iron-workers and for all the employees at Hellefors.

The benefits in kind consisted of free housing, free potato patch, including manuring and ploughing, and free firewood. Up to 1888 the money earnings include "cow-fodder allowance", varying between 45 and 90 kronor. No reduced price benefits have been operative at Hellefors.

There are no particulars whatever as to the hours of work *per annum*. The following scanty notes have been supplied to us concerning the hours of work *per diem*. In the open-hearth there were two alternating shifts of about 12 hours each. The transport workers were however day-workers, their working period corresponding to that of day-job labourers in general. The concern states that the hours were not shortened in the open-hearth until the introduction of the 8-hour day. The Lancashire started on Sunday afternoon and work went on until 6.00 p. m. on the following Saturday. As in the open-hearth, there were two working shifts of 5—7 hours per shift, that is to say, about 12 hours *per diem*. The length of the working day of those em-

ployed in the foundry was shortened to 10 hours in May 1905. In the rolling-mill the work was done in 8-hour shifts, two shifts working alternately from 6.00 p. m. on Sunday to the same hour on Saturday.

Table 36. Annual Earnings (in kronor) of Workers at Hellefors 1876—1910.

Year	Open-hearth			Lancashire melters	Moulders	Rolling-mill		
	Melters	Ladle-men	Transport workers			Fore-men	Heaters	Rollers
1874	—	—	—	1635	—	1851	—	—
75	—	—	—	1700	—	1802	—	—
76	—	—	—	1579	—	1837	—	—
77	—	—	—	1379	—	1684	—	—
78	—	—	—	1620	—	1636	—	895
79	—	—	—	1534	—	1701	—	950
1880	—	—	—	1232	—	1633	—	993
81	—	—	—	1287	—	1629	1239	871
82	—	—	—	1731	—	1510	1131	844
83	—	—	—	1788	—	1527	1154	896
84	—	—	—	1606	—	1631	1226	942
85	1147	—	—	1754	—	1469	1118	830
86	1296	—	—	1813	581	1488	1130	890
87	1086	—	—	1672	570	1178	1075	880
88	1164	—	—	1292	573	1101	1054	870
89	1178	702	—	1313	623	1131	1011	834
1890	1371	817	—	—	612	1156	1020	835
91	1310	798	541	—	702	1148	1021	786
92	1151	811	552	—	688	1213	1015	837
93	1218	851	546	—	659	1240	1090	790
94	1118	781	541	—	644	1212	1059	801
95	1078	708	—	—	616	1179	1011	771
96	1095	730	600	—	699	1186	1035	756
97	1245	850	565	—	719	1201	1044	783
98	1198	804	608	—	713	1283	1104	819
99	1268	830	628	—	757	1317	1182	893
1900	1354	906	704	—	774	1396	1274	932
01	1385	882	587	—	786	1200	1110	822
02	1233	879	589	—	664	1273	1171	883
03	1505	974	619	—	783	1609	1528	1093
04	1398	929	623	—	770	1446	1359	966
05	1324	840	574	—	649	1466	1337	966
06	1539	935	614	—	728	1574	1439	1046
07	1728	1063	702	—	1007	1797	1588	1075
08	1771	1152	—	—	922	1753	1566	1147
09	1750	854	—	—	790	1570	1538	955
1910	1950	1259	724	—	990	1834	1739	1292

HELLEFORS IRONWORKS

295

Table 37. Annual Earnings of all Workers at Hellefors.
Cross-Section 1890.

Occupation	Number of workers	Annual money earnings kronor
1) Open-hearth.		
Melters	2	1372
Ladlemen	2	817
Transport workers	4	744
Furnace crew	6	562
Pitmen	4	724
Gas-makers	4	724
Labourers	2	631
<i>Average</i>	—	741
2) Lancashire works.		
Foreman	1	1723
Melters	16	873
Melters' helpers	3	638
Iron-carters	3	730
Helpers	2	561
Tilters	3	663
<i>Average</i>	—	818
3) Foundry.		
Foreman	1	1034
Foundry-workers	6	604
<i>Average</i>	—	666
4) Rolling-mill.		
Foremen	3	1156
Heaters	6	1049
Rollers	12	811
Heaters' helpers	7	803
Catchers	2	666
Lever-men	4	725
Rolling-mill workers	26	562
Inspectors	2	1305
<i>Average</i>	—	751
5) Engineering workshops.		
Vice-hands	11	707
Blacksmiths	8	714
Lathe-hands	5	1352
<i>Average</i>	—	844
6) Other occupations.		
Electrician	1	547
Machinists	2	1147
Greasers	4	743
Sledge-hands	2	382
Pattern-makers	4	834
Unskilled workers	46	502
<i>Average</i>	—	560
7) Sawmill workers.		
Planer	1	601
Plank-piler	1	742
Sawyers	5	931
Saw-sharpener	1	979
Sawmill worker	1	602
Timber sorters	2	756
<i>Average</i>	—	827
<i>Average of groups 1—5</i>	—	774
<i>Average of all groups</i>	—	718

E. Långshyttan Ironworks.

The Långshyttan Ironworks is situated in the County of Kopparberg. It is represented by a number of wage series taken from the blast-furnace, the Bessemer works, the open-hearth and the rolling-mills, and also from certain special occupational groups: moulders, those in the engineering works, carpenters and unskilled workers.

With regard to the blast-furnace wage series, in order that the arrangement of the material may be similar for all the different works, the foreman represents an independent group, keepers, top-fillers and calciners are combined into a second group, and the other workers in the blast-furnace, ore-breakers, coal-carters and crusher-tenders into a third group. Furthermore, an aggregate has been made of all those in the blast-furnace with the exception of the foreman. In a special column the latter's annual earnings are published. In 1889 he was replaced by another foreman, and this causes a break in the wage curve which is not representative for the occupation in question. The series relating to keepers (4 workers), top-fillers (2—3 workers) and calciners (3—4 workers), are all of a very homogeneous character, with the result that the series obtained by weighting and combining these groups acquire considerable representative value. Ore-breakers (2—3 workers), coal-carters (3—4 workers) and crusher-tenders (2—3 workers) do not form so homogeneous a group as they are not so technically uniform as the former occupations. The average number of workers, excluding the foreman, is thus 17—20.

The number of hours worked annually by each worker included in the series is recorded in days, so that it has been possible to compute their average daily earnings. On the basis of particulars furnished by the ironworks concerning the number of hours of work *per diem* in different years we have also worked out the hourly earnings. It is particularly interesting to follow the trend of the hourly earnings of top-fillers at the time of the introduction of the system of shifts with three alternate sets of workers. In 1899 the average hourly earnings of keepers and calciners amounted to 19.4 öre, and those of top-fillers to 17.8 öre. In the following year the hourly earnings of the first two groups were 19.6 öre, while the top-fillers earned 30 öre an hour. The latter's earnings thus increased by 69 % over the previous year. During the succeeding years also the top-fillers' hourly earnings work out at about 70 % above the average earnings of keepers and calciners.

The Långshyttan Ironworks is one of the few works that employed the Bessemer method for the production of iron and steel. Wage series in respect of the Bessemer workers: ladlemen, furnace-men and engineers have been worked out covering the period 1880—1909 (2 workers in each occupation). The annual earnings

of a first steel-blower are published as from 1884 and those of a second steel-blower as from 1893. As far as wages are concerned, ladlemen and furnacemen are in the same class and have been combined to form one series, which thus comprises 4 workers. The curve representing the engineers' wages follows the other curves closely, except for the period 1893—1897, when replacements of workers have a very marked effect on the wages. As far as regards these five years, several estimates have been made.

The open-hearth workers have been combined into three main groups: (A) foreman and melters (3 workers), (B) melters' helpers and ladle-liners (4 workers) and (C) transport workers, furnace crew, cranimen, pitmen and sinkhead liners, also gas-makers (13—14 workers). Judging from the material it seems evident that the works underwent reconstruction in 1906. In spite of this the days at work were the same in that year as in other years, but the daily earnings were far lower than usual.

The rolling-mill is represented by the following occupational groups: foreman, heater, roller, greaser, firemen and steel-inspectors. From 1880 to 1887 there are only heaters, and the wages of the selected workers during this period are higher than those of the new workers, who come in as from 1888. That is to say, from that year all the other rolling-mill workers are included in the series. The foreman, however, does not come in until 1895. The trend of wages is, on the whole, the same for all occupational groups, but in view of the great difference in the levels of wages as between the various occupations, it has been possible to combine groups only in the case of the greasers and the firemen.

The hours of work *per annum* have been recorded for all wage series with the exception of the foreman series; we have therefore been able to compute an average of daily earnings.

The moulders' wage series comprises 6 workers and is very homogeneous. The engineering workshops at Långshyttan are represented by wage series covering the master mechanic, lathe-hands, tool-makers and blacksmiths. In 1901 a new master mechanic took the place of the old one, who had been in the series throughout the entire period 1885—1900, and this explains the break in the curve in 1901. The lathe-hands and tool-makers series have been combined to form an average of 6—7 workers, the difference in wage level being small and each series being homogeneous.

The trend of the blacksmiths' series is slightly different from that of the series relating to the other workers in the workshops. For the first two years the series consists of only one worker, whose earnings reach their maximum (979 kronor) in 1882 — a rise of 80 % since 1880, in spite of his remaining in the series right up to 1893. In 1883 a second worker is added, and a third in 1887. The decline in wages between 1886 and 1887 is mainly due to the third worker's being paid a lower wage than the other two. The break

in the curve in 1890 is considerably intensified by the fact that the fourth worker, who was added in that year, received a wage falling short of the average of the others' wages by 15 %. The series is more homogeneous from 1890.

To represent the carpenters' wage series 2 workers were selected up to 1900, and from 1901 4 workers. The substantial rise in 1900—1901 is due to the two added workers having considerably higher wages than the original two. The unskilled workers' series is based on particulars of the maximum and minimum daily rate during the year. From these two yearly figures we have struck an average.

The benefits in kind have consisted of free housing, firewood at a reduced price, a potato patch and free medical services, and they have been operative during all years in which there are wage series. The value per year of benefits at the works have been estimated at:

	Housing kronor	Cheaper firewood kronor	Medical ser- vices kronor
1880—1889	40	12	8
1890—1899	45	15	10
1900—1909	50	18	12

The hours of work in the blast-furnace, when all workers were working on a two-shift system, was 12 hours per 24-hours day up to 1900; after that the top-fillers worked in three shifts, the rest still in two shifts. For day-work the number of hours a day was 12 up to 1890, 11 up to 1897 and after that 10. According to information furnished by the concern, the week's shift timetable started at 9.00 p. m. on Sunday, but after 1890 work on Sundays was exceptional. Nevertheless, we can observe no shortening of the hours of labour as far as regards those workers from the rolling-mill who are included here. Work at the Bessemer works was done in two shifts throughout the period 1880—1909.

The average time worked *per annum* is as follows: open-hearth workers, moulders, engineers and rolling-mill workers about 300 days, and blast-furnace workers and Bessemer workers as a rule 350—360 days. It should be noted that, though the annual earnings of the two latter groups are as high as those of the other occupational groups, the daily earnings work out at a far lower level owing to the longer time worked annually by the blast-furnace and Bessemer men.

If we compare the annual earnings within the different technical units, blast-furnace, Bessemer works, open-hearth, etc., we find that blast-furnace workers, workers in the rolling-mill, moulders, engineers, and also inspectors and rollers, are on approximately the same level and exhibit a similar secular trend. However, lathe-hands and tool-makers in the engineering shops and inspectors do not follow suit when the strong rise takes place in

1905—1906. Indeed, the inspectors in the rolling-mill appear to be more or less unaffected by cyclical variations as also by the closing down of works. The blacksmiths are found to have earned far higher pay in the earlier years, but lower pay in the later years, than the rest of the workers in the engineering shops. From 1903 to 1906, i. e. the years in which increases in wages were general, the blacksmiths' wages remain at the same level as before. The heaters in the rolling-mill and the Bessemer men are on about the same wage level as, and somewhat higher than, the afore-mentioned groups except during the decade 1887—1897, when the heaters received a lower income. As regards annual earnings, there is a distinct tendency for the margin between the earnings of the foreman and those of other rolling-mill workers — for instance the heaters — to narrow.

	Heaters' earnings in percentage of foreman's earnings
1895	54
1900	52
1905	58
1906	68
1907	70
1908	81
1909	73

The tables likewise show how, in the Bessemer works, the second steel-blower's earnings approached those of the first blower. Thus, the latter's earnings in 1893 were 55 %, in 1900 30 %, in 1905 25 % and in 1909 5 % higher than the former's. While the annual income of ladlemen and blast-furnace labourers increased between 1893 and 1909 by 46 %, that of the first steel blower increased during the same period by only 19 %, whereas the second steel-blower's annual earnings in 1909 exceed his earnings in 1893 by 78 %.

From the beginning of the eighties up to the year 1885, which was a peak year, wages increased steadily. After a period of depression there was an economic revival during 1891—1892, resulting in a rise in wages of about 20 % in the case of the Bessemer workers and of about 10 % in other departments. In the following year the annual earnings of most occupational groups reached a minimum. Other markedly "good years" were 1896, 1900 and 1906—1907, in the course of which the average annual earnings generally rose 10 % above the preceding years' earnings. The general crisis after 1900 was responsible for the heavy fall in wages that reached bottom in 1902. From 1900 to 1901 the foreman's income went down 8 % and that of the other blast-furnace workers 4 %. The annual earnings of the workers engaged at the Bessemer works likewise declined 3 % in the case of the first steel-blower, 10 % in

Table 38. Annual and Daily Earnings (in kronor) of Blast-Furnace Workers at Långshyttan 1880—1909.

Year	Annual earnings				Daily earnings			
	Foreman	Keepers, top-fillers and calchairs	Coal-carters, crusher-tenders and ore-breakers	All blast-furnace workers, except the foreman	Keepers, top-fillers and calchairs	Coal-carters, crusher-tenders and ore-breakers	All blast-furnace workers, except the foreman	Unskilled workers
1880	1001	587	573	580	1.63	1.62	1.62	1.20
81	1012	616	585	602	1.69	1.66	1.68	1.20
82	1001	606	636	620	1.66	1.76	1.71	1.20
83	1050	671	625	649	1.90	1.72	1.81	1.20
84	1020	708	614	664	1.94	1.68	1.82	1.25
85	1020	713	604	662	1.96	1.68	1.83	1.30
86	1020	646	589	619	1.87	1.70	1.79	1.30
87	1020	647	591	621	1.82	1.70	1.77	1.30
88	1020	680	607	646	1.88	1.84	1.87	1.30
89	1100	685	628	658	1.91	1.74	1.83	1.33
1890	1140	702	637	671	1.94	1.76	1.86	1.40
91	1350	726	627	679	2.01	1.73	1.88	1.45
92	1385	706	638	674	1.97	1.78	1.88	1.45
93	1290	646	599	624	1.83	1.69	1.76	1.45
94	1371	683	605	646	1.99	1.73	1.86	1.53
95	1486	732	665	698	2.12	2.03	2.08	1.38
96	1477	727	658	693	2.04	1.84	1.94	1.23
97	1527	713	620	667	2.09	1.86	1.97	1.38
98	1477	736	686	712	2.27	2.24	2.25	1.50
99	1546	744	759	752	2.28	2.25	2.27	1.70
1900	1716	824	802	813	2.35	2.34	2.35	1.70
01	1581	796	791	794	2.33	2.37	2.36	1.63
02	1525	723	712	717	2.32	2.29	2.31	1.65
03	1760	911	847	879	2.63	2.50	2.56	1.85
04	1657	937	897	918	2.70	2.57	2.64	1.90
05	1779	978	909	947	2.75	2.67	2.71	2.20
06	1933	1070	1145	1104	3.11	3.20	3.15	2.20
07	1994	1153	1091	1124	3.26	3.28	3.27	2.25
08	1979	1157	1085	1122	3.29	3.22	3.25	2.40
09	2027	1130	1001	1069	3.63	3.56	3.60	2.90

that of the second steel-blower and also in that of ladlemen and furnace labourers, and 17 % in the case of the engineers. Of the rolling-mill workers, the foreman's, rollers' and inspectors' wages fell 6 %, 5 % and 9 % respectively; on the other hand, those of the heaters showed an increase of 6 %, and those of the greasers an increase of 3 %. At the same time, the earnings of the moulders fell 4 %. The wages of the master mechanic rose 21 %, while there was no change in the income of the blacksmiths. In 1901—1902 the earnings at the blast-furnace continued to decline, the foreman's by 4 and the other blast-furnace workers' by 10 %, whereas the

LÅNGSHYTTAN IRONWORKS

301

Table 39. Hourly Earnings (in öre) of Blast-Furnace Workers at Långshyttan 1880—1909.

Year	Keepers, top-fillers and calciners	Coal-carters, crusher-tenders and ore-breakers	All blast-furnace workers
1880	13.6	13.5	13.6
81	14.1	13.9	14.0
82	13.9	14.7	14.3
83	15.9	14.4	15.2
84	16.2	14.1	15.2
85	16.4	14.0	15.2
86	15.7	14.2	15.0
87	15.2	14.2	14.7
88	15.7	15.3	15.5
89	15.9	14.6	15.3
1890	16.2	15.4	15.8
91	16.7	15.1	15.9
92	16.4	15.6	16.0
93	15.3	14.7	15.0
94	16.5	15.1	15.9
95	17.8	17.8	17.8
96	17.1	16.1	16.6
97	17.4	17.1	17.3
98	19.0	20.7	19.8
99	19.0	20.9	20.0
1900	21.6	21.7	21.7
01	21.6	22.1	21.9
02	21.4	21.4	21.4
03	24.3	23.4	23.8
04	26.0	24.0	25.0
05	26.4	25.2	25.9
06	29.8	30.2	30.0
07	31.5	30.9	31.2
08	31.7	30.4	31.1
09	35.2	33.7	34.5

earnings at the Bessemer works were as follows: first and second steel-blowers and engineers, a rise of 6 %, 12 % and 6 %, ladlemen and furnacemen, a fall, though no more than 2 %. Moulders' and master mechanics' earnings show no change, those of the blacksmiths now dropping 3 %.

Up to 1903 the earnings increase throughout; this applies to all occupational groups with the exception of the first steel-blower, whose income continues to fall altogether another 2 %. The increase in earnings is strongest in the case of the blast-furnace workers (18—23 %).

Table 40. Annual and Daily Earnings (in kronor) of Workers in the Bessemer Works and of Moulders at Långshyttan 1880—1909.

Year	Annual earnings				Daily earnings		Annual earnings Moulders	Daily earnings Moulders
	First steel-blowers	Second steel-blowers	Ladlemen and furnace men	Engineers	Ladlemen and furnace men	Engineers		
1880	—	—	479	530	1.47	1.48	—	—
81	—	—	663	551	1.84	1.51	—	—
82	—	—	627	568	1.75	1.60	—	—
83	—	—	685	612	1.90	1.71	—	—
84	1200	—	805	795	2.22	2.22	—	—
85	1200	—	889	820	2.45	2.29	708	2.25
86	1200	—	820	793	2.28	2.23	693	2.22
87	1200	—	839	775	2.34	2.20	694	2.23
88	1200	—	857	818	2.36	2.32	560	2.04
89	1200	—	848	828	2.39	2.37	619	2.12
1890	1237	—	839	838	2.40	2.37	643	2.17
91	1522	—	917	848	2.83	2.55	647	2.10
92	1500	—	1008	985	2.99	2.77	678	2.22
93	1500	958	891	852	2.65	2.43	682	2.27
94	1500	1114	970	930	2.87	2.62	698	2.33
95	1609	1304	1021	910	3.38	2.82	732	2.49
96	1548	1203	953	820	2.70	2.39	753	2.49
97	1548	1319	931	823	2.67	2.44	729	2.47
98	1556	1239	936	830	2.97	2.61	721	2.55
99	1706	1198	923	882	2.66	2.47	764	2.55
1900	1606	1242	971	942	2.78	2.67	806	2.63
01	1556	1120	877	787	2.56	2.46	773	2.64
02	1642	1250	860	836	2.69	2.56	773	2.62
03	1612	1482	1010	1030	2.80	2.85	859	2.92
04	1688	1441	1068	989	2.99	2.82	895	3.19
05	1898	1507	1084	998	3.00	2.81	993	3.46
06	1892	1612	1225	1241	3.44	3.44	1091	3.74
07	1728	1637	1236	1199	3.51	3.39	1182	4.18
08	1828	1727	1239	1258	3.53	3.51	1198	4.09
09	1783	1709	1302	1307	4.02	4.11	1017	4.62

Table 41. Annual and Daily Earnings (in kronor) of Open-Hearth Workers at Långshyttan 1905—1909.

Year	Annual earnings			Daily earnings		
	Foremen and melters	Helpers and ladle-men	Transport workers, inspectors, crane-men, pitmen, sinkhead liners and gas-makers	Foremen and melters	Helpers and ladle-men	Transport workers, inspectors, crane-men, pitmen, sinkhead liners and gas-makers
1905	2313	1050	853	7.63	3.76	2.98
06	1767	1010	713	5.35	3.14	2.60
07	2453	1501	1125	8.32	4.94	3.81
08	2340	1406	1113	7.91	4.66	3.80
09	2649	1443	1062	8.86	5.66	4.39

Table 42. Annual and Daily Earnings (in kronor) of Workers in the Rolling-Mill at Långshyttan 1880—1905.

Year	Annual earnings					Daily earnings			
	Foremen	Heat-ers	Rollers	Steel-inspec-tors	Greasers and firemen	Heat-ers	Rollers	Steel-inspec-tors	Greasers and firemen
1880	—	550	—	—	—	1.79	—	—	—
81	—	639	—	—	—	2.04	—	—	—
82	—	621	—	—	—	2.02	—	—	—
83	—	746	—	—	—	2.41	—	—	—
84	—	825	—	—	—	2.64	—	—	—
85	—	840	—	—	—	2.75	—	—	—
86	—	869	—	—	—	2.88	—	—	—
87	—	855	—	—	—	2.78	—	—	—
88	—	657	508	679	511	2.48	1.73	2.25	1.77
89	—	724	622	680	587	2.36	2.01	2.24	1.89
1890	—	791	659	674	627	2.53	2.11	2.25	2.02
91	—	838	720	677	655	2.69	2.32	2.26	2.11
92	—	794	712	728	639	2.59	2.28	2.31	2.05
93	—	584	530	705	502	2.25	2.05	2.47	1.85
94	—	861	717	669	634	2.92	2.31	2.17	2.05
95	1600	865	715	716	608	2.77	2.43	2.35	1.94
96	1600	818	765	720	622	2.73	2.54	2.34	2.04
97	1600	784	616	723	633	2.75	2.50	2.33	2.13
98	1600	848	723	725	640	3.42	2.67	2.35	2.43
99	1600	847	852	785	677	2.96	3.12	2.61	2.36
1900	1700	885	836	838	660	2.95	3.04	2.78	2.34
01	1600	937	792	761	676	3.19	2.82	2.52	2.36
02	1677	812	750	717	631	2.75	2.77	2.40	2.17
03	1784	909	854	779	670	3.10	2.91	2.71	2.33
04	1652	875	921	936	689	3.02	3.07	3.12	2.33
05	1756	1022	917	886	772	3.40	3.08	2.93	2.48
06	1795	1228	1131	930	864	4.01	3.65	3.13	2.83
07	1843	1291	1166	1000	858	4.18	3.89	3.28	2.87
08	1571	1268	1068	1032	824	4.23	3.48	3.42	2.77
09	1800	1321	1343	1062	1077	5.22	4.42	3.75	3.63

Table 43. Annual and Daily Earnings (in kronor) of Master Mechanic, Lathe-Hands and Tool-Makers, Blacksmiths, Builders and Carpenters at Långshyttan 1880—1909.

Year	Annual earnings					Daily earnings	
	Master mechanic	Lathe-hands and tool-makers	Blacksmiths	Builders	Carpenters	Master mechanic	Lathe-hands and tool-makers
1880	—	—	544	—	490	—	—
81	—	—	608	—	492	—	—
82	—	—	979	—	555	—	—
83	—	—	830	—	600	—	—
84	—	—	896	820	582	—	—
85	891	563	876	780	573	—	1.81
86	1040	580	747	817	604	—	1.88
87	1057	578	644	780	567	—	1.92
88	919	613	622	780	551	—	1.98
89	907	582	708	780	633	—	1.95
1890	1084	653	661	826	713	—	2.11
91	1200	650	785	900	712	—	2.14
92	1200	623	787	902	607	—	2.17
93	1200	648	706	900	647	—	2.24
94	1200	655	684	921	551	—	2.27
95	1323	701	667	964	555	—	2.35
96	1236	742	715	936	577	—	2.47
97	1236	734	732	936	609	—	2.53
98	1241	754	736	941	568	—	2.57
99	1242	772	819	942	573	4.27	2.53
1900	1242	780	794	943	581	4.50	2.57
01	1503	742	795	1515	734	5.04	2.54
02	1500	758	770	1560	756	4.95	2.54
03	1500	787	806	1560	759	5.00	2.70
04	1500	844	788	1575	806	5.00	2.79
05	1540	926	799	1774	838	5.13	3.14
06	1625	969	802	1894	844	5.42	3.34
07	1680	974	835	1776	876	5.85	3.31
08	1800	964	840	1810	901	5.92	3.20
09	1839	834	902	2100	662	7.60	3.86

F. Näs Ironworks.

From these works we have wage series dating from 1893 to 1914. The works, which are situated on the River Dalälven about 20 km. east of Avesta, possesses a blast-furnace and a rolling-mill.

The blast-furnace is represented by the following occupational groups: keepers, top-fillers and calciners, and from each one of these we have selected two representative workers. During the earliest years the annual earnings of the keepers are about 40 % higher than the others', but later on the divergence narrows down

to about 10 %, while from the year 1905 both the top-fillers and calciners earn the same income as the keepers. The above groups have been combined into one larger group, blast-furnace workers, and the value of the series thus obtained will best be judged by comparing it with a series made up of all workers in one gang, in all probability a shift. This latter series comprises 20—30 workers belonging to different occupational groups.

The series agree remarkably well, except for two years: 1909, the year of the general strike, when, as might be expected, the representative series shows higher annual earnings, viz. 734 kronor as compared with 422 kronor; and 1912, when work was suspended during the months of August and September.

The series comprising all workers in one gang contains, besides the annual earnings, data regarding the annual hours of work, thus enabling a computation of the average daily wage. The number of hours of work *per diem* has varied a good deal according to the occupational group. Thus, from August 1, 1907 the top-fillers work in three shifts as against two shifts previously; the keepers, slagmen and coal-carters, on the other hand, do not begin working in three shifts until September 1916. As to the crusher-tenders, their daily hours of work are recorded as about 9, and the ore-breakers' as 10 hours, a day.

Like the blast-furnace, the rolling-mill is also represented by series relating to selected workers and by a series comprising all workers belonging to a gang. The representative series cover only the occupational groups foremen, heaters and catchers. Each of these groups consists of 2 selected, representative workers. The series including all workers in a gang relates, on the other hand, to 19—23 workers.

The wage curves for heaters and foremen follow one another pretty closely. In 1893—1901 the former's earnings were between 10 and 20 % higher than the latter's. From 1902 the wages of these two occupational groups practically coincide. In the earlier years the heaters' and foremen's wages were about 70 % and in later years about 50 % higher than the catchers' wages. The curve representing all workers combined remains below the other curves, but the movement of this and the other curves is parallel.

However, in the series, as in those relating to blast-furnace workers, the effect of closing down is far more marked in the combined workers' curve than in the representative workers' curves.

The daily hours of work at the rolling-mill from the year 1893 to March 31, 1906 were $11 \frac{3}{4}$, including an interval of half-an-hour, from April 1, 1906 to the year 1908 $11 \frac{1}{2}$, including an interval of half-an-hour, and from 1909 to 1917 10 hours and 50 minutes, including an interval of half-an-hour.

From April 1, 1906 the period during which work was stopped on Sundays was extended, the first shift of the week start-

ing work on Monday morning instead of on Sunday afternoon.

All the employees at the works received until 1908 the benefits of free housing and potato patch, and throughout the entire period free medical services.

Table 44. Annual and Daily Earnings (in kronor) of Workers at Näs 1893—1913.

Year	Blast-furnace			Rolling-mill			
	Keepers, top-fillers and calciners	All workers in one gang		Heaters	Foremen	Catchers	All workers in one gang
		Annual earnings	Annual earnings				
1893	621	607	1.69	1240	1128	717	700
94	486	480	1.52	1082	929	634	523
95	540	494	1.52	1107	1007	826	563
96	541	550	1.56	1312	1153	818	641
97	658	629	1.74	1216	1174	738	661
98	700	715	1.90	1238	1029	777	558
99	749	758	2.01	1346	1143	841	741
1900	799	799	2.12	1322	1089	808	728
01	760	766	2.03	1277	1023	794	685
02	752	755	2.00	1191	1130	776	694
03	741	752	1.99	1066	1067	731	639
04	675	651	1.90	1214	1242	830	707
05	817	806	2.23	1267	1314	883	748
06	891	941	2.60	1497	1576	1090	952
07	980	984	2.76	1434	1478	1004	985
08	1042	1051	2.90	1239	1272	876	869
09	734	422	3.52	955	939	638	601
1910	1258	1241	3.44	1838	1827	1249	1307
11	1542	1513	4.18	1942	1946	1323	1168
12	1619	1393	4.66	2100	2097	1548	1125
13	1685	1599	4.52	2522	2518	1726	1530

G. Sandviken Ironworks.

The Sandviken Ironworks was founded during the years 1862 and 1863. The plant consisted of blast-furnace, Bessemer works, tire rolling-mill and forge. The blast-furnace then built was at the time the largest in Sweden, producing 70 centner (cwt) of metal every fifth hour. As early as in March 1866, however, the works had to close down owing to financial difficulties. A new company, which was formed under the name of the Sandviken Ironworks Company, purchased the ironworks, thus enabling it to open up again in September 1868. At the turn of the century the

works comprised three blast-furnaces, four Bessemer converters, tilting forge, several rolling-mills, a wire-mill, a manufacturing forge, foundry, engineering shops, etc. At that period it employed about 1650 workers.

From the year 1868 there are wage series relating to blast-furnace workers (keepers, top-fillers and calciners) and smiths (tilting smiths), and, from 1875, rolling-mill employees (head-rollers, heaters, rollers). The wage series, with the exception of that relating to the calciners, cover all years up to 1927. No wage records however are available for blast-furnace workers in 1879, the wage-book for that year having been lost. Besides the series of selected workers' wages there are two cross-sections made, one for 1885 and one for 1905. These cross-sections comprise all those employed at the works; that is to say, they include also foremen, women and youths. These cross-sections tally with the selected workers' series as far as the secular trend is concerned. If we compare the cross-section and the blast-furnace workers' series, for instance, we find that the cross-sectional wage in 1885 is nearly 12 % higher and in 1905 not quite 11 % higher than the earnings of the blast-furnace workers.

In the years 1869 and 1870 2 keepers have been included in the series, in 1871, 1872 and 1873 3, and from 1874 onwards 4. The top-fillers and calciners series relate to 3 workers throughout the entire period. Particulars of the latter's wages however have only been supplied up to 1921. It has been possible to weight and combine these three specialized occupations into a single group owing to the similarity of their wage levels and the considerable homogeneity within each category.

The rolling-mill is represented by a head-roller (1 worker up to 1870, 2 workers in all subsequent years), heaters (2 workers throughout) and rollers (3 workers). All these series show a very homogeneous trend. We have not however combined them into one, owing to the dissimilarity in the annual earnings.

The tilting smiths' series comprise 4 workers throughout the period. In spite of there having been several changes of personnel, the homogeneity of the series is good.

Up to 1910 the workers lived in free dwellings. A small croft was attached to each tenement house. About the year 1900 there were 130 workmen's dwellings erected by the concern at Sandviken, and in these a total of 3 674 people lived rent-free. Up to the middle of the eighties the free accommodation consisted as a rule of one room, and after that year up to 1909 usually of one room and kitchen. During the period 1910—1920 the workers paid a rent of 78 kronor for one room and 124 kronor for one room and kitchen. After 1920 the rent for one room is 87 kronor and for one room and kitchen 166 or 187 kronor, according to the quality of the dwelling. At the present time about 50 % of the employees

at the works live at a cheaper rent than that prevailing in the open market.

According to the material, the wages of all groups have consisted of earnings on piece-work. However, the piece-work wage system seems to have been applied to blast-furnace workers at a later date than that at which it became operative for the other groups. Thus in the case of keepers it is first recorded in 1883 that earnings were paid for piece-work and day-jobs; top-fillers' work consisted of piece-work from the year 1890, and calciners were engaged on a piece-work basis from 1899.

As a rule we have selected only such workers as were engaged throughout the year. The ordinary number of working-days *per annum* is recorded as being 300 for rolling-mill workers and smiths and 365 for blast-furnace workers. There are no exact particulars as to working hours. If any of the workers concerned did not work throughout the year, the time they have been at work during the year has been expressed in months and parts thereof.

The daily working time is 12 hours up to 1917, then 8 hours. The calciners adopted the 8-hour day earlier, in 1913.

In the first year, 1869, the smiths' and blast-furnace workers' earnings are similar. Up to 1870 the former's annual earnings rise 32 % while the latter's rise only 2 %. From the beginning of the seventies the smiths' wages rise sharply up to 1875, heaters' up to 1876, melters' up to 1877, and head-rollers' and rollers' up to 1878, after which the wages fall heavily up to 1879. After a brief subsequent revival the annual earnings again recede to the 1879 wage level, affecting rolling-mill workers in 1883—1884 and melters and smiths in 1885—1886. From the nineties the wage curve rises steadily right up to 1902 without any material changes. From 1902—1903 the rolling-mill workers' annual earnings fall: the head-rollers' 14 %, the rollers' 7 % and the heaters' 5 %. Smiths' and blast-furnace workers' earnings likewise decline, the latter's however not until 1903—1904. A rapid revival in 1906—1907 is again followed by a setback in 1908 and 1909. Head-rollers', heaters' and rollers' incomes go down 9, 10 and 5 % between 1907 and 1908, and those of smiths' and blast-furnace workers' 12 % between 1908 and 1909. From 1909 to 1910 there follows a general rise in wages, due probably to the abolition of free housing. In 1915 the wage level is almost the same as in 1910. After 1915 commences the strong rise that continues right up to 1919—1920, blast-furnace workers' wages increasing 175 % and rolling-mill workers' 120—130 % during that period. The increase in the smiths' wages continues until 1920, that is since 1915 then working out at 135 %. From 1919 and 1920 the wages fall steeply. In 1923 the blast-furnace and rolling-mill workers were employed for only about 5 ½ months, as indeed will be seen from the abrupt break in the wage curve. Normal conditions appear to have once more set in in 1924.

Table 45. Annual Earnings (in kronor) of Workers at Sandviken Ironworks 1869—1926.

Year	Blast-furnace workers	Rolling-mill workers			Tilting smiths	Year	Blast-furnace workers	Rolling-mill workers			Tilting smiths
		head-rollers	heaters	rollers				head-rollers	heaters	rollers	
1869	604	—	—	—	610	1900	974	1570	1320	1238	1140
1870	618	—	—	—	795	01	983	1599	1271	1184	1186
71	644	—	—	—	832	02	991	1652	1320	1248	1250
72	722	—	—	—	954	03	1056	1423	1257	1164	1206
73	847	—	—	—	1051	04	1014	1474	1320	1211	1215
74	887	—	—	—	1107	05	1063	1592	1404	1233	1206
75	889	1100	1033	887	1229	06	1118	1923	1651	1439	1336
76	908	1043	1117	929	1193	07	1204	1967	1653	1432	1488
77	931	1052	1097	945	1100	08	1272	1797	1483	1362	1363
78	878	1119	998	943	1011	09	1118	2092	1524	1460	1195
79	—	857	919	766	942	1910	1466	2344	1993	1709	1450
1880	841	1116	1133	951	969	11	1431	2171	1880	1604	1595
81	810	1081	1170	934	1083	12	1458	2367	2050	1852	1655
82	807	1161	1219	931	1177	13	1453	2391	2017	1832	1772
83	805	1167	1194	956	1022	14	1514	2158	1979	1746	1651
84	815	851	917	753	1061	15	1489	2138	1954	1731	1833
85	806	900	855	809	1027	16	1822	2520	2206	2069	2021
86	703	1117	1008	861	910	17	2165	2820	2325	2128	2352
87	711	1124	965	918	965	18	3108	3715	3083	2890	3216
88	708	1084	918	890	1057	19	4094	4818	4063	3736	3801
89	756	1086	1014	973	1171	1920	3443	4651	3978	3549	4027
1890	790	1245	1040	990	1169	21	3029	3592	2248	2046	3297
91	838	1212	1034	1017	1096	22	2799	3085	2355	1955	2408
92	842	1234	1052	996	1162	23 ¹	1356	1457	1368	1065	2198
93	854	1204	1127	922	1181	24	2954	3140	2615	2245	2431
94	821	1246	1174	979	1116	25	2941	3263	2708	2499	2889
95	871	1332	1216	1046	1128	26	2964	3215	2874	2464	2984
96	897	1427	1216	1121	1048						
97	884	1492	1241	1112	1089						
98	863	1520	1245	1103	1063						
99	940	1438	1303	1149	1052						

H. Smedjebacken Rolling Mills.

The Smedjebacken Rolling Mills are situated in the southern part of Kopparberg County.

The wage material suitable for compilation extends over the period 1865—1909. It has not been necessary to make the usual adjustment to account for the transition from blast-furnace years

¹ Stoppage on account of wage dispute.

to calendar years as the books have been kept throughout the period from one calendar year to another. The annual earnings of the occupational categories head rollers, heaters and rollers have been extracted. Each of the workers in these groups paid and maintained a helper, and these series have therefore been supplemented by corresponding particulars relating to head-rollers' helpers, heaters' helpers and rollers' helpers. Further, a series has been worked out for lathe-hands in the engineering shops. The account books show that out of the wages earned by master and helper the concern's office paid to the helper a certain wage in money, which was at the same time debited to the master's account. These books also record the value of the helper's keep as estimated by the works. To the money wages have also been added the value of the allowances, of which a detailed account is given below. This book-keeping system has made it possible to differentiate between masters' and helpers' earnings during all the years in which there have been helpers. It has likewise been possible to distinguish throughout between money earnings and benefits in kind. On the other hand, we have not been able to divide the money earnings into earnings at the rolling-mill and other earnings.

The value of the helper's keep has been estimated by the works at 250—300 kronor. The works' estimate includes also free housing, the monetary value of which, however, it is impossible to ascertain. The works estimated the rental value of the masters' dwellings at 60 kronor during the period 1865—1872 and at 80 kronor in 1873—1889. These sums include the rental value of the helpers' accommodation. In order then to make the helpers' wages directly comparable with the masters' wages from the amounts representing the helpers' benefits in kind a sum equivalent to the value of their dwellings should be deducted. This sum is, however, inconsiderable.

According to the account books the helper system was abolished as from 1874. The fact that the annual earnings remained the same may have involved a substantial rise in real wages, as the helpers now received in money what was formerly perhaps merely a fictitious sum of 300 kronor. In that case the masters' wages suffered a real decline. In contrast to the practice in previous years, both masters and their former helpers were paid from the year 1874 the same allowance in respect of day-jobs (unskilled work) in the winter, when the rolling-mills were not working. During the period 1874—1877, then, the helpers were paid entirely by the concern, and from 1878, when the names of the occupations were changed, the head-roller's helper being called a conveyer, the heater's helper a "bakvärmare", and the roller's helper a lever-man, they were in receipt of allowances that were generally equivalent to half the masters'.

As representative of each occupational group we have selected 2 workers whose wages have been on a similar level and who have

been employed throughout the year. The data, however, do not indicate the occasions on which workers have been replaced.

For the purpose of comparing the annual earnings we publish for the two head-rollers an average of the quantity of bar iron produced *per annum*, showing the existence of a strong correlation between production and earnings.

As the tables show, the measure of agreement both in the general level and the trend of wages between head-rollers and heaters is very good, and we have therefore struck an average of these occupational groups. The rollers' wages are at a far lower level, but the trend of their wages is the same as that of head-rollers and heaters up to 1878. From 1878 to 1879 the head-rollers' earnings increase 30 %, while the rollers' earnings drop 26 % within the same period. As has previously been remarked, in 1878 the head-rollers helper becomes a conveyer and the heater's helper a "bakvärmare". In connection with this change the earnings of both these occupations go up 33 % in 1877—1878 and 17 % in 1878—1879. This brings the rollers, conveyers and "bakvärmare" on to the same wage level, and after that the trend of the wages of these three categories is similar. For the period 1865—1878 we have combined the head-rollers and heaters' helpers, and from 1879 conveyers, "bakvärmare" and rollers, into one series, which is marked by a considerable degree of homogeneity. For all years the rollers' helpers (from 1878 called lever-men) are on a lower wage level than the previous series, though the trend is the same. The lathe-hands series (1—2 workers) are not so susceptible to cyclical changes as the other series. In fact, the lathe-hands are independent of the work going on in the rolling-mills. It is recorded in the material that up to 1887 the workers received a fixed annual wage, but that after that year they were paid on a piece-work basis.

There is a record of the winter and summer daily wage paid to unskilled workers, which amounted in 1865—1871 to 0.80 and 1.20, in 1872 to 0.90 and 1.50, in 1874—1877 to 1.00 and 1.75, in 1878—1884 to 0.75 and 1.50, in 1885—1896 to 1.00 and 1.35 kronor. For each period the first amount denotes the winter daily wage rate and the second the summer daily wage rate. When the rolling-mills were not working, the employees in that department were regarded as unskilled workers.

As has already been mentioned above, the benefits in kind consisted of a certain allowance in the form of varying rations and also free housing. The allowance is recorded in respect of each year, as also its value. Up to 1878 the head-rollers, heaters and rollers appear to have had the same allowance, and the other workers either a smaller allowance or else none at all. The head-rollers' allowance consisted of:

1867		1878	
100 "lispund" ¹ of hay	: 60 kronor	Cow-feed	100.00 kronor
100 " " straw	20 " "	5 cords of firewood	32.50 " "
6 cords of firewood	30 " "	5 barrels potatoes	25.00 " "
6 barrels potatoes	36 " "		
			<i>Total</i> 157.50 kronor
<i>Total</i> 146 kronor			
1897			
8.5 decitons of hay	51.00 kronor		
8.5 " " straw	21.25 " "		
6 cords of firewood	45.00 " "		
6 barrels potatoes	28.80 " "		
			<i>Total</i> 146.05 kronor

In 1879 the rollers' allowance was reduced by half. When in 1878 the helpers were in receipt of an allowance, it amounted as a rule to half of that of the masters. The benefits in kind allowed to the employees in the machine shops consisted mainly of housing accommodation and wood-fuel during the period 1865—1909. The unskilled workers generally received no benefits in kind. The dwellings consisted as a rule of one room and kitchen, the value of which the concern assessed at: 60 kronor in 1865—1872, 80 kronor in 1873—1889, 90 kronor in 1890—1899 and 100 kronor in 1900—1910. Subsequent to 1897 the benefits in kind consisted only of free housing. The total annual earnings published do not include the value of the free housing (see however above concerning the helpers).

There are no particulars of the annual hours of work. During the winter months the rolling-mill was not always in operation, but on such occasions the employees were given unskilled jobs in the works. The working time *per diem* in the rolling-mills was 12 hours gross from 1865 up to about the turn of the century. During that period the rolling-mills were not in operation between 6.00 p. m. on Saturday until 6.00 p. m. on Sunday. In about 1900 the suspension of work in the rolling-mills was extended from Sunday afternoon until 4.00 a. m. on Monday. In this department the 6-hour shift system was applied until 1900, and after that an 8-hour shift became operative. In the case of the employees in the shops (day-workers) the number of hours of work per week was about 72 up to about 1900, and thereafter 57.

From the Hage Ironworks, which is situated in the same district as the Smedjebacken Rolling Mills, and which is owned by the latter, we have obtained wage data for Lancashire forges, relating partly to 2 melters (working half a single hearth) and partly to 2 helpers, covering the period 1865—1896. The helpers' series includes up to the year 1873 two unmarried helpers, whose respective

¹ lispund = 8.5 kilogrammes = 18 lbs. 12 oz.

SMEDJEBACKEN ROLLING MILLS

313

Table 46. Annual Earnings (in kronor) of Rolling-Mill Workers at Smedjebacken 1865—1909.

1	2	3	4	5	6	7	8	9	10
Year	Head-rollers	Head-rollers' helpers	Heaters	Heaters' helpers	Rollers	Rollers' helpers	Average of Col. 2 and 4	Average of Col. 3, 5 and 6	Output of bar iron in tons
1865	1270	455	905	450	831	355	1088	453	510
66	1211	452	975	452	802	355	1093	452	510
67	1340	455	1193	448	959	360	1207	453	728
68	1357	450	1261	450	945	465	1309	450	679
69	1298	452	1202	450	852	370	1250	451	551
1870	1680	452	1606	442	1116	375	1643	447	633
71	1625	452	1554	450	1114	365	1590	451	646
72	1455	450	1380	442	1010	370	1418	446	709
73	1552	450	1383	450	1054	365	1468	450	704
74	1926	453	1669	465	1273	355	1798	459	799
75	1895	460	1843	448	1382	356	1869	454	827
76	1874	467	1826	461	1420	371	1850	464	1100
77	1946	474	1859	457	1354	387	1903	466	846
78	1327	648	1188	594	972	444	1258	621	506
79	1724	738	1542	715	723	510	1633	725	765
1880	1657	773	1651	782	809	548	1654	788	687
81	1375	660	1343	609	757	531	1359	675	642
82	1345	757	1252	706	757	623	1299	740	575
83	1225	714	1134	697	722	560	1180	711	652
84	1761	984	1719	923	1001	638	1740	969	1072
85	1352	774	1233	755	838	544	1293	789	788
86	1281	801	1258	713	846	548	1270	787	726
87	1791	980	1711	944	932	619	1751	952	1277
88	1668	837	1630	833	977	531	1649	882	1190
89	1952	985	1762	967	1009	682	1857	987	1496
1890	1662	860	1489	852	919	633	1576	877	1462
91	1800	910	1555	884	938	759	1678	911	1607
92	1769	902	1571	859	975	717	1670	912	1577
93	1650	882	1536	845	930	717	1593	886	1630
94	1649	862	1488	842	933	733	1569	879	1646
95	1649	875	1478	867	885	724	1564	876	1570
96	1603	874	1341	848	802	639	1472	841	1517
97	1502	899	1308	846	875	759	1405	873	1360
98	1632	876	1387	862	821	767	1510	853	1307
99	—	—	—	—	—	—	—	—	—
1900	—	—	—	—	—	—	—	—	—
01	—	—	—	—	—	—	—	—	—
02	2210	1121	1835	1092	1196	916	2023	1136	4871
03	—	—	—	—	—	—	—	—	—
04	1513	846	1323	831	902	689	1418	860	3597
05	1705	890	1505	890	985	685	1605	922	4041
06	1920	1005	1643	990	1114	726	1782	1036	4555
07	1869	1040	1636	1040	1252	803	1753	1111	4190
08	1698	1100	1492	1013	1295	763	1595	1136	3518
09	1404	843	1162	765	1012	570	1283	873	3411

¹ Average of head-rollers' and heaters' helpers (from 1878 conveyers and "bakvärmare" respectively) and rollers (from 1879). See P. 304.

² In 1865—1898 on an average for head-rollers, in 1902—1909 as produced by two gangs of workers.

Table 47. Annual Earnings of Lathe-Hands at Smedjebacken 1865—1909.

Year	Kronor	Year	Kronor
1865	960	1890	1045
66	960	91	1005
67	990	92	975
68	987	93	999
69	987	94	1013
1870	987	95	990
71	987	96	1039
72	996	97	1105
73	994	98	1292
74	1014	99	—
75	1054	1900	—
76	961	01	—
77	952	02	1079
78	885	03	—
79	830	04	1120
1880	833	05	1145
81	833	06	1245
82	955	07	1345
83	922	08	1300
84	918	09	954
85	938		
86	833		
87	966		
88	878		
89	946		

money wages and benefits in kind both agree well with one another. From the said year have been added one married helper and one unmarried helper; the total earnings are no longer in agreement, and an average for these two workers would be of but little value. We give below annual incomes (in kronor) earned by smiths at Hagge:

	Masters	Helpers	
	(responsible for half a hearth)	Unmarried	Married
1865	993	455	—
1870	1247	460	—
1875	1375	550	700
1880	1154	410	500
1885	1384	450	750
1890	1182	450	650
1895	1068	405	500

All smiths lived rent-free. Potatoes (or potato patch) were provided by the concern and had a book value of 30 kronor in 1865—1872, of 40 kronor in 1873—1881, of 60 kronor in 1882—1886, of 50 kronor in 1887—1896. This latter benefit is included in the

STJERNFORS-STÄLLDALEN IRONWORKS 315

total annual earnings, whereas the value of the free housing is not. The value of the free housing has been estimated by the concern at: 60 kronor in 1865—1872, 80 kronor in 1873—1890, 90 kronor in 1891—1896.

I. *Stjernfors-Ställdalen Ironworks.*

The Stjernfors-Ställdalen Company, which has its central offices at Bredsjö, Örebro County, was not founded as a company until 1896, but there are preserved in its archives wage records dating a long way back. As far as the wages of the blast-furnace workers are concerned, however, they are incomplete up to 1898, owing to the fact that prior to that date the forge at Ställdalen had at times been operated for private individuals, also partly, perhaps, with workers other than those regularly employed. Of the blast-furnace workers 2 have been selected from each of the occupational categories keepers, top-fillers and calciners. The three wage series that have been worked out on the basis of these workers are in close agreement as far as regards the trend of wages; and as, moreover, the difference in wage level was found to be not very wide, all the workers were combined into one single series. Further, with a view to demonstrating the ratio between output and earnings in each year annual figures from the Board of Trade's material are published, showing the period during which the blast-furnace was operating and the production at the Ställdalen forge. Of the mineworkers we have included in the series 4 miners during the years 1860—1872. The fact that the mineworkers series could not be made to cover a longer period is due to the methods of book-keeping. We give below the annual earnings of these mineworkers during the years 1860—1873, which series also is included in the average annual earnings of all mineworkers (Table 8).

1860	368 kronor	1867	438 kronor
1861	373 "	1868	499 "
1862	435 "	1869	490 "
1863	416 "	1870	450 "
1864	403 "	1871	421 "
1865	404 "	1872	644 "
1866	498 "	1873	718 "

Only very meagre information has been forthcoming in regard to the hours of work *per annum* and *per diem*. Up to 1917 keepers and calciners worked in two shifts, and after that year in three shifts. From as early as 1900 the top-fillers had been divided into three shifts. There are no details whatsoever concerning the time worked by the mineworkers.

According to the concern's statement, the workers were in

receipt of no benefits in kind whatsoever prior to 1890, but after that year they were given free housing, or an allowance in lieu of rent for those not living in the concern's houses. No other benefits have been granted.

Table 48. Annual Earnings (in kronor) of Workers at Stjernfors-Stålldalen 1898—1914.

Year	Blast-furnace workers				Number of days (of 24 hours) the blast-furnace was in operation	Output of iron in tons
	Keepers	Top-fillers	Calciners	Average		
1898	956	776	655	796	365	3606
99	919	822	731	824	256	2616
1900	1084	961	886	977	343	5161
01	896	880	835	870	361	5319
02	776	795	731	767	274	3680
03	892	870	789	850	363	5169
04	909	864	828	867	345	5030
05	869	832	748	816	312	4589
06	1043	1007	932	994	365	6297
07	1179	1107	1075	1120	365	6567
08	1026	955	958	980	289	5263
09	1014	973	914	967	301	5512
1910	1237	1176	1177	1197	360	6867
11	1280	1205	1158	1214	362	7060
12	1293	1028	1219	1180	362	7385
13	1236	1037	1096	1123	299	5884
14	1458	1220	1208	1295	360	7300

J. Stjärnsund Ironworks.

The Stjärnsund Ironworks is situated about 10 km. east of Långshyttan Ironworks.

Whereas at Långshyttan there are blast-furnaces, Bessemer and open-hearth works, electro-steel works, hot and cold rolling-mill, flanging and dishing plant and manufacturing works, at Stjärnsund there have only been installed rolling-mills and a manufacturing works. The two places are connected by railway and are under joint administration.

The following occupational groups represent the rolling-mills (see Table 49): head-rollers, welders, rollers, heaters, catchers, inspectors and sheet-metal shearmen, straighteners, packers, greasers, engineers, firemen, loaders and foreman. The manufacturing works (Table 50) is represented by the occupational groups lathe-hands, blacksmiths and blacksmiths' helpers, sheet-metal workers' foreman and sheet-metal workers. Besides these, there are wage series

relating to day labourers and carpenters. With a few exceptions the series cover the period 1880—1909.

The head-roller series includes 2 workers. Up to 1896 the difference between their wages is about 20—30 %. In 1897 the head-roller who had had the higher wage was replaced by another, whose wages up to 1903 are the same as those of the second head-roller included in the series. From 1903 to 1904 the new head-roller's wages were increased by nearly 35 % while the other's earnings remained unaltered. The difference in their earnings, about 35 %, remained constant during the rest of the years under review.

The pay of the welders (2 workers) in the early years was only slightly higher than that of the other qualified rolling-mill workers. From the year 1886 the difference became wider, the welders' wages rising above the others' to the extent of 20—40 %. The phases of development exhibited by the welders' annual earnings are the same as that shown by the head-rollers'.

Rollers (6), heaters (3), catchers (4), inspectors (4—5) and sheet-metal shearman from 1889 (1) have been combined into one series, which thus comprises 17—19 workers. The wages of all workers included herein are on about the same level, the inspectors' being somewhat higher than the others', and their trend is similar. The homogeneity of this series is therefore very good. The other occupational groups at the rolling-mill, straighteners (2), packers (1), greasers (1—2), engineer (1), all of whom were on a lower wage level than the first-mentioned categories and may be regarded as unskilled workers, have been combined to form another wage series. The greasers, however, are first included from the year 1888 and the engineer not until 1890. This series is thus made up of 3—6 workers. Up to 1897 the two series show a steady tendency to approach one another, after which they again diverge somewhat, though in a far less degree. We quote below some figures to illustrate the tendency.

	Earnings of skilled workers kronor	Earnings of unskilled workers kronor	Earnings of unskilled in percentage of those of skilled workers
1880	570	392	69
1885	787	625	79
1890	679	574	85
1895	756	663	88
1897	762	742	97
1900	874	818	94
1905	898	766	85

We have combined the two last-mentioned series, and the resultant series will comprise 20—25 workers, that is to say, most of those employed in the rolling-mill.

Firemen (1—2 workers) are included for the period 1880—1909. On several occasions there is a change of workers, and the series does not agree closely with the other rolling-mill series.

Of the workers in the shops (Table 50) the sheet-metal workers' foreman received the highest wages. Of the other occupational groups the sheet-metal workers (3—6), lathe-hands (1—2) and blacksmiths (3—4) are on about the same level. Blacksmiths' helpers (1—2) were in receipt of a far lower wage. The sheet-metal workers, like their foreman, do not come into the series until 1891, whereas the other series begin as early as 1880. In 1891 the foreman's wages amounted to 35 %, in 1892 to 50 %, in 1893 to 60 %, in 1894 to 30 % and in 1895 to only 10 % more than the sheet-metal workers'. From 1896 the difference again widens, but from the beginning of the present century the difference is more constant, being about 20—30 %.

Of the two lathe-hands the one does not begin until 1885. The annual earnings of this latter fell short of the other's by 20 % right up to 1896. During the period 1896—1903 their wages coincide, after which there again arises a divergence of about 20 %.

As already mentioned, the blacksmith's series is made up of 3—4 workers, all of whom are on the same level, with the result that this series is marked by a considerable degree of homogeneity.

With regard to the helpers' series, on the other hand, there are several replacements recorded, and these cause a number of abnormal breaks in the wage curve. This is the case in 1885—1886, 1891—1892 and 1898—1899. After 1899 there are no replacements. From 1902 to 1907 the wages rise 95 %, thus bringing the helpers' wages almost to a level with those of the smiths. During the same period the latter's wages went up no more than 30 %. Lathe-hands, blacksmiths and sheet-metal workers have been weighted together to form one series, which thus indicates the trend of wages in the engineering workshops. The sheet-metal workers, however, do not come into this series until 1895. As mentioned above, this series does not start until 1891, it being in previous years on a lower level than the others.

The carpenters' and day labourers' wage curves run parallel to one another. The boom year 1900 is marked by a strong rise in the wages of the carpenters. Their wages actually went up 25 % as compared with the previous year's. An increase is also observed in the wages of day labourers up to 1900, although to a lesser extent.

As at Långshyttan, the benefits in kind have consisted of free housing, cheaper firewood and free medical services in the course of all the years covered by the wage series.

There are no particulars whatsoever regarding the hours of work, but the wages concern such workers as have as a rule been employed throughout the year. In the case of those working in shifts in the rolling-mill the length of the working week was 72 hours up to

STJÄRNSUND IRONWORKS

Table 49. Annual Earnings (in kronor) of Workers in the Rolling-Mills at Stjärnsund 1880—1909.

1	2	3	4	5	6	7	8
Year	Head-rollers	Welders	Rollers, heaters, catchers, inspectors, sheetmetal shearmen (from 1889)	Straighteners, packers, greasers (from 1888), engineers (from 1890)	Col. 4 and 5 combined	Firemen	Loaders
1880	844	743	570	392	543	486	—
81	885	743	593	452	572	479	—
82	959	666	613	437	587	420	—
83	962	789	717	522	688	585	—
84	1128	877	769	602	745	524	—
85	1089	945	787	625	763	518	—
86	833	759	627	533	613	486	—
87	826	740	620	517	604	458	—
88	1026	840	687	543	654	556	—
89	1098	920	689	596	669	578	—
1890	997	828	679	574	653	502	—
91	1103	951	704	585	675	524	562
92	1059	994	699	641	685	564	638
93	1070	883	659	587	642	535	610
94	1263	1054	735	673	720	593	571
95	1222	1008	756	663	734	635	710
96	1355	1096	763	730	755	599	692
97	1278	999	762	742	757	560	570
98	1419	1056	783	735	771	572	710
99	1469	1105	843	764	826	702	767
1900	1530	1157	874	818	862	720	815
01	1295	983	790	701	771	685	738
02	1240	903	754	677	738	592	669
03	1470	1096	873	764	850	721	789
04	1718	1109	885	754	858	674	792
05	1749	1144	898	766	870	682	689
06	1881	1324	931	825	909	647	819
07	1929	1326	1018	902	994	708	944
08	1792	1236	1001	909	982	718	853
09	1873	1189	957	789	922	754	1050

1906, when it dropped to 64 hours as a result of the suspension of work on Sundays being prolonged. As to those not working in shifts in the rolling-mill, the engineering workshops, and also day labourers, the working time consisted of 12 hours *per diem* up to 1898, and after that 11 hours *per diem* until 1906, from which year it was 10 hours.

In 1886—1887 the rolling-mills at Stjärnsund underwent reconstruction and the quantity of metal rolled in the course of those years amounted to only 67 % of that rolled in 1884 and 1885 and 79 % of the quantity in 1889. It is true, the rolling-mill workers

Table 50. Annual Earnings (in kronor) of Men in the Workshops, etc. at Stjärnsund 1880—1909.

1	2	3	4	5	6	7	8	9
Year	Roll-turners	Blacksmiths	Blacksmith's helpers	Sheet-metal workers' foreman	Sheet-metal workers	Col. 2, 3 and 6 weighted together	Day labourers	Carpenters
1880	420	448	308	—	—	441	352	385
81	564	485	338	—	—	505	393	426
82	563	440	326	—	—	471	499	405
83	594	471	321	—	—	502	421	401
84	558	494	327	—	—	510	465	442
85	537	502	313	—	—	516	474	447
86	541	512	377	—	—	524	464	465
87	570	485	362	—	—	519	449	478
88	573	483	357	—	—	519	471	476
89	631	528	371	—	—	569	512	512
1890	673	539	378	—	—	593	522	527
91	676	587	424	680	—	623	557	531
92	670	616	376	709	—	638	601	486
93	673	617	409	800	—	639	543	479
94	671	607	363	800	—	633	552	516
95	679	666	390	824	742	694	574	533
96	807	670	387	859	729	721	561	517
97	787	886	399	1013	751	812	545	538
98	825	712	441	1189	822	786	613	596
99	838	826	397	1189	835	833	638	694
1900	844	819	493	1095	829	828	646	849
01	823	750	416	964	777	776	608	698
02	826	784	402	1004	769	784	659	663
03	858	750	479	1034	787	787	645	747
04	930	787	573	1129	851	843	623	768
05	1095	817	692	1080	882	896	639	780
06	1089	859	730	1120	931	933	654	809
07	1114	1006	783	1348	1082	1062	745	821
08	1134	1043	773	1332	1059	1066	736	802
09	1112	889	744	1541	756	860	612	785

were fully employed, being engaged in building-work, but their daily earnings on such work were less than those earned in the mill. The year 1893 was conspicuous for the lack of orders received at the works and the small quantity of rolled metal produced, i. e., only about 80 % of the output in the succeeding year, the result being a lower scale of earnings. In 1901 and 1902 there was a serious lack of water-power, the output of rolled metal in consequence declining to 74 and 60 % respectively of the production in 1899—1900. However, the workers were employed in building new dwelling-houses during the time the mills were not working. As the tables show, the annual earnings in 1901 and 1902 were far lower than in the immediately preceding and succeeding years.

Q. Boxholm Ironworks.

The Boxholm works are situated in the county of Östergötland at Svartån, not far from Lake Sommen; at the present time they comprise blast-furnaces, open-hearth, Lancashire hearth, foundry, rolling-mills and manufacturing forge, also sawmills and wood-planing mill. The Company further carries on agriculture, forestry, and a flour-milling and dairy business. The history of the works dates very far back, but it is only from the time when the present Company was established, in 1872, that wage records have been preserved. The wage material covering the first three years is, however, far too meagre to make it worth compiling. From 1875 to 1914 particulars of wages and hours of work have been extracted from the works' account books, payrolls and manufacturing and blowing journals. Extracts from the primary data have been made in respect of all workers in the following departments: blast-furnace, Lancashire hearth and rolling-mills.

All occupational groups, and all workers in those groups from the departments for which we have made wage extracts have been included in the calculations. In order to render the material comparable with that derived from other ironworks, the figures for some typical occupational groups are published, both individually and in summary form.

Regarding workers in the blast-furnaces the following wage series are published: keepers (2 workers 1875—1888), foreman (1 worker 1889—1907), slagmen (2—4 workers), top-fillers (2—3 workers), calciners (3—7 workers). In order that this wage material may be capable of comparison with that derived from other works, for which as a rule there are only these five occupational groups available representing the blast-furnace, and in view of the fact that the trend of wages has been similar, these groups have been combined. Moreover, series have been computed relating to workers receiving a daywage at the blast-furnace. This group comprises the following occupational categories: crushertenders, ore-transporters, ore-breakers, limestone-breakers, ore-hoist men; it represents an average of 4—9 workers. Besides these wage series we also publish one representing the average wage of all those engaged in the blast-furnace with the exception of keepers and foreman. This comprehensive group also comprises, besides the groups enumerated above, the occupational groups charcoal-screeners and coal-carters. It is true that the workers coming under these two occupational categories at this blast-furnace are to be reckoned amongst those who work in shifts, but as they are on a lower wage level than the others, and since they are not as a rule represented at other works, they have only been included in the common average for the blast-furnace.

The employees in the Lancashire hearth are classified as: shing-

lers, half-melters, helpers, quarter-melters, coal-washers and coal-carters, also extra melters. In view of the workers' different qualifications, no summary has been made regarding those engaged at the Lancashire hearth. Up to 1878 the Franche-Comté method of forging was exclusively employed, but after that date both the Franche-Comté and the Lancashire methods were used, the former however only up to 1883, and until that year only in one out of seven Lancashire hearths. On the introduction of the Lancashire system the occupational groups shinglers and half-melters are added, all these workers being paid by the works direct. The task of the shingler was to hammer and shape all the blooms and carefully to remove all impurities, and in his capacity of foreman at the forge to supervise and ensure that every worker did his duty. The half-melters, all of whom had to provide board and lodging for a helper, were 12 in number in 1875, but by 1905 they had dropped to 2. From the year 1909 there were no half-melters, the number of quarter-melters being increased instead. In 1878 there were 10 quarter-melters employed, in 1885 there were 14, in 1900 22, in 1905 39. Half- and quarter-melters are occupational terms that have arisen on account of the distribution of the work amongst the workers. Prior to 1920, there were working at each forge of two tuyères two shifts, each consisting either of two melters, who divided the earnings between them, or else of a foreman-melter and helper, the latter being provided for by the foreman, but receiving his money wages at the works' office by special contract. The foreman was thus responsible for half the forge, while each melter was responsible for only one-quarter of the forge. When the master-and-helper system was abolished in 1909 all melters became quarter-melters, and from the year 1920, when the three-shift system was introduced, they became melters.

The work of a melter comprised, besides the production of the blooms, at the orders of the foreman, reconditioning the hearth, keeping the tools and implements in good condition, looking after the conveyance of the blooms to and from the forge, assisting in the work of shingling, rolling, catching, cutting and weighing the blooms, whenever required to do so — all without extra remuneration.

According to his contract the extra melter was liable, at the summons of a shingler, to work an auxiliary shift, and on such occasions to obey the rules laid down for the ordinary melter. When not called upon to assist in forging, the extra melter had to report for some other job.

On occasions when the forge was not working, those employed in the Lancashire works had to do day-jobs at a daily wage rate varying with the seasons. When engaged on a daily wage job a helper had to pay his master half his wage to cover his keep.

The production of 100 kilogrammes of wrought iron requires a certain amount of pig-iron and a certain amount of charcoal, these quantities being fixed by the concern. If more than the fixed quantity of coal or iron was used, the smith had to pay the works for the "wasted coal" at the works' purchase price and for the "wasted iron" at a price per 100 kilos fixed by the concern each year. If, on the other hand, less than the estimated quantity of coal and iron were consumed in the production of 100 kilos of wrought iron, then the melter received a bonus for "surplus iron" and "surplus coal". The excessive consumption of material was rare. As the figures given below show, the bonus for surplus coal and surplus iron was about one-third of the earnings.

Surplus iron and surplus coal in per cent. of the total money earnings.

Average for 1875—1914:

Half-melters	Helpers	Quarter-melters
34	37	34

These figures refer only to the money portion of the earnings, so that the percentage is obviously too low for half-melters and too high for helpers. The fact is that the value of maintenance should be deducted from the half-melter's wage and added to the helper's earnings. The quarter-melters' percentage, on the other hand, is correct, as there is no keep provided for helpers to be taken into account as far as this category is concerned.

We have published the earnings of shinglers from 1900 only, i. e. the year in which the number was increased to 3, half-melters in the Lancashire works (1879—1908), helpers (1884—1908; the helpers' earnings were not recorded in the books of the concern during the years 1881—1883), quarter-melters (1878—1914), and also coal-washers and coal-carters from 1893, from which year the number of workers remained fairly constant. Besides the series that are published there are also series relating to the annual earnings of extra melters, Franche-Comté melters and helpers. As to the earnings of the extra melters, these varied considerably and are of minor value for our purposes since during certain periods these workers were engaged in other spheres of activity. The difference in wage-level between melters and helpers working on the Franche-Comté forge is far smaller than the difference between melters and helpers at the Lancashire forge, which may have something to do with the arrangements in regard to keep for the helpers. Indeed, there are no means of finding out whether the Franche-Comté melter paid for the helper's keep or not.

In the bar mill, as in the sheet mill, there were 10—15 different occupational groups. When collecting wage data from other works we have confined ourselves to some few occupational

groups that are representative and typical of rolling-mills, generally rollers and heaters. For this reason special series have been drawn up in tabular form relating to these categories. The roller series comprises 2—8 workers and the heater series 2—10 workers. Series have likewise been worked out embracing all workers taking part in shifts in each one of the various departments, forming groups of workers possessing very different qualifications and in receipt of piece-work rates (rollers, heaters, catchers, welders etc.). The number of those working in shifts in the bar mill was about 20 in the earlier years and about 50 in the later years. There were 12—20 men employed in the sheet mill. By using the data for the time during which the mill has been working we can estimate with a fair degree of certainty the daily earnings of these workers. Special series are also published for those on a daily wage in the two rolling-mills, but these series cover only the annual earnings. The annual earnings series relating to all workers in the bar mill (23—90 workers), in the sheet mill (20—33 workers), and all workers in both the bar mill and the sheet mill combined, have been summarized.

Cross-sections have been computed embracing all those appearing in the concern's wage records as engaged in the manufacture of iron, and covering the years 1875, 1885 and 1905. As mentioned above, we have included in the longitudinal series all workers in the departments in question with the exception of the foreman. It may be of interest to see how the wages within the other departments of the concern compare with the wages paid to those engaged in the blast-furnace, Lancashire works and the rolling-mill. Thus, in 1875, besides a blast-furnace, Lancashire works, bar mill and sheet mill, there were also a nail factory and machine shop. Cross-sections for the years 1885 and 1905 indicate the addition of two further departments, viz. a rolling-mill attached to the Lancashire works and a cast-iron foundry. Moreover, these cross-sections contain a number of occupational groups that comprise a few workers only. These groups of workers are accounted for in the table of cross-sections under the heading "other occupations".

The average annual earnings of all adult male workers included in the cross-sections (150—200 in all), are given below. The average annual earnings of the workers in the Lancashire works and the rolling-mills are included in the table by way of comparison.

In earlier times benefits in kind were operative on a large scale. When the concern was formed, a considerable number of these benefits were abolished, but the workers continued to live rent-free and to receive free medical services and medicine. The melters received also a fuel allowance, and all the employees at the works were entitled to buy milk at a reduced price and fuel at a low price in the form of sawmill waste, though not more than 12 loads per

Average Annual Earnings (in kronor) at Boxholm of all Adult Male Workers Compared with those in the Lancashire Works and Rolling-Mills 1875, 1885 and 1905.

Year	All workers		Lancashire workers		Rolling-mill workers	
	Number of workers	Annual earnings	Number of workers	Annual earnings	Number of workers	Annual earnings
1875	128	847	21	927	45	745
1885	183	982	23	863	64	915
1905	184	1221	23	1099	54	1062

family *per annum*. Each married worker was allotted a plot of ground for growing potatoes. The ground was usually intended to suffice for the sowing of 1 barrel of potatoes. It is however asserted by the concern that the workers did not appreciate the potato patch, as it was cheaper to buy potatoes from the works. No reduction was allowed in the price of grain and roots, as anyone in the district or from the neighbourhood was able to buy these necessaries at the same prices as those paid by the works' employees. Such benefits as free lighting, working clothes etc. never existed. In the auditors' report for 1873 the complaint is made that the workers are compelled to pay high prices for the grain, flour and bread they purchase from the miller at the works and for such other necessaries as they purchase from a private concern which leases from the concern the shop established near the works. The auditors recommend that the concern arrange for grain to be obtainable by the workers at lower prices, and that the concern either take over the retail business or else arrange for and contribute towards the workers' setting up a "cooperative retail shop". This was actually done, for some years afterwards the workers established a retail business of their own, in which they themselves were shareholders, in a house especially built by the concern for the purpose.

As to the value of the free accommodation, some details on this point are quoted below; these particulars were obtained in connection with the valuations carried out when the free housing benefit was abolished in 1908.

The blast-furnaces: Twenty workers had free dwellings of an average value of 87 kronor. One worker received from the concern a rent allowance of 50 kronor. Only one worker at the blast-furnace had neither free accommodation nor rent allowance.

The Lancashire works: 48 of the workers in this department had free housing valued on an average at 99 kronor; 2 melters and 2 coal-washers were in receipt of rent allowance, 50 kronor

each, while the two melters' helpers, the extra melters and one of the coal-carters had the benefit neither of a free dwelling nor of a rent allowance. Besides a free dwelling, the melters (but no others) were allowed fuel to a value of 9 kronor per worker *per annum*.

The bar mill: Of the workers in this department 39 had free dwellings, the average value of which was 84 kronor, 8 received 50 kronor rent allowance, while the other 12 workers (1 straightener, 4 lever-men, 2 rolling-mill workers, 1 catcher, 1 heater, 1 conveyer, 1 screwman and 1 bar-inspector were not in receipt of this benefit.

The sheet mill: Free dwellings were enjoyed by 31 workers. The average value of the accommodation was 74 kronor. A 50 kronor rent allowance was paid to 18 of the workers. The others (1 sheet-iron shearer, 1 sheet-heater's helper, 1 blacksmith, 2 waste-removers, 2 conveyers and 19 rolling-mill workers) were in receipt of neither free dwelling nor rent allowance.

The workers at Boxholm to this day have the benefit of being able to purchase milk at a reduced price, the quantity per person per day being, however, restricted to $\frac{1}{8}$ litre. If the worker desires more than this quantity he must pay the market price for the extra milk bought.

In spite of the excellent quality of the wage data for these years, particulars are nevertheless lacking to make possible the computation of the daily and hourly earnings in the various departments. For this reason we have been bound to make certain estimates in order to arrive at the hours of work per annum for the different occupational groups. For those working in shifts at the blast-furnace the wages have been estimated on the basis of the quantity of pig iron produced per wage period. Each occupational group receives a certain proportion of the wages paid out on each pay-day. All workers within each occupational category receive equal shares if they have been present throughout the entire period. The size of the wages thus indicate at once whether the individual workers have been employed all the time during which blowing has been going on or for only part of the time. If a worker has not taken part in the work throughout the blowing period, then the gap in the earnings has been filled up. Besides the ordinary work there was a number of smaller jobs to be done during the shifts, such as repairing, casting of slag-bricks, lime-burning and cleaning, all of which were paid for at an hourly wage-rate which was considerably below the normal hourly rate payable for day-jobs. These jobs served to increase the daily earnings. The blowing-journals have supplied particulars of the blowing period for each year. This blowing period thus corresponds to the pay earned on blowing plus the extra pay earned on jobs done during that period. If blowing was done during only a portion of the year, at the end of the blow-

ing period the workers proceeded to carry out day-jobs. Details are always available of the time spent on such work. We are thus able to calculate the length of the annual working period in the case of those working in shifts at the blast-furnace, which is not possible in the case of the daily wage earners at the blast-furnace, for they worked on a piece-work basis, and the working hours were never recorded.

The "Lancashire report books" served as the basis for estimating the number of hours of work *per annum* for the workers in the Lancashire works. These books provide particulars of the number of hearths at which work was going on during the week, and of the time of operation, i. e. the period, expressed in hours, during which all the hearths were working simultaneously. From these figures can be estimated the average hours of work per worker *per annum* at one hearth, which are given in the tables. It is not possible to estimate from the average time of operation the average number of hours worked *per annum* by the shinglers and the coal-washers, as these workers have to serve, one in each shift, in the smithy as soon as a hearth is working. From the number of hours thus calculated we have deducted the time during which an extra shift was employed. This was possible as we obtained from the account books particulars of the amount spent annually by each melter on extra shifts and of the price paid for them during the respective years. Each extra shift usually involves 6 hours' work.

We have also had to estimate the number of days worked annually by the rolling-mill workers. The auditors' reports furnished details of the time during which the different rolling-mills were working. In most years up to 1890 the sheet mill was working for a longer period than the bar mill. While work in the bar mill was at a standstill the workers in many cases took up work in the sheet mill. The wages received by each worker on such occasions are kept separate from the rest of the earnings. The number of working hours during which pay was earned in this way in the sheet mill by workers from some occupational group or other in the bar mill has been computed on the basis of the piece-work earnings per day obtained in a corresponding occupation in the sheet mill. Work that does not consist of rolling is paid for at hourly rates. Particulars are available as to the time worked on all jobs paid for on a time-wage basis. It has only been possible to employ the method of determining the number of day-jobs carried out in the course of the year, as described above, in the case of employees working in shifts. We have not been able to compute the hourly earnings of the other occupational groups in the rolling-mills, nor of the corresponding workers in the blast-furnaces.

In the case of the workers in the blast-furnaces there is a distinct correlation between wages and time of operation. A falling-off in earnings was frequently caused by a short campaign and by the fact that the men were given less well paid employment when the furnace was not in blast, as, for instance, in 1887 and 1891, while the blast-furnace was being repaired. To serve as a guide for judging the variations in the annual earnings, a table is published showing the time of operation and the quantity of iron produced in the blast-furnace in different years during this period. It will be seen from this table that the blast-furnace was operating throughout the year (365 days) during the period 1880—1910 with the exception of certain years in which repairing was going on. The annual operating period at the rolling-mills, published side by side with the operating period of the blast-furnace, during the 40 years investigated, amounted on only one single occasion at one of the rolling-mills to 300 days. If we count extra jobs (as a rule time-wage jobs, for which the number of hours of work are given), we find that for a period of 8 years the working time of the workers in the rolling-mills exceeds 300 days. Usually the total working period ranges around 270—290 days.

Up to 1920 all shift-workers in the blast-furnace, with the exception of the top-fillers, worked in two, and after that year in three, shifts. The shifts took over at 6 a. m., 12 noon and 8 p. m., resulting in 6, 8 and 10 hours' shifts without any irregularities being caused in the weekly change-over. Since the top-fillers work was of a more arduous nature, these workers had as early as in 1891 started to work in three alternate shifts. The top-fillers thus worked a 6-hour shift starting alternately at 6 and 12 o'clock throughout the day and night. Up to 1900 the day-workers worked about 12 hours a day, during the period 1900—1908 about 11 hours a day and after the latter year 10 hours.

Until May 1899 the week in the Lancashire hearth began at 6 on Sunday evening and ended at 6 on Saturday evening. The period during which the hearth was in operation was thus 144 hours a week. From the above date it was started going at 6 on Monday morning, continuing as before until 6 o'clock on Saturday evening. During this period, then, the workingtime was 132 hours a week. Each melter made 6 blooms per shift. In view of this the length of the shift might vary somewhat. A melter was expected to make on an average 1 bloom per hour, so that each shift came to last about 6 hours. Half-melters, melters' helpers, quarter-melters, and also coal-washers and coal-screeners worked in two shifts in all years up to 1920. The number of hours of work per week was thus 72 up to the year 1899, and after that 66 hours per worker. The shinglers, like the other workers, worked in two shifts up to 1900, one worker in each shift. During the years 1900—1903 there were three shinglers, there still being one worker per shift, but during these

BOXHOLM IRONWORKS

Table 51. Period during which Blast-Furnace and Rolling-Mills Have Been Working at Boxholm 1875—1927.

Year	Number of operative days of 24 hours			Production in tons
	Bar mill	Sheet mill	Blast-furnace	Blast-furnace
1875	214	300	357	3711
76	277	286	317	3527
77	262	285 ^{1/2}	316	3670
78	196	238	365	4403
79	—	—	291	3508
1880	282	286	364	4698
81	181 ^{1/2}	180	322	3735
82	269	269	365	4409
83	289	291	318	3856
84	290	262	366	4739
85	266	272	365	4536
86	280	251 ^{1/2}	365	4536
87	279	252	295	3817
88	285	281	366	5358
89	239	271	365	5120
1890	270 ^{1/2}	272	365	5370
91	—	—	175	2331
92	—	—	339	6214
93	278	224	365	6647
94	249	252	365	6578
95	280	267 ^{1/2}	365	6549
96	284 ^{1/2}	266	366	6729
97	287	246	327	6135
98	272	263	365	7295
99	256	242	365	7358
1900	259 ^{1/2}	249 ^{1/2}	338	6866
01	265	238 ^{1/2}	365	7093
02	257	247 ^{1/2}	365	7548
03	275 ^{1/2}	232	365	7717
04	261	253 ^{1/2}	331	6809
05	234 ^{1/2}	256	365	7453
06	219	251 ^{1/2}	365	7495
07	245 ^{1/2}	236	311	6410
08	261	222	366	8145
09	195 ^{1/2}	198	240	5253
1910	240 ^{1/2}	108 ^{1/2}	333	7508
11	247	87 ^{1/2}	357	7692
12	257	113 ^{1/2}	322	6727
13	253 ^{1/2}	139	365	7767
14	210	108	172	3321
15	—	—	250	5350
16	—	—	364	6987
17	—	—	364	7282
18	—	—	312	6445
19	—	—	365	7689
1920	—	—	186	3702
21	—	—	257	4787
22	—	—	214	4254
23	—	—	321	6179
24	—	—	172	3584
25	—	—	81	1686
26	—	—	364	7717
27	—	—	235	4862

Table 52. Money Earnings of Keepers (1875—1888) and Blast-furnace Foreman (1889—1907) at Boxholm 1875—1907.

Year	Annual money earnings	Daily money earnings	Hourly money earnings	Earnings during blowing period per hour
	kronor	kronor	öre	öre
1875	1173	3.29	27.4	29.1
76	1088	3.01	25.1	23.8
77	997	2.82	23.5	22.3
78	1058	2.90	24.2	21.7
79	848	2.50	20.8	20.5
1880	1051	2.89	24.1	21.7
81	897	2.53	21.1	20.7
82	1060	2.90	24.2	21.8
83	1025	2.87	23.9	22.6
84	1165	3.18	26.5	24.1
85	1133	3.10	25.8	23.4
86	1125	3.08	25.7	23.2
87	1029	2.97	24.8	24.2
88	1222	3.34	27.8	25.5
89	1329	3.64	—	—
1890	1376	3.77	—	—
91	1097	3.53	—	—
92	1641	4.59	—	—
93	1514	4.15	—	—
94	1499	4.11	—	—
95	1494	4.09	—	—
96	1561	4.26	—	—
97	1499	4.58	—	—
98	1667	4.57	—	—
99	1665	4.56	—	—
1900	1640	4.85	—	—
01	1615	4.42	—	—
02	1704	4.67	—	—
03	1742	4.77	—	—
04	1515	4.19	—	—
05	1387	3.80	—	—
06	1387	3.80	—	—
07	1466	4.71	—	—

years the work was done in three shifts. In 1904 a change was made, a fourth shingler being added, and then the work was again divided between two shifts, as before. This went on until 1920. Thus, the gross working time per week for these workers was 72 hours up to 1899, 44 hours from 1900 to 1903 and 66 hours during the period 1903—1919. The above details apply to forging done by the Lancashire process, which, as mentioned above, was the principal method employed at Boxholm from the year 1878.

A few words should be said about the time spent in working by the Franche-Comté process, which was also employed at these works, although on a small scale, up to 1883 at the same time

BOXHOLM IRONWORKS

Table 53. Money Earnings of Slagmen and Top-fillers at Boxholm 1875—1914.

Year	Slagmen				Top-fillers			
	Annual money earnings	Daily money earnings	Hourly money earnings	Earnings during blowing period per hour	Annual money earnings	Daily money earnings	Hourly money earnings	Earnings during blowing period per hour
	kronor	kronor	öre	öre	kronor	kronor	öre	öre
1875	814	2.28	19.0	18.3	1080	3.03	25.3	24.9
76	734	2.08	17.3	17.8	950	2.64	22.0	23.3
77	576	1.73	14.4	14.4	926	2.65	22.1	22.8
78	689	1.89	15.8	15.6	811	2.22	18.5	17.9
79	645	1.78	14.8	15.8	771	2.09	17.4	19.3
1880	693	1.90	15.8	15.6	915	2.51	20.9	20.1
81	601	1.71	14.3	14.7	822	2.05	17.1	18.8
82	656	1.80	15.0	15.0	787	2.16	18.0	17.9
83	651	1.85	15.4	15.7	789	2.25	18.8	19.4
84	782	2.14	17.8	17.8	908	2.48	20.7	20.7
85	759	2.08	17.3	17.3	836	2.29	19.1	19.1
86	755	2.07	17.3	17.3	753	2.06	17.2	17.2
87	709	1.98	16.5	17.8	706	1.99	16.6	17.8
88	905	2.47	20.6	20.6	912	2.49	20.8	20.8
89	797	2.18	18.2	18.2	926	2.54	21.2	21.2
1890	891	2.44	20.3	20.3	974	2.67	22.3	23.3
91	662	2.08	17.3	18.5	637	2.61	21.8	24.4
92	933	2.58	21.5	21.9	1021	2.89	35.4	36.6
93	966	2.65	22.1	22.1	922	2.53	31.6	31.6
94	960	2.63	21.9	21.9	930	2.55	31.9	31.9
95	958	2.62	21.8	21.8	918	2.52	31.5	31.5
96	1021	2.79	23.3	22.9	952	2.60	21.7	32.5
97	982	2.80	23.3	23.9	930	2.57	30.6	33.3
98	1109	3.04	25.3	25.3	1035	2.84	35.5	35.5
99	1107	3.03	25.3	25.3	1046	2.87	35.4	35.9
1900	1083	3.00	25.2	25.5	1020	2.89	35.6	36.6
01	1072	2.94	24.5	24.5	1021	2.80	35.0	35.0
02	1134	3.11	25.9	25.9	1079	2.96	37.0	37.0
03	1159	3.18	26.5	26.5	1109	3.04	38.0	38.0
04	1093	3.04	25.5	25.8	1026	2.83	34.3	36.1
05	1116	3.06	25.5	25.5	1057	2.90	36.3	36.3
06	1154	3.16	26.3	26.3	1086	2.98	37.3	37.3
07	1207	3.50	29.4	29.6	1102	3.05	36.1	38.9
08	1346	3.68	30.7	30.7	1223	3.34	41.8	41.8
09	1395	4.38	37.8	39.1	1221	3.95	45.9	52.4
1910	1404	3.93	33.0	33.2	1523	4.18	51.0	54.0
11	1515	4.19	34.9	35.0	1555	4.30	53.7	54.0
12	1509	4.27	36.5	36.3	1479	4.16	50.9	53.6
13	1654	4.53	37.8	36.4	1582	4.33	54.1	54.1
14	1069	3.34	30.6	30.3	1061	3.13	35.9	43.3

Table 54. Money Earnings of Calciners and Average Earnings of Top-fillers, Slagmen and Calciners at Boxholm 1875-1914.

Year	Calciners				Top-fillers, slagmen and calciners				
	Annual money earnings	Daily money earnings	Hourly money earnings	Earnings during blowing period per hour	Number of workers	Annual money earnings	Daily money earnings	Hourly money earnings	Earnings during blowing period per hour
	kronor	kronor	öre	öre		kronor	kronor	öre	öre
1875	949	—	—	—	8	948	—	—	—
76	888	—	—	—	8	865	—	—	—
77	836	—	—	—	8	794	—	—	—
78	812	—	—	—	7	777	—	—	—
79	668	—	—	—	8	688	—	—	—
1880	740	—	—	—	8	772	—	—	—
81	713	—	—	—	8	712	—	—	—
82	729	2.00	16.7	16.5	8	725	1.99	16.6	16.5
83	735	2.09	17.4	17.8	10	729	2.07	17.3	17.7
84	821	2.24	18.7	18.6	10	831	2.27	18.9	18.9
85	808	2.21	18.4	18.3	10	804	2.20	18.3	18.3
86	844	2.31	19.3	19.2	11	811	2.01	18.6	18.5
87	780	2.18	18.2	20.0	10	751	2.10	17.5	19.1
88	966	2.64	22.0	21.9	11	940	2.60	21.4	21.4
89	862	2.36	19.7	19.7	10	867	2.37	19.8	19.8
1890	941	2.58	21.5	21.5	11	933	2.56	21.3	21.5
91	654	2.08	17.3	18.9	11	653	2.18	18.1	19.8
92	1083	3.06	25.5	25.9	12	1030	2.90	27.0	27.5
93	1008	2.76	23.0	22.8	12	976	2.68	24.9	24.8
94	992	2.72	22.7	22.5	12	969	2.66	24.8	24.7
95	967	2.65	22.1	22.1	13	954	2.61	24.2	24.2
96	1015	2.77	23.1	23.1	12	1001	2.73	22.8	25.4
97	996	2.71	22.6	23.8	11	975	2.69	24.9	26.4
98	1104	3.02	25.2	25.1	12	1088	2.98	27.8	27.8
99	1105	3.03	25.3	25.1	11	1089	2.99	28.1	28.1
1900	1065	2.98	25.1	25.1	12	1058	2.96	27.8	28.1
01	1073	2.94	24.5	24.5	12	1060	2.91	27.1	27.1
02	1137	3.12	26.0	26.0	12	1122	3.08	28.7	28.7
03	1163	3.19	26.6	26.4	12	1149	3.15	29.4	29.3
04	1092	3.02	25.4	25.8	11	1080	2.99	27.0	27.7
05	1127	3.09	25.8	25.6	11	1111	3.05	27.6	27.5
06	1119	3.07	25.6	25.4	12	1120	3.07	28.7	28.6
07	1143	3.29	27.6	27.8	10	1154	3.31	29.8	30.6
08	1275	3.48	29.0	28.9	13	1285	3.51	32.5	32.4
09	1299	4.07	34.5	36.8	13	1311	4.14	38.1	41.1
1910	1564	4.38	36.8	37.3	12	1500	4.18	39.1	40.1
11	1516	4.21	35.1	35.2	13	1525	4.22	39.3	39.5
12	1427	4.02	33.8	34.7	13	1464	4.13	38.6	39.6
13	1441	3.95	32.9	32.8	13	1539	4.22	39.3	38.8
14	1075	3.43	29.3	32.8	13	1070	3.33	31.2	34.5

BOXHOLM IRONWORKS

Table 55. Average Number of Workers and Average Earnings of those Receiving a Daily Wage and of all Blast-Furnace Workers at Boxholm 1875—1914.

Year	Workers in receipt of a daily wage		All blast-furnace workers	
	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor
1875	8	846	16	895
76	9	752	20	775
77	9	744	21	744
78	8	785	19	771
79	7	640	19	652
1880	6	767	18	756
81	7	657	19	674
82	7	737	19	725
83	8	729	21	722
84	8	789	22	803
85	7	722	20	772
86	6	784	19	796
87	6	745	18	743
88	6	888	21	901
89	6	839	19	857
1890	6	802	21	879
91	5	671	20	651
92	5	1026	21	1030
93	5	921	21	954
94	5	915	21	943
95	5	913	21	930
96	6	950	22	977
97	5	937	20	952
98	5	1011	20	1061
99	5	1003	20	1052
1900	5	960	21	1027
01	5	989	21	1023
02	5	1051	21	1094
03	5	1094	21	1123
04	5	1047	19	1063
05	4	1075	19	1088
06	6	1067	20	1092
07	4	1085	16	1128
08	4	1257	20	1274
09	5	1235	21	1261
1910	5	1411	20	1476
11	5	1438	22	1505
12	4	1379	21	1398
13	4	1415	22	1490
14	5	1178	22	1075

Table 56. Money Earnings of Workers in the Lancashire Works at Boxholm 1878—1914.

Year	Shing- lers'	Half- melters'	Melters' -helpers'	Coal- washers' and -carters'	Quarter-melters		
					Annual earnings k r o n o r	Annual earnings kronor	Daily earnings kronor
1878	—	—	—	—	1098	—	—
79	—	1610	—	—	883	—	—
1880	—	2195	—	—	1074	—	—
81	—	2377	—	—	1192	—	—
82	—	2482	—	—	1358	—	—
83	—	2473	—	—	1437	—	—
84	—	2466	487	—	1505	—	—
85	—	2453	535	—	1567	—	—
86	—	2047	575	—	1255	—	—
87	—	2158	556	—	1150	—	—
88	—	2216	571	—	1308	—	—
89	—	2149	564	—	1340	—	—
1890	—	2305	540	—	1393	5.57	46.4
91	—	2065	779	—	1254	—	—
92	—	2205	500	—	1278	—	—
93	—	2037	494	656	1288	5.13	42.8
94	—	1987	453	680	1240	4.93	41.1
95	—	2201	564	717	1274	5.05	42.1
96	—	2305	559	764	1380	5.47	45.6
97	—	2269	501	722	1449	5.73	47.8
98	—	2606	692	833	1683	6.47	53.9
99	—	2373	791	922	1674	6.46	58.7
1900	1561	2399	772	803	1652	6.95	63.2
01	1505	2160	698	868	1536	6.68	66.8
02	1584	2339	629	898	1666	7.18	65.3
03	1510	1977	653	900	1419	5.89	53.5
04	1992	2475	656	1234	1664	6.22	56.5
05	1905	2443	743	1189	1628	6.75	61.4
06	1992	2592	924	1241	1694	7.23	65.7
07	1816	2156	694	1185	1693	7.14	64.9
08	1700	2441	687	1035	1628	—	—
09	1354	—	—	793	1193	6.58	59.8
1910	1747	—	—	1070	1677	—	—
11	1784	—	—	1041	1575	7.14	64.9
12	1959	—	—	1194	1751	7.41	67.4
13	1910	—	—	1159	1749	7.51	68.3
14	1697	—	—	1045	1586	8.12	73.8

BOXHOLM IRONWORKS

Table 57. Money Earnings of Workers in the Bar Mill at Boxholm 1875-1914.

Year	Heaters				Rollers			
	Annual money earnings kronor	Daily money earnings kronor	Hourly money earnings öre	Where-of piece-work earnings per hour öre	Annual money earnings kronor	Daily money earnings kronor	Hourly money earnings öre	Where-of piece-work earnings per hour öre
1875 . . .	971	3.23	26.9	29.0	969	3.27	27.3	29.4
76 . . .	940	2.95	24.6	25.5	1000	3.17	26.4	27.3
77 . . .	1019	3.23	26.9	30.0	1018	3.24	27.0	30.0
78 . . .	863	3.21	26.8	33.6	857	3.26	27.2	33.6
79 . . .	767	—	—	—	750	—	—	—
1880 . . .	1021	3.40	28.3	29.6	1010	3.47	28.9	29.6
81 . . .	722	2.31	19.3	26.3	704	2.39	19.9	26.3
82 . . .	1175	3.96	33.0	35.5	1323	4.46	37.2	39.9
83 . . .	1354	4.60	38.3	38.8	1500	5.03	41.9	43.0
84 . . .	1317	4.33	36.1	37.3	1200	4.04	33.7	34.3
85 . . .	1138	3.92	32.7	34.8	1079	3.77	31.4	33.2
86 . . .	992	3.44	28.7	29.3	966	3.36	28.0	28.8
87 . . .	1132	3.91	32.6	33.4	1087	3.69	30.8	31.9
88 . . .	1151	3.85	32.1	33.2	1055	3.51	29.3	30.3
89 . . .	959	3.40	28.3	29.8	899	3.16	26.3	27.5
1890 . . .	1145	4.03	33.6	34.7	1064	3.76	31.3	32.3
91 . . .	1128	—	—	—	1085	—	—	—
92 . . .	1198	—	—	—	1162	—	—	—
93 . . .	1170	—	—	—	1165	—	—	—
94 . . .	970	3.49	29.1	31.0	922	3.38	28.2	29.7
95 . . .	1028	3.41	28.4	29.7	958	3.19	26.6	27.8
96 . . .	958	2.95	24.6	26.3	1018	3.47	28.9	29.5
97 . . .	1110	3.60	30.0	31.3	1126	3.79	31.6	32.3
98 . . .	1186	4.14	34.5	35.7	1173	4.09	34.1	35.2
99 . . .	1153	4.16	37.8	39.9	1155	4.34	39.5	40.5
1900 . . .	1098	3.65	33.2	36.1	1158	4.09	37.2	39.1
01 . . .	1064	3.51	31.9	34.0	1185	4.26	38.7	39.9
02 . . .	1216	4.18	38.0	40.9	1274	4.71	42.8	44.4
03 . . .	1232	3.87	35.2	37.8	1192	3.86	35.1	36.9
04 . . .	1356	4.85	44.1	46.1	1318	4.82	43.8	45.1
05 . . .	1262	—	—	—	1365	—	—	—
06 . . .	1300	—	—	—	1329	—	—	—
07 . . .	1289	4.11	37.4	41.8	1449	5.58	50.7	52.5
08 . . .	1490	5.18	47.5	50.0	1643	5.93	54.4	56.1
09 . . .	1407	5.06	46.0	48.7	1435	5.16	46.9	49.7
1910 . . .	1733	6.37	58.4	61.8	1850	7.19	66.0	68.0
11 . . .	1722	6.17	56.6	59.6	1736	6.49	59.5	61.6
12 . . .	1780	6.16	56.5	59.5	1840	6.65	61.0	63.0
13 . . .	1819	6.40	58.7	61.8	1710	6.28	57.6	59.3
14 . . .	1582	6.05	56.0	61.8	1657	6.57	60.8	66.4

Table 58. Money Earnings of Workers in the Bar Mill at Boxholm 1875—1914.

Year	Number of workers	Employees working in shifts				Day-workers		All workers	
		Annual money earnings	Daily money earnings	Hourly money earnings	Where-of piece-work earnings per hour	Number of workers	Annual money earnings	Number of workers	Annual money earnings
		kronor	kronor	öre	öre		kronor		kronor
1875	22	740	2.53	21.1	22.3	2	666	24	733
76	22	722	2.28	19.0	19.4	2	507	24	704
77	21	776	2.42	20.2	22.0	3	680	24	764
78	22	655	2.51	20.9	25.0	3	556	25	643
79	20	574	—	—	—	3	496	23	564
1880	21	740	2.52	21.0	21.5	4	545	25	709
81	22	551	1.88	15.7	19.7	2	383	24	535
82	18	878	2.97	24.8	26.3	5	523	23	797
83	22	1080	3.66	30.5	30.9	2	550	24	1035
84	21	1087	3.59	29.9	30.8	5	893	26	1050
85	21	876	3.02	25.2	26.7	8	862	29	872
86	22	803	2.77	23.1	23.5	4	637	26	778
87	20	914	3.11	25.9	26.8	2	585	22	880
88	23	939	3.15	26.3	27.0	3	754	26	917
89	19	778	2.78	23.2	23.9	6	777	25	778
1890	20	965	3.33	27.8	28.5	7	689	27	896
91	22	912	—	—	—	6	791	27	886
92	24	980	—	—	—	18	567	41	805
93	22	989	3.39	28.3	29.0	7	733	29	930
94	24	783	2.83	23.6	24.8	9	640	33	744
95	20	806	2.78	23.2	23.6	12	744	32	782
96	17	843	2.87	23.9	24.3	14	840	31	842
97	18	874	2.95	24.6	25.0	15	823	33	851
98	22	994	3.48	29.0	29.8	7	758	29	937
99	28	1002	3.68	33.5	34.7	10	616	38	902
1900	25	999	3.53	32.1	33.6	11	622	36	886
01	15	994	3.58	32.5	33.4	21	816	36	890
02	24	1079	3.88	35.3	36.9	13	681	37	940
03	17	1018	3.57	32.5	33.1	20	870	37	938
04	27	1118	4.03	36.6	38.0	10	685	37	1001
05	21	1151	4.36	39.6	42.4	17	758	38	975
06	21	1173	4.94	44.9	47.2	14	627	35	956
07	16	1314	4.98	45.3	47.2	14	986	30	1161
08	51	1229	4.27	39.2	40.9	7	1034	58	1205
09	49	1116	4.29	39.4	40.7	40	921	89	1028
1910	50	1404	5.25	48.6	51.3	35	957	85	1219
11	51	1392	4.98	45.7	47.9	33	947	84	1216
12	41	1447	5.00	45.9	48.0	32	1116	73	1302
13	47	1528	5.30	48.6	51.3	33	1086	80	1345
14	48	1350	5.19	48.1	52.2	20	1108	68	1278

BOXHOLM IRONWORKS

337

Table 59. Money Earnings of Workers in the Sheet-Mill at Boxholm 1875—1914.

Year	Number of workers	Employees working in shifts				Day-workers		All workers	
		Annual money earnings	Daily money earnings	Hourly money earnings	Where-of piece-work earnings per hour	Number of workers	Annual money earnings	Number of workers	Annual money earnings
		kronor	kronor	öre	öre		kronor		kronor
1875	12	861	2.80	23.3	23.5	8	562	20	741
76	12	925	3.03	25.3	25.8	7	634	19	818
77	12	899	2.97	24.8	25.5	6	636	18	811
78	12	848	2.87	23.9	27.6	5	692	17	800
79	11	779				7	678	18	740
1880	10	1001	3.40	28.3	28.9	8	870	18	943
81	13	693	2.30	19.2	25.8	5	595	18	666
82	12	883	2.98	24.8	26.4	6	844	18	870
83	13	979	3.25	27.1	27.7	7	784	20	911
84	12	1044	3.55	29.6	31.8	9	774	21	928
85	16	1061	3.54	29.5	31.5	6	834	22	999
86	14	761	2.67	22.3	23.7	9	604	23	700
87	13	732	2.54	21.2	22.7	8	666	21	707
88	14	948	3.21	26.8	27.5	7	662	21	853
89	12	842	2.83	23.6	24.8	9	601	21	738
1890	12	845	2.91	24.3	24.9	9	712	21	787
91	12	816	—	—	—	8	687	20	764
92	13	721	—	—	—	7	756	19	733
93	14	663	2.50	—	—	7	813	21	714
94	14	727	2.63	21.9	22.8	7	799	21	751
95	13	836	2.87	23.9	24.9	7	697	20	788
96	14	908	3.15	26.3	27.3	8	858	22	890
97	13	902	3.22	26.8	28.8	7	986	20	931
98	14	922	—	—	—	7	1035	21	960
99	12	1023	3.69	33.5	36.5	9	855	21	949
1900	14	944	—	—	—	7	977	21	955
01	13	898	—	—	—	7	984	20	928
02	12	978	—	—	—	7	1067	19	1011
03	9	1179	4.17	37.9	42.6	8	1056	17	1121
04	9	1264	—	—	—	8	1054	17	1165
05	8	1283	—	—	—	7	1110	15	1202
06	8	1070	3.98	36.2	37.5	8	1189	16	1130
07	6	1221	4.37	39.7	43.3	9	1026	15	1103
08	18	1166	3.95	36.6	41.5	10	1239	28	1192
09	17	928	3.90	36.1	38.1	9	1133	25	999
1910	15	1231	—	—	—	10	1206	25	1221
11	16	1144	—	—	—	10	1253	26	1187
12	15	1234	—	—	—	10	1286	25	1254
13	11	1389	—	—	—	14	1251	25	1310
14	24	1076	—	—	—	9	1278	33	1130

Table 60. Average Annual Money Earnings of all Workers in the Rolling-Mills at Boxholm 1875—1914.

Year	Number of workers	Annual money earnings kronor	Year	Number of workers	Annual money earnings kronor
1875	44	737	1895	52	784
76	43	755	96	52	861
77	42	784	97	53	881
78	42	708	98	50	946
79	41	642	99	58	918
1880	43	807	1900	57	911
81	42	591	01	56	904
82	41	829	02	56	964
83	44	979	03	54	996
84	47	995	04	54	1052
85	51	926	05	53	1039
86	49	742	06	51	1010
87	43	796	07	45	1142
88	46	888	08	85	1201
89	46	760	09	114	1022
1890	48	848	1910	110	1220
91	47	835	11	110	1209
92	61	782	12	98	1290
93	50	840	13	105	1337
94	54	746	14	102	1230

as the Lancashire method. In the Franche-Comté method the work was divided up between assistant and master as follows: the former made the first and last of the three blooms that were produced in each 5—7 hour shift, whereas the master did the tilting while his assistant looked after the welding. The master himself made the "middle bloom", the assistant tilting it while his master undertook the welding. Besides these two workers, there was always engaged temporarily a coal-boy, "fire-boy", who was paid by the concern.

Work at the rolling-mills went on during the same hours as work at the Lancashire hearth. Thus, during the years 1875—1899 the number of hours a week was 72, i. e. 12 hours a day. From 1899 the period of the Sunday stoppage of work was prolonged, as in the case of the Lancashire works, by 12 hours, so that the working week comprised 66 hours up to the year 1920.

Table 61. Annual Earnings of Workers in the Nail Factory, Engineering Works, the Rolling-Mill in the Lancashire Works, the Foundry, and other Occupations in the Cross-Sectional Years 1875, 1885 and 1905 at Boxholm.

Occupation	1875		1885		1905	
	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor
<i>Nail factory.</i>						
Foreman	1	1196	1	1747	1	2070
Machine-adjusters	3	1006	4	1435	5	1748
Shearers' foreman	—	—	1	1694	—	—
Shearers	4	551	2	668	1	770
Shearers, non-adult	12	248	17	365	—	—
Shearers, female	11	276	1	331	—	—
Nailsmith	1	827	1	873	—	—
Nailsmiths' helpers	2	776	1	515	—	—
Heater	1	622	1	834	1	1626
Roller	1	665	1	805	—	—
Roller, female	1	193	—	—	—	—
Nail-carter	—	—	1	1154	—	—
Sorter	1	407	—	—	—	—
Sorters, non-adult	2	183	1	235	—	—
Sorters, female	2	251	1	1037	—	—
Nailer	1	282	1	374	—	—
Nail-packers	—	—	2	555	—	—
Box-makers	2	640	—	—	2	1143
Factory hands	—	—	1	392	2	727
Factory hands (old employees)	—	—	—	—	4	448
<i>Engineering works.</i>						
Foreman	1	1004	1	1206	1	1500
Lathe-hands	1	908	1	941	2	1030
Vice-hands	—	—	5	585	3	1027
Blacksmiths	4	754	5	712	7	867
Blacksmiths' helpers	5	441	6	414	1	723
<i>Rolling-mill in the Lancashire Work.</i>						
Rollers	—	—	2	1207	2	1264
Catchers	—	—	2	916	2	1052
Screwmen	—	—	—	—	1	974
<i>Foundry.</i>						
Foreman	—	—	1	1383	1	1432
Moulders	—	—	5	632	2	721
<i>Other occupations.</i>						
Mechanics	1	847	2	1672	2	702
Firemen	—	—	2	478	4	812
Sheetmetal worker	—	—	1	1400	—	—
Smith	—	—	—	—	1	980
Weighers	—	—	1	591	2	1253
Bricklayer	1	700	1	578	1	857
Storeman	—	—	—	—	1	684
Coal-catcher	—	—	1	541	1	455
Stonemason	—	—	1	627	—	—
Waste-remover	—	—	—	—	1	896

R. Edsbro Blast-Furnace.

The wage data, which have been extracted from the account books of the works (now preserved in the archives of the Stockholm School of Commerce) relate to 1—2 keepers and 2—4 top-fillers. The material is rather incomplete, with the result that the series are not very satisfactory and are published only to throw some light on the peculiar conditions prevailing at this place, which cannot be regarded as typical. Wage series have been worked out covering the years 1860—1874. The workers' annual income is classified in the records under the following headings: earnings on the output of pig iron, other income earned at the blast-furnace, earnings on day-jobs, sundry earnings, and money for clothing. Besides these particulars there are records of children's grain allowance, viz. — the quantity supplied to each employee and the value thereof at a reduced price.

For the years 1865 and 1870 extracts have been taken from the works' journals concerning the grain withdrawn by those workers represented in the wage series. The journals make it clear that the works supplied its employees with various kinds of commodities, such as peas, wheat, rye, barley, salt, herring, "strömming" (small Baltic herring), dried fish, hops, tallow; only rye and barley however were supplied at a reduced price. The workers were entitled only to a certain quantity of rye and barley (fixed by the concern for each worker) at a reduced price. Any worker taking out more than the fixed quantity had to pay for the excess at market prices. If on the other hand he took out a smaller quantity than he was entitled to he was credited by the concern with the difference in price.

Quantities in excess of or falling short of the fixed maximum amount to only small sums, and in most years the quantity taken out accorded with the established allowance.

Withdrawals of Grain (in cub.ft.).

Year	Keepers			Top-fillers		
	Rye	Barley	Children's grain	Rye	Barley	Children's grain
1865	30.9	19.1	—	51.6	30.9	26.8
1870	25.9	18.2	—	48.4	34.7	18.3
<i>Average</i>	28.4	18.7	—	50.0	32.8	22.6

In both years the same workers are represented, namely 2 keepers and 4 top-fillers. The children's grain allowance consisted of equal proportions of rye and barley.

In order to arrive at a basis for calculating the value of the reduced price benefit during the different years we have struck an average of the withdrawals made during the two above-mentioned years. The following values have been obtained by multiplying the average quantity withdrawn by the difference between the market price and the reduced price, both of which prices are quoted in the journals.

Value of Reduced Price Benefit (in kronor).

Year	Keepers			Top-fillers		
	Rye	Barley	Total	Rye	Barley	Total
1860	11.08	9.35	20.43	23.91	22.05	45.96
61	20.16	2.99	23.15	43.52	7.06	50.58
62	13.35	2.99	16.34	28.81	7.06	35.87
63	29.25	11.78	41.03	63.14	27.78	90.92
64	23.57	9.16	32.73	50.88	21.61	72.49
65	6.82	4.30	11.12	14.71	10.14	24.85
66	24.71	13.28	47.99	53.33	31.31	84.64
67	36.07	20.76	56.83	77.85	48.95	126.80
68	68.44	29.73	98.17	147.73	70.12	217.85
69	45.16	30.48	75.64	94.47	71.88	166.35
1870	11.64	6.17	17.81	25.13	14.55	49.68
71	17.89	12.16	30.05	38.62	28.67	67.29
72	23.00	15.52	38.52	49.65	36.60	86.25
73	28.68	19.26	47.94	61.91	45.42	107.33

The material available does not indicate whether the employees were in receipt of any other benefits, but they undoubtedly had free housing, free pasturage for cows and free potato patch.

The annual hours of work are recorded except for the years 1873 and 1874, and are divided into hours spent on time-wage work and hours spent on piece-work. Work done on a time-wage basis consisted of jobs of various kinds performed at the works when the blast-furnace was not in operation, while the piece-work consisted of work at the blast-furnace, so that the time spent on piece-work coincides with the blowing-period.

In order to illustrate the ratio between the pay earned during the blowing period and that earned on day-jobs we publish the amount of daily earnings on piece-work and on time-wage work, it being possible to calculate these figures exactly from the records. We also publish an average of the daily earnings on all work performed, including the value of the benefits in kind.

There are no particulars regarding the hours of work per diem,

but there is no doubt that the work in the blast-furnace was performed in shifts, there being two alternating shifts and working periods. The number of hours of work was thus 12 per day of 24 hours.

Time during which the Blast-Furnace was in Operation in Different Years.

	Days of 24. hours		Days of 24. hours
1860	87	1868	0
61	91	69	112
62	0	70	99
63	25	71	130
64	139	72	131
65	105	73	84
66	0	74	131
67	144		

Table 62. Earnings of Keepers and Top-fillers at Edsbro Blast-Furnace 1860—1874.

Year	Keepers				Top-fillers			
	Total annual earnings	Total daily earnings	Blast-furnace money earnings per day	Time-wage money earnings per day	Total annual earnings	Total daily earnings	Blast-furnace money earnings per day	Time-wage money earnings per day
	kronor	kronor	kronor	kronor	kronor	kronor	kronor	kronor
1860	199	0.66	1.10	0.37	217	0.71	0.76	0.41
61	226	0.80	1.43	0.37	269	0.93	1.33	0.42
62	145	0.53	—	0.28	162	0.59	—	0.41
63	191	0.72	1.46	0.39	262	0.93	1.40	0.42
64	303	1.01	1.43	0.37	330	1.12	1.35	0.38
65	270	0.93	1.59	0.38	256	0.85	1.30	0.43
66	157	0.55	—	0.38	195	0.67	—	0.37
67	298	0.97	1.20	0.37	381	1.18	1.20	0.37
68	210	0.78	—	0.37	339	1.36	—	0.43
69	332	1.10	1.50	0.35	391	1.25	1.19	0.41
1870	276	0.93	1.68	0.39	243	1.09	1.33	0.43
71	328	1.13	1.75	0.36	341	1.09	1.43	0.44
72	338	1.19	1.81	0.34	379	1.21	1.38	0.51
73	—	—	—	0.44	366	1.19	1.40	0.50
74	583	1.88	3.24	0.63	479	1.62	2.60	0.61

S. Finspong Ironworks.

The Finspong works, in the district of Risinge, in the County of Östergötland, have been known since the 16th century. The concern owns, besides the main establishment at Finspong, a number of agricultural estates, mines and sawmills, etc. The ironworks

now belong to the Finspong Metal Works, which was founded in 1913. Finspong is especially famous for its manufacture of guns and other war equipment, of which it was at one time the leading producer in the country.

Payrolls exist from the year 1700, but extracts have been taken only from 1860 onwards. Up to about 1885 the figures were taken from the account books and after that year from the wage books, as after 1885 the former relate to office staff and agricultural labourers only. The material however does not extend further than the early years of the nineties. During the period in question the plant at the works consisted of a blast-furnace with two blast-furnace plant stacks, which was used as a gun-foundry until 1870, in which year a special gun-foundry was built, a foundry for machine- and building-castings, forges, rolling-mill and engineering workshops. Extracts have been made from the annual earnings of ironworks' employees, moulders and workers in the rolling-mill. We have also collected material relating to keepers and helpers. The masters paid for their helpers' keep, but the latter's money wages were paid by the works. As the number of helpers to each master appears to have varied, it has not been possible to subtract from the masters' earnings the value of the helpers' keep and to add that sum to the helpers' earnings. We have therefore excluded these series altogether.

The ironworks' employees' series, 1860—1887, embraces as a rule 4—5 workers. It appears from the wage data that these men were engaged on different kinds of work in the ironwork. Such workers were paid in several different forms. Thus, wages were paid for the day-jobs and shifts performed, and for days during which blast-furnace and charging work was done at the forge. In certain years the income consisted of a fixed annual wage plus money earned on piece-work.

The moulders series, covering the period 1860—1894, includes 3—5 workers. Up to 1869 the wages were based on a certain fixed daily rate and were paid at a certain rate per "gun-day" (24 hours). The gun-day was the time that elapsed between two casts when the casting of guns was going on in the blast-furnace. During such a process both stacks were blown parallel so that the largest possible quantity of iron might be supplied for making the guns. The time worked by the moulders and "pit-boys" was thus dependent upon how long this process went on at the blast-furnace. (The pit-boys' task was to scoop up all the mould-sand around the cast and glowing gun — a particularly hot and laborious job. Besides their regular wage the pit-boys also received from the works one gallon of malt with which to brew small beer.) From 1870, when, as already mentioned, a special gun-foundry was built, the work consisted exclusively of piece-work.

Of the employees in the rolling-mill the following occupational groups have been formed into series: foremen (1863—1884), heaters (1869—1883), catchers, conveyers and welders (1869—1884). The foremen series is composed of averages of the two workers' earnings. The same workers have been included throughout a long series of years and the workers concerned are on about the same wage level. The wage series relating to heaters (after 1877 welders), which embraces 2—4 workers, is only published as from the year 1869. The data covering the period 1860—1868 have had to be discarded as there was no means of differentiating between the earnings of the head of the family and those of the other members of the family. The earnings of the foremen and heaters, like those of the other categories in the rolling-mill, consist for the most part of wages paid for the manufacture of bar iron. No information is available as to the basis on which this method of payment was calculated. The usual basis of calculation is a certain fixed sum paid to the workers for each unit of rolled iron, this sum being then apportioned out according to a sliding scale amongst the different occupational categories, and the same system has undoubtedly been adopted here. When owing to sickness or for any other reason an employee has been unable to do his share of the work a substitute was found. The latter's wages had to be paid by the permanent employee and were entered in his account as an expense for an extra shift. During all the years for which there are wage series such expenses in connection with extra shifts have been deducted from the workers' incomes. There are also recorded in the accounts of all categories a number of minor wage items concerning day-jobs and shifts performed by the individual workers. Moreover, the foremen and heaters were in receipt up to 1872 of a bonus for coal saved ("surplus coal"). Besides this, up to the year 1870 the workers belonging to these two categories received a money allowance (which was incorporated in the annual earnings) for cow-fodder, potatoes and firewood, this in lieu of the corresponding benefits in kind. The series relating to catchers, conveyers and assistant heaters, the trend of whose wages is quite parallel, have been combined into one series, which consequently refers to 4—8 workers. In 1874 there were replacements amongst the workers comprising the conveyers' series, which were unsatisfactory from a statistical point of view. This has been corrected on the basis of the earnings of the other worker included in the series, account also being taken of the other wage series during that same year.

Concerning benefits in kind granted at the works, it has only been possible to secure the following particulars, which have been supplied by a former foundry-foreman at the works. Grain and salted herring were supplied by the works' own store at prices below those prevailing in the open market. We were unable to ascertain

the value of this reduced price benefit. The same informant stated that only employees holding the position of foreman, foundry-foreman, Lancashire foreman and suchlike had an allowance of cow-fodder, a potato patch and free firewood. As already mentioned, these benefits were granted up to 1870 partly as a money allowance, and it is probable that no benefits were forthcoming after that date. The value of the smiths' helpers' keep was estimated at 60 öre a day in 1870, 75 öre in 1880 and 1 krona during the decade 1890—1900.

A number of the blast-furnace workers and gun-turners leased cottage holdings at a rental determined in number of day-jobs to be performed. The day-jobs were carried out by sons or by a labourer engaged by the workers. Moulders and smiths never had a cottage-holding, but lived, doubtless rent-free, in the concern's workmen's dwellings.

As throwing some light on the conditions prevailing in the early days at the Swedish ironworks it may be mentioned that at Finspong the owner of the works conducted his own savings bank business up to 1884. The deposits were limited to at least 25 öre and at most 1 krona per worker and month. Interest was allowed at the rate of 5 %. Until 1881 the works undertook the administration of poor relief. The works also provided a school and a cottage hospital for the benefit of its employees.

The hours of work per day were 12 for those engaged on day-jobs. Work started at 5.30 a.m. and went on until 7.00 p.m., with intervals between 7.30 and 8.00 a.m. and between 12 noon and 1.00. In 1875 the working time on Saturdays was shortened by 1 hour. On July 1, 1897 the length of the hours of work was fixed at 10 hours a day.

In the blast-furnace, Lancashire works and rolling-mill the work was performed in two alternating shifts. The length of the shifts was: blast-furnace workers 12 hours, the shifts changing at 12 noon and 12 midnight; workers in the Lancashire works and rolling-mill 8 hours. The week's shift time-table started at 6 on Sunday evening and ended at 6 on Saturday evening. The stoppage on Sunday was prolonged in 1897, after which the time-table began at 6 on Monday morning, but still continued until 6.00 p.m. on Saturday. At each hearth in the Lancashire forge there were 2 masters and 4 helpers working together. In order that the forge could be run continuously throughout the week, the hearth had to be repaired on Sundays. This work was carried out by one of the masters assisted by one of the helpers, so that a master had Sunday work every other week and each helper every fourth week.

The trend of wages in the different series lacks uniformity. They are however found to possess certain features in common. For instance, in all series the wages rise sharply between 1871 and 1876, causing a break in the wage curve in 1871. The annual earn-

Table 63. Annual Earnings (in kronor) of Workers at Finspong Ironworks 1860—1894.

Year	Ironworks employees	Moulders	Rolling-mill foremen	Heaters	Other rolling-mill workers
1860	242	534	—	—	—
61	237	486	—	—	—
62	232	557	—	—	—
63	241	531	937	—	—
64	257	570	903	—	—
65	238	589	902	—	—
66	252	692	925	—	—
67	263	496	1348	—	—
68	333	648	1585	—	—
69	350	662	1053	907	467
1870	437	772	1318	1120	478
71	437	707	971	880	423
72	451	737	1389	1256	538
73	469	856	1249	1088	559
74	507	881	1046	975	530
75	524	864	1138	1003	581
76	502	1022	1324	1171	646
77	555	872	1230	1121	631
78	493	629	1247	929	585
79	433	538	1019	778	530
1880	427	566	1337	1043	596
81	428	676	1343	989	640
82	427	800	1343	1041	629
83	550	855	1556	1228	765
84	471	901	1590	—	750
85	511	880	—	—	—
86	526	738	—	—	—
87	426	688	—	—	—
88	—	731	—	—	—
89	—	824	—	—	—
1890	—	937	—	—	—
91	—	824	—	—	—
92	—	714	—	—	—
93	—	638	—	—	—
94	—	622	—	—	—

ings of the ironworks employees went up 27 % in 1871—1877, but a still steeper rise took place in the earnings of "ironworks employees" 1867—1870, 66 %, which is not apparent for the other groups of workers. The moulders' annual earnings increased 45 % in 1871—1876, the rolling-mill foremen 36 %, the heaters 33 % and the group catchers, conveyers and assistant heaters 53 %. There is likewise a uniform drop in wages from the middle of the seventies to the year 1879, there being a percentage fall of 22 % for "ironworks employees" from 1877, of 47 % for moulders from 1876, of 23 % for rolling-mill foremen, 34 % for heaters and of

18 % for catchers, conveyers and assistant heaters, all also from the latter year. Then follows a general rise in wages up to 1883, but henceforth neither of the two remaining series, "ironworks employees" and moulders, follow suit. The trend of the heaters' annual earnings and the averages in respect of catchers, conveyers and assistant heaters turn out to be markedly parallel and similar in all respects except for a slightly stronger rising tendency exhibited by the latter group. The rolling-mill foremen series, on the other hand, produces a more uneven and less reliable curve. Taking the 1869 figures to represent 100, we get the following index numbers for 1883:

	Ironworks employees	Moulders	Rolling-mill foremen	Heaters	Other rolling-mill workers
1869 . .	100	100	100	100	100
1883 . .	157	129	148	135	164

The wages of the lowest paid workers thus show the highest increase. No reliable conclusions can be drawn as to the trend of wages in the years prior to 1869 and subsequent to 1883 as the existing series are lacking in uniformity during these periods.

T. Gimo Ironworks.

The Gimo Ironworks is situated in the Skefthammar district in the County of Uppsala.

Extracts have been taken from the account books concerning the annual earnings of the occupational groups: keepers, Lancashire foremen, helpers and tilters during the period 1865—1910. The transition from blast-furnace years to calendar years took place at this works in the year 1890, which thus came to cover 14 months' wages. Corrections have been made for this in the calculations. Two workers have been taken from each occupational group. As no data whatsoever regarding hours of work have been furnished for the workers involved, it is difficult to judge the value of the material. The principle followed in the selection of workers has been to take those that have been employed throughout the entire ordinary working period during the year, and, to judge from the annual earnings, which are generally on an even level, the selection of workers would appear on the whole to be satisfactory.

It may be questioned, however, whether much value can be attached to the keepers' series in certain years, as the difference between the earnings of the two workers is pretty wide, but as will be seen from the cross-sections in 1865, 1885 and 1905,

only two keepers' were employed at the blast-furnace. The strong variations in the annual earnings of these workers appear to be due largely to the length of the operating period. As the tables show, blowing went on for only a part of the year up to 1905, after which date the blowing period was extended to cover the greater part of the year. Nor do we find that the annual earnings show any wide variations after 1905.

The wage series on the whole show the same trend in the case of both Lancashire foremen and melters. From 1906 onwards the latter's annual earnings exceed those of the former (with the exception of 1908). Up to 1881 the wages of the tilters come between those of the foremen and the melters. The tilters earnings have a falling tendency from 1882 to 1886 (1885 excepted), after which they again begin to rise. Thus during the period 1882—1886 the earnings are found to have gone down no less than 50 % (i. e. 53 % for the one and 47 % for the other of the two selected workers). No such fall in annual earnings occurred in the case of the foremen and melters. From 1886 a rise set in, reaching its peak in 1890. Between these years the wages of the tilters went up 75 %. At the same time the foremen's and melters' earnings increased 45 and 42 % respectively. On the other hand, the tilters' earnings lie for a time between those of the two last-mentioned occupations, but rise rapidly between 1897 and 1898 (27 %), exceeding the others' earnings after that for most of the remaining years of the period under review.

We have made a summary of all workers and their earnings in 1865, 1885 and 1905, stating only the number of workers and the total earnings of each occupation, but we have no particulars as to how far part-year workers and benefits in kind are included. An estimate has been made of the approximate average annual earnings of all workers combined.

1865		1885		1905	
Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor
43	292	41	463	72	701

A comparison between the selected workers series (A) and this "cross-section" (B) gives the following result:

Percentage Change in Wages between the Years stated.

	1865—1885	1885—1905	1865—1905
Keepers (A)	— 6	+ 259	+ 237
Lancashire foremen (A)	+ 68	— 2	+ 65
Melters (A)	+ 46	+ 8	+ 58
" (B)	+ 58	+ 13	+ 78
Tilters (A)	+ 5	+ 35	+ 42
" (B)	+ 45	+ 14	+ 65
Averages for the above occupa- tions (A)	+ 31	+ 37	+ 80
(B)	+ 59	+ 20	+ 91
<i>All workers combined</i>	+ 59	+ 51	+ 140

The different development of the wages of the keepers is due to the fact that in 1865 and 1885 the blast-furnace was in operation for only a small part of the year (18 and 28 days of 24 hours), but in 1905 it was working for 176 days. Otherwise the trend is fairly similar, except as mentioned above.

No particulars whatsoever have been furnished regarding the hours of work *per annum* and *per diem*.

The workers were entitled to purchase grain from the works at a reduced price. They were debited during the year for withdrawals of grain at market rates, presumably on the basis of the "markgång" scales¹, and at the end of the year they were credited with the difference between the market price and the reduced price. The difference in price has been added to the published annual earnings in all years during which the benefit is operative. The date when this method of payment was abolished has not been stated. Children's grain, consisting of equal parts of rye and barley, was supplied to each child under 12 years of age to the extent of one "fjårding" (10.5 litres) per month. Each worker was allowed a piece of ground to provide cow feed or else 40 centners² of hay and 29.4 centners of straw, the whole valued at 60—70 kronor *per annum*. Besides this, the employees were given a potato patch of 8 "kappland" (about 1/8 acre), and also firewood at a reduced price. In most cases the workers are still in receipt of free housing, consisting of 1 room or 1 room and kitchen, on the works' premises. Melters and tilters were not in receipt of maintenance from the masters at the works but were paid by the works direct and supported themselves.

¹ Cf. *Myrdal*, *Cost of Living in Sweden 1830—1930*. Stockholm 1933.

² 1 centner = 42.5 kilogrammes.

Table 64. Annual Earnings (in kronor) of Workers, Blowing Period and Output of Iron at Gimo 1865-1910.

Year	Annual earnings				Number of days (of 24 hours) the blast-furnace was in operation	Output of iron in tons
	Keepers	Lancashire foremen	Melters	Titlers		
1865	241	479	409	477	28	332
66	395	566	479	493	87	1034
67	341	464	450	446	53	542
68	388	618	544	581	—	—
69	493	554	510	535	107	1146
1870	245	458	343	390	91	1030
71	274	540	442	505	—	—
72	307	593	445	524	131	1388
73	259	654	483	571	—	—
74	276	725	486	591	44	413
75	362	741	569	626	107	1176
76	311	717	548	616	70	730
77	348	731	553	611	91	998
78	307	808	617	717	93	929
79	362	788	547	724	155	1487
1880	543	830	771	793	134	1449
81	367	726	614	695	66	673
82	508	810	617	854	62	681
83	394	721	528	712	125	1482
84	336	723	561	536	93	1220
85	226	803	597	606	18	170
86	345	743	605	427	83	1055
87	395	719	616	470	146	1797
88	243	648	510	497	37	495
89	497	685	536	527	140	2000
1890	292	921	738	642	49	630
91	478	808	627	665	152	2099
92	454	753	489	647	126	1615
93	401	718	525	645	31	378
94	517	766	558	705	98	1326
95	519	764	571	687	95	1351
96	573	793	592	726	155	1977
97	542	732	566	706	143	1729
98	558	769	586	898	109	1408
99	568	721	587	873	101	1182
1900	653	825	736	1041	124	1566
01	749	1165	857	968	154	2018
02	653	797	644	867	103	1495
03	759	1016	787	947	119	1641
04	774	888	774	836	123	1716
05	812	788	645	821	176	2478
06	760	602	710	743	356	4456
07	740	850	892	1135	203	2727
08	731	795	724	848	358	4350
09	753	746	790	874	253	3601
1910	899	847	909	787	357	5937

U. Söderfors Ironworks.

One of the oldest and most renowned of Sweden's ironworks is the Söderfors Ironworks, situated in the district of Söderfors, on the River Dalälven, in Uppsala County. The ironworks is now owned by Stora Kopparbergs Bergslag.

The material, which is preserved in the archives of the Bergslag, Falun, is particularly suitable for throwing light on certain wage systems applied in olden days, when the wage consisted largely of benefits in kind in the form of grain procurable at reduced prices and grain-transfers, children's grain allowance, fuel, pasture and land allotments, and free housing.

The material consists of the works' account books, output journals, certain records kept for assessment purposes, labour contracts and the annual reports of the Board of Directors, as well as verbal information furnished by present and former clerks and workmen at the ironworks.

Wage series have been worked out relating to the following departments at the works: blast-furnace, Lancashire, open hearth, rolling-mill, foundry and engineering workshops. The series start in 1860 and cover the period up to 1914. The transition from blast-furnace years to calendar years took place in 1872.

In the blast-furnace were employed only 7 permanent workers in 1860 (see cross-section), but besides these there were temporary workers engaged on various daily jobs. The wages paid to the permanent workers were on the basis of $2\frac{1}{2}$ — $4\frac{1}{2}$ öre per ship pound (170 kg.) of pig iron produced during the blowing period. All extra work was done at a certain daily wage-rate. The total number of day-jobs performed to produce the pig iron amounted in that year to 2 885. In the years 1885 and 1905 the number of permanent workers was 32 and 35 respectively. The large increase in the labour personnel from the year 1860 is due to the reconstruction of the blast-furnace towards the close of the seventies. During the period 1860—1874 each worker was paid according to the quantity of iron he produced. Thereafter up to 1884 the workers were paid per working day, and later on, either *per diem*, per shift or per hour; the employees were thus time-wage workers as contrasted with the blast-furnace workers at other iron works. The blast-furnace workers are represented by 1—2 keepers, 2 top-fillers and 1—5 calciners, which occupational categories of blast-furnace workers may be regarded as the most representative of this branch of the iron industry. As a rule, all the workers within these three groups have been included in the series. Since the homogeneity within each series and between the different series is good, and as the trend of wages is practically similar for all workers, their earnings have been weighted and combined to form

averages, which consequently comprise 4—9 workers or about one quarter of the personnel in the blast-furnace.

Prior to 1860 there was manufactured at the works Walloon bar iron, Lancashire iron and bars made of crucible iron. The production of Walloon bar iron required 12 men per shift at each of the two Walloon forges. The first melting shift, then, was taken by the melter foreman and two melters' helpers; the second shift was worked by one melter's mate and one melters' helper. Thus, the process required 5 men. The first tilter shift was taken by the head tilting-smith, one tilting-smith's assistant and two coalmen, and the second tilter shift by the tilting-smith's helper (= mate) and two coalmen. The tilting thus required 7 men. On occasions when one of the ordinary workers was unable on account of sickness, leave, or for any other reason, to take part in the work, recourse was had to an extra smith, who received a money wage, the amount of which depended upon the class of worker for whom he did the job. The wages paid to the permanent workers were calculated on the basis of the quantity of iron of one kind or another produced in one week at the forge in question — the "ton-wage"-system, a common form of remuneration at the Swedish ironworks and wood-pulp mills. For every "skeppund"¹ manufactured all the workers within the same occupational category received the same amount of pay. If any one of the workers had been absent during the production period, a certain rate of wage per shift was deducted on his account to pay for the extra shift worked for him by an extra smith. A special *bonus* was received for savings in iron and coal. 6 blooms were made and forged in each three-hour shift. Generally the forging occupied 44 shifts per week or 5.5 days per worker per week. 8 men worked together at the two Lancashire forges, each containing two hearths. The one shift was worked by the master and one Lancashire smith, the other shift was worked by two Lancashire smiths at each of the forges. At this period the "new hammer-forge" was used for the manufacture of bar iron and sundries. The first shift at this forge was worked by a head tilting-smith, one heater, one tilting-smith and one "goujard" (Walloon-forge coalman) and the second shift by one heater, two tilting-smiths and one "goujard". During different periods of the year, however, the employees worked at different forges, so that it is impossible to classify the occupations according to the forges.

During the year 1885 the work was carried out in 9 Lancashire forges. The total forge-period amounted to 2 107 days of 24 hours, or on an average 234 days per forge or 234 days per worker. It took 1 $\frac{1}{2}$ hour to produce 100 kilogrammes of iron. For an average of 117 days the anchor-smiths were employed on rough-forging and for 164 days they did ordinary work on a time-wage basis.

In 1905 the anchor-smith group disappeared altogether. Lan-

¹ 1 skeppund = 170 kilogrammes.

cashire iron was produced in 9 forges, employing a total of 36 melting-smiths.

The series master-smiths and smiths' helpers are made up of 3—5 selected workers. That the helpers at Söderfors had a different position from the helpers at other works is evident from the fact that masters at Söderfors were never responsible for a helper's keep, and also that a helper was entitled to practically the same grain allowance as the master. Moreover, the helpers were as a rule married (most of them were in receipt of children's grain allowance), which was by no means common amongst helpers in general. In 1873 and 1874 the helpers' earnings were almost as high as the masters', due to the latter's earnings having gone down about 25 % up to 1873 owing to the fact that in the course of these two years all the smiths were replaced, and their successors were of an entirely different quality. The smiths' helpers' earnings also declined up to the year 1873, but only by about 10 %; this, however, is not the result of a replacement of workers, as only one worker was changed, and his successor was a worker of similar quality. On the other hand, the great difference between masters' and helpers' earnings in 1875 and 1876 is caused by a fall in the latter's earnings, which continued steadily until 1877, when all the workers were changed, their places being filled by workers whose earnings were considerably higher. The helpers' series covers the period up to 1880 only.

In 1884 the term master-smiths was abolished, its place being taken by the category melter-smiths (5 workers). This occupational group, however, includes all workers embodied in the master-smith series. At the same time as this change took place the annual earnings fell about 10 %. The fall in wages in 1884—1885 is only observable in the case of smiths and is perhaps to be attributed to a reorganization of operating methods that was carried out at the time.

From 1894 the smiths' series includes also 4 steelsmiths, so that as from that year the annual earnings represent an average of the earnings of 9 workers. The steelsmiths were added already in 1890, but up to 1894 their wages were throughout considerably below those of the melter-smiths. Thus, in 1890 and 1891 the melters' earnings were well over 60 %, in 1892 close on 50 % and in 1893 not quite 35 % higher than the steelsmiths' earnings. During the period 1894—1914 the maximum difference between the earnings of these two groups of forge-workers is 15 %.

The open-hearth works was constructed in 1885 and was blown in in May of that year. At the start, the works contained only one furnace (of 6-ton capacity), but in December 1897 an additional open-hearth furnace (of 12-ton capacity) was put into operation. The workers are represented by three occupations: melters (2—4 workers), gas-makers (2—4 workers) and assistant labourers

(4 workers). The melters' annual earnings were on a higher level than those of the other occupations during the period under review. The difference was wider in the later than in the earlier years, due to the fact that the standard of quality of the melters was changed on two occasions, viz. in 1897 and 1902. Prior to 1897 the melters were termed open-hearth workers, and the workers who in those days went by the name of open-hearth melters were foremen and are not included here. At the same time as the change took place in the name of the occupation, the difference in wages was widened as between melters and gas-makers. In 1896, for instance, the melters' (i. e. the open-hearth workers') annual earnings were 20 % above the gas-makers', and by 1897 the difference had increased to 45 %. In 1902 a further change took place, when, upon the creation of a new occupational group, assistant labourers, the melters were once more promoted to a higher wage-class. The difference in wages in 1901 was slightly over 50 %, but by 1902 it had increased to 80 %. This difference of 80 % between the melters' and the gas-makers' annual earnings was maintained fairly consistently during the remainder of the period. In no case are the variations in wages the result of a replacement of workers. The steep rise in the wages of melters seems to have been very largely due to the fact that from 1902 these workers received, besides their money earnings, a wage *in natura*, consisting of 10 cords of wood, 12 1/2 hectolitres of potatoes and 912 1/8 litres of milk per worker and year. The value of these benefits has been booked at market prices and is included in the total earnings.

All wage series relating to the open-hearth workers are of a homogeneous character and, except for such more or less important changes as are indicated, show on the whole a similarity in the trend of wages. The earnings of these workers have not in any way been combined, as the difference in the wage level is too wide.

The rolling-mill, which was built in 1874—1875 and was started in the beginning of March 1876, is represented by two occupational groups: foremen and catcher. Between 1876 and 1882 there were two foremen employed at the works, while in 1883 the rolling-mill was working without the supervision of a foreman. The two former foremen then worked as ordinary rolling-mill workers, and it was not until 1884 that two new foremen were engaged. The wages of these two were on a far higher level than those of the old foremen. From 1901 the number of foremen was increased to four. The catchers' wage series is made up of an average of 3—4 workers' earnings. From the cross-section for 1885 it is clear that all catchers are represented in the longitudinal series, whereas the cross-section for 1905 shows that four out of the six catchers employed have been included in the later years. Both these series exhibit a considerable degree of homogeneity. The narrow-

ing down of the difference between the earnings of foremen and of catchers is distinctly noticeable. Thus, in 1885 the formers' earnings were 105 %, in 1890 95 %, in 1895 110 %, in 1900 90 %, in 1905 50 %, in 1910 60 % and in 1914 50 % higher than the latter's.

The moulders wage series, which does not begin until 1886, includes all workers at the casting foundry, 4 in number. In earlier years the moulders themselves engaged and paid their assistants, the numbers and wages of whom are not known. The moulders wage series is very homogeneous, and here, as elsewhere, the marked sensitiveness of the moulders' wages to variations in the trade cycle is particularly noticeable.

Lathe-hands and vice-hands have been combined to form one series, as no significant difference in wages between them can be observed. During the period 1890—1894 the series is composed of 4 lathe-hands only, but from the following year it includes also the vice-hands (5 workers), so that from that time it comprises 9 workers in all. There are data concerning the lathe-hands from as far back as 1876, but owing to their lack of homogeneity the earlier years have been excluded.

Cross-sections have been drawn for the years 1860, 1885 and 1905 and cover most of the workers who were engaged in the production and manufacture of iron. The material provides particulars of the annual earnings of each worker included in the cross-sections, and also, for 1885 and 1905, particulars of the hours of work expressed in months. From these data we can thus calculate direct the average income per individual. The cross-sections relating to other industrial groups, on the other hand, have been drawn up in such a manner as to indicate for each wage period, say for each week, the number of workers employed during that period and their common earnings. In such cases the average annual earnings are computed by dividing the total annual earnings by the average number of workers during the year. This procedure has applied to the 1885 and 1905 cross-sections. On the basis of the particulars as to the number of months each employee has worked, averages have been calculated in respect of each occupation for "full-year employees". The number of workers published is, however, the total number of individuals. The average annual earnings per worker (individual) irrespective of any possible period of absence differs in general but slightly from the average annual earnings per full-year worker, as the averages for the blast-furnace, open-hearth etc. show.

It appears from the ledger for 1860 that besides the regular employees, at the blast-furnace, for instance, workers from entirely different occupational groups were temporarily engaged. Thus, during the said year there were bricklayers, sawyers, barge-men, charcoal-burners, agricultural workers and labourers, who

performed day-jobs at the blast-furnace, the roasting-furnace and the crushing-mill. These workers, however, have not been included in the cross-sections, as their principal income has been earned in a branch of industry entirely different from the iron-manufacturing.

It is often impossible to follow the trend of wages of the different occupational groups by means of the three cross-sections of 1860, 1885 and 1905, as several of the groups that existed in 1860 had already disappeared by 1885 and entirely different occupational groups had taken their place. Moreover, the quality of the different occupational groups changed considerably.

In the cross-section for 1860 particulars have been given of the amount of grain withdrawn by each worker during the year, as well as the market price and reduced price of rye and corn. It has been possible to calculate from these figures the exact value of the reduced price benefit in the case of each worker. Around the year 1860 an estimate was also made by the works of the value of the benefit consisting of pasturage and potato patch. In the cross-sectional years 1885 and 1905 we found that the material already contained an estimate of the value of the different benefits in kind. In the latter year the foremen were the only employees who enjoyed these benefits.

If we compare the selected workers' wages and the cross-sections for those groups that permit of comparison, we find a satisfactory measure of agreement between them, as the table on the next page shows.

For the year 1860 the following particulars have also been furnished as to the most common daily wage rate. Adult male workers, day-job labourers for instance, were paid during the winter 36 öre, and during the summer 44 öre. These rates generally applied to unskilled labour. Employees engaged in skilled work, but whose pay was based on a daily rate, generally received somewhat higher pay. Thus, when engaged on anchor-making and rough forging work, heaters were paid 50—58 öre *per diem*, sledgehands 48 öre; in the manufacturing forge the blacksmiths' helper received 52 öre and the horse-shoer's helper 48 öre; those employed in the workshops, carpenters, builders' foremen, sawyers, bricklayers and coal-catchers were paid a daily wage rate of 44 öre in the winter and 52 öre in the summer.

Many different kinds of benefit have been operative and they have been granted in different forms. Where it has not been possible, for instance, to allow certain workers the benefit in kind, it has been replaced by a money allowance. It is of but little interest to draw a distinction between money earnings and total annual earnings, seeing that within the same occupational group both forms of payment have been applied to the different workers side by side, and as, moreover, the same workers might at the same time receive a certain allowance to compensate for a poorer plot of

	Blast-furnace workers		Melting		Melting helpers		Moulders		Lathes hands		Labourers	
	Number	Annual earnings	Number	Annual earnings	Number	Annual earnings	Number	Annual earnings	Number	Annual earnings	Number	Annual earnings
		kro-nor		kro-nor		kro-nor		kro-nor		kro-nor		kro-nor
1860												
Selected workers . . .	4	289	5	540	4	393	—	—	—	—	—	—
Cross-section	7	293	11	515	17	411	—	—	—	—	—	—
Selected workers in per cent. of cross-section		99		105		96		—		—		—
1885												
Selected workers . . .	8	673	5	929	—	—	—	—	—	—	—	—
Cross-section	32	596	38	834	—	—	—	—	—	—	—	—
Selected workers in per cent. of cross-section		113		111		—		—		—		—
1905												
Selected workers . . .	9	855	5	1278	—	—	4	1288	9	1082	4	1177
Cross-section	35	827	36	1235	—	—	26	1104	13	1001	14	1147
Selected workers in per cent. of cross-section		103		103		—		117		108		103

ground. The total annual earnings therefore comprise not only the money wages but also benefits in kind, with the exception, however, of the free housing benefit, which for the present has been entirely left out of account in computing the total annual earnings, the benefits in kind being partly estimated and partly assessed by the works in connection with the data that had to be submitted for assessment purposes. In respect of the blast-furnace workers is published, besides the total earnings, the value of the benefits in kind and other allowances granted in each year.

Undoubtedly the most important of the benefits was the grain allowance. Prior to 1869 each worker was entitled to obtain at the works grain at a reduced price. In 1869 the system was altered to the extent that the works' employees were debited for the amount of grain they withdrew at the current price (the works' price), and then, on the closing of the accounts, they were credited with the difference between the reduced price, which was current for many years, and the price at which they had been debited. If the quantity at which the year's withdrawals were fixed was exceeded, the workers had to pay for the excess quantity at the works' price. The size of the grain allowance also varied, inasmuch as the blast-furnace workers, for instance, were entitled while the blast-

furnace was in operation to a larger allowance than when working on day-jobs while the blast-furnace was being repaired. The works purchased grain partly at the "markegång" price (from landtenants, small farmers, and others) and partly at the mining-district ("Bergslag") or "works" price (from large estates). The Söderfors works have furnished detailed extracts from the grain allowance records: the quantities withdrawn, the value at the reduced price and the value at the current market price. The product of the quantity withdrawn and the difference between the current price and the reduced price represented the benefit in kind, and we publish below the value of this benefit as applied to the employees in the blast-furnace. Allowances and reduced prices are constant, the strong variations being due entirely to the works' prices.

Value (in kronor) of the Benefit of a Reduced Price for Grain.

	Keepers	Top-fillers	Calciners	Average
1860	30.46	30.47	29.25	30.06
1861	66.50	66.50	63.00	65.33
1862	93.84	93.84	87.75	91.81
1863	50.82	51.48	47.52	49.94
1864	45.60	45.60	43.20	44.80
1865	18.72	18.72	17.28	18.24
1866	50.32	50.66	48.96	49.98
1867	48.64	48.64	46.08	47.79
1868	144.76	142.88	142.88	143.51
1869	120.84	120.84	117.04	119.57
1870	33.88	33.88	33.88	33.88
1871	49.28	49.28	49.28	49.28
1872	77.28	77.28	77.28	77.28
1873	71.76	60.72	71.76	68.08

In the case of children living at home and working at the works who were allowed to take out grain at a reduced price or were subsequently allowed a "reduction in the price of grain", the difference in price, as also their earnings, have had to be deducted from the father's account with the works. Withdrawals of grain ceased to be debited to the employees at the works in 1873, after which year an allowance of grain was made only to charcoal-burners and various peasant farmers, besides the clerical staff at the works.

Up to the middle of the sixties there was allowed free for each child one "fjårding" (about 20 litres) of grain per month. The market value of this grain and the quantity consumed is recorded for each year in respect of workers with small children.

The benefit in kind consisting of "pasture and plot" is recorded as having been assessed by the works about the year 1860, when

its value as applied to a keeper, for instance, amounted to 20 kronor. From 1885 the benefit was assessed annually and its value was generally 50 kronor. The "pasture and plot" benefit was abolished in 1893, and after that the workers were entitled to lease ground from the works. Owing to the nature of the terrain at Söderfors, some workers were not able to obtain ground for cultivating cow-fodder and a plot for potatoes and cabbages, in which case a money allowance was received in lieu of hay and potatoes. In some instances it also occurred that, when an allotment of ground has not been considered to be perfectly satisfactory, the holder has received compensation for the poor ground either in kind (e. g. potatoes) or else in money (potato allowance). When a milk allowance, which, like cow-fodder, was in lieu of pasturage, or a potato allowance (in lieu of a potato patch) was received, both the quantities and the values thereof were carefully recorded. Thus, a worker may at one and the same time have a piece of land and, in addition, that is, if the ground allotted to him is not considered to be fully as good as that assigned to the other workers, he may receive compensation in the form of a certain quantity of potatoes. It has been possible on the basis of the particulars given in the material as to the allowances in kind paid as a supplement to pasturage or land or else in lieu thereof, and on the basis of the value of the milk or potato allowance that has likewise been granted in several instances, to make a fairly accurate estimate of the value of the "pasture and plot" benefit for those years for which the value thereof is not recorded. It can be seen from a contract with the employees at Söderfors dated February 1, 1879 that owing to the lack of available ground the size of this pasture and plot benefit was carefully fixed and its value exactly stated as follows: "§ 13. Workers on attaining the age of 21 receive as cow-fodder 30 centner¹ of hay and 30 centner of straw or corresponding pasturage and 1.4 "qvadratref"² of ground for the cultivation of potatoes; or else an allowance of 50 kronor, according as the administration may decide, in lieu of cow-fodder and potato plot".

Firewood was allowed free up to 1875. After that, "firewood money" was received as compensation, but this allowance was abolished in 1887. During the period 1875—1887 "firewood money" represents an item of 15—20 kronor. For the years 1860—1875 the value of free firewood is assessed at 15 kronor. On this point it is stipulated in the same contract as was quoted above: "§ 14. A worker with a household who has rented accommodation from the Company receives a fuel allowance of 15 kronor. Firewood is obtainable, if possible delivered to the workers' homes, at a price of 3 kronor per cord of 6 feet or else chopped in the forest at a price of 1 krona per cord; otherwise the workers may fell trees that have

¹ 1 centner = 42.5 kilogrammes.

² About 45.5 square yards.

been blazed for the purpose and transport them to their homes free of charge. Twigs and brushwood may be gathered in the Company's forests."

Apparently free dwellings have been supplied to the workers from the earliest times. Owing probably to the serious defects that characterized these workmen's dwellings, as indeed was pointed out in a "Report to the Ordinary Meeting of the Shareholders in the Söderfors Ironworks for the year 1880", no valuation of the housing benefit was carried out until the year 1894 and after. The benefit of a free dwelling was abolished in 1908, after which rent was paid by means of a monthly deduction from wages. Information as to the value of the dwellings during the period 1894—1908 was furnished to the assessment authorities, and in spite of the defects existing in the housing the assessments must be regarded as low. For throughout the whole of this period one room has been valued at 20 kronor *per annum*, yet in respect of the year 1908, in connection with the abolition of free housing, the valuation was about 80 kronor per room. As mentioned above, we have not included the value of the free housing in the published earnings.

Notwithstanding the careful bookkeeping at Söderfors, it has been necessary here as in the case of most other ironworks to make at least a partial estimate of the hours of work. The time worked by the blast-furnace workers has always been recorded, up to 1902 in days and thereafter in shifts. Where the men worked in shifts, 8-hour shifts were worked by two sets of workers: that is to say, each employee worked on an average 12 hours a day. The top-fillers thus did not have shorter working hours at this works, as was the rule at other ironworks from the beginning of the nineties. It was not until 1920 that the system was adopted of working 8 hours a day in three different shifts. The hours worked by these sets of men has only been estimated in a few isolated instances, where they have carried out sundry important piece-work jobs, the time spent on which has not been recorded. When they were engaged on smaller piece-work jobs, they did them in the course of the ordinary working hours. These data have served as a basis for calculating the total daily and hourly earnings. It has not been possible to calculate any separate figure representing the income earned per hour at the blast-furnace, as such income is separately recorded in the books only in respect of the very earliest years. From the table showing the operating period and production at the Söderfors blast-furnace we find that from 1875 blowing went on for a considerably longer period *per annum* than had formerly been the case. Thus, the average time during which the blast-furnace was working from 1860 to 1874 was only 155 days (of 24 hours) *per annum*, whereas the time rose in the course of the succeeding years to, on an average, 323 days. Moreover, it is to be noted that during this latter period blowing went on for as long as

five years at a stretch without the blast-furnace being relined. There exists, as usual, a strong correlation between blowing-period and the blast-furnace workers' annual earnings. In 1878—1879, however, the circumstances were different. Thanks to a substantial increase (37.5 %) in the average daily output, due to the old blast-furnace's having been replaced by a new one, and thanks to an increase of close on 10 % in the operating period as compared with previous years, the total output increased 51 % between 1878 and 1879. In spite of this, the annual earnings dropped nearly 12 %, i. e., from 692 kronor in 1878 to 612 kronor in 1879. At the same time the hourly earnings fell from 17.0 öre to 14.5 öre, equivalent to 15 %.

Data concerning the hours worked by Lancashire melters are far more difficult to arrive at than in the case of the other occupational categories in the iron industry. The length of the shifts worked by melters is dependent upon the time they take to produce a certain number of blooms (usually 6). This meant that the shift might vary between 5 and 10 hours, though it usually lasted 6—7 hours. The effective number of working hours was actually only half of this time, as the procedure was as follows: one worker made a bloom (i. e. about one hour's work) after which he rested while the other melter made the next bloom, and so on. The relative time data have been procured from the forging journals, in which the forging weeks, that is to say the number of calendar weeks during which the workers were employed at the forge, are recorded. In the journals were entered for each forging week the quantity of iron produced during the week at each forge and the time in days spent in producing that quantity. The time covered by the wages earned while the forge was not working is also recorded. We have only been able to obtain the data concerning the time worked by melters up to 1884, so that it has only been possible to compute the daily and hourly earnings up to that year. Accordingly it should be noted that the hourly earnings are not exact.

From the year 1888 the open-hearth workers were paid a "ton-wage" (see above p. 352) and at an hourly rate. Their time-wage earnings, however, constituted only a minor proportion of their pay. The variations in the annual earnings are based on data, taken from the production records, concerning the period during which the open-hearth furnaces have been at work. It has not been possible to compute the daily and hourly earnings.

Moulders have throughout the whole period been paid on a piece-work basis, the time spent on which was never recorded.

As to foremen and catchers in the rolling-mill, the number of working hours *per annum* is given in respect of each worker included in the series during the period 1876—1884. The time is partly expressed in weeks, partly in days and partly in hours, and this heterogeneous material renders the figures relating to the

daily and hourly earnings less reliable. In fact, those years in which both the number of weeks and the corresponding number of days and hours are given in the material demonstrate that the weekly particulars do not always correspond to 72 hours, a week which has been used for converting the number of weeks into hours, but frequently to a somewhat shorter time. The weekly data thus cause the figure for daily and hourly earnings to be too low. The conversion of the number of working hours into days may also result in too low a figure representing the daily earnings if these hours relate to overtime on an extensive scale: it should rather make the hours of work per day longer. During the years 1885—1893 the hours of work are only recorded for the individual workers when engaged on time-wage work. It has not been possible to compute any total earnings from the year 1885 inclusive. The hours of work in the rolling-mill is published as from 1885 to 1914.

The trend of the annual earnings very strongly and uniformly reflects the variations in trade conditions. Thus there was a substantial rise in wages during the first half of the seventies (from 1870 to 1876—77), and after that a fall, the minimum wage being recorded in 1879, followed by a not very distinctly pronounced rise up to 1884—85, then a distinct decline in earnings up to 1887—88, which was succeeded by a strong rise in wages up to 1890. During the first half of the nineties the annual earnings showed a tendency to fall, but from 1894 to 1897—1900 there was a marked increase

The Percentage Variations of the Annual Earnings as between the Years stated below (+ increase, — decrease).

	1870/ 1876—1877	1879	1876—1878 /1879	1884—1885 /1887—1888	1887—1888 /1890	1890/1894	1897—1900 /1894/ 1900	1899—1900 /1901	1901—1904 /1906—1908	1908/1910
Blast-furnace workers	+ 89	- 12	- 16	+ 15	- 7	+ 47 ^a	+ 10	+ 21	+ 68	
Open hearth workers	—	—	—	+ 36	- 25	+ 68	- 6	+ 41	+ 17	
Open hearth gas-makers	—	—	—	+ 26	- 7	+ 57	- 11	+ 38	+ 12	
Lancashire melters	+ 73	- 13	- 21	+ 34	- 17	+ 16	- 3	+ 16	+ 23	
Melters' helpers	+ 85	- 15	—	—	—	—	—	—	—	
Rolling-mill foremen	—	- 34	- 8	+ 31 ¹	- 1	+ 11	- 19	+ 37	+ 10	
Catchers in the rolling-mill	—	- 20	- 10	+ 34	- 12	+ 26	- 13	+ 45	+ 19	
Moulders	—	—	—	+ 16	- 21	+ 51	- 9	+ 49	+ 20	
Lathe- and vice-hands	—	—	—	—	—	- 25	+ 54	- 11	+ 41	
Output of iron ^a	+ 103	+ 52	- 20	- 2	- 10	+ 1	+ 60	+ 7	+ 43 ⁸	

¹ 1887—1892. — ² 1894—1903. — ³ in tons.

in wages, which, however, was interrupted by a general decline up to 1901. From that date until about 1907 there was a steady, strong rise, which was interrupted in 1908 and 1909. Up to 1910 there took place a very heavy rise in wages. The trend of the different occupational groups, which on the whole is uniform, is seen from the above table, which indicates the percentage increase or decrease, between the years stated (including the first and final years in each period quoted). For purposes of comparison we have also worked out corresponding percentages representing the quantity of iron produced at the blast-furnace at Söderfors, from which it will be seen that the deviations shown by the blast-furnace workers in comparison with the other groups (see the periods 1887—88/90, 1899—00/1901 and 1908/1910) are apparently attributable to the special conditions of production prevailing at the blast-furnace.

As to the secular trend, it is somewhat lacking in uniformity, as the following table shows (annual earnings = 100 for the five-year periods 1860—1864 and 1888—1892 respectively):

Trend of the Annual Earnings as between the Years stated below.

(1860—1864 and 1888—1892 respectively = 100).

	1860—1864/ 1910—1914	1888—1892/ 1910—1914
Blast-furnace workers	380	225
Open-hearth melters	—	320
" " gas-makes	—	210
Lancashire melters	298	152
Rolling-mill foremen	—	125
Catchers in the rolling-mill	—	161
Moulders	—	187
Lathe- and vice-hands	—	168

The wages of the more skilled workers (Lancashire melters, rolling-mill foremen) have increased far less than those of the less skilled workers (e.g. blast-furnace workers). The rise in the openhearth melters' wages is not significant (see above p. 354). According to the cross-sections, the average annual earnings of all workers went up 115 % between 1860 and 1885, 35 % between 1885 and 1905 and 191 % between 1860 and 1905.

Table 65. Earnings (in kronor) of Workers at Söderfors 1860—1914.

Year	Lancashire melters		Melters' helpers		Rolling-mill foremen		Catchers in the rolling-mill		Moulders
	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings
1860	540	1.79	393	1.39	—	—	—	—	—
61	542	1.92	487	1.76	—	—	—	—	—
62	611	2.15	534	1.93	—	—	—	—	—
63	602	2.23	453	1.81	—	—	—	—	—
64	582	2.16	479	1.97	—	—	—	—	—
65	605	2.00	438	1.61	—	—	—	—	—
66	734	2.29	525	1.80	—	—	—	—	—
67	563	2.29	448	1.76	—	—	—	—	—
68	764	2.63	547	2.03	—	—	—	—	—
69	661	2.29	488	1.85	—	—	—	—	—
1870	629	2.17	428	1.59	—	—	—	—	—
71	699	2.33	472	1.82	—	—	—	—	—
72	661	2.75	542	2.17	—	—	—	—	—
73	620	2.30	555	1.84	—	—	—	—	—
74	743	2.48	684	2.24	—	—	—	—	—
75	987	3.28	660	2.41	—	—	—	—	—
76	1089	3.58	642	2.26	1157	3.98	663	2.66	—
77	1017	3.38	793	2.22	978	3.64	699	2.51	—
78	1078	3.92	723	2.84	873	3.61	613	2.15	—
79	937	3.20	676	2.41	759	2.81	557	1.96	—
1880	911	3.13	733	3.02	895	3.17	587	2.23	—
81	925	3.27	—	—	912	3.21	563	1.93	—
82	975	3.43	—	—	867	3.11	572	1.91	—
83	1016	3.42	—	—	—	—	726	2.33	—
84	1025	3.33	—	—	1567	—	750	2.41	—
85	929	—	—	—	1552	—	757	—	—
86	1033	—	—	—	1489	—	721	—	958
87	907	—	—	—	1445	—	678	—	900
88	985	—	—	—	1479	—	749	—	933
89	1186	—	—	—	1647	—	815	—	1048
1890	1215	—	—	—	1769	—	906	—	1043
91	1188	—	—	—	1798	—	916	—	1073
92	1086	—	—	—	1895	—	913	—	995
93	1139	—	—	—	1791	—	869	—	984
94	1013	—	—	—	1744	—	797	—	826
95	1035	—	—	—	1723	—	823	—	875
96	1062	—	—	—	1712	—	820	—	1055
97	1010	—	—	—	1709	—	809	—	1250
98	1124	—	—	—	1789	—	945	—	1247
99	1125	—	—	—	1879	—	1003	—	1209
1900	1177	—	—	—	1890	—	975	—	1147
01	1145	—	—	—	1631	—	889	—	1039
02	1188	—	—	—	1659	—	1000	—	1104
03	1186	—	—	—	1779	—	1106	—	1163
04	1240	—	—	—	1824	—	1177	—	1261

Tab. 65. (Cont.). Earnings (in kronor) of Workers at Söderfors 1860—1914.

Year	Lancashire melters		Melters' helpers		Rolling-mill foremen		Catchers in the rolling-mill		Moulders
	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings	Daily earnings	Annual earnings
1905	1278	—	—	—	1860	—	1219	—	1288
06	1302	—	—	—	2227	—	1416	—	1407
07	1381	—	—	—	2088	—	1379	—	1543
08	1323	—	—	—	2006	—	1148	—	1500
09	1437	—	—	—	1959	—	1135	—	1314
1910	1629	—	—	—	2208	—	1370	—	1798
11	1642	—	—	—	2038	—	1286	—	1823
12	1793	—	—	—	2144	—	1419	—	2068
13	1831	—	—	—	2264	—	1473	—	1992
14	1683	—	—	—	2082	—	1394	—	1832

Table 66. Earnings of Blast-Furnace Workers at Söderfors 1860—1914.

Year	Keepers				Top-fillers			
	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings
	kronor	kronor	kronor	öre	kronor	kronor	kronor	öre
1860	312	87	1.02	8.5	288	87	0.95	7.9
61	390	129	1.22	10.2	317	121	1.08	9.0
62	534	160	1.72	14.3	441	147	1.50	12.5
63	552	111	1.64	13.7	443	101	1.31	10.9
64	370	86	1.21	10.1	343	94	1.21	10.1
65	482	59	1.52	12.7	394	66	1.27	10.6
66	320	90	1.07	8.9	297	94	1.04	8.7
67	411	89	1.33	11.1	346	89	1.17	9.7
68	524	185	1.72	14.3	476	183	1.50	12.5
69	676	166	2.04	17.0	562	161	1.70	14.2
1870	427	79	1.39	11.6	367	74	1.18	9.8
71	532	94	1.72	14.3	398	89	1.29	10.7
72	612	136	1.96	16.3	477	136	1.54	12.8
73	696	142	2.15	17.9	500	131	1.59	13.2
74	778	70	2.24	18.7	671	70	2.08	17.3
75	809	70	2.29	19.1	675	70	1.90	15.8
76	756	70	2.13	17.7	673	70	2.00	16.7
77	857	70	2.45	20.4	701	68	2.49	20.7
78	845	70	2.64	22.0	683	73	1.95	16.2
79	650	70	1.82	15.2	632	70	1.86	15.5

Table 66. (Cont.). Earnings of Blast-Furnace Workers at Söderfors 1860—1914.

Year	Keepers				Top-fillers			
	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings
	kronor	kronor	kronor	öre	kronor	kronor	kronor	öre
1880	676	70	1.89	15.7	672	70	1.87	15.6
81	680	70	1.95	16.2	651	70	1.84	15.3
82	668	70	1.90	15.8	658	70	1.87	15.6
83	681	70	1.88	15.7	682	70	1.88	15.7
84	793	70	2.17	18.1	691	70	1.89	15.7
85	783	70	2.14	17.8	713	93	1.96	16.3
86	789	70	2.17	18.1	727	93	1.99	16.6
87	701	70	2.00	16.7	686	93	2.02	16.8
88	571	50	1.75	14.6	631	82	1.81	15.1
89	666	50	1.88	15.7	676	85	1.87	15.6
1890	666	50	2.00	16.7	658	50	1.81	15.1
91	674	59	1.91	15.9	650	48	1.81	15.1
92	656	50	1.94	16.2	643	50	1.77	14.7
93	633	50	1.94	16.2	649	50	1.84	15.3
94	573	—	1.85	15.4	616	—	1.78	14.8
95	655	—	2.00	16.7	639	—	1.78	14.8
96	694	—	1.96	16.3	614	—	1.68	14.0
97	706	—	2.04	17.0	680	—	1.92	16.0
98	726	—	2.09	17.4	675	—	2.01	16.7
99	798	—	2.33	19.4	836	—	2.29	19.1
1900	712	—	2.33	19.4	806	—	2.35	19.6
01	914	—	2.65	22.1	961	—	2.66	22.2
02	939	—	2.90	24.2	908	—	2.53	21.1
03	1026	—	2.96	24.7	919	—	2.54	21.2
04	922	—	2.70	22.5	807	—	2.52	21.0
05	956	—	2.79	23.2	901	—	2.59	21.6
06	1097	—	3.01	25.1	997	—	2.74	22.8
07	1102	—	3.02	25.1	1065	—	2.92	24.3
08	955	—	2.62	21.8	941	—	2.58	21.5
09	1101	—	3.43	28.6	932	—	2.53	21.1
1910	1471	—	4.03	33.6	1434	—	3.99	33.2
11	1495	—	4.16	34.7	1390	—	4.04	33.7
12	1594	—	4.49	37.4	1613	—	4.53	37.7
13	1588	—	4.56	38.0	1523	—	4.51	37.6
14	1490	—	4.57	38.1	1377	—	4.36	36.3

SÖDERFORS IRONWORKS

367

Table 67. Earnings of Blast-Furnace Workers at Söderfors 1860—1914.

Year	Calciners				Keepers, top-fillers and calciners			
	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings	Annual earnings	Thereof value of benefits in kind	Daily earnings	Hourly earnings
	kronor	kronor	kronor	öre	kronor	kronor	kronor	öre
1860	266	93	0.82	6.8	289	89	0.94	7.8
61	304	138	0.99	8.2	332	127	1.09	9.1
62	383	171	1.26	10.5	450	156	1.50	12.5
63	374	117	1.25	10.4	453	108	1.38	11.5
64	295	112	1.07	8.9	338	97	1.18	9.8
65	328	81	1.03	8.6	400	68	1.27	10.6
66	283	104	0.98	8.2	299	96	1.03	8.6
67	315	101	1.12	9.3	355	92	1.20	10.0
68	402	192	1.36	11.3	470	186	1.52	12.7
69	446	152	1.28	10.7	562	160	1.68	14.0
1870	305	74	1.01	8.4	367	75	1.19	9.9
71	325	89	1.10	9.2	413	90	1.35	11.2
72	416	131	1.49	12.4	496	135	1.63	13.6
73	463	160	1.36	11.3	566	144	1.70	14.1
74	640	65	1.87	15.6	690	69	2.07	17.2
75	656	65	1.89	15.7	680	67	1.94	16.2
76	669	65	1.90	15.8	685	68	1.97	16.4
77	655	65	1.89	15.7	692	66	2.11	17.5
78	659	65	1.93	16.1	692	68	2.04	17.0
79	597	65	1.68	14.0	612	67	1.74	14.5
1880	621	65	1.72	14.3	641	67	1.78	14.8
81	594	65	1.70	14.2	614	66	1.76	14.6
82	593	65	1.71	14.2	619	67	1.77	14.8
83	622	65	1.72	14.3	644	67	1.78	14.8
84	631	65	1.73	14.4	663	66	1.82	15.1
85	635	65	1.74	14.5	673	73	1.85	15.4
86	628	65	1.73	14.4	673	73	1.85	15.4
87	602	65	1.65	13.8	635	73	1.79	14.9
88	531	52	1.55	12.9	562	58	1.65	13.8
89	624	50	1.71	14.3	651	60	1.80	15.1
1890	639	50	1.82	15.2	649	50	1.86	15.5
91	638	50	1.79	14.9	649	52	1.82	15.2
92	618	50	1.79	14.9	632	50	1.82	15.1
93	623	50	1.79	14.9	629	50	1.83	15.3
94	608	—	1.78	14.8	602	—	1.82	14.9
95	605	—	1.69	14.1	624	—	1.78	14.8
96	647	—	1.78	14.8	650	—	1.80	15.0
97	678	—	1.86	15.5	685	—	1.91	15.9
98	662	—	1.89	15.7	679	—	1.96	16.3
99	743	—	2.08	17.3	776	—	2.18	18.2
1900	686	—	2.05	17.1	723	—	2.20	18.3
01	766	—	2.25	18.7	852	—	2.45	20.4
02	835	—	2.39	19.9	879	—	2.55	21.3
03	800	—	2.24	18.7	886	—	2.50	20.8
04	810	—	2.24	18.7	834	—	2.40	20.1

Table 67. (Cont.). Earnings of Blast-Furnace Workers at Söderfors 1860—1914.

Year	Calciners				Keepers, top-fillers and calciners			
	Annual earnings kronor	Thereof value of benefits in kind kronor	Daily earnings kronor	Hourly earnings öre	Annual earnings kronor	Thereof value of benefits in kind kronor	Daily earnings kronor	Hourly earnings öre
1905	796	—	2.38	19.8	855	—	2.52	21.0
06	899	—	2.55	21.2	965	—	2.69	22.4
07	933	—	2.60	21.7	1008	—	2.79	23.2
08	848	—	2.32	19.3	892	—	2.44	20.3
09	986	—	3.29	27.4	1001	—	3.14	26.1
1910	1266	—	3.52	29.3	1349	—	3.74	31.1
11	1299	—	3.67	30.6	1363	—	3.86	32.2
12	1412	—	4.00	33.3	1497	—	4.23	35.2
13	1377	—	4.06	33.8	1456	—	4.27	35.6
14	1398	—	3.89	32.4	1414	—	4.15	34.5

Table 68. Earnings of all Workers at Söderfors. Cross-Section 1860.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
1) Blast-furnace.			
Blast-furnace foreman	1	368	91
Keeper	1	312	87
Helper	1	258	66
" (extra)	1	272	79
Top-fillers	2	287	87
Calciner	1	266	93
<i>Average</i>	7	293	84
2) Smiåhs.			
a) Anchor-master	1	648	130
Anchor-smith	1	275	75
Anchor-journeymen	3	266	76
Anchor-masters' helpers	8	252	82
<i>Average</i>	13	288	84
b) Lancashire foremen	4	559	97
Lancashire melters	6	463	78
Foreman's helpers	4	430	92
Melters' helpers	17	411	79
<i>Average</i>	31	443	83
<i>Average of a) and b)</i>	44	397	83

Tab. 68. (Cont.). Earnings of all Workers at Söderfors.
Cross-Section 1860.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
3) Engineering workshops.			
Blacksmith	1	257	72
Blacksmiths' helper	1	225	67
Nailsmith	1	230	64
Workshop's assistants	5	231	76
<i>Average</i>	8	234	73
<i>Average of 1)—3)</i>	59	362	82
4) Handicraftsmen.			
Horse-shoer	1	224	69
Brickmaker	1	219	69
Barge-builder	1	240	74
Bricklayers	2	210	72
Watchmen	2	195	64
Sawyers	2	224	86
Bargemen	7	251	81
<i>Average</i>	16	231	76
<i>Average of 1)—4)</i>	75	335	81
5) Charcoal-burners	11	325	75
6) Day-job labourers	21	210	68
<i>Agricultural labourers</i>	15	204	71
<i>Average of group 6</i>	36	207	69
<i>Average of all workers</i>			
a) per full-year worker	—	296	77
b) per individual	—	296	77

Table 69. Earnings of all Workers at Söderfors.
Cross-Section 1885.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
1) Blast-furnace.			
Foreman	1	947	70
Keeper	1	783	70
Top-fillers	2	690	70
Helpers	2	638	99
Coal-carters	4	615	65
Cinder-carters	2	361	59
Calcliner-foremen	2	684	70
Calcliners	8	604	65
Ore-washer	1	476	65
Crusher foreman	1	600	148
Crusher-tenders	3	495	65
Ore-breakers	3	610	49
Coal-screener	1	467	65
<i>Average per full-year worker</i>	32	596	69
<i> " individual</i>	—	538	63
2) Open-hearth.			
Melters	2	1376	120
Open-hearth workers	3	690	27
<i>Average per full-year worker</i>	5	1048	76
<i> " individual</i>	—	781	56
3) Lancashire.			
a) Shinglers			
Melters	38	834	66
Extra melters	3	548	62
Pig-iron weigher	1	742	65
Coal-carters	3	496	65
<i>Average per full-year worker</i>	47	822	71
<i> " individual</i>	—	780	67
b) Anchor-master			
Anchor-journeyman	1	593	70
Anchor-masters' helpers	3	481	60
<i>Average per full-year worker</i>	5	546	64
<i> " individual</i>	—	546	64
<i>Average of a) and b):</i>			
per full-year worker	—	794	70
per individual	—	758	67
4) Rolling-mill.			
Foremen	2	1535	129
Welders	2	1223	119
Heaters	2	880	115
Heaters' helpers	2	758	107

Table 69. (Cont.). Earnings of all Workers at Söderfors.
Cross-Section 1885.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
Breaking-down rollers	4	782	85
Catchers	4	760	83
Lever-men	4	616	58
Adjusters	2	707	57
Foreman-straighteners	2	533	50
Straighteners	6	395	50
Greasers	2	650	50
Firemen	2	539	62
Packer	1	648	65
Inspector	1	1438	238
Transport-workers	3	728	65
<i>Average per full-year worker</i>	39	734	71
<i>» individual</i>	—	734	71
5) Engineering workshops.			
Foreman blacksmith	1	1432	232
Blacksmiths	4	526	82
Blacksmiths' helpers	3	324	14
Lathe-hands	2	1017	166
Labourers	3	445	60
<i>Average per full-year worker</i>	13	617	87
<i>» individual</i>	—	570	81
<i>Average of 1)—5):</i>			
<i>per full-year worker</i>	141	725	72
<i>» individual</i>	—	685	68
6) Handicraftsmen.			
Carpenters	3	638	94
Carpenters' apprentice	1	274	50
Bricklayer	1	528	65
Ore-unloaders	2	937	65
Engineer	1	546	70
<i>Average per full-year worker</i>	8	642	75
<i>» individual</i>	—	642	75
<i>Average of all workers</i>			
<i>per full-year worker</i>	149	720	72
<i>» individual</i>	—	682	68

Table 70. Earnings of all Workers at Söderfors.
Cross-Section 1905.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
1) Blast-furnace			
Foreman	1	1334	190
Keepers	2	960	—
Top-fillers	2	757	—
Helpers	2	803	—
Coal-carters	4	789	—
Coal-screener	1	546	—
Pig-iron weigher	1	731	—
Calciner foremen	2	948	—
Calciners	11	787	—
Crusher-foreman	1	860	—
Crusher-tenders	4	688	—
Cinder-carters	2	770	—
Ore-unloaders	2	1160	—
<i>Average per full-year worker</i>	<i>35</i>	<i>827</i>	<i>6</i>
<i>• individual</i>	<i>—</i>	<i>779</i>	<i>5</i>
2) Open-hearth.			
Foreman	1	2587	190
Melters	4	1913	190
Helpers	14	1147	—
Gas-makers	4	1105	—
Ladle-men	4	1240	—
Sinkhead liner	1	1110	—
Steel-sorter	1	1030	190
Transport-workers	2	954	84
<i>Average per full-year worker</i>	<i>31</i>	<i>1279</i>	<i>47</i>
<i>• individual</i>	<i>—</i>	<i>1180</i>	<i>43</i>
3) Lancashire-works.			
Shinglers	2	1729	190
Melters	36	1235	—
Odd-job men	5	401	—
Coal-carters	2	994	—
Greasers	2	872	—
Foreman	1	639	39
<i>Average per full-year worker</i>	<i>48</i>	<i>1130</i>	<i>10</i>
<i>• individual</i>	<i>—</i>	<i>1024</i>	<i>9</i>
4) Foundry.			
Foremen	2	1765	190
Chargers	2	752	—
Moulders	26	1104	—
Helpers	3	1162	—
Trimmer	1	1332	—
Odd-job men	13	596	—
<i>Average per full-year worker</i>	<i>47</i>	<i>990</i>	<i>9</i>
<i>• individual</i>	<i>—</i>	<i>930</i>	<i>8</i>

Table 70. (Cont.). Earnings of all Workers at Söderfors.
Cross-Section 1905.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
5) Rolling-mill.			
Foremen	5	1845	190
Foreman-straighteners	2	1095	—
Welders	4	1534	—
Heaters	4	1194	—
Breaking-down roller	6	1168	—
Catchers	6	1184	—
Adjusters	4	1145	—
Lever-men	6	1106	—
Gas-makers	4	951	—
Pilers	4	1016	—
Inspector's helpers	6	892	—
Greasers	2	1160	—
Straighteners	6	927	—
Rolling-mill workers	11	600	—
• Weighers	2	1117	—
Ingot-weigher	1	883	—
Roll-turner	1	1132	40
Heating-furnace bricklayer	1	869	—
Inspector	1	1266	—
Transport-workers	4	1218	—
Packers	2	701	—
<i>Average per full-year worker</i>	82	1096	13
• individual	—	1040	12
6) Engineering workshops.			
Master-mechanic	1	1990	190
Foreman blacksmith	1	1170	180
Heaters	2	844	—
Anvil-smiths	6	935	—
Blacksmiths	9	1048	—
Vice-smiths	3	1078	—
Tool-makers	2	1005	—
Lathe-hands	13	1001	—
Anvil-hardeners	2	1394	—
Sheetmetal workers	5	742	—
Greasers	2	1045	—
Odd-job men	27	669	—
<i>Average per full-year worker</i>	73	893	5
• individual	—	856	5
7) Steel-bar works.			
Foreman	1	1790	190
Tilting-smiths	10	1393	54
Steel-weigher	1	1317	—
Steel-inspector	1	1221	—
Steel-shearer	1	1106	—
Heaters	8	607	—
Helpers	19	481	—

Table 70. (Cont.), Earnings of all workers at Söderfors
Cross-Section 1905.

Occupation	Number of workers	Total annual earnings kronor	Thereof value of benefits in kind kronor
Firemen	3	645	—
Chippers	3	890	—
<i>Average per full-year worker</i>	47	815	13
<i> " individual</i>	—	770	12
8) Crucible works.			
Foreman	1	2190	190
Crucible-maker	1	1450	190
Crucible-works employees	4	926	—
<i>Average per full-year worker</i>	6	1246	68
<i> " individual</i>	—	1160	63
9) Cleaning shop.			
Foreman	1	1600	190
Welder	1	1440	—
Heater	1	640	—
Sand-grinder	1	1295	—
Heavy scrap breaker	1	1413	—
Chippers and trimmers	21	742	—
Mould strippers	4	1011	—
<i>Average per full-year worker</i>	30	877	7
<i> " individual</i>	—	811	6
<i>Average of 1)—9):</i>			
<i>per full-year worker</i>	399	993	13
<i> " individual</i>	—	932	12
10) Handicraftsmen.			
Patternmaker foreman	1	1540	190
Patternmakers I	5	836	—
" II	5	301	—
Carpenters	3	631	—
Bricklayers	4	910	—
Odd-job men	4	441	—
<i>Average per full-year worker</i>	22	659	9
<i> " individual</i>	—	646	8
<i>Average of all workers</i>			
<i>per full-year worker</i>	421	975	13
<i> " individual</i>	—	917	12

SÖDERFORS IRONWORKS

375

Table 71. The Number of Days (24 hours) per Year during which the Different Departments at Söderfors have been in Operation 1860—1914.

Year	Blast-furnace ¹			Open-hearth works ²		Lancashire works ² days (24 hours) in operation	Rolling-mill ² days (24 hours) in operation
	Days (24 hours) in operation	Output of iron per day (24 hours) (tons)	Output of pig-iron during operation-period (tons)	Open-hearth furnace producing			
				6-ton days (24 hours) in operation	12-ton days (24 hours) in operation		
1860	93.5	7.1	662	—	—	—	—
61	113.0	7.3	821	—	—	—	—
62	159.5	9.4	1495	—	—	—	—
63	193.5	8.7	1691	—	—	—	—
64	126.5	8.8	1113	—	—	—	—
65	180.5	9.3	1662	—	—	—	—
66	76.5	8.3	635	—	—	—	—
67	109.5	9.6	1050	—	—	—	—
68	119.5	10.2	1227	—	—	—	—
69	224.5	9.9	2219	—	—	—	—
1870	143.5	9.6	1369	—	—	—	—
71	147.5	9.8	1436	—	—	—	—
72	224.0	9.7	2185	—	—	—	—
73	168.0	10.0	1668	—	—	—	—
74	252.0	9.2	2324	—	—	—	—
75	310.0	9.2	2841	—	—	—	—
76	312.0	8.9	2773	—	—	—	—
77	314.0	8.7	2746	—	—	—	—
78	294.0	9.6	2825	—	—	—	—
79	323.0	13.2	4263	—	—	—	—
1880	324.0	13.1	4229	—	—	—	—
81	300.0	13.8	4193	—	—	—	—
82	288.0	14.0	4026	—	—	—	—
83	357.0	13.5	4825	—	—	—	—
84	350.0	13.4	4679	—	—	—	—
85	363.0	13.2	4806	—	—	—	220
86	358.0	13.4	4783	—	—	—	268
87	364.0	13.7	4973	—	—	—	252
88	276.0	13.9	3844	—	—	—	202
89	308.0	13.7	4224	—	—	206	48 weeks
1890	297.0	12.6	3752	—	—	280	43 "
91	358.0	11.9	4262	—	—	50 weeks	50 "
92	362.0	13.2	4761	179	—	50 "	50 "
93	362.0	11.9	4295	218	—	284	50 "
94	280.0	12.1	3379	235	—	48 weeks	50 "

¹ Data up to 1903 are taken from *Hjalmar Braune, Om utveckling av den svenska masugnen* (On the development of the Swedish blast-furnace), *Jernkontorets annaler* 1904. For the period after 1903 particulars have been extracted from primary material at the archives of the Board of Trade.

² Data supplied by the ironworks.

Table 71 (Cont.). The number of Days (24 hours) per Year during which the Different Departments at Söderfors have been in Operation 1860—1914.

Year	Blast-furnace			Open-hearth works		Lancashire works (24 hours) in operation	Rolling-mill (24 hours) in operation
	Days (24 hours) in operation	Output of iron per day (24 hours) (tons)	Output of pig-iron during operation-period (tons)	Open-hearth furnace producing			
				6-ton days (24 hours) in operation	12-ton days (24 hours) in operation		
1895	317.0	14.4	4568	213	—	282	50 weeks
96	366.0	14.7	5385	227	—	269	274
97	367.0	13.7	5046	264	24	268	254
98	363.0	12.0	4349	177	171	273	280
99	365.0	14.1	5121	140	216	265	250
1900	286.0	11.9	3413	182	154	255	260
01	365.0	14.9	5454	149	174	256	217
02	365.0	16.6	6056	194	216	260	268
03	365.0	15.6	5685	132	222	260	250
04	366.0	14.7	5391	213	242	268	247
05	320.0	14.5	4652	220	243	264	248
06	364.0	15.6	5693	220	253	269	248
07	365.0	16.2	5911	238	239	270	47 weeks
08	140.0	13.4	1874	239	235	268	42 "
09	259.0	25.0	6471	171	220	264	192
1910	357.0	28.3	10099	258	247	262	253
11	254.0	27.4	6966	261	232	256	229
12	345.0	27.3	9416	270	261	245	263
13	282.0	27.1	7633	247	247	259	263
14	293.0	24.0	7037	234	256	205	222

2. MINING.

A. Blötberget Minefield.

The minefield at Blötberget owned by the Vulcanus Mining Company, is situated in the county of Kopparberg. Particulars of wages have been obtained as from 1901 and cover the period up to 1914. The material available consists of two payrolls, and from them extracts have been taken concerning a number of selected workers within the groups drillers, loaders and truckmen on the one hand, and on the other, in respect of all the workers employed in the minefield, divided into full-year workers and part-year workers. As regards the selected workers, it has not always been possible, on account of the nature of the material, to include the same workers for a long series of years. The table contains, besides the wage series for all workers,

Table 72. Annual Earnings (in kronor) of Workers at the Blötberget Minefield 1901—1913.

Year	Truckmen	All full-year workers		All workers combined	
		Number	Earnings	Number	Earnings
1901	858	73	868	125	857
02	894	95	893	151	848
03	959	128	945	216	868
04	931	149	987	231	922
05	933	161	999	249	941
06	945	168	1067	274	985
07	1041	176	1080	310	989
08	1179	218	1183	305	1122
09	984	164	1021	313	864
1910	1123	131	1304	240	1199
11	1058	148	1202	238	1158
12	1131	185	1229	282	1138
13	1223	170	1339	276	1242

only the truckmen series comprising two workers who have been employed throughout the entire period. With regard to the first series, we have grouped the workers, under the headings "full-year workers" and "part-year workers". The number of full-year workers, that is to say, those workers who, according to the wage books, have been employed during all the wage periods, during the period in question was 73—218, and that of the part-year workers 78—270. Using the particulars given for each worker as to the number of wage periods during which the worker was employed, we have converted part-year workers into full-year workers and have produced a series for the entire number of workers, 125—313, converted into full-year workers.

As the table shows, the annual earnings of the real full-year workers are, taking the average for the period, 22 % higher than the average earnings in respect of the entire labour personnel.

Production was restricted during the months of August and September 1909, this affecting all workers with the exception of 46, who were fully employed throughout the year.

As to the number of hours of work per day and week, we have received the following information, applying to the whole period and covering the net working time: workers underground, except mine-constructors and pump-hands, 47 hours a week; pump-hands and mine-constructors 48 hours (excl. time spent in ascending and descending); ore-pickers 47 hours; windlassmen 53 hours; compressor-minders 10 hours a day; workers at the enrichment works up to January 1, 1904 68 hours a week, after that date 48 hours; workers in the workshops 60 hours; other workers above-ground from

February 1, to March 15, 9 hours a day, from March 16, to October 15, 10 hours, from October 16, to January 31, 8 hours, or, on an average, 9.3 hours a day.

Prior to 1915 firewood used to be sold to the workers, though not to any very great extent, through the intermediary of the concern. It is probable that by this means the workers paid a lower price for their fuel than if they had bought it on their own account. The value of this benefit cannot however be stated. The concern let out a few apartments (about 10 in all) comprising 1 room and kitchen at a low rent (about 60 kronor *per annum.*).

B. Nora Bergslag's Joint Mining Administration.

Of the concerns that are associated with the Nora Bergslag's joint mining administration, Striberg, Dalkarlsberg and Timansberg are represented in the investigation.

Concerning *Striberg* there have only been furnished particulars of the daily wage rates. Thus, particulars have been available regarding the ordinary summer and winter daily wage rates paid to mine-workers during the period 1860—1875. Further, weighted daily wage rates have been computed from the annual records showing the number of day-jobs and applying to all work performed, with the exception of the task of breaking the ore and transporting it, and the total paid in wages therefore. Similar weighted daily wage rates are worked out for the period 1860—1867. In all years the average daily wage rates are far higher than the average of the summer and winter standard daily wage rates. It has been impossible to determine whether the weighted daily wage rates actually correspond to the average daily earnings during the respective years or whether this average merely indicates the average income on work done on a time-wage basis. The change that the typical daily wage rates underwent in the beginning of the seventies is of interest. In 1872 the winter daily wage rate was 80 öre and the summer daily wage rate 100 öre. During 1873 the former rate was 140 öre and the latter 150 öre, so that the winter daily wage rate had gone up by no less than 75 % and the summer daily wage rate by 50 %. Up to 1874 the winter rate showed a further rise, this time 7 %, while there was no change in the summer rate, with the result that the winter and summer daily wage rates then stood at the same level. After that comes a fall up to 1875, the former rate declining 28 % and the latter 17 %.

Dalkarlsberg has furnished one series of annual earnings and several series of daily earnings. The annual earnings' series extends from 1860 to 1902, with the exception of 1880, for which year no data are available. For the years prior to 1880 the earnings reported give the annual average for the entire staff of workers

employed at the mine, but for the years subsequent to 1880 only the miners proper who have been in employment throughout the whole year have been included in the series. The result is that the earnings prior to and those subsequent to 1880 are not directly comparable. Particulars regarding the number of workers included are available only for 1860 and 1872, being in those years 60 and 140 respectively.

From the year 1895 the particulars of earnings are derived from a different source from those furnished in respect of earlier years. Nevertheless, they are based on the same principle as before, namely, the inclusion of only those workers that were employed throughout the whole year. From 1894 to 1895 the earnings decline from 610 to 528 kronor. It has not been possible to ascertain whether this fall in wages is real or merely due to a difference in the selection of workers. After 1895, therefore, the annual earnings have been dealt with as a separate series.

The earnings shown in this series are on about the same level for the different years during the first half of the sixties, but from 1864 onwards they show a rising tendency up to 1868, by which year they have risen 24 %. Then follow once more a number of years in which the wages show no movement. Between 1871 and 1873 occurs a rapid rise, the earnings increasing during this period from 520 kronor to 750 kronor, that is to say by 44 %. From 1873 to 1879 the wages experience a heavy fall, in 1873—1875 a decline of 31 % and in 1875—1879 23 %, i. e. 47 % within that whole period. During the years 1881—1894 the wages range between 500 and 600 kronor. From 1895 they show a steady increase, rising 43 % between 1895 and 1900 and 2 % between 1900 and 1902.

The records for the years 1881—1902 provide particulars of the total number of day-jobs carried out by the mine-workers each year, usually about 10,000, as well as of the corresponding wages paid for the work. The majority of the workers who performed day-jobs seem to have held cotters' tenures. For this and other reasons the daily wage rate computed on this basis certainly cannot correspond to the total daily earnings.

From the auditors' reports have been extracted for Dalkarlsberg the number of day-jobs and the wages paid for them under different headings: shaft-driving, "coffin"-work, etc. The series published covers the years 1904—1915 and refers to the average wage rate *per diem* paid for all work done at the mine-field.

From the same source data have been provided also for *Timansberg* regarding the number of day-jobs and the total wages paid during the years 1904—1915.

With regard to the number of hours of work *per annum* and *per diem*, and benefits in kind accruing to the workers at these mines, we have only succeeded in obtaining verbal information, furnished

Table 73 a. Annual Earnings and Daily Wage Rate (in kronor) of Workers at Striberg 1860—1875.

Year	Average of winter and summer daily wage rates	Average daily wage rate	Year	Average of winter and summer daily wage rates	Average daily wage rate
1860	0.93	1.34	1868	0.81	—
61	1.18	1.40	69	0.81	—
62	0.92	1.32	1870	0.83	—
63	1.06	1.29	71	0.81	—
64	0.90	1.27	72	0.90	—
65	0.90	1.26	73	1.45	—
66	0.81	1.30	74	1.50	—
67	0.90	1.27	75	1.16	—

Table 73 b. Annual Earnings and Daily Wage Rate (in kronor) of Workers at Dalkarlsberg 1860—1915.

Year	Annual earnings	Daily wage rate	Year	Annual earnings	Daily wage rate
1860	440	—	88	532	1.14
61	420	—	89	527	1.18
62	420	—	1890	579	1.27
63	420	—	91	517	1.24
64	410	—	92	547	1.27
65	430	—	93	610	1.26
66	450	—	94	610	1.30
67	480	—	95	528 ¹	1.30
68	510	—	96	572	1.31
69	500	—	97	598	1.35
1870	500	—	98	631	1.37
71	520	—	99	670	1.49
72	650	—	1900	755	1.51
73	750	—	01	764	1.56
74	650	—	02	766	1.72
75	520	—	03	—	—
76	500	—	04	—	2.63
77	470	—	05	—	3.05
78	450	—	06	—	3.09
79	400	—	07	—	3.54
1880	—	—	08	—	3.36
81	541	1.11	09	—	3.26
82	576	1.17	1910	—	3.55
83	572	1.20	11	—	3.41
84	554	1.28	12	—	3.52
85	595	1.29	13	—	3.28
86	537	1.33	14	—	4.02
87	499	1.26	15	—	3.98

¹ Change of selected workers.

Table 73 c. Daily Wage Rate (in kronor) of Workers at Timansberg 1904—1915.

Year	Daily wage rate	Year	Daily wage rate
1904	2.14	1910	3.33
05	2.20	11	3.57
06	2.48	12	3.48
07	2.85	13	3.51
08	2.98	14	3.52
09	3.23	15	4.29

us by former employees and foremen at the works. This information applies equally to Striberg, Dalkarlsberg and Timansberg.

Throughout the period 1860—1880 the number of hours of work *per diem* was 10 for all categories of workers. From 1880 to 1885 all workers, mine-constructors, ore-loaders, etc., with the exception of drilling-machine workers with their mates (boys), worked 9 hours a day, and after 1885 8 hours. In regard to the ore-loaders, however, it should be observed that for a long time past their hours of work might show very considerable variation: from 6 to 10 or 12 hours, as these workers were usually engaged on a piece-work basis, that is to say, they had to load a given number of tons per shift. The drilling-machine workers and their mates worked during the period 1880—1895 in two alternating sets of shifts with three shifts each working 8 hours out of the 24, i. e. 12 hours per worker per 24-hour day.

C. Norberg Minefield.

The Norberg Mines consist of a fairly large ore-field, belonging to various concerns, but managed by a common administration. The workers concerned in this investigation have been employed in the Mossgruvan, the largest of the mines employing on an average some 30 workers. Up to the year 1875 all the workers were registered as "miners", but from that year they were divided into different specific occupations. Series of wages have been computed for the period 1860—1875 and for the period after 1875 up to 1914. For the earlier years, 1860—1875, 3 workers have been selected, and for the other years 2 workers have been selected within each of the occupational groups drillers and loaders. The fact that the system of grouping according to occupations was not introduced until 1875 is due to the methods of work. First the worker blasted and broke up the rock for a

few days, and then he loaded the ore and conveyed it to the surface. During the earlier period the wages earned during the year are accounted for in respect of each worker as one single total without any specification of different wage items and without any time data whatsoever being recorded. The differences between the wages of the three selected workers are generally small, but the workers were frequently replaced in the series by others.

From the year 1875 there are available monthly particulars concerning each selected worker in regard to the amount of wages earned on piece-work and on time-wage work, and also the number of hours spent on the latter. Whether however as regards the years subsequent to 1875 the selection of workers has throughout been the best possible is very much open to doubt, seeing that in the course of the different months of the year the replacement of workers in the series was frequent. It has been difficult to determine the value of the figures relating to the annual earnings thus obtained. During the first few years after the occupations began to be specified the wages stand at practically the same level. In spite of the subsequent splitting up of the wages, we nevertheless find that the trend of wages is uniform throughout, a fact that justifies the striking of an average between the two occupational categories drillers and loaders as a continuation of the wage series relating to "miners".

Cross-sections have been worked out for the years 1885 and 1905 embracing *all* the workers in the Mossgruvan mine. We find that the earnings as measured by the average series for the selected workers are respectively 5 % and 9 % higher than the average earnings of miners according to the cross-section.

At several points during the period we see that for some reason or other, to judge from the figures relating to earnings, work was at a standstill. Thus, drilling work was restricted in 1880 during the autumn months, as also during 1882, the last quarter of 1890, December of 1891, the first four months of 1892, September, October and November of 1896, June and July of 1903 and August and September of 1909. Certain of these periods of stagnation apply throughout to both occupational groups, others not. For instance, loading work was suspended in September 1880, December 1886, December 1891, the first quarter of 1892, July, August and September 1896, October 1898, June—September 1903 and August and September 1909.

Prior to 1875 the concern purchased the ordinary necessities, which were then retailed to the workers without profit to the concern. Upon the establishment of the local cooperative shop in 1875 the concern ceased its retail selling. During the years 1880—1885 were built the first workmen's dwellings at the concern's expense. The amount paid in rent, which remained constant right up to 1914, was 1.75 kronor per month for one room

Table 74. Annual Earnings (in kronor) of Workers at Norberg Minefield 1860—1913.

Year	Drillers	Loaders	All mine-workers	Year	Drillers	Loaders	All mine-workers
1860	—	—	502	1890	519	722	621
61	—	—	521	91	607	601	604
62	—	—	517	92	501	505	503
63	—	—	460	93	753	609	681
64	—	—	456	94	768	571	670
65	—	—	536	95	662	555	609
66	—	—	497	96	443	423	433
67	—	—	498	97	718	634	676
68	—	—	570	98	843	677	760
69	—	—	566	99	950	738	844
1870	—	—	601	1900	987	672	830
71	—	—	603	01	880	741	811
72	—	—	595	02	909	783	846
73	—	—	1093	03	768	544	656
74	—	—	1191	04	878	776	827
75	613	591	602	05	802	734	768
76	585	584	585	06	885	742	814
77	524	654	589	07	832	747	790
78	531	558	545	08	820	944	882
79	474	485	480	1909	726	927	827
1880	508	518	513	10	950	1127	1039
81	598	603	601	11	1372	986	1179
82	593	572	583	12	1267	995	1131
83	585	682	634	13	1287	1065	1176
84	687	775	731				
85	613	727	670				
86	546	564	555				
87	526	562	544				
88	449	495	472				
89	505	599	552				

and 3.25 kronor for two rooms. As a rule the workers owned a potato patch. Each worker received free medical services both for himself and his family, as well as free medicine for his own use.

According to verbal information, the number of hours of work per day was in 1875 9—10, in 1885 9—9¹/₂ and in 1890 8—8¹/₂. The workers were however to a certain extent free to decide how many hours they wished to work per day.

Most of the income was earned on piece-work, so that it would be of little interest to compute the earnings per hour. Each miner who had been employed throughout the year and had duly performed the task allotted to him during that period received at the end of the year a bonus of 2 % of his earnings. The substantial rise in wages from 1872 to 1873 and 1874 is not due to a replacement of workers in the records but is found to apply to each one of the selected workers. Machine-drills were introduced in September

1910. From 1910 to 1911 the earnings of loaders fell 13 %, while those of drillers rose by no less than 44 % during the same years.

D. Rällingsberg Mine.

The Rällingsberg Mine is situated in the district of Husby, in the county of Kopparberg.

Wage series have been worked out for foremen miners, drillers, as well as for loaders and winders. The series continue uninterrupted through the period 1880—1909.

The wages of foremen miners remain constant for lengthy periods. Thus, from 1880 right up to 1901 the wages were more or less constant at 1,500 kronor with the exception of the year 1891, when a break in the wage curve occurs owing to replacements of workers in the series. In 1901 and 1902 they rise, after that remaining steady at 1,800 kronor up to 1906. They then rise in 1906 and 1907 to 2,400 kronor, subsequently remaining constant.

The drillers series, like the loaders series, comprises as a rule 4 workers. Only such workers are included as were employed for the full year of 300 days. Such replacements as have occurred in this series are apparently satisfactorily effected and the series is quite homogeneous.

The annual earnings of the loaders are at first on about the same level as the drillers'. From 1884 the difference in wages widens, reaching the maximum in 1887, when the drillers' annual earnings are 53 % above those of the loaders and winders. By the following year, 1888, the difference has again become normal (7 %). In the year 1892 there is a complete replacement of workers in the series. Wages drop simultaneously 16 % from 1891 to 1892. Whether this decline is significant or only due for the most part to the replacement of workers cannot, in this case, be decided. From 1898 the gap between loaders' and drillers' earnings again widens, the maximum being reached in 1907 with a difference of 54 %.

As to the trend of wages, we find that these series have much in common. Thus, the earnings rise right up to the middle of the eighties, after which there is a fall, the lowest level being reached in 1887 in the case of the loaders and in 1888 in that of the drillers. The subsequent rise in wages continues until the first years of the nineties, when it is broken by a sudden depression in the curve, which continues up to 1899. From 1899 to 1900 the earnings of both drillers and loaders increase, the former's by 25 % and the latter's by 13 %. After an interruption in 1902 the earnings continue to rise year by year up to 1908. During the year 1909 work went on on only 285 days owing to the general strike that year, and the earnings were accordingly lower in proportion.

Table 75. Annual Earnings (in kronor) of Drillers and Loaders at Rällingsberg Mine 1880—1909.

Year	Drillers	Loaders	Year	Drillers	Loaders
1880	628	568	1895	596	553
81	664	594	96	605	573
82	686	669	97	651	639
83	724	670	98	681	626
84	655	672	99	703	589
85	681	554	1900	879	664
86	618	486	01	859	691
87	589	384	02	791	654
88	484	454	03	874	671
89	633	560	04	848	664
1890	702	635	05	872	680
91	678	715	06	951	650
92	708	600	07	1030	671
93	593	559	08	1042	708
94	574	555	09	861	641

I. Falu Copper Mine.

Falu Mine, situated within the boundaries of the city of Falun in the county of Kopparberg, is owned by Stora Kopparbergs Bergslag, the oldest existing company in Sweden and probably the oldest existing industrial corporation in the world. In all probability its origin dates back more than 600 years. The original object of the company was to work the then rich copper mine at Falun. Nowadays the production of copper at the Falu Mine plays only a small part, but for two hundred years, up to as late as 1750, the Falu Mine was the biggest copper-producing mine in the world.

The wage data obtained have been taken from the payrolls preserved in the archives of the Bergslag in Falun, covering the period 1830—1914. The wage periods throughout the year were 13 in number, each period covering 4 weeks, an exception however being the year 1876, which comprised 15 pay-periods owing to the concern's changing over from mining years to calendar years. Allowance has been made for this in the calculations. From 1902 the wages were paid monthly.

The wage series, which are only published as from the year 1860, relate to the occupational groups miners and shaft-house workers. By "miners" is meant workers who are employed on the "rock", i. e., those who have had to do with the actual "getting" of the ore. The shaft-house workers, also called "shaft-head boys", worked alternatively for two weeks down in the mine at loading the broken rock into barrels, and for two weeks above-ground receiving the rock as it was conveyed to the surface.

The miners' series related to 4 workers, in respect of each one of which particulars have been obtained as to the amount earned during the year, the number of pay-days and, for certain years, the actual working time, which with the exception of the years 1913 and 1914, when it was recorded in hours, was expressed in days. It has thus been possible to work out the exact daily earnings for the periods 1863—1870 and 1889—1912, and exact hourly earnings for the years 1913 and 1914. For other years the daily earnings have been computed on the basis of the number of pay-days and the normal number of hours worked per wage period. The workers concerned are as a rule on the same wage level, but owing to the frequent occurrence of replacements of workers in the records the material is not entirely satisfactory. Thus, there is a complete simultaneous replacement of workers between the years 1869 and 1870, 1873—1874, 1876—1877, 1890—1891, 1899—1900, 1907—1908, 1908—1909. On such occasions there is always a risk that workers may have been taken into the series whose wage standard is different from that of their predecessors.

The shaft-house workers' series, like the miners' series, consists of 4 selected workers. The number of days worked *per annum* are recorded for the shaft-house workers only for the years 1908—1913. The calculation of exact daily earnings has therefore only been possible in respect of those years, and the daily earnings for earlier years have as far as this group is concerned, not been computed. In 1914 the working time was recorded in hours. Prior to 1908 the number of actual wage periods was, as in the case of the miners, stated in respect of each worker. In this series also, replacements of three or all workers occurred often, which lessens the value of the series. Workers were thus exchanged between the periods 1863—1864, 1864—1865, 1865—1866, 1867—1868, 1869—1870, 1871—1872, 1873—1874, 1881—1882, 1884—1885, 1890—1891, 1899—1900, 1909—1910. Usually, however, the workers included in the series are on the same wage level. On several occasions replacements of all or practically all the workers took place simultaneously in the two series.

Benefits in kind have for the most part consisted only of free medical services and medicine and a reduced price for rye, the latter benefit being granted until the year 1867. In order to estimate the value of this benefit extracts have been made covering the withdrawals of rye on the part of workers included in the series in the course of different years. The miners appear to have been entitled to 13 such withdrawals *per annum*, while the shaft-house workers were only allowed to make 12 withdrawals. The withdrawal fixed for an unmarried worker was 16 cans, for man and wife together 24 cans and for every child 4 cans, making 208 cans or 5.4 hectolitres *per annum* for an unmarried miner, 312 cans or 8.1 hl. for a married worker, and 52 cans or 1.4 hl. for

Table 76. Annual and Daily Earnings (in kronor) of Workers at Falu Mine 1860—1914.

Year	Annual earnings			Daily earnings	
	Miners	Shaft-house workers	Average	Miners	Shaft-house workers
1860	593	558	576	2.18	—
61	580	547	564	2.13	—
62	625	525	576	2.30	—
63	731	539	635	2.74	—
64	740	673	707	2.66	—
65	714	604	659	2.65	—
66	761	606	684	2.68	—
67	729	552	641	2.56	—
68	698	529	614	2.41	—
69	682	568	625	2.42	—
1870	718	585	652	2.47	—
71	728	506	617	2.68	—
72	721	537	629	2.71	—
73	825	658	742	3.07	—
74	843	795	819	3.10	—
75	899	830	865	3.44	—
76	721	853	787	2.68	—
77	670	792	731	2.46	—
78	538	766	652	1.98	—
79	598	765	682	2.20	—
1880	561	685	623	2.06	—
81	570	691	631	2.10	—
82	632	743	688	2.32	—
83	627	715	671	2.30	—
84	677	629	653	2.49	—
85	642	737	690	2.36	—
86	643	749	696	2.36	—
87	575	672	624	2.12	—
88	550	524	537	2.02	—
89	558	638	598	2.02	—
1890	593	705	649	2.19	—
91	615	765	690	2.20	—
92	632	799	716	2.24	—
93	613	791	702	2.19	—
94	620	829	725	2.23	—
95	583	826	705	2.18	—
96	613	816	715	2.29	—
97	595	848	722	2.16	—
98	673	914	794	2.39	—
99	772	1038	905	2.69	—
1900	751	992	872	2.70	—
01	760	1013	887	2.79	—
02	712	1108	910	2.53	—
03	711	1131	921	2.71	—
04	812	1161	987	2.93	—

Table 76. (Cont.). Annual and Daily Earnings (in kronor) of Workers at Falu Mine 1860—1914.

Year	Annual earnings			Daily earnings	
	Miners	Shaft-house workers	Average	Miners	Shaft-house workers
1905	879	1217	1048	3.22	—
06	941	1132	1037	3.43	—
07	1166	1088	1127	4.29	—
08	1356	1204	1280	5.12	4.42
09	789	597	693	4.15	4.42
1910	—	1150	1150	4.66	3.93
11	1282	1104	1193	4.88	3.97
12	1286	1208	1247	4.80	4.29
13	1281	1316	1299	4.82 ¹	4.44
14	1449	1046	1248	5.16 ²	3.68 ³

every child; for an unmarried shaft-house worker 192 cans or 5 hl., for a married worker 288 cans or 7.5 hl., and for every child 48 cans or 1.2 hl. During the period here in question the reduced price was fixed at 19 öre per can of 2.6 litres. The difference between the value of the withdrawal at the market price and at the reduced price represents the value of the benefit, which is embodied in the earnings.

Free housing was only granted to foremen and those in a similar position. A contribution towards house-rent was paid during the years 1906—1908, the arrangement being that the benefit of free medical services and free medicine was waived and the workers were granted a sum of money instead, as a contribution towards rent.

As to the number of hours of work *per diem*, only a few scattered data have been available. The miners for instance are stated to have worked in 1876 in two shifts during the day, each working for 8 hours. One shift worked from 6 a. m. to 2 p. m. and one from 2. p. m. to 10 p. m. In the following year the number of hours of work seems to have been increased from 8 to 9 per shift.

J. Ämmeberg Zinc Mine.

By far the most abundant zinc resources in Sweden, those contained in the mine at Ämmeberg, are owned by the Belgian Company "La Société des mines et fonderies de zinc de la Vieille Montagne". The ore-mine, situated in Örebro County, was purchased by the concern in the fifties, and by the end of the year 1862 the

¹ 60.2 öre per hour. — ² 64.5 öre per hour. — ³ 46.0 öre per hour.

most important constructional work was accomplished. The broken ore (sphalerite) is partially roasted, after which it is exported to Belgium for further refining.

The extracts from the payrolls start with the year 1860 as far as workers in the mine are concerned, with 1863 in respect of ore-washers and with 1865 in respect of workers in the roasting-works; they cover the period up to 1915. These extracts give particulars of the number of workers employed by the concern during the years in question, the total number of day-jobs performed by these workers, and the total sum paid in wages during each year. The number of workers recorded is the average number during a year. The recorded number of day-jobs comprises partly those day-jobs carried out during the regular hours of work, and partly those done as overtime. Overtime work was paid for at a rate 50 % higher than that for ordinary work. Each overtime job representing the same number of hours' work as an ordinary day-job was accounted for in the books as $1\frac{1}{3}$ ordinary day-job. The recorded number of day-jobs is therefore too high. It has not been possible to obtain any particulars as to the existence of overtime work. By dividing the total amount of wages by the total number of day-jobs, we thus get an average daily wage rate paid for the regular hours of work.

The mine-workers are divided into following occupational groups: foremen (2—7 workers), drillers (about 150—200 workers), smiths (10—24 workers), and miners (about the same number as the drillers). The wage series in regard to foremen has not been published on account of the dissimilarity of the wage-variations between this and other series. The wages of smiths and miners are on about the same level, the drillers are somewhat above the other two, though later on they gradually approach more closely to the first-mentioned categories. The variations are on the whole the same for all series.

As regards the washery, wage series have been worked out for the following categories: foremen (2—4 workers), crusher tenders (7—34 workers), ore-washers (about 50—100 workers) and greasers (2—4 workers). Of these occupations are published series relating to crusher tenders from 1875, and to ore washers from 1865, as being the most representative groups in the washery. For the latter occupational category has been taken, as far as the daily earnings are concerned, the exact daily wage paid to fully competent workers, as the averages include a varying number of non-adult workers; this apparently applies also to the crusher tenders (observe the considerable variations in the wages from year to year).

The low annual earnings during the years 1876, 1878, 1881 and 1883 are due to shorter working time than that recorded for the adjacent years. As the published tables show, the daily earnings are not exposed to such variations.

In the roasting-works a distinction is made between the categories "calciners" and "workers." The number of "calciners" is generally about 100, while that of the "workers" is only about one-fifth of that number. Up to 1888 the wage series are not very reliable; the number of workers varies considerably, as also the number of working days, the movements of the different wage curves are not the same, etc. For these reasons the earliest year for which series are published is 1889, from which year the agreement exhibited by the trend of wages is, as the tables show, very close. The daily earnings are, however, published as from the years 1865.

Foremen were allowed free firewood. The concern provided dwellings for the workers at a rental corresponding to half that prevailing in the locality. This benefit has always existed and is still operative at the present day. Workers who build a home of their own are granted by the concern a loan of up to 2 000 kronor, on which they pay 2 % interest. Workers who are declared by a physician to be unfit for work receive for 30 years of service an annual pension of Kr. 268: 10, with an additional Kr. 7: 56 for each year of service over 30, this pension being increased in 1906 to Kr. 450: — on completing 30 years' service. Both the worker and his family receive free medical treatment and medicine. The concern also contributes towards funeral expenses.

Up to 1885 the mine-workers worked 10 hours a day, and after that year 8 hours. In the roasting-works the men worked in 12-hour shifts (the effective hours of work being $7\frac{1}{2}$ —8) up to November 1, 1891, when the system was introduced of 8-hour shifts with three alternating sets of workers (about $6\frac{1}{2}$ hours' effective working time). In the other departments the number of hours worked a day was 12, including 2 hours for meals, up to the time of the introduction of the obligatory 8-hour day.

ÄMMEBERG ZINC MINE

391

Table 77. Annual Earnings (in kronor) of Workers at Ammeberg Zinc Mine 1861—1914.

Year	The mine			The washery		The roasting-work		Average
	Drillers	Smiths	Workers	Crusher tenders	Ore washers	Calciners	Workers	
1861	571	286	306	—	—	—	—	434
62	661	340	337	—	—	—	—	495
63	534	345	353	—	—	—	—	444
64	517	284	398	—	—	—	—	451
65	495	381	343	—	331	—	—	425
66	473	355	354	—	324	—	—	417
67	477	359	365	—	323	—	—	424
68	493	344	341	—	306	—	—	415
69	509	419	344	—	317	—	—	431
1870	512	390	329	—	334	—	—	428
71	613	475	357	—	339	—	—	485
72	762	471	386	—	383	—	—	563
73	787	467	422	—	401	—	—	590
74	773	651	449	—	390	—	—	607
75	744	713	578	778	421	—	—	655
76	761	686	600	522	303	—	—	625
77	791	682	574	596	382	—	—	648
78	783	606	600	476	323	—	—	634
79	756	663	541	580	368	—	—	618
1880	868	692	620	813	454	—	—	721
81	787	590	583	599	353	—	—	637
82	804	659	616	875	464	—	—	701
83	808	657	624	646	402	—	—	677
84	790	669	636	640	551	—	—	707
85	760	720	628	653	506	—	—	688
86	808	695	629	560	473	—	—	790
87	715	687	620	559	486	—	—	656
88	723	645	567	622	406	—	—	626
89	774	655	596	694	406	786	648	660
1890	767	680	594	681	464	827	726	680
91	794	688	628	672	451	824	693	691
92	828	690	619	694	512	797	670	701
93	807	701	614	635	472	763	754	683
94	819	664	630	634	460	802	719	693
95	824	682	637	681	481	—	—	704
96	840	690	657	637	451	801	726	705
97	869	679	648	725	471	784	716	713
98	861	685	649	737	484	807	725	719
99	875	667	660	825	477	836	767	735
1900	896	712	677	756	511	879	806	759
01	814	722	588	773	495	885	794	716
02	886	717	700	744	514	881	819	764
03	892	679	696	740	512	878	877	764
04	915	731	706	747	506	892	871	777
05	931	720	697	736	520	885	917	781
06	970	803	735	805	550	942	905	823
07	995	919	814	811	584	962	906	864
08	990	906	815	835	580	977	927	867
09	962	941	813	829	586	978	995	866
1910	998	937	848	874	598	985	1034	890
11	1088	1058	945	952	663	1025	1087	968
12	1089	1082	968	919	658	1082	1054	982
13	1059	1060	952	951	665	1077	1082	973
14	1003	952	891	896	739	1022	1154	939

Table 78. Daily Earnings (in kronor) of Workers at Ämmeberg Zinc Mine 1860—1914.

Year	The mine			The washery		The roasting-work		Average
	Drillers	Smiths	Workers	Crusher tenders	Ore washers	Calciners	Workers	
1860	1.61	1.08	1.19	—	—	—	—	1.44
61	1.94	1.05	1.29	—	—	—	—	1.64
62	2.20	1.13	1.23	—	—	—	—	1.74
63	1.92	1.12	1.20	—	—	—	—	1.60
64	1.75	1.11	1.27	—	—	—	—	1.54
65	1.65	1.13	1.25	—	1.22	1.83	1.75	1.49
66	1.62	1.16	1.19	—	1.21	1.89	1.65	1.48
67	1.65	1.17	1.16	—	1.17	1.84	1.67	1.46
68	1.65	1.18	1.14	—	1.10	1.97	1.67	1.47
69	1.67	1.23	1.18	—	1.12	2.11	1.80	1.53
1870	1.69	1.23	1.15	—	1.12	1.99	1.78	1.51
71	2.17	1.43	1.28	—	1.30	2.19	1.87	1.74
72	2.57	1.52	1.41	—	1.40	2.32	2.00	1.94
73	2.74	1.61	1.54	—	1.40	2.35	1.98	2.04
74	2.73	2.04	1.65	—	1.40	2.43	2.02	2.09
75	2.67	2.23	1.98	1.90	1.40	2.34	—	2.12
76	2.59	2.26	2.15	1.84	1.50	2.35	1.84	2.13
77	2.65	2.25	2.11	1.94	1.50	2.41	1.83	2.15
78	2.73	2.26	2.06	1.88	1.50	2.40	1.82	2.17
79	2.63	2.15	1.87	1.90	1.50	2.40	1.84	2.09
1880	2.63	2.10	2.00	1.88	1.50	2.45	1.81	2.14
81	2.65	2.09	2.45	2.03	1.50	2.46	1.72	2.25
82	2.73	2.13	2.07	2.25	1.50	2.48	1.81	2.21
83	2.70	2.14	2.09	2.15	1.50	2.49	1.88	2.21
84	2.70	2.14	2.09	2.16	1.50	2.48	1.82	2.23
85	2.62	2.18	2.13	2.04	1.50	2.53	1.90	2.24
86	2.76	2.19	2.10	1.96	1.75	2.52	1.97	2.26
87	2.54	2.20	2.02	1.92	1.75	2.51	1.96	2.17
88	2.49	2.01	1.89	2.12	1.75	2.44	2.14	2.11
89	2.63	2.12	2.06	2.28	1.75	2.49	2.01	2.20
1890	2.62	2.16	2.06	2.23	1.75	2.53	2.06	2.23
91	2.70	2.18	2.08	2.21	1.75	2.50	2.08	2.26
92	2.76	2.21	2.09	2.21	1.75	2.47	2.08	2.28
93	2.70	2.18	2.11	2.05	1.75	2.47	2.10	2.25
94	2.77	2.19	2.13	2.13	1.75	2.47	2.14	2.27
95	2.77	2.22	2.18	2.12	1.75	2.45	2.19	2.21
96	2.80	2.22	2.19	2.23	1.75	2.47	2.15	2.30
97	2.84	2.30	2.19	2.27	1.75	2.47	2.21	2.32
98	2.87	2.22	2.16	2.30	1.75	2.47	2.19	2.32
99	2.93	2.23	2.23	2.62	1.75	2.61	2.30	2.41
1900	3.00	2.34	2.26	2.48	2.00	2.70	2.40	2.47
01	2.95	2.32	2.35	2.55	2.00	2.70	2.38	2.48
02	2.98	2.29	2.36	2.45	2.00	2.71	2.44	2.49
03	2.99	2.35	2.34	2.39	2.00	2.71	2.62	2.50
04	3.05	2.35	2.36	2.40	2.00	2.71	2.67	2.52
05	3.14	2.36	2.32	2.44	2.00	2.71	2.77	2.55
06	3.25	2.61	2.43	2.50	2.00	2.90	2.63	2.66
07	3.33	2.90	2.67	2.56	2.25	3.03	2.62	2.79
08	3.29	2.96	2.73	2.63	2.25	3.03	2.78	2.81
09	3.22	2.99	2.71	2.64	2.25	3.02	2.95	2.80
1910	3.32	2.96	2.81	2.64	2.25	3.04	2.97	2.85
11	3.60	3.25	3.22	2.88	2.50	3.25	3.17	3.12
12	3.61	3.27	3.25	2.83	2.50	3.32	3.08	3.15
13	3.64	3.19	3.24	2.93	2.50	3.32	3.20	3.18
14	3.83	3.26	3.30	2.86	2.50	3.40	3.26	3.27

METAL MANUFACTURING AND ENGINEERING
(CHAPT. V).

A. Carl Gustav's Stads Small Arms Factory.

Series of wages have been constructed in respect of the tool-makers (4—6 selected workers during the years 1876—1890 and 10 during the years 1891—1910) and vice-hands (10 selected workers). The payrolls contain only particulars of monthly earnings, no data being given as to working time, so that it has only been possible to compute the annual earnings. There is often a fairly wide variation between the wage levels of the different workers, with the result that the absolute level of the average earnings is in many cases uncertain. Below a comparison is made between the series of selected workers and the cross-sections for 1885 and 1905.

1885.

	Tool-makers		Vice-hands		All workers	
	num-ber	annual earnings kronor	num-ber	annual earnings kronor	num-ber	annual earnings kronor
A. Selected workers	6	915	10	959	—	—
B. Cross-section ¹	—	—	18	966	43	942
<i>A in per cent. of B</i>	—	—	—	99	—	—

1905.

	Tool-makers		Vice-hands		All workers	
	num-ber	annual earnings kronor	num-ber	annual earnings kronor	num-ber	annual earnings kronor
A. Selected workers	10	1301	10	1328	—	—
B. Cross-section ¹	32	1483	81	1393	360	1321
<i>A in per cent. of B</i>	—	88	—	95	—	—

¹ No non-adult or casual workers are included in the cross-sections.

Owing to the large number of workers, the replacement of workers in the series does not affect the trend of wages. Moreover, the course taken by the two series is quite similar and runs parallel to the average annual earnings of all workers combined, as given in the Board of Trade's special enquiry into the engineering industry, Part II¹, in reference to this concern. If the annual earnings in 1876 are taken to be equivalent to 100, we get the following index numbers:

	1876	1886	1895	1900
Tool-makers and vice-hands	100	105	120	148
All workers (according to the Board of Trade's enquiry)	100	107	115	137

The workers received no benefits in kind, but were granted an old-age pension of 600 kronor after 1900. The tool-makers worked for half their time on a piece-work basis; the vice-hands were almost exclusively engaged on piece-work, though odd jobs were often done as timework. According to the Board of Trade's enquiry, the standard working period per week was in 1874—1876 64 $\frac{1}{2}$ hours, in 1877—1878 60 hours, in 1879 48 hours, in 1880 59 $\frac{1}{2}$ hours, in 1881—1892 60 hours, in 1893—1900 56 $\frac{1}{2}$ hours.

Averages of annual earnings in the above-mentioned occupations are given in Table 79.

A characteristic feature of the trend of wages at this works is the less marked cyclical influence as compared with other works, presumably owing to the fact that the concern is owned by the Government and that it does not produce capital goods. The year 1891 proved an exceptional one, the wages rising about 45 % as

Table 79. Annual Earnings (in kronor) of Workers at Carl Gustav's Stad's Small Arms Factory 1876—1910.

Year	Tool-makers	Vice-hands	Year	Tool-makers	Vice-hands	Year	Tool-makers	Vice-hands
1876	824	904	1888	870	887	1900	1257	1292
77	853	870	89	902	883	01	1252	1267
78	811	839	1890	1062	963	02	1287	1277
79	869	752	91	1242	1310	03	1286	1285
1880	775	801	92	1099	1097	04	1366	1353
81	992	857	93	1094	1036	05	1301	1328
82	942	862	94	1071	1019	06	1375	1343
83	898	922	95	1073	1004	07	1464	1370
84	902	923	96	999	980	08	1385	1264
85	915	959	97	1095	958	09	1266	1223
86	950	872	98	1209	1078	1910	1648	1480
87	962	974	99	1298	1253			

¹ See page 118 note 1.

from 1889, followed by a drop of 25 % up to 1893. Otherwise the annual earnings at this factory were but slightly affected by the heavy depression suffered by the industry in 1879, nor was there any pronounced rise at the beginning of the eighties. The general rise that began in the middle of the nineties recurred here as elsewhere, but slowed down at an earlier stage, aggregating about 29 % between the years 1896 and 1899. This rise in wages was not succeeded by any appreciable setback, but continued, although at a decidedly less rapid rate, up to the year 1907 (between 1905 and 1907 a certain degree of acceleration is noted, and a rise of 8 %). The substantial rise in wages up to 1910, amounting to 18 % from 1908, is worth noting.

B. Eskilstuna Ironware Manufacturing Company.

This concern is represented in the present enquiry by tool-makers and blacksmiths, 4 selected workers in each occupation. For each worker are recorded particulars, covering fortnightly periods of earnings, divided up into time wages, piece-work wages and overtime earnings, the working time being given in hours under the same headings and in days in respect of all work done. The average annual and hourly earnings of these occupations are published in Table 80.

The tool-makers had very little piece-work (4—5 % of the total annual earnings), so that their average hourly earnings agree closely with the average hourly wage rate, although when engaged on piece-work they were able to earn double as much per hour as on time-work (the hourly earnings for piece-work were subject to very rapid and violent fluctuations). The blacksmiths were for the most part engaged on piece-work (during 1890—1900 about 5 % of their income was earned on time-work, and during 1900—1914 10 %).

The number of working hours per year generally varied between 290 and 295 days. The number of hours of work per day was $10\frac{1}{2}$ around the year 1880, $9\frac{1}{2}$ —10 up to 1908 and after that $9-9\frac{1}{2}$. The tool-makers apparently had slightly shorter hours per day.

The trend of wages of the two series is largely similar. We find however that the situation is reversed when, after 1900, the wages of the tool-makers lie as much above those of the blacksmiths as they had been below prior to 1900. This is doubtless due to the above-mentioned change in the form of the tool-makers' wages, which took place at that period. The prevailing trade conditions are clearly reflected in the trend of wages, as is seen from the table below, showing the percentage rise or fall, as the case may be, between the years stated. Where the significative change in wages

Table 80. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Eskilstuna Ironware Manufacturing Company (Tunafors), Eskilstuna, 1878—1913.

Year	Annual earnings		Hourly earnings		Year	Annual earnings		Hourly earnings	
	Tool-makers	Blacksmiths	Tool-makers	Smiths		Tool-makers	Blacksmiths	Tool-makers	Smiths
1878	811	780	25.4	25.1	1896	909	1064	31.0	36.0
79	713	692	23.9	23.5	97	953	1133	33.3	39.0
1880	893	837	27.3	26.5	98	988	1184	34.6	40.3
81	897	917	27.5	29.0	99	1137	1200	39.5	41.0
82	875	935	28.9	30.8	1900	1225	1286	42.0	44.3
83	834	940	28.0	32.6	01	1133	1161	42.9	40.7
84	901	984	29.9	33.8	02	1209	1170	43.5	42.7
85	843	816	30.8	28.7	03	1199	1095	42.6	40.6
86	741	800	29.2	27.1	04	1209	1106	42.6	39.5
87	757	853	28.3	29.3	05	1214	1107	42.6	39.9
88	854	875	28.5	29.9	06	1229	1129	42.8	41.0
89	985	1021	32.4	35.1	07	1317	1188	46.2	43.0
1890	870	1106	29.9	38.0	08	1453	1200	52.1	43.9
91	824	1078	28.8	37.2	09	1226	1016	51.9	44.1
92	839	958	29.6	33.1	1910	1442	1281	52.3	46.8
93	870	962	29.5	33.3	11	1505	1266	53.7	45.9
94	851	1032	30.0	35.1	12	1452	1282	53.3	46.5
95	842	988	29.9	34.2	13	1490	1312	55.3	48.8

did not take place in these years, the variation has been computed for the years mentioned in the notes.

		1879/	1884/	1886/	1890/	1895/	1900/	1906/	
		1884	1886	1890	1892	1900	1901	1908	
Annual earnings	Tool-makers	. . .	+26	-18	+33 ¹	-15 ²	+45	-8	+18
	Blacksmiths	. . .	+42	-19	+38	-13	+30	-15 ³	+6
Hourly earnings	Tool-makers	. . .	+25	-2	+14 ⁴	-11 ⁵	+40	+2	+22
	Blacksmiths	. . .	+44	-20	+40	-13	+30	-8	+7

¹ 1886/1889. — ² 1887/1889. — ³ 1889/1892. — ⁴ 1889/1891. — ⁵ 1900/1903.

In the earlier years up to the end of the 19th century, the wages of the blacksmiths exhibit stronger cyclical fluctuations, while the hourly wage rate of the tool-makers is more constant; on the other hand, the hours of work of the latter are variable. Subsequently, the tool-makers' hourly earnings rise at a more rapid pace.

C. A File Works in Eskilstuna.

The data supplied by this factory is of a far poorer quality than those furnished by the two concerns dealt with above, but on account of the long period they cover (1860—1914) they are published below in Table 81. We have only extracted from the pay-rolls the total annual earnings of each of the file-cutters selected (generally 5 in number). There are no particulars as to the hours of work. Prior to 1890, the annual earnings of the selected workers are very heterogeneous (one worker might earn more than double as much as another), but the trend of the wages is more or less uniform. It is in approximate agreement with that recorded at the Eskilstuna Ironware Manufacturing Company (B).

Table 81. Annual Earnings of File Cutters at a File Works in Eskilstuna 1860—1914.

Year	Kronor	Year	Kronor	Year	Kronor	Year	Kronor
1860	409	1874	1015	1888	801	1902	1534
61	354	75	1036	89	848	03	1561
62	406	76	1036	1890	896	04	1592
63	439	77	1041	91	1089	05	1494
64	310	78	965	92	1122	06	1416
65	470	79	845	93	1054	07	1546
66	467	1880	953	94	1046	08	1348
67	—	81	1137	95	1123	09	1314
68	564	82	1157	96	1226	1910	1650
69	713	83	924	97	1336	11	1665
1870	709	84	990	98	1538	12	1745
71	700	85	951	99	1343	13	1819
72	884	86	879	1900	1556	14	1833
73	982	87	879	01	1438		

I. Bolinder's Engineering Works.

Extracts have been taken from the payrolls of Bolinder's Engineering Works in Stockholm covering the years 1885—1905. These extracts contain data on the number given to each worker, his hourly earnings, time-wage period, amount of time-wage and piece-work wage for each wage period (week). No occupations are specified, and the only means of distinguishing between skilled and unskilled workers is by the substantial difference between their hourly earnings. The most important departments are represented, viz. machine-shop, sheet-metal works, kitchen-grate and stove works,

the old foundry, the new foundry, and, besides, a group of workers employed on outdoor jobs. A selection has been made of both skilled and unskilled workers from each department, 4—7 workers from each group. It was not possible to form any such groups in the grate and stove works, as no appreciable difference could be observed in the level of hourly wages earned by the different workers, those employed in that department being on the border-line between skilled and unskilled workers. The hours of work could only be ascertained in respect of time-work. The skilled workers in the machine-shop, those in the sheet-metal works and in the old foundry have been combined into one skilled workers' group — comprising 16 selected workers — as they are all on about the same wage level and the trend of their wages is similar. (Some disparity between them is, however, observable owing to their having a varying share in the piece-work.) No skilled workers from the new foundry have been included, as these men were particularly expert moulders engaged exclusively on piece-work, and they are not to be regarded as typical. They earned as much as 60 % more than the other skilled workers, but there were very wide variations in their annual earnings. The new foundry was closed down in 1898. The unskilled workers in the different shops and the outdoor workers have been combined to form an unskilled workers' group comprising 20—26 selected workers. The variations in the annual earnings between the years 1898 and 1900 are not very reliable, as in 1899 and 1900 the workers' numbers were altered in the payrolls, with the result that hardly any of the numbers selected in 1891 occur in the books for 1899 or 1900. From 1900 onwards, the workers represented in the averages are, on the whole, entirely new. The trend of wages of the unskilled workers in particular is rather uncertain.

Some of the older workers were allowed free dwellings as a reward for long service. This benefit ceased however in 1905. Otherwise there were no benefits in kind.

From the close of the nineties, piece-work became more and more general. In the sheet-metal works, for instance, during the period 1885—1888, up to 8 % of the total wages of the skilled workers were earned on piece-work. This percentage increased in the course of 1889 to 14 %, when the wage maximum was reached, only to drop again to about 7 %, at which point it stood until 1895, when it rose to 20 %. From 1899 onwards, the work done was predominantly (90—95 %) piece-work. A similar development took place in the kitchen-grate and stove works and in the old foundry, only time-work having been done in the latter prior to 1894. The same applies to the unskilled workers, but in their case the movement was generally still more pronounced, seeing that in former years they had had a far smaller share of piece-work than the skilled workers (in many instances there was no piece-work done at all during the eighties). The workers in the new foundry were an exception, as they were

engaged exclusively on piece-work. In all series, a strong reciprocal relation is observable between wage level and percentage of piece-work.

The standard number of working hours per day was 10, except that on Saturdays, which was 7 hours (the gross number of working hours was 11 1/2, including one hour and a half allowed for meals). The hours of work *per annum* of those workers who were engaged exclusively on time-work totalled between 3 200 and 3 500 hours. Overtime was done on a large scale, payment for overtime being generally computed at 25 % over and above the standard wage rates.

A cross-section has been taken for the year 1885. Below will be found a table comparing the annual earnings (in kronor) of the selected workers and at cross-sections.

	Machine-shop				Sheet-metal works			
	Skilled workers		Unskilled workers		Skilled workers		Unskilled workers	
	num-ber	annual earnings	num-ber	annual earnings	num-ber	annual earnings	num-ber	annual earnings
A. Selected workers	4	1005	4	489	7	876	4	559
B. Cross-section . .	137	879	65	604	37	790	41	553
A in per cent. of B	—	114	—	81	—	111	—	88
	Old foundry				Kitchen-grate and stove works		Outdoor workers	
	Skilled workers		Unskilled workers					
	num-ber	annual earnings	num-ber	annual earnings	num-ber	annual earnings	num-ber	annual earnings
A. Selected workers	4	949	4	625	6	859	6	574
B. Cross-section . .	35	894	20	620	75	841	17	596
A in per cent. of B	—	106	—	101	—	102	—	96

As regards the machine-shop and the sheet-metal works, the agreement is not very close, clearly owing to the difficulty in distinguishing between skilled and unskilled workers, as skilled workers of too high a standard and unskilled workers of too low a standard had been selected. The average annual earnings of 272 skilled workers in 1885 were, measured by the cross-section, 875

kronor, and those of 219 unskilled workers 664 kronor (the corresponding figures in the longitudinal series work out at 930 and 575 kronor). As to the cyclical fluctuations, it may be noted that wage maxima were obviously reached in 1889 and 1900. The following are the percentages by which the annual earnings rose or fell:

	1886/1889	1889/1891	1898/1900	1900/1902
<i>Machine-shop</i>				
skilled workers . . .	+ 12	— 24	+ 19	— 5
unskilled » . . .	+ 34	— 20	+ 13	— 20
<i>Sheet-metal works</i>				
skilled workers . . .	+ 24	— 21	+ 50	— 17
unskilled » . . .	+ 13	— 15	+ 89	— 22
<i>Old foundry</i>				
skilled workers . . .	+ 7	— 12	+ 32	+ 6
unskilled » . . .	+ 29	— 4	— 7	— 6
<i>Kitchen-grate and stove works</i>				
»	+ 24	+ 6	+ 10	+ 8
<i>Outdoor workers</i>	+ 10	— 12	+ 72	— 2

The variations in wages occurred simultaneously in most of the skilled groups, although there are a number of deviations. As pointed out above, the figures for the years 1891—1900 are not reliable. Owing to the doubtful accuracy of the material relating to each skilled group, only the averages for skilled and unskilled workers are published. These series ought to be quite reliable as they contain such a large number of selected workers. They are given below in Table 82.

Table 82. Annual Earnings (in kronor) of Workers at Bolinder's Engineering Works in Stockholm 1885—1905.

Year	Skilled workers	Unskilled workers	Year	Skilled workers	Unskilled workers
1885	930	575	1896	1035	734
86	896	551	97	1020	757
87	968	589	98	1030	816
88	988	608	99	1360	1061
89	1052	660	1900	1388	1161
1890	968	579	01	1289	1040
91	862	580	02	1291	960
92	856	583	03	1294	1054
93	887	608	04	1462	1175
94	887	618	05 ¹	735	588
95	1031	673			

¹ Strike and lockout.

L. Motala Engineering Works.

This concern is represented for the period 1860—1903 by vice-hands, moulders, joiners and outdoor workers, 4 workers being selected from each occupation.

The earnings of the 4 workers during each fortnightly period have been extracted *in toto*, thus precluding any observations in regard to homogeneity and corrections for replacements of workers in the series. There are no data regarding hours of work. However, the striking uniformity displayed by the three skilled workers' series, which are in very close accord both in point of cyclical variations and secular trend, offers strong evidence of the reliability of the averages. We have also computed an average of these variations, covering 12 skilled workers.

The workers rented houses from the concern on reduced terms: in 1860—1870 at a rent of 35—40 kronor *per annum* (the market rent being about 70 kronor) and in the eighties and nineties at 45—55 kronor (the market rent being 70—80 kronor). No particulars are given as to the number of hours of work per year. The hours of work per day are given summarily as 11—12 up to the year 1885, when they were reduced to 10. During the period in question the workers were engaged almost exclusively on time-work. It was not until some time after the turn of the century that piece-work was done on any considerable scale. In 1903, there was a lockout, which lasted three weeks.

The trade cycles are clearly revealed in the variations in the annual earnings, the skilled workers getting a 45 % rise between 1866 and 1874, and the outdoor workers a 44 % rise between 1872 and 1877. Between 1874 and 1879 the skilled workers' annual earnings dropped 31 %, while those of the outdoor workers during the short period 1877—1879 fell 6%. This was followed by a recovery, the skilled workers' wages rising 25 % during the period 1879—1883, while the outdoor workers' substantial rise of 39 % suffered a setback as early as in 1882. There are no data for 1885, but there was presumably a continuous fall in wages up to 1887 (12 % in the case of the skilled workers and 20 % in that of the outdoor workers). Up to 1889 the wages advanced 18 % for skilled workers and 17 % for outdoor workers, the rise however taking place a year later. Then there followed a heavy fall in wages, skilled workers losing 20 % and outdoor workers 11 %, this lasting until 1892 and 1891 respectively. The rise that occurred during the period 1894—1900 amounted to 32 % and 22 % respectively. A distinct approximation between the earnings of the skilled and the outdoor workers is discernible. In 1870, the earnings of the former were 97 %, in 1880 36 %, in 1890 34 % and in 1900 56 % higher than those of the latter.

Table 83. Annual Earnings (in kronor) of Workers at Motala Engineering Works 1860—1903.

Year	Vice-hands	Moulders	Joiners	Average	Outdoor workers
1860	596	621	563	593	323
61	577	620	584	594	320
62	637	617	585	613	326
63	592	578	668	613	319
64	664	562	609	612	357
65	674	622	647	648	416
66	630	622	653	635	355
67	657	628	709	665	358
68	675	641	741	686	374
69	731	717	783	744	382
1870	729	869	722	773	392
71	743	767	788	766	348
72	783	846	876	835	344
73	831	939	859	876	390
74	831	981	945	919	427
75	852	960	851	888	459
76	805	957	782	848	480
77	801	774	771	782	494
78	795	710	701	735	491
79	640	601	655	632	463
1880	717	719	742	726	533
81	780	829	695	768	642
82	789	804	701	765	630
83	764	858	744	789	597
84	784	804	762	783	579
85	—	—	—	—	589
86	767	758	748	758	567
87	702	660	716	693	516
88	685	710	832	742	515
89	780	841	841	821	585
1890	800	827	791	806	600
91	732	668	688	698	532
92	615	616	732	654	532
93	733	812	849	798	570
94	726	760	810	765	530
95	759	825	846	810	554
96	807	792	886	828	567
97	851	884	781	839	609
98	855	883	854	864	636
99	977	1002	1025	1001	644
1900	1022	1004	1013	1013	648
01	1051	876	934	954	650
02	957	982	1075	1005	675
03	855	952	1102	970	655

M. An Engineering Works in the County of Värmland.

This works is represented by one series of 4 selected vice-hands and one series of 4 selected turners, covering the years 1880—1914. Up to the year 1898, extracts from the payrolls have been made in the form of fortnightly figures showing the earnings divided into time-wages, piece-work wages and overtime earnings, the working time being given in hours for time-wage and overtime work prior to 1899, but after that year for piece-work as well. The computed hourly earnings thus refer, prior to 1899, only to time-wage work. During this period and up to 1904, the selected vice-hands had generally very little piece-work, whereas the turners earned between 50 and 200 kronor on piece-work during the same period. The true average earnings per hour is probably somewhat higher than the published time-wage per hour in 1880—1898, since after 1899 the workers often earned more than double as much per hour at piece-work as at time-wage work. After 1905, nearly half of the annual income was earned on piece-work. The turner series is heterogeneous, as two types have been represented throughout, the one of a higher

Table 84. Annual Earnings (in kronor) and Hourly Earnings (in öre) at an Engineering Works in the County of Värmland 1880—1914.

Year	Annual earnings		Hourly earnings		Year	Annual earnings		Hourly earnings	
	Vice-hands	Turners	Vice-hands	Turners		Vice-hands	Turners	Vice-hands	Turners
1880	564	502	17.6	16.1	1900	1062	1046	30.2	31.9
81	691	637	19.2	17.3	01	1045	1196	30.8	35.7
82	813	666	21.4	16.3	02	964	1122	29.9	34.2
83	778	656	21.9	17.3	03	928	970	32.6	35.1
84	801	676	22.6	18.0	04	1105	1065	33.3	34.6
85	797	682	22.9	18.3	05	717	720	36.9	38.7
86	817	690	23.4	18.1	06	1321	1399	40.6	44.1
87	821	737	23.9	17.7	07	1440	1633	46.3	50.9
88	868	804	24.1	18.3	08	1606	1626	51.3	51.0
89	852	810	23.6	19.0	09	1366	1430	50.5	51.5
1890	807	747	25.4	20.1	1910	1383	1453	45.3	48.0
91	822	726	25.4	20.2	11	1433	1649	44.8	49.4
92	765	693	25.3	20.2	12	1442	1519	45.8	50.8
93	863	795	23.5	19.6	13	1328	1495	44.4	46.9
94	797	780	23.6	19.7	14	1390	1365	46.0	47.7
95	805	783	23.9	20.7					
96	867	906	25.5	23.1					
97	832	929	23.5	24.9					
98	823	975	24.4	26.8					
99	971	980	28.4	30.4					

and the other of a lower standard. Corrections for replacements of workers in the series have had to be made in a number of instances. The annual and hourly earnings of the two series move remarkably parallel to one another, in spite of the above-mentioned inconsistencies appearing in the material.

The working time *per annum* varied between 270 and 300 days, but might sometimes rise to 320 days. In 1905 there was a strike, which lasted 5 months. The number of hours of work per day was 11—12 in the eighties, 11 in the nineties, and 9.5 during the period 1900—1910. Overtime was worked on a large scale, the number of hours varying normally between 100 and 300 *per annum*, though in certain years they might amount to as much as 500 hours.

The conjunctural movements of the annual earnings can be traced very clearly. From 1880 to 1882 they rose 38 %, from 1886 to 1888 11 %, from 1889 to 1892 they dropped 13 %, rose again 41 % from 1895 to 1901, fell 15 % in 1901—1903, rose 49 % in 1904—1908 (in connection with the transition to piece-work employment), once more standing in 1912 at a level 8 % lower than in 1908. Largely the same variations are seen in the hourly earnings, though they are less marked.

R. The Bolt Manufacturing Company, Hallstahammar.

From among the workers at this bolt factory, 6 have been selected without any special indication as to their occupation, the period covered being 1876—1910. Particulars have been obtained from the payrolls as to annual earnings and the number of days worked by each wage earner. We have thus been able to ascertain the exact daily earnings. A strike occurred in 1902, when practically all the old workers left their jobs, and a fresh set of workers was taken on. No annual earnings are published for 1902; in 1901 and 1903, there are no workers appearing right throughout the series, with the result that it is difficult to draw conclusions from the published figures as to the degree of wage variation between those years.

Only a few of the workers had free housing, but generally speaking the workers were able to obtain dwellings at rents that were far lower (50 %) than those paid by other workers in the district. The number of days of work *per annum* was about 300. The standard hours of work per day were 11 during the years 1876—1910 and 10 from 1911 to 1918. There was very little overtime work.

The average annual earnings of the selected workers do not afford a true picture of the average wage level. Cross sections give the average annual earnings as 631 kronor for 15 whole-time workers in 1876 and the daily earnings as 2.17 kronor, whereas the corresponding figures measured by the selected workers series are 781

kronor and 2.71 kronor. In 1894 the average annual earnings of 125 workers were 586 kronor, and the daily earnings 1.98 kronor, the corresponding figures for 250 workers in 1905 being 799 kronor and 2.88 kronor respectively.

Table 85. Annual Earnings of Workers at the Bolt Manufacturing Company, Hallstahammar 1876—1910.

Year	Kronor	Year	Kronor	Year	Kronor
1876	781	1888	766	1900	1145
77	747	89	826	01	968
78	608	1890	903	02	—
79	715	91	915	03	887
1880	809	92	922	04	947
81	819	93	924	05	1028
82	866	94	949	06	1089
83	849	95	1088	07	1242
84	867	96	1035	08	1225
85	815	97	1050	09	1156
86	853	98	1189	1910	1140
87	750	99	1189		

Similar variations may be observed in the annual earnings to those applying generally to the other concerns within this group. In 1876—1878 (otherwise 1879) annual earnings fell 22 %, during 1878—1884 they rose 43 %, then came a fall of 13 % up to 1887, a 20 % rise up to 1890, a rise of 29 % during 1893—1898, a 15 % drop in 1900—1901, from 1903 to 1907 a rise of 40 %, followed by a fall of 8 % up to 1910.

S. Gunnebo Foundry and Manufacturing Company.

The Gunnebo Foundry is represented in the enquiry by 10 selected workers from the wire-works and 10 from the chain-works. Besides this, an average of the annual earnings of all workers employed at the works has been computed for each year. Data have been obtained for each month showing the total earnings and the number of workers.

During the period 1870—1875, the workers were housed free, and during the years 1887—1909 they were charged 75 öre per month for one room and kitchen and 50 öre per month for one room. The value of the free housing and an approximate difference between the market price and the rent charged by the concern are included in the annual earnings. The number of hours of work per day from 1870 to 1890 was about 12, from 1891 to 1909 11, and in

1909 and 1910 $9\frac{1}{2}$. The payrolls gave no particulars as to the number of hours worked by each wage earner.

Table 86. Annual Earnings (in kronor) of Workers at Gunnebo Foundry and Manufacturing Company 1887—1910.

Year	All workers		Wire-works, annual earnings	Chain-works, annual earnings
	Number	Annual earnings		
1887	143	482	609	571
88	147	475	672	605
89	158	465	634	626
1890	212	494	622	642
91	219	501	610	640
92	232	540	694	650
93	240	548	715	663
94	241	556	708	682
95	254	564	721	712
96	262	564	760	687
97	266	574	738	692
98	276	586	783	718
99	285	616	808	750
1900	269	643	855	807
01	230	626	774	770
02	220	665	879	790
03	231	674	869	849
04	229	690	928	806
05	251	658	928	842
06	250	669	862	853
07	256	694	889	902
08	244	728	901	905
09	212	636	703	743
1910	229	701	—	966

The curves of the three wage series run practically parallel to one another. During the period 1887—1908 the annual earnings rose 51 % for wire drawers, 63 % for chainsmiths and 56 % for all workers. No distinct cyclical variations are discernible, the trend of development being a very smooth one.

STONE, CLAY AND GLASS INDUSTRIES (CHAPT. VI).

A. Höganäs—Billesholm.

Series have been worked out involving 4 selected hewers, 4 hauliers and 4 brickmakers, all mine-workers and all factory-workers during the period 1860—1913. They are published in Table 87.

The trend of the different wage curves is closely parallel, not only secularly but also in regard to the cyclical variations.

Percentage Variations in Annual Earnings between the Years stated below (+ increase, — decrease).

	1870/ 1877	1877/ 1879	1895/ 1900	1905/ 1907	1865/ 1905	1860—1869/ 1900—1910 ¹
Hewers	+ 98 ^a	—24	+ 55 ^a	+ 30	+ 150	+ 172
Hauliers	+ 138	— 9	+ 68 ^a	+ 20 ^b	+ 189	+ 176
Brickmakers	+ 87 ^a	—37 ^a	+ 9	+ 25 ^c	+ 112	+ 133
All mine-workers	+ 58	—13	+ 23 ^d	+ 18	+ 136	+ 153
All factory-workers	+ 64 ^a	—27 ^a	+ 29	+ 20	+ 123	+ 133
According to cross-sections ^e	—	—	—	—	+ 137	—

The most substantial rise in wages occurred in 1870—1877; the peak year for the wages of brickmakers was 1875, and of factory-workers 1876, as the notes show. After that the wages fell heavily, while in general this fall was not repeated or if so only on a minor scale, after the other peak years 1900 and 1907.

A series has been worked out covering the years 1910—1913 and comprising four selected brick-moulders of a homogeneous standard, no replacements occurring during the period. Their average annual earnings rose from 1 182 kronor in 1910 to 1 387 kronor in 1913, i. e. a total of 17 %, this increase exceeding that of the hewers and brickmakers by 6 %, but falling short of the hauliers by 29 % during the same years.

¹ Excl. 1909. — ² See below. — ³ From 1896. — ⁴ From 1897. — ⁵ To 1908. — ⁶ To and from 1875 resp. — ⁷ From 1904. — ⁸ To and from 1876 resp. — ⁹ See below p. 411.

Table 87. Number of Workers and Annual and Daily Earnings (in kronor) of Workers at Högånäs-Billesholm 1860—1914.

Year	Number of workers		Annual earnings				Daily earnings			
	Mine-workers	Factory-workers	Hewers	Hauliers	Brick-makers	All mine-workers	All factory-workers	Hewers	Hauliers	Brick-makers
1860	224	269	391	182	338	313	287	1.36	0.63	1.13
61	229	272	417	195	367	303	310	1.45	0.68	1.22
62	224	284	411	189	361	313	305	1.43	0.66	1.20
63	229	294	394	245	362	304	311	1.37	0.86	1.21
64	226	286	421	279	363	323	315	1.48	0.97	1.21
65	237	291	402	225	395	323	322	1.43	0.80	1.32
66	243	302	402	284	407	335	340	1.42	0.99	1.37
67	256	294	401	284	400	319	334	1.41	1.01	1.33
68	253	253	451	323	385	323	327	1.58	1.14	1.30
69	244	242	399	260	399	311	334	1.40	0.84	1.33
1870	223	226	376	186	410	316	350	1.27	0.62	1.38
71	226	212	443	197	458	328	384	1.44	0.64	1.53
72	227	216	542	306	475	374	402	1.83	1.05	1.62
73	229	250	525	286	488	370	424	1.86	0.91	1.66
74	246	—	602	393	597	420	—	2.09	1.28	2.00
75	271	—	649	431	768	459	—	2.20	1.46	2.59
76	271	259	561	378	744	472	574	1.91	1.29	2.48
77	297	245	746	443	713	500	531	2.60	1.49	2.38
78	332	236	590	416	612	467	490	2.10	1.45	2.04
79	305	209	570	402	482	435	419	1.99	1.41	1.61
1880	266	230	562	390	601	458	477	1.99	1.35	2.00
81	241	263	680	422	601	490	466	2.38	1.47	2.00
82	265	307	767	475	602	524	500	2.68	1.65	2.00
83	281	320	762	467	599	533	535	2.66	1.62	1.99
84	286	337	747	401	620	536	545	2.61	1.39	2.07
85	304	359	731	464	581	548	531	2.55	1.61	1.94
86	299	348	678	422	601	522	527	2.35	1.47	2.00
87	302	336	687	364	604	524	551	2.39	1.26	2.01
88	300	341	684	377	608	518	564	2.38	1.31	2.02
89	301	380	727	477	631	521	562	2.52	1.67	2.10
1890	324	397	739	466	646	542	566	2.58	1.63	2.15
91	341	414	765	473	699	553	572	2.66	1.64	2.33
92	348	409	721	408	690	555	576	2.52	1.42	2.30
93	343	419	720	404	699	573	577	2.58	1.41	2.33
94	330	436	764	446	711	594	587	2.73	1.55	2.37
95	330	467	728	434	707	589	557	2.55	1.51	2.36
96	324	418	673	416	716	582	561	2.13	1.44	2.39
97	329	491	699	417	740	586	580	2.51	1.45	2.47
98	352	490	841	496	764	637	600	2.42	1.72	2.55
99	391	503	879	680	777	658	653	3.08	2.36	2.59
1900	392	485	1046	699	772	724	716	3.66	2.43	2.59
01	439	574	1026	649	810	731	628	3.61	2.25	2.70
02	483	607	1043	639	821	724	657	3.62	2.22	2.74
03	481	599	1059	704	814	753	657	3.79	2.48	2.71
04	455	592	1069	704	784	792	669	3.87	2.46	2.61
05	443	537	1004	651	838	762	717	3.54	2.29	2.79
06	437	549	1133	660	891	802	755	3.98	2.29	2.97
07	431	588	1303	600	979	902	857	4.57	2.08	3.26
08	417	563	1247	779	988	910	864	4.39	2.70	3.29
09	342	384	962	636	814	861	795	4.11	2.54	3.14
1910	360	477	1188	723	1096	901	898	4.15	2.51	3.65
11	381	529	1240	741	1093	909	925	4.32	2.57	3.64
12	386	579	1231	686	1149	911	961	4.30	2.38	3.83
13	367	680	1255	930	1165	943	973	4.40	3.23	3.88
14	—	691	—	—	—	—	1050	—	—	—

The selected workers' series are based on particulars of earnings during each fortnightly period in respect of each worker. Up to 1880 the number of days' absence on account of sickness is stated for each worker and from 1868 to 1877 the number of shifts worked by hewers and hauliers. This is the only period for which it has been possible to compute exact daily earnings for these two occupations. For other years and occupations we have assumed a normal annual working time of 300 days, from which has been deducted the number of days of absence for sickness if particulars have been available, otherwise a period of absence, estimated according to the size of the earnings.

The hewers' and brickmakers' series are very homogeneous as far as annual earnings are concerned, and generally speaking the replacements of workers in the series do not disturb the trend. It should be noted, however, that the rise in hewers' wages in 1876—1877 is abnormally strong, two workers having been replaced by two others whose earnings were considerably higher, so that, while the average annual earnings advanced 32 % of the workers represented in both years, the wages of the one rose 13 % and those of the other 7 %. The same applies to 1898, when two workers were again replaced by others (the wages of the one worker rose 19% and those of the other 2 %, while the average advanced 20 % during the period 1897—98).

The hauliers are as a rule non-adults, the workers included in the series being 17—19 years of age. The different workers are thus only represented for 1—3 years at a time, and numerous replacements had to be made in the series. Moreover, the averages are often heterogeneous, due to most of the mining being done on a piece-work basis and the physical capacity of the hauliers at these ages varying considerably. The wage series for the hauliers is thus irregular, but in the long run it conforms very closely to the wage series for the other occupations.

The two series representing all workers include non-adults as well, to the number of about 20 %, according to the concern's estimate. The material is in the form of data regarding the number of workers and the total amount of wages paid for each wage period. The average annual earnings have been obtained by dividing the total amount of wages for the year by the average number of workers employed during the year.

Free housing accommodation consisting of one room and kitchen was provided throughout the period. During the period 1860—1873 an alternative system was in practice, 18 kronor being paid *per annum* to cover rent; in 1874—1899 the corresponding payment was 30 kronor, and in 1900—1913 50 kronor *per annum*. During the period 1860—1870 the workers received free coal for household requirements, from 1870 to 1907 they were given a free allow-

ance of 60 hectolitres of coal plus 10.50 kronor equivalent to 30 hectolitres of coal. In 1907—1913 90 hectolitres of coal were allowed free. According to information received from Höganäs, the market price of this coal ranged between 0.50 and 0.70 kronor per hectolitre during the period 1878—1910, and between 0.80 and 1 kronor during the period 1911—1913. The value of this benefit in kind would thus vary between 45 and 90 kronor. Up to the year 1880 the concern paid the workers' taxes; and after that year up to 1906 the workers paid 1 % of their income and the company the rest of their taxes. The works' personnel formed a community of their own, whose economic affairs were conducted entirely by the concern. Thus, the concern owned and maintained church, schools, etc., paid salaries to clergyman, policemen and other officials. Furthermore, the workers were given free medical attendance and hospital services, also free medicine for themselves, their wives and children under 15 years. During the whole period covered by the investigation the workers had the right to buy grain, milk etc. at the concern's own cost price. None of these benefits are accounted for in the annual earnings published here.

Work on Sundays was not done to any very great extent. Only generators and steam boilers were kept going continuously, there being two shifts attending to them prior to the introduction of the 8-hour day. At the mine the workers regularly had one day free a month, on which lots were drawn for the various places of work. Sometimes, however, the workers were engaged on repairs to pumps, etc. on these free days.

Prior to 1900, work in the mine began at 5 a. m., the hewers and non-adult workers starting at 6.00, all finishing definitely at 4.30 p. m. In those days, then, the standard hours of work per day seem to have varied between $10\frac{1}{2}$ and $11\frac{1}{2}$, including short intervals for meals. After 1900 all workers began at 6.00 a. m., and after 1907 the work in the mine lasted from 6.00 a. m. to 2.00 p. m., i. e. 8 hours. The standard working time per day for factory-hands was $11\frac{1}{2}$ hours during 1851—1873, 11 hours during 1874—1878 throughout the light part of the year, and 10 hours during the period 1/10—31/3. From 1879 to 1897 the standard daily working time was 10 hours, in 1898—1909 $9\frac{1}{2}$ —10 hours and on Saturdays 8 hours up to 1914, after that year $7\frac{1}{2}$ hours, and 7 hours during the years 1918 and 1919. After 1919 the number of hours worked per day was $8\frac{1}{2}$, except on Saturdays, when it was $5\frac{1}{2}$.

Cross-sections have been drawn for the years 1865 and 1905.

A comparison with Table 87 shows a good agreement between the averages of the cross-sections and the corresponding figures for the selected workers' series. The percentage rise in the period 1865—1905 is according to the cross-sections 137 and according

Table 88. Annual Earnings of all Workers at Höganäs—Billesholm in the Cross-Sectional Years 1865 and 1905.

Occupation	Average number of workers	Annual earnings kronor
<i>1865</i>		
Hewers	105	388
Windlassmen	50	326
Pit-boys	59	172
Workers above-ground	84	316
Potters, adult	117	342
" non-adult ¹	13	116
Brickmakers, adult	145	347
" non-adult ¹	11	133
Skilled male workers	501	347
Unskilled or non-adult workers	83	158
<i>1905</i>		
Mine-workers, adult	359	870
" non-adult ¹	82	314
" female	1	381
Factory-workers, adult	451	790
" non-adult ¹	85	309
" female	4	303
Mechanics, adult	35	892
" non-adult ¹	6	316
Handicraftsmen, adult	97	765
" non-adult ¹	16	236
" female	14	162
Skilled male workers	942	822
Unskilled or non-adult workers	189	305

to the selected workers' series, for mine-workers 136 and for factory-workers 123, a very close agreement (see p. 407).

According to an investigation made by the union of the Billesholm Coal and Clay Workers², the average daily earnings of the hewers in 1902—1903 were 3.62 kronor, a figure that agrees very closely with the hewers' daily earnings in Table 87, which, on an average for these years, worked out at 3.66 kronor. The same investigation computed the average daily earnings of the day-workers in the mine at 2.57 kronor, those of blasters at 4 kronor in 1903, those of hauliers (average for the years 1902 and 1903) at 2.48 kronor (according to Table 87 2.35 kronor). The windlassmen's average earnings varied between 2.14 and 3.36 kronor, blacksmiths and machinists earned a daily wage of 2.25 kronor, joiners 2.50—2.75 kronor and stokers 2.00—2.25 kronor.

¹ Possibly also unqualified workers.

² In the Archives of the Swedish Labour Movement, Stockholm.

According to an enquiry carried out by the concern, the daily wage for unskilled time-wage work was as follows:

	Daily wage (in öre)
1827—1836	50
1837—1854	58
1855—1864	67
1865—1874	76
1875—1884	150
1885—1903	175
1904—1913	225

B. Annetorp Limestone Quarries.

The Annetorp limestone quarries as well as the cement works at Limhamn and the cement and brick works at Lomma (see the following monograph) are owned by the same concern, the Scanian Cement Company (Skånska Cement Aktiebolaget). The wage data from all these works cover the period 1875—1914 and consist of payrolls, wage books and work journals, containing details of earnings per day and of days of work (from 1912 hours of work) per week, month, or, in summary form, per year.

The Annetorp limestone quarries are represented by stone-quarrymen, stokers and engine-drivers, for which occupations the annual and hourly earnings are given in Table 89 below.

For the stone-quarrymen there is a series of selected workers (in 1887—1889 and 1892—1893 4 workers, in 1905—1914 8 workers) giving their annual and hourly earnings. The stone-quarrymen worked in teams of 5—8 men. The average hourly earnings of four teams in 1892—1893 and two teams during the period 1897—1914, and of all teams during 1897—1914, have been obtained from the monthly reports on the number of day-jobs and the earnings of the respective teams. As in the case of the selected stone-quarrymen, the hourly earnings have been obtained by dividing the daily earnings by the standard number of hours of work per day — i. e. 9 hours. The fact that the hourly earnings of the selected workers work out, on an average, at a level far lower than those of the four teams is due to the former having time-wage work, while for the latter only piece-work was entered in the books. Otherwise the different series of hourly earnings are in very close agreement. Two workers are selected to represent each of the occupational groups stokers and engine-drivers; the calculation of hourly earnings is based on data showing the number of working days, hours of overtime and standard hours of work per day, 9—10 hours, except in 1897, 1898, 1912—1914, when the working time was recorded in hours. In 1909 and 1914 there were strikes lasting three

ANNETORP LIMESTONE QUARRIES 413

Table 89. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at the Annetorp Limestone Quarries 1887—1914.

Year	Annual earnings			Hourly earnings				
	Quarrymen (4—8 workers)	Stokers	Engine- drivers	Quarrymen			Stokers	Engine- drivers
				4—8 workers	2—4 teams	All teams		
1887	477	—	—	16.1	—	—	—	—
88	482	—	—	17.4	—	—	—	—
89	539	—	—	19.8	—	—	—	—
—	—	—	—	—	—	—	—	—
1892	572	—	—	20.2	25.8	—	—	—
93	577	—	—	20.8	25.6	—	—	—
—	—	—	—	—	—	—	—	—
97	—	571	858	—	30.0	31.3	17.9	27.6
98	—	622	1034	—	33.2	32.9	19.8	30.0
99	—	820	1217	—	37.8	36.4	28.9	35.3
1900	—	874	1169	—	38.4	38.0	28.9	36.0
01	—	879	1127	—	34.9	35.1	29.0	36.5
02	—	847	1024	—	35.0	35.6	28.7	34.5
03	—	956	1198	—	37.3	36.9	30.3	35.9
04	—	951	1156	—	41.6	39.1	31.2	37.1
05	1010	981	1235	38.8	41.9	39.7	31.6	39.8
06	1103	973	1224	43.2	45.6	44.6	33.1	43.5
07	1165	1187	1449	46.1	49.9	49.0	38.1	46.8
08	1225	1279	1560	46.9	50.9	50.4	42.0	50.5
09	870	884	1040	43.9	48.7	50.3	40.0	48.4
1910	1195	1242	1452	48.8	54.0	54.2	41.1	47.5
11	1205	1088	1412	47.1	57.1	54.9	36.4	46.7
12	1191	1143	1456	46.1	58.2	56.2	40.3	51.2
13	1265	1149	1429	48.5	63.2	60.7	40.8	51.4
14	834	990	1118	46.6	57.4	56.7	49.7	56.8

and four months respectively (involving also the other works), with the result that the working time was reduced to 220 and 200 days in the respective years; in other years it ranged from 280 to 320 days. Overtime was worked in most years and to a widely varying extent. The decline of stokers' earnings in 1911 is attributable entirely to a replacement of workers in the series. The stokers and engine-drivers were largely engaged on piece-work, after 1911 entirely so, their earnings often being on a commission basis. The recorded hours of work seem to correspond to the entire earnings and have served as a basis for calculating the hourly earnings.

C. *Limhamn Cement Works.*

From this works we publish in Table 90 the average annual earnings and hourly earnings of 4 cement-millers and 4 cement-burners (8 workers) in 1905—1914, the annual earnings of 4 selected coopers in 1891—1914, the annual and hourly earnings of 3—4 packers and loaders in 1893—1914, and 5—7 masons, joiners and iron workers (craftsmen) in 1890—1914.

Table 90. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Limhamn Cement Works 1890—1914.

Year	Annual earnings				Hourly earnings		
	Cement-millers and -burners	Coopers	Packers and loaders	Crafts-men	Cement-millers and -burners	Packers and loaders	Crafts-men
1890	—	—	—	858	—	—	24.9
91	—	608	—	771	—	—	24.9
92	—	709	—	1036	—	—	30.6
93	—	637	586	934	—	17.6	26.2
94	—	660	600	881	—	18.3	27.2
95	—	767	611	882	—	17.9	27.3
96	—	594	544	834	—	18.1	28.9
97	—	672	599	874	—	18.3	28.5
98	—	766	655	894	—	19.8	30.6
99	—	870	708	1153	—	21.5	32.4
1900	—	1002	713	1000	—	22.9	32.7
01	—	913	707	989	—	22.5	32.4
02	—	1035	699	996	—	22.5	33.0
03	—	999	727	1079	—	23.4	34.0
04	—	893	704	1110	—	23.4	35.1
05	1232	1151	738	1262	42.6	23.8	36.3
06	1388	1242	889	1296	47.9	29.0	38.7
07	1466	1007	868	1273	50.4	29.3	41.3
08	1564	1135	970	1307	50.0	31.5	42.3
09	1016	946	896	1039	41.3	31.8	43.2
1910	1272	1083	942	1361	40.9	32.4	43.1
11	1405	1355	964	1402	43.7	31.3	43.6
12	1438	1367	974	1503	49.7	31.3	44.2
13	1440	1443	1153	1542	48.6	35.6	46.0
14	1031	981	1120	1083	50.3	36.4	47.2

The working time for cement-millers and cement-burners up to 1912 is given in days, and after that year in hours, and as the standard hours of work per day (10 hours) have served as a basis for computing the hourly earnings, the transition between 1911 and 1912, as in similar cases elsewhere, is not quite exact. Both occu-

pational groups' annual earnings were approximately on an equally high level, but since up to 1912 the cement-millers had as a rule a shorter annual workingtime (max. 297 days), whereas the burners worked for as many as 356 days, the hourly earnings do not work out so homogeneously. From 1912 however the burners' hourly earnings exceeded the millers' by only a slight margin. The coopers were engaged almost exclusively on piece-work, so that there are no particulars as to working hours; it is true that the earnings vary very widely from year to year, but this is due to the form in which the wages are paid and not to defective data in the wage material, which is homogeneous and discloses but few replacements of workers in the series. As regards packers and loaders, only time-wage workers have been included, although there were also workers engaged on piece-work. The workers have occasionally had a smaller amount of extra piece-work, which is assumed to have been earned in the course of the time-wage period, but this is not known for certain. The craftsmen's series is not very homogeneous. In earlier years the masons earned 37 % more than the iron workers, the joiners' earnings coming in between the two; in more recent years the joiners earned 40 % more than the masons, whose annual earnings in those years were the lowest of all. The rise that took place in annual and hourly earnings in 1892 is due to there having been no data in respect of joiners and iron workers for that year. In some years the workers made less money on piece-work, and this had probably not been earned during the period stated, which in all years is expressed in hours. The hourly earnings therefore correspond only to time-wage work, but they should be representative, seeing that the earnings on piece-work *per annum* never exceeded 150 kronor. The craftsmen did a great deal of overtime work, normally 200—500 hours *per annum*, but this was considerably exceeded in some years (one joiner, for instance, worked 1 200 hours overtime in 1913), the wage paid for overtime in the nineties exceeding the standard wage-rate by 15—20 %, and in more recent years by 45—55 %.

The cement and brick works at Lomma (D), which also is owned by the Scanian Cement Company, are represented during the period 1875—1903; the data relating to them are, however, somewhat scanty and defective, why no special monograph is published for this works.

B—C—D. The Common Trend of Wages at the Works of the Scanian Cement Company (Annetorp Limestone Quarries and the Limhamn and Lomma Cement and Brick Works).

In spite of the defective and heterogeneous nature of the wage data given in the two last monographs, an average of annual and hourly earnings at the works in question has been worked out in order to illustrate the common trend of wages. The averages of annual earnings cover only 4—6 workers in 1875—1890, 17—21 workers in 1893—1904 and 35—37 workers in 1905—1914. The averages of hourly earnings cover a slightly smaller number of workers; 3—4 workers, 11—18 workers and 34—35 workers during the respective periods. As it is only the trend that can be of interest here (the absolute height of the earnings is of minor interest in such mixed averages with a very wide dispersion), we have published only those numbers that are obtained by the use of the chain index method, care being taken to ensure that the index numbers coincide with the average earnings during the period 1908—1914.

The trade cycles are very clearly apparent with peak-years 1890, 1899 and 1908. The figure for the year 1890 is more uncertain owing to there being so few series common to that and previous years (for the hourly earnings there is no common series). Between 1896 and 1899 the annual earnings rose 39 %, and between 1896 and 1900 the hourly earnings rose 23 %. In these years all the series included in the averages showed a distinct rise. Then came stagnation, and in most quarters some reduction of wages up to about 1904; the annual earnings index number fell 19 % up to 1904, but the hourly earnings index number did not fall more than 4 %, and that only during the period 1900—1902, after which the upswing began with a rise of 35 % up to 1908. The rise in the annual earnings went on during the period 1904—1908 and likewise amounted to 35 %. Here too the rise affected all series alike.

The Board of Trade's Department for Labour Statistics has published the results of an enquiry into the labour and wage conditions of industrial workers in Limhamn in 1905;¹ the enquiry deals mainly with labour conditions in one limestone quarry and one cement works belonging to the Scanian Cement Company. Only workers of from 20 to 65 years of age are concerned, and

¹ Arbets- och löneförhållanden för fabriksarbetare i Limhamn år 1905. Meddelanden från K. Kommerskollegii avdelning för arbetsstatistik. Stockholm 1906. P. 480—495.

ANNETORP, LIMHAMN AND LOMMA 417

Table 91. The Common Trend of Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Annetorp Limestone Quarries and Limhamn and Lomma Cement and Brick Works 1875—1914.

Index: 1908—1914 = direct average.

Year	Annual earnings	Hourly earnings	Year	Annual earnings	Hourly earnings
1875	503	—	1895	717	26.5
76	506	—	96	701	27.9
77	511	—	97	752	27.7
78	507	—	98	818	30.0
79	500	—	99	972	33.5
1880	494	—	1900	964	34.1
81	382	—	01	922	33.6
82	532	—	02	913	32.7
83	540	—	03	974	34.3
84	544	—	04	953	35.5
85	581	—	05	1075	36.5
86	578	—	06	1171	40.3
87	579	19.6	07	1196	42.5
88	600	21.1	08	1284	44.1
89	627	22.2	09	947	41.4
1890	687	—	1910	1218	43.1
91	638	24.0	11	1281	43.3
92	709	26.5	12	1319	45.2
93	717	26.4	13	1364	46.6
94	717	27.5	14 ¹	985	47.4

in the annual earnings workers are included who had worked 270 days and more. The following are the resultant averages.

Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers in the Scanian Cement Company, Limhamn, in 1905.

	Number of workers	Annual earnings	Number of workers	Hourly earnings
Limestone quarry	283	1070	386	35
Cement works	241	1190	331	40
<i>Average</i>	524	1125	717	37

These direct averages agree very closely with the index numbers for 1905 published above, the average annual earnings for 1905 in Table 91 being 1 075 kronor and the average hourly earnings 36.5 öre, i. e. a difference of 5 and 2 % respectively.

¹ Strike.

E. Klagstorp Limestone Quarries and Cement Works.

We have computed averages for all whole-time workers in the limestone quarry during the period 1908—1911, in 1913 and 1914, and in the cement works in 1909—1913.

As regards the limestone quarry, we publish in Table 92, on the one hand, the annual and hourly earnings of unskilled workers, which is the only large occupational group, and, on the other hand, averages for all workers, including, besides the unskilled workers, dock labourers, engine-drivers, engine-firemen, engine-cleaners, masons, joiners, mechanics, sheet-metal workers, etc.

Table 92. Number of Workers, Annual Earnings (in kronor) and Hourly Earnings (in öre) at Klagstorp Limestone Quarries 1908—1914.

Year	Number of		Annual earnings		Hourly earnings	
	Unskilled workers	All workers	Unskilled workers	All workers	Unskilled workers	All workers
1908	60	116	1010	990	37.3	36.2
09	79	134	781	809	38.9	37.2
10	64	136	1066	1079	40.5	38.2
11	72	120	1063	1075	38.0	38.0
12	—	—	—	—	—	—
13	48	112	1127	1148	41.1	36.2
14	41	114	877	885	37.5	36.3

Up to and including 1911 the workers were employed on a time-wage basis. After that year the unskilled workers earned about 80 %, and all workers combined about 42 %, of their wages on piece-work, and for that part of their earnings the hours of work are not recorded. Thus the hourly earnings for 1913 and 1914 in Table 92 correspond only to the time wages, which explains the relatively low figures for these years, and also that, from 1911 to 1913, when time-wages are going down the annual earnings are rising rapidly. According to a series including 4 dock labourers, which is not published here, the average hourly earnings in 1911 were 46 öre, but in 1913, when the greater part of the earnings were derived from piece-work, these hourly earnings on a time-wage basis dropped to 32 öre, but the hourly earnings from piece-work were 66 öre, so that the average hourly earnings remained constant at 46 öre. In 1909 there was a strike lasting 10 weeks, and in 1914 a lockout lasting about 13 weeks.

The cement works is represented by the usual cement-works' employees (burners, cement-millers, cement-packers, clay-loaders etc.), workers on special jobs (stokers, mechanics, smiths, coopers etc.), unskilled workers, and an average of all workers, including also, besides the above-mentioned groups, a number of men working on various jobs, such as hodmen, sack-cleaners, sack-brushers etc.

Table 93. Number of Workers, Annual Earnings (in kronor) and Hourly Earnings (in öre) at Klagstorp Cement Works 1909—1913.

Year	Number of				Annual earnings				Hourly earnings			
	Cement-workers	Special workers	Unskilled workers	All workers	Cement-workers	Special workers	Unskilled workers	All workers	Cement-workers	Special workers	Unskilled workers	All workers
1909	29	23	13	78	1268	1174	1128	1140	44.0	42.5	40.9	41.3
10	39	18	16	79	1509	1283	1256	1356	43.7	41.3	36.4	40.8
11	41	20	9	76	1435	1228	1257	1293	45.2	42.3	37.2	42.0
12	35	28	9	83	1540	1332	1306	1343	28.1	34.7	29.1	29.8
13	40	21	14	91	1566	1421	1211	1372	29.2	43.2	29.9	32.1

At the cement works, too, only time-wage work was done up to 1911, but after that year, on an average, 55 % of the earnings represented piece-work wages. In 1912 and 1913 the hourly earnings in Table 93 correspond only to earnings on a time-wage basis. According to a series representing 4 cement-packers, the hourly earnings in 1911 were 56 öre, but these hourly earnings on a time-wage basis dropped in 1912 to 30 öre, whereas those derived from piece-work were 61 öre, the resultant average hourly earnings working out at 57 öre.

F. Gustavsberg China Factory.

Seeing that before the War Gustavsberg China Factory produced one-third of the country's manufacture of china, the wages paid by the firm afford a good idea of the general trend of wages in that branch of industry. In 1850 there were employed 148 men and 37 women, in 1875 325 men and 216 women, in 1900 567 men and 361 women, and in 1914 896 men and 289 women. These figures include an unusually large number of young workers, especially female workers; in order to attain to a high standard of craftsmanship, the workers must start working at an early age. The average number of workers in different occupations at Gus-

tavsberg during each year from 1850 until 1914 is given in Table 94.

The wage data have in general been taken from payrolls in the form of earnings for each wage period (month). The time spent on time-wage work is generally indicated in days. Another source of information has been the concern's work-journals, which contain, besides the same data as the payrolls, particulars of working hours. These journals however are few and far between and a worker's wages might be recorded in several places, whereas the payrolls contain a record of a worker's income throughout the year. For the time after 1907 it was necessary to extract the wages of the oven-men, the outdoor workers and the female handlers from the day-job journals, as in the payrolls these wages were recorded only in lump sums. The number of hours of work spent on piece-work has only been obtainable in respect of oven-men and female dippers. The hours of work of other workers have been estimated from the size of the monthly earnings, so that the daily earnings are only estimated, except in the case of the oven-men and female dippers, whose daily earnings it has been possible to compute direct from the wage data. Apart from the series representing selected workers, we have worked out, for the purpose of comparison, the average wages of all workers in the same occupational groups. Non-adult workers are however excluded. The selected workers' series comprise as a rule 4 workers, with the exception of the oven-men, who are represented by 5.

The actual cyclical movement of the trend of wages is best studied in the wage series of the selected oven-men, this series being the most representative. Obvious peak-years are 1889, 1899 and 1907.

If we compare the trend of wages of the male and female occupational groups we clearly observe how the latter's wages approach the former's. In the sixties the annual earnings of the oven-men were about $3\frac{1}{3}$ times as high as those of the female dippers, whereas during the eighties they were on an average only 75 % above. This process of adjustment has nevertheless not continued in subsequent decades — rather the difference has widened. While, then, the female dippers' annual earnings doubled during the period 1860—1880, and the male workers' wages advanced only 15 %, the female dippers' and the handlers' wages increased by 135 and 138 % respectively from the eighties up to the first decade of the present century, those of the oven-men, potters and outdoor workers, on the other hand, rising respectively 142, 149 and 155 %. The substantial rise in the wages of the outdoor workers is noteworthy.

GUSTAVSBERG CHINA FACTORY

Table 94. Average Number of Workers in Different Occupations at Gustavsberg China Factory 1850--1915.

Year	Potters	Oven-men	Outdoor workers	Female handlers	Female dippers	Total number of workers	
						Male	Female
1850	25	26	24	—	—	148	37
51	22	25	26	—	12	152	26
52	16	23	44	—	10	116	39
53	14	24	49	—	11	148	29
54	14	27	42	1	12	168	31
55	15	31	46	—	9	179	37
56	15	33	48	1	9	181	51
57	15	31	39	1	10	186	43
58	15	28	40	3	11	169	45
59	43	28	37	3	11	199	52
1860	43	32	32	3	10	202	48
61	40	27	27	2	7	192	52
62	39	26	26	1	6	174	50
63	41	26	21	—	6	180	44
64	47	24	24	—	6	194	34
65	47	28	24	—	7	196	38
66	48	32	24	—	8	221	49
67	45	34	27	—	9	221	67
68	45	33	11	—	9	226	78
69	44	32	7	—	9	223	75
1870	47	34	11	—	10	236	96
71	54	39	21	4	14	304	94
72	63	44	35	6	17	368	98
73	81	50	40	6	16	422	114
74	78	54	42	7	16	419	171
75	65	55	38	7	15	325	216
76	58	48	35	6	13	320	203
77	63	52	38	11	14	353	212
78	62	46	39	12	13	357	219
79	56	46	31	9	12	321	183
1880	52	54	42	10	14	334	216
81	63	57	46	9	17	401	248
82	73	61	43	10	19	412	251
83	74	62	41	15	21	428	267
84	70	64	41	16	20	417	269
85	71	61	43	12	17	406	265
86	69	55	38	—	17	383	248
87	54	63	35	14	17	397	259
88	49	60	40	14	16	492	269
89	57	62	52	17	17	472	319
1890	60	69	48	17	18	474	339
91	65	65	40	17	15	467	306
92	55	61	38	19	14	448	297
93	54	60	35	21	15	451	289
94	55	63	45	23	12	465	296
95	60	66	43	22	15	483	316
96	63	72	43	20	17	506	336
97	65	76	36	18	17	557	308
98	68	81	40	21	20	548	363
99	70	79	43	19	17	594	359

Tab. 94. (Cont.). Average Number of Workers in Different Occupations at Gustavsberg China Factory 1850—1915.

Year	Potters	Oven-men	Outdoor workers	Female handlers	Female dippers	Total number of workers	
						Male	Female
1900	77	80	21	24	15	567	361
01	73	75	43	22	13	555	342
02	67	67	46	—	10	554	311
03	65	68	44	24	14	557	308
04	67	75	42	29	15	567	350
05	76	81	46	34	16	613	392
06	78	80	42	29	16	639	340
07	86	99	61	29	—	680	307
08	85	100	64	31	—	773	274
09	87	100	65	39	—	787	276
1910	95	111	67	48	—	826	294
11	95	108	72	47	—	860	243
12	98	118	77	45	—	878	252
13	102	114	80	44	—	872	278
14	101	116	82	41	—	896	289
15	—	—	—	35	—	—	—

Table 95. Annual Earnings (in kronor) of Workers at Gustavsberg China Factory 1850—1915.

Year	Potters		Oven-men		Outdoor workers		Female handlers		Female dippers	
	Se-lected	All	Se-lected	All	Se-lected	All	Se-lected	All	Se-lected	All
1850	—	528	—	343	—	220	—	—	—	—
51	—	562	—	349	—	262	—	—	—	170
52	—	655	—	351	—	294	—	—	—	189
53	—	760	—	353	—	299	—	—	—	184
54	—	786	—	357	—	326	—	362	—	186
55	—	782	—	389	—	331	—	—	—	183
56	—	944	—	498	—	374	—	411	—	216
57	—	963	—	578	—	496	—	532	—	241
58	—	909	560	507	—	439	—	361	—	188
59	—	693	633	600	—	461	—	398	—	179
1860	—	741	605	558	—	458	514	514	188	159
61	901	693	582	545	488	392	436	345	179	142
62	1001	680	613	566	463	374	476	321	202	167
63	1031	718	613	578	481	404	—	—	179	171
64	960	672	627	581	499	419	—	—	164	162
65	952	686	623	593	514	432	—	—	179	157
66	1080	775	625	592	509	449	—	—	183	163
67	1011	753	602	550	473	431	—	—	180	168
68	969	659	584	512	408	360	—	—	173	171
69	910	592	547	481	395	365	—	—	181	164

GUSTAVSBERG CHINA FACTORY

423

Table 95. (Cont.). Annual Earnings (in kronor) of Workers at Gustavsberg China Factory 1850—1915.

Year	Potters		Oven-men		Outdoor workers		Female handlers		Female dippers	
	Se-lected	All	Se-lected	All	Se-lected	All	Se-lected	All	Se-lected	All
1870	945	610	608	532	386	329	—	—	182	165
71	985	644	675	562	427	347	362	196	195	167
72	1068	753	775	645	438	356	451	213	247	203
73	1129	694	763	647	470	353	434	264	282	231
74	1230	829	812	741	537	376	534	251	321	264
75	1220	874	621	610	500	349	456	375	310	264
76	1220	792	711	694	520	372	451	378	366	288
77	1220	893	776	744	543	382	452	344	391	310
78	1020	809	675	695	474	369	460	348	428	336
79	920	722	462	532	449	332	415	366	324	270
1880	1140	929	629	648	460	367	435	396	360	302
81	1140	878	703	706	500	426	510	496	375	313
82	1070	854	663	673	490	438	419	377	375	318
83	1105	903	654	711	500	397	443	364	390	315
84	1120	972	689	709	485	362	423	342	395	334
85	1050	930	669	675	486	389	419	368	386	316
86	1070	946	725	688	498	376	412	—	411	316
87	1288	907	679	630	498	436	382	330	354	260
88	1350	964	768	784	509	461	398	371	379	272
89	1273	951	837	728	540	484	415	350	406	285
1890	1318	904	803	691	540	462	457	348	387	266
91	1269	866	768	691	510	453	433	359	379	275
92	1229	890	751	681	515	478	432	335	408	297
93	1235	961	788	730	520	489	400	366	445	314
94	1345	1038	832	795	558	495	434	404	456	355
95	1414	1042	786	805	527	520	480	395	466	376
96	1321	965	825	758	554	507	464	421	471	349
97	1465	1180	830	777	603	499	494	437	477	369
98	1512	1105	880	813	646	564	515	445	452	319
99	1636	1157	1026	890	735	605	567	466	464	376
1900	1654	1029	936	910	718	622	584	487	485	392
01	1569	988	927	891	700	641	542	458	469	410
02	1546	1000	878	911	721	663	532	—	473	400
03	1534	1055	934	881	712	620	540	513	478	388
04	1737	1161	1025	902	715	635	584	509	516	418
05	1754	1156	1026	932	747	645	586	517	496	405
06	1786	1211	975	866	711	674	621	556	500	355
07	1980	1292	1135	965	884	711	640	579	—	—
08	1691	1180	1066	939	900	685	610	527	—	—
09	1938	1208	1109	1005	883	758	619	507	—	—
1910	1987	1188	1196	945	826	679	621	474	—	—
11	2023	1217	1083	978	860	778	658	508	—	—
12	2278	1314	1158	1008	853	637	647	506	—	—
13	2000	1312	1183	1010	888	661	644	531	—	—
14	1550	1220	953	922	877	623	641	531	—	—
15	—	—	—	—	—	—	—	607	—	—

The material from Gustavsberg gives, as already mentioned, an opportunity of comparing the wage series for selected workers with averages for all workers in the respective occupations. Such a comparison being of great interest because of the general methods of compilation used in this enquiry (see Chapter II), we will study Table 95 somewhat closer from this point of view.

If we thus compare the annual earnings of selected and all workers within each group, we find that they follow one another closely as far as the actual movement of wages is concerned, although the selected workers' wages exceed those of all workers combined by a percentage that varies as between the occupations. The oven-men's series come nearest to one another, the selected workers' wages being, on an average, 7 % above the series for all workers; this group is moreover of a more homogeneous character than, for instance, the potters', among whom there are a number of odd-men and suchlike assistant workers. In one or two rare instances the wages of all workers combined are found to exceed those of the selected workers, as for example in 1879. The corresponding percentage for potters, as that quoted for oven-men above, is 40 %, for outdoor workers 19 %, for female handlers 17 %, and for female dippers 25 %. Potters and outdoor workers constitute occupational groups of very varied degrees of skill, and the selected workers are more highly skilled. The high percentage in respect of female dippers is due to special circumstances. The glaze contains a number of lead compounds (white lead, lead monoxide), which make the work injurious to the health, and consequently the female dippers are only allowed to work for a short time in the dipping department, being then transferred to other departments. This has meant that the selected female dippers have also been working elsewhere, while the workers in the series representing all the employees have been female dippers throughout, earning relatively low wages. Even if, then, owing to these high percentages we cannot regard the selected workers' wages as representative of the whole group in question, the trend of wages of the two series, as pointed out above, is parallel. It may be observed, however, that when a general rise in wages occurs, the selected workers' wages rise at a more rapid rate than those of the entire occupational group, often due presumably to the fact that in good times a greater number of less professionally trained workers are taken on and these tend to lower the average wage figure, while the selected workers remain the same. For the same reason the wages of selected workers and of all workers combined should approach one another in adverse years, when the less efficient workers probably are weeded out. We may quote as an instance of this the year 1879, to which we have referred above. To take the oven-men, for example, the curve of their wages reaches its highest peak in 1889, 1899 and 1907. From 1888 to 1889 the wages of the selected workers rise 9 %.

GUSTAVSBERG CHINA FACTORY

425

Table 96. Daily Earnings (in öre) of Selected Workers at Gustavsberg China Factory 1858—1914.

Year	Potters	Oven-men	Outdoor workers	Female handlers	Female dippers	Year	Potters	Oven-men	Outdoor workers	Female handlers	Female dippers
1858	—	197	—	—	—	1887	441	230	171	130	123
59	—	225	—	—	—	88	455	241	174	137	139
1860	—	203	—	180	71	89	433	264	179	143	156
61	308	210	169	153	70	1890	447	262	179	154	144
62	339	205	162	169	72	91	427	253	174	147	133
63	349	203	164	—	72	92	414	237	177	147	146
64	323	213	168	—	67	93	423	255	180	136	159
65	323	216	177	—	63	94	456	270	188	150	154
66	366	212	165	—	62	95	484	266	179	155	162
67	344	212	157	—	64	96	451	254	190	156	166
68	332	199	134	—	64	97	498	255	205	169	167
69	308	193	134	—	65	98	509	263	219	175	159
1870	325	211	132	—	66	99	560	349	246	193	169
71	335	232	142	128	65	1900	557	305	228	199	176
72	364	263	153	152	86	01	528	302	221	183	167
73	385	260	147	147	101	02	526	303	222	186	175
74	417	275	176	180	114	03	519	310	225	182	173
75	413	217	170	155	111	04	591	323	230	197	180
76	410	245	181	156	128	05	594	331	237	203	182
77	428	266	183	157	138	06	601	310	232	215	179
78	351	237	173	157	155	07	667	355	245	206	—
79	316	200	150	144	124	08	569	361	268	207	—
1880	393	224	156	148	125	09	652	377	273	211	—
81	400	247	173	173	137	1910	668	405	263	213	—
82	360	231	173	145	130	11	705	391	268	229	—
83	380	223	167	153	130	12	768	398	267	223	—
84	377	237	163	145	135	13	691	404	278	219	—
85	356	234	161	144	145	14	541	389	282	220	—
86	364	254	170	141	144						

whereas those of all workers drop 7 %. From 1898 to 1899 the former's go up 17 % and the latter's 9 %, the corresponding figures for 1907 being 16 % and 11 %.

Average annual earnings have been computed for all workers in 1865, 1885 and 1905. In the extracts from the pay-rolls the workers are divided up into their respective occupational groups, but in the tables they are combined into four categories: skilled workers (comprising workers engaged in the industry itself), craftsmen (smiths, joiners, ironworkers etc.), unskilled workers (those on outdoor jobs, odd-men and other unskilled workers connected with the actual manufacturing processes), and finally, all female workers.

Year	Skilled workers		Craftsmen		Unskilled workers		Female workers	
	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor
1865	124	645	21	618	16	342	34	170
1885	243	774	76	636	59	422	267	341
1905	319	929	79	711	82	584	364	456

A comparison between these cross-sections and the tables for selected workers shows that the trends of annual earnings for all skilled workers and the selected skilled occupations, potters and oven-men, tally fairly well between the three years when averages for all workers have been struck. There is a still closer agreement between the corresponding data for female workers. As to unskilled workers there is a wider deviation in the secular trend between all workers and selected outdoor workers. There is, however, a very close agreement between the trends of annual earnings of all outdoor and selected outdoor workers, and the deviation between the cross-sections and the time-series for unskilled workers probably owes to the heterogeneous composition of the unskilled workers' group.

The annual income in money includes quite a number of bonuses under various names, such as rewards for industry, oven-men's money etc. and, in more recent years, extra bonuses as part of a profit-sharing system, based on a certain percentage of the workers' annual income (in some years as much as 10 %). The potters were subject to a number of deductions, viz. for wear-and-tear of machinery (5 % of the amount due to them for piece-work). Besides these bonuses and deductions, which are all duly accounted for in computing the annual and daily earnings, the workers enjoyed a number of benefits to which no monetary value has been assigned in the books. Thus, for two rooms, kitchen and garden the workers paid only 5 kronor per month, which amount actually represented only the rent for the garden. The normal rent in the locality payable for two rooms and kitchen might be assessed at 450 kronor, and the rent for one room and kitchen at 300 kronor *per annum*. Further, the workers were paid a sum equivalent to half the municipal taxes and were supplied with free medicine. Besides this, they were allowed to buy firewood and coal at the concern's cost price, milk and vegetables, from a farm owned by the concern, at prices far below the market level. Fish was obtained very cheaply from the concern's own fishermen ("strömning" — the Baltic herring — never cost more than 25 öre per four-score).

The working time ranged normally between 280 and 300 days

per annum. There was generally no work done on Sundays, and sometimes the workers had a week's holiday before Christmas. Frequently the oven-men had night-work (paid for at a rate approximating to the average daily earnings). Oven-men and workers on outdoor jobs had a good deal of overtime, which is recorded both in days and hours. The number of overtime days generally increases during prosperous years. Thus, in 1907 the oven-men worked 32 overtime days and 56 overtime hours, the corresponding figures for 1906 and 1908 being 20 days and 49 hours and 16 days and 58 hours respectively. The number of days worked overtime by men on outdoor jobs amounted in 1907 to as much as 59, whereas in 1906 and 1908 it was respectively 21 and 43. Some of the occupations were of a seasonal character, but there was usually work available elsewhere during the dead season. While the ovens were being raked out, for instance, the oven-men were generally employed on outdoor jobs, so that 10—15 % of their income was earned on such work. All groups of workers, with the exception of the potters, have had a standard daily working time of 11 hours. For technical reasons the potters work only 8 ½ or at the highest 9 hours a day.

The form in which wages were paid has varied greatly in the course of years. In 1865 the time-wage represented 20 % of the total earnings, this applying mostly to outdoor workers, mechanics, firemen, masons, smiths, etc., though also to a number of workers engaged purely on china-making, such as dippers, sorters and sliphouse-men. During the seventies the work was done more and more on a piece-work basis, so that the cross-section in 1885 shows piece-work earnings practically throughout. At the close of the eighties time-work again began to find favour. The potters, for instance, had worked on a piece-work basis right up to 1887, but then about 10 % of their wages came to be paid on a time-work basis (generally speaking, the selected workers have more piece-work than the average). The rest of the occupations represented likewise did a certain amount of time-work after 1887, although on a smaller scale. In 1905 the time-wages constituted 27 % of the total wage account. The oven-men's share of time-wages disappears after 1906. Overtime was paid for at the same rate as for ordinary hours of work.

G. Kosta Glass Works.

In 1898 no less than 30 out of Sweden's 50 glassworks were located in Småland, and 1821 out of the country's 4 655 glassworkers (39 %) were at work in that province. The Kosta glassworks, which was located in this province and employed 450 workers at that period, well illustrate, therefore, the conditions of labour in the

glass industry.¹ Like most of the glassworks in Småland, the Kosta works have specialized in the manufacture of domestic glass, being particularly well-known for their decorative glassware.

The payrolls have provided particulars as to annual earnings, hours of work and the value of certain benefits. There are, however, no data whatever covering the period 1894—1900.

The wage series clearly reflect the business cycles. Good times prevailed up to the year 1863. In 1862 more designed and engraved glass was manufactured than in any other year during the period under review. A glass-designer's annual earnings increased from 996 kronor in 1861 to 1 442 kronor in 1862, falling during the next year to 620 kronor. Subsequent to 1863 there is a gradual falling-off of annual earnings up to the years 1867 and 1868, when the strong upward cyclical movement begins. The wages of unskilled workers already start rising after 1867. Those of the glass-blowers, however, rise far more steeply at the beginning (they went up 61 % between 1868 and 1871, the corresponding rise for the unskilled workers being 24 %). After that the glass-blowers' wages ceased to rise, and a violent decline followed after 1876. The unskilled workers' annual earnings went on increasing up to 1877 (by 32 % from 1871). The fall in the glass-blowers' wages was apparently extremely heavy after 1876 — 52 % in the period 1876—1878 (the daily earnings, however, only 30 %) as compared with the unskilled workers' 12 % decrease from 1877—1878. The annual earnings of those skilled workers who are not engaged in the actual manufacture of glass rise gradually between the years 1871 and 1877, the subsequent fall being very slight. The boom prevailing in the seventies is very clearly reflected in the total of wages paid to the glass-polishers, the rise from 1869 to 1876 being 292 %. The adverse years 1878 and 1879 are followed by a period in which the wages increase slowly but surely, the movement gaining in speed after 1888 and reaching its climax in 1890, as is particularly noticeable in the case of the stem-makers, whose wages rose 38 % from 1888. The strong rise in earnings up to 1892 for "various craftsmen" is due to the fact that in these years the making of moulds was resumed at the works, with the result that the highly paid iron-mould makers are once more represented in the average. From 1903 onwards there is a gradual rise in wages, which is accelerated in 1906—1907, being interrupted in 1907, as far as the blowers are concerned, by a slight drop up to the next year, whereas the other groups do not reach the maximum until 1908.

As regards the secular trend of development, the obvious approach between the unskilled workers' earnings and the skilled workers' wages is very striking. In the sixties the annual earnings of the

¹ *K. Key-Aberg, Arbetsstatistisk studie över glasindustrien i Sverige. Skrifter utgivna av Lorénska Stiftelsen. Stockholm 1899.*

KOSTA GLASS WORKS

429

Table 97. Annual Earnings (in kronor) of Workers at Kosta Glass Works 1860—1914.

Year	Glass-blowers	Stem-makers	Blowers	Glass-blowers' mates	Polish-ers	Glass-painters, -designers, -etchers	Various crafts-men	Unskil-led workers
1860	1571	—	—	—	—	—	467	206
61	1654	—	—	—	—	—	409	230
62	1701	—	—	—	—	—	511	233
63	1725	—	—	—	—	—	505	230
64	1483	—	—	—	—	—	479	244
65	1553	—	—	—	—	—	483	247
66	1572	—	—	—	—	—	470	263
67	1448	—	—	—	—	—	400	226
68	1341	—	—	—	—	—	485	265
69	1556	—	—	—	—	—	428	274
1870	1859	—	—	—	—	—	423	295
71	2165	—	—	—	—	—	383	327
72	2077	—	—	—	—	—	396	331
73	2278	—	—	—	—	—	411	371
74	2133	—	—	—	—	—	426	388
75	2355	—	—	—	—	—	469	379
76	2335	—	—	—	—	—	455	390
77	1868	723	—	—	—	—	570	432
78	1113	616	—	—	—	—	555	379
79	1151	354	—	—	—	—	536	385
1880	1208	421	—	—	—	—	524	431
81	1098	506	—	—	—	—	558	428
82	1253	534	—	—	—	—	561	417
83	1206	583	—	—	—	—	559	419
84	1194	613	—	—	—	—	563	417
85	1305	702	—	—	—	—	563	424
86	1319	724	—	—	—	—	564	428
87	1492	776	—	—	—	—	563	407
88	1444	640	—	—	—	—	550	373
89	1341	622	—	—	—	—	611	430
1890	1570	880	—	—	—	—	611	443
91	1096	761	—	—	—	—	659	545
92	1383	544	—	—	—	—	791	563
93	642	283	—	—	—	—	745	329
—	—	—	—	—	—	—	—	—
1901	1252	669	472	344	751	1419	839	564
02	1480	901	471	435	1263	1651	837	571
03	1400	840	452	370	1224	1604	847	576
04	1438	881	526	412	1271	1566	846	621
05	1353	753	521	407	1234	1458	856	614
06	1431	722	380	324	1316	1502	856	644
07	1678	1002	744	473	1425	1807	920	699
08	1681	1212	937	581	1508	1675	950	778
09	1505	1132	847	468	1383	1599	894	688
1910	1831	1348	760	622	1511	2253	991	760
11	1881	1327	394	670	1493	2373	1014	771
12	2007	1307	773	730	1607	2562	998	806
13	1941	1323	735	614	1523	2607	1114	769
14	1523	1158	637	576	1130	1867	1097	782

Table 98. Daily Earnings (in kronor) of Workers at Kosta Glass Works 1860—1914.

Year	Glass-blowers	Stem-makers	Blowers	Glass-blowers' mates	Various craftsmen	Unskilled workers
1860	5.85	—	—	—	1.70	0.68
61	6.16	—	—	—	1.49	0.78
62	6.33	—	—	—	1.86	0.78
63	6.35	—	—	—	1.84	0.78
64	5.73	—	—	—	1.74	0.82
65	5.79	—	—	—	1.76	0.83
66	5.81	—	—	—	1.71	0.90
67	5.68	—	—	—	1.45	0.77
68	5.20	—	—	—	1.76	0.89
69	6.07	—	—	—	1.56	0.91
1870	6.59	—	—	—	1.54	0.99
71	7.31	—	—	—	1.33	1.07
72	7.25	—	—	—	1.48	1.12
73	7.79	—	—	—	1.52	1.22
74	7.69	—	—	—	1.58	1.31
75	7.97	—	—	—	1.74	1.26
76	8.37	—	—	—	1.66	1.29
77	6.92	2.71	—	—	2.19	1.43
78	5.84	2.26	—	—	2.14	1.25
79	5.44	1.66	—	—	1.82	1.27
1880	4.45	1.54	—	—	1.78	1.38
81	4.25	2.03	—	—	1.89	1.37
82	4.94	2.14	—	—	1.91	1.33
83	4.76	2.33	—	—	1.89	1.31
84	4.71	2.30	—	—	1.91	1.33
85	5.06	2.81	—	—	1.91	1.35
86	5.16	2.90	—	—	1.93	1.40
87	5.47	2.84	—	—	1.91	1.40
88	5.29	2.35	—	—	2.12	1.29
89	5.37	2.49	—	—	2.35	1.50
1890	5.75	3.22	—	—	2.35	1.57
91	4.01	2.91	—	—	2.68	2.00
92	5.07	2.33	—	—	2.97	1.97
93	4.70	2.26	—	—	2.98	2.08
—	—	—	—	—	—	—
1901	5.50	2.93	2.07	1.51	3.33	1.96
02	5.42	3.34	1.83	1.59	3.28	1.99
03	5.13	3.08	1.65	1.35	3.26	2.01
04	5.27	3.23	1.93	1.51	3.28	2.13
05	5.35	3.01	2.08	1.63	3.32	2.15
06	5.68	3.47	2.33	1.99	3.31	2.25
07	6.25	4.12	3.51	2.08	3.54	2.45
08	6.16	4.63	3.43	2.13	3.80	2.73
09	6.51	4.94	3.67	2.15	3.85	2.70
1910	6.70	4.94	2.78	2.28	3.81	2.69
11	7.19	4.86	2.87	2.46	3.90	2.68
12	7.35	4.79	3.09	2.67	3.90	2.78
13	7.11	4.85	2.80	2.25	4.35	2.74
14	7.05	5.36	3.30	2.66	4.39	2.86

glass-blowers were on an average $6\frac{1}{2}$ times as high as the unskilled workers', in the seventies $5\frac{1}{4}$, in the eighties 3, and, finally, during the period 1901—1914 they were on an average $2\frac{1}{2}$ higher. The glass-blowers' annual earnings rose about 25 % during the period covered by the investigation, the corresponding figure relating to the unskilled workers being 233 %.

The glass-blowers' series shows the average of the annual and daily earnings of 4 workers during the period 1860—1914 (except the years 1894—1900, see above). The same workers have been followed for lengthy periods, so that there are no abnormal breaks in the series. Formerly, in prosperous years, the earnings of these 4 workers differed a good deal. Thus towards the close of the sixties and in the beginning of the seventies, when prosperity was increasing, the dispersion between the earnings of the respective glass-blowers was very wide. A particularly skilled glass-blower earned in 1872 3 082 kronor, whereas the annual earnings of another glass-blower were only 1 593 kronor. During the years of depression 1878 and 1879 the earnings were at a very constant level, as in all subsequent years.

The stem-makers', (1877—1914), the blowers' (1901—1914), the glass-blowers' mates' (1901—1914) series show for each group the average annual and daily earnings of 2 workers.

In the group glass-polishers and edge-polishers, the latter did not exist prior to 1901. During the period 1860—1881 the glass-polishers kept assistants, to whom they themselves paid wages. From 1865 to 1873 each assistant received from the master an annual wage of 35 kronor in money and board and lodging at the rate of 15 kronor per month (215 kronor *per annum*). During 1874—1881 each assistant received 50 kronor in money and the same benefits in kind, making a total of 230 kronor *per annum*. The number of assistants each master polisher employed varied between 4 and 6. There is no doubt that not only did the number of assistants vary greatly from year to year, but the time during which the master employed each assistant varied according to the amount of work available. The material contains only particulars of the total annual sum paid to each polisher, no mention being made of the number of assistants he employed, and there is no possibility of ascertaining the amount of the assistants' wages. According to information received, the masters should have ceased keeping assistants in 1881, but to judge from the amount of the earnings it would seem that the system was in practice up to 1887. The averages relate to 3 glass-polishers and 2 edge-polishers, and for the reasons given above are published only from the year 1901. Except in regard to a few isolated years, the earnings are on a very consistent level.

Prior to 1901 the averages for glass-painters, glass-designers

and glass-etchers are uncertain, often only one worker having been selected. After 1900 3 workers are included (1 from each occupation). In early days the glass-painters paid wages to several assistants and paid the concern for some of their materials. In view of these conditions, the averages are given as from 1901.

The "various craftsmen" series contains the wages of workers not belonging to the actual glass industry: iron-mould makers, joiners, masons and smiths. During the period 1860—1867 the average comprises 2 workers (an iron-mould maker and a joiner), in 1868 a mason is added, in 1871 another joiner, i. e. 4 workers in all. From 1876 to 1891 no moulds were made at the works, all such utensils being purchased from elsewhere. From 1901 a smith is taken into the average, which now consists of 5 workers. The average of annual earnings is often a very heterogeneous average. The joiners earn far less than the iron-mould makers; in 1873, for instance, one of the joiners earned 245 kronor, while the iron-mould maker earned 613 kronor. This applies also to subsequent years, in 1910 the corresponding figures being 528 and 1 500 kronor. One smith, who is not included in the average, has a fixed annual wage and earns so much more than the other workers in the group that he cannot be regarded as typical; during the period 1863—1873 he received an annual wage of 800 kronor, in 1874—1877 900 kronor, in 1878 and 1879 his wages dropped to 858 and 813 kronor respectively, from 1881 to 1884 they amounted to 1 400 kronor and by 1889 they had risen to 1 830 kronor.

The unskilled workers' series consist of averages of glass-melters', stoppers', glasshouse labourers', gas-firemen's cutters', storemen's, crushers', glass-sorters', glass-carriers', glass-packers' and box-makers' wages. During the period 1860—1885 7—8 workers are included in each annual average, in 1886—1893 9—11 workers, and from 1901 to 1914 the group consists of 11—12 workers.

In earlier years all workers received free medical attention, free housing, firewood and potato-ground, these benefits in kind being valued by the concern on an average at 50 kronor altogether. In respect of some workers (skilled workers) the items have been specified and their value indicated. Firewood has been valued at 20—30 kronor. Formerly the lower paid workers used to be allowed cow-fodder to a value of 30 kronor and those receiving higher wages to a value of 50 kronor. Most of the concern's workmen's dwellings were newly built at the end of the 19th century and were roomy and light. The value of the free housing is not included in the annual earnings.

Of the different occupations the following were engaged on piece-work: glass-blowers, stem-makers, glass-polishers and glass-designers. The iron-mould maker was engaged on piece-work during the period 1860—1875, after which he received a monthly wage. The

smith did piece-work from 1860 to 1862, received an annual wage during 1863—1879, a monthly wage during 1880—1890 and an hourly wage during 1891—1914. Blowers and glass-blowers' mates were paid both time- and piece-work rates. Edge-polishers, glass-painters and all workers within the unskilled workers' group were engaged on time-work, payment being mostly by the hour and day, although some received weekly and monthly wages.

The working time has been indicated in the records in a number of various ways: in days, weeks or months, while sometimes it has only been noted that the worker has been employed throughout an entire year. In some instances we have reduced the working time to days. For skilled workers 12 months have been taken to equal 273 days, and 11 months to equal 250 days. In the case of unskilled workers, who as a rule appear to have had longer working time, 12 months have been taken to equal 290 days. The working time of the glass-blowers has been given in months, but it includes also "waiting-weeks", the number of which is stated each year up to 1887. In this case 12 months have been taken to equal 51 weeks and 11 months to equal 47 weeks, and thereafter the number of "waiting-weeks" has been subtracted from the number of weeks thus computed. The resultant number of weeks worked has been multiplied by 6 to obtain the number of working days in the year.

With regard to the "waiting-weeks", the glass-blowers were paid at the rate of 2 kronor per week. The number of waiting-weeks during the sixties was about 7, falling however to 4 or 5 in the eighties. In 1878 and 1879, a period of trade depression, the number amounted to 18 and 17. All groups worked 6 shifts per week. The number of days *per annum* worked by the glass-blowers generally amounted to 260—270. The unskilled workers, on the other hand, often did over 300 days' work a year, as did also occasionally masons and joiners. On the whole, however, the annual working time is based on a fairly rough estimate. During the period 1860—1905 there were two shifts per 24 hours working in the "glass-house", the number of effective working hours being $8\frac{1}{2}$ per shift. From 1906 the manufacture of glass was carried on by day only, the number of effective working hours being about 9. The men in the glass-house however could, as piece-workers, more or less choose their time for working. The firemen at the glass-furnaces constituted an exception from the other workers in the glass-house, as they worked on a 12-hour shift, with 2 hours allowed off for meals. Those engaged in other departments of the glass-works worked throughout the whole period on a 12-hour shift, with two intervals of 1 hour each, i. e., a net working time of 10 hours.

H. Eda Glass Works.

In order to afford some basis of comparison with the Kosta Glass Works some figures are quoted below regarding the Eda Glass Works in Värmland. On the whole, the same method of compilation has been followed as in the case of Kosta, the same number of days *per annum* serving as a basis for calculating the daily earnings. Generally speaking, the data obtained from Eda are less reliable and more meagre. Only the annual and daily earnings of glass-blowers, glass-polishers and glass-packers are published in Table 99 hereunder.

Up to 1903 a fairly close agreement is observable between the earnings of the glass-blowers at Eda and Kosta, the Kosta workers

Table 99. Annual and Daily Earnings (in kronor) of Workers at Eda Glass Works 1886—1914.

Year	Annual earnings			Daily earnings		
	Glass-blowers	Glass-polishers	Glass-packers	Glass-blowers	Glass-polishers	Glass-packers
1886	1288	1012	446	4.72	3.71	1.54
87	1294	890	410	4.74	3.26	1.41
88	1369	862	383	5.01	3.16	1.32
89	1609	989	410	5.89	3.62	1.41
1890	1213	871	405	4.44	3.19	1.40
91	1292	1024	446	4.73	3.75	1.54
92	1306	1016	458	4.78	3.72	1.58
93	944	717	310	4.60	3.50	1.42
94	1255	1098	421	4.60	4.02	1.45
95	1231	1208	444	4.92	4.42	1.53
96	1260	1386	471	4.62	5.08	1.62
97	1089	1093	473	3.99	4.00	1.63
98	1327	1202	451	4.86	4.40	1.56
99	1285	1170	465	4.71	4.29	1.60
1900	1195	1065	468	4.38	3.90	1.61
01	1408	1022	472	5.16	3.74	1.63
02	1283	917	434	4.70	3.36	1.50
03	639	420	196	4.66	3.07	1.35
04	995	620	—	3.64	2.27	—
05	1144	637	—	4.19	2.33	—
06	1175	641	—	4.70	2.35	—
07	822	488	—	4.52	2.68	—
08	1027	637	—	4.50	2.79	—
09	791	517	—	4.35	2.84	—
1910	1288	845	—	4.72	3.10	—
11	1323	892	—	4.85	3.27	—
12	1292	930	—	4.73	3.41	—
13	1338	944	—	4.90	3.46	—
14	1266	777	—	5.55	3.41	—

earning as a rule about 10 % more than the Eda workers, which does not however prevent the latter's earnings occasionally exceeding the former's, as for instance in 1889, when the maximum wage was paid at Eda, the peak year for glass-blowers at Kosta being 1890. After 1903, however, the divergence becomes wider and wider (up to as much as 50 %) and is obviously not attributable merely to the fact that the Eda averages involve a larger number of workers (see below). Similar observations may be made in regard to glass-polishers and glass-packers, the latter as compared with the unskilled workers at Kosta. The difference in the level of the wages is not great towards the beginning of the present century, but in subsequent years it widens considerably.

Up to 1904 only 2 workers are represented in the annual averages, but their wages are on about the same standard, and there are not many replacements. From 1904 all workers within the glass-blowers' and glass-polishers' group are included in the averages, the number of the former varying between 13 and 15, and that of the latter between 40 and 55. The variation in the wages between 1903 and 1904 is thus of no account. If we compare these average earnings during the period 1910—1914 and the corresponding earnings of 5 selected representative workers during the same years, we find that the wages of the 5 selected glass-blowers are on an average 10 % above, and those of the corresponding glass-polishers 19 % above, the average earnings shown in Table 99.

All workers were housed free (valued at 60 kronor). They were entitled to obtain without payment firewood up to a value of 30 kronor at the works' own cost price, receiving in money such balance thereof as was not spent on firewood. From 1886 to 1895 the glass-blowers were given milk free (valued at 60 kronor). The values of milk and firewood are included in the annual earnings.

Those employed in the glass-house worked about 9 hours a day other workers generally 10 hours, with the exception of melters, who worked for about 12 hours, and glass-packers 11—12 hours. Only the gas-firemen worked in shifts.

WOOD PRODUCTS (CHAPT. VII).

A. Hellefors Sawmill.

The Hellefors ironworks¹ situated in the county of Örebro, formerly owned also a water-driven sawmill, in respect of which wage series have been drawn up for the years 1865—1910. The only particulars available concern the annual earnings of two workers in each occupation represented. These are: sawyers, edgers, edgers' helpers and plank-pilers. The series are occasionally lacking in homogeneity. It is probable that in 1874—1891 the earnings of one of the edgers include income earned by a member of his family, the earnings of the other worker being particularly low, and the series as far as those years are concerned has therefore been excluded. The plank-piler's series, which starts in 1879, is the most homogeneous series. The series nevertheless agree fairly closely with one another in their general trend.

The benefits in kind were the same as those allowed to the workers employed at the ironworks. The sawmill-hands are said to have been engaged on forest work when the saw was not in operation. Sawing was done only in the summer up to 1907, and after that year, when sawing began to be carried on in the winter as well, there occurs a substantial increase in annual earnings. The sawmill was involved in the general strike in 1909 for one month.

The hours of work are stated to have been 12 a day in the earlier years. In 1895 the time was changed to 11 hours a day, and at the turn of the century to 10 hours a day. It was probably somewhat shorter on Saturdays. The plank-pilers had no definite hours of work per day, but kept on working until they had piled up the boards that had been sawn. They did not work more than 8—10 hours.

The sawyers' series reflects the heavy rise in wages at the beginning of the seventies, 1871—1873, and the subsequent decline in 1877—1879. The wages of the edgers' helpers show precisely the same trend. The sawyers do not again reach the level of the seventies until 1907. The wages during the eighties and nineties vary within very narrow limits. In 1899—1900 a general rise and in 1900—1902 a fall in wages can be observed. In 1906—1907 they rise considerably, evidently owing to the prolongation of the sawing season; the rise continues until 1908, the wages of the sawyers and plank-pilers in 1906—1908 showing an average rise of 46 %.

¹ See p. 291.

HELLEFORS SAWMILL

437

Table 100. Annual Earnings (in kronor) of Workers at Hellefors Sawmill 1865-1910.

Year	Sawyers	Plank-pilers	Edgers	Edgers' helpers
1865	705	—	—	—
66	1054	—	—	—
67	885	—	—	—
68	754	—	—	—
69	799	—	—	—
1870	766	—	—	447
71	735	—	—	501
72	979	—	—	616
73	1147	—	—	721
74	1153	—	—	757
75	1130	—	—	755
76	1051	—	—	702
77	1072	—	—	689
78	888	—	—	600
79	502	—	—	444
1880	672	524	—	—
81	711	534	—	—
82	755	626	—	—
83	704	640	—	—
84	802	665	—	—
85	785	723	—	—
86	824	761	—	—
87	848	705	—	—
88	768	706	—	—
89	829	702	—	—
1890	800	724	—	—
91	855	768	—	—
92	854	778	—	547
93	777	778	612	498
94	762	872	778	481
95	711	831	713	462
96	725	820	684	493
97	741	837	744	500
98	710	847	—	508
99	784	794	—	502
1900	885	901	747	586
01	869	941	678	—
02	829	892	704	623
03	894	972	800	527
04	830	885	721	516
05	855	967	734	547
06	836	945	778	—
07	1150	1204	1125	—
08	1248	1356	1241	919
09	1220	1309	1167	720
1910	1280	1407	1244	—

B. Mo Sawmill.

From the Mo Mills, in the County of Västernorrland, wage data have been collected covering the periods 1864—1869, 1871—1878 and 1881—1893. Up to the year 1878 they relate to a water-driven sawmill, and from 1881 they refer to the steam-sawmill that was erected in that year. The last part of the series has been included in the average for the Norrland steam-sawmills. In 1865 and 1885, the years when all workers have been taken into account, there were respectively 25 and 32 workers engaged at the mill, besides smiths and charcoal-burners. The steam-sawmill set up in 1881 comprised four frames. In 1895 the mill was removed down to the coast.

The material consists of the annual earnings of all the mill-hands, charcoal-burners, smiths and sundry workers, the earnings of 2—5 workers selected from amongst the mill-hands, their earnings being divided into piece-work and time-wage earnings, as well as the working hours corresponding to the time-wage earnings. The time-wage consists partly of earnings at the sawmill and partly of wages earned on the less well paid day-jobs. The average daily earnings are found to vary considerably, as the latter form of employment occurred on a different scale in different years and the relative figures are therefore more or less useless for our purpose. Many of the selected workers have had to be excluded as they were assisted by wives, children, brothers-in-law, male and female servants. Those too have been excluded who have been at work for a very short period or have been engaged on too much day-job work. This series (*a*) then contains 8—16 workers.

The difference between the highest earnings and the lowest is up to 1881 generally less than 50 %. After that year and in connection with the introduction of the wages at the steam-sawmill there was a wider differentiation between the wages, and several distinct groups at different wage levels can be observed. The workers have accordingly been divided into three different series. Of these, series *b* is a direct continuation of series *a*, including the same workers as this series or else workers of a similar status. The series relates to 12—21 workers of the same class as those in series *a*. Series *c* embraces workers that were newly engaged at the steam-sawmill and were earning a lower wage. The number of workers included is 4—8. The difference between the highest and lowest earnings is in general less than 25 % of the lowest earnings. Series *d* includes workers who are on a higher wage level than the others. The series comprises 2—8 workers with an absolute dispersion of wages generally less than 40 % of the lowest earnings in the group. Series *c* and *d* have been carried back a couple of years, embracing such workers as appear in them in 1890. Finally, there is a series of saw-adjusters

(1—2 workers), who are on a wagelevel that is practically the same as that of series *d*.

Table 101. Annual Earnings (in kronor) of Workers at Mo Sawmill 1864—1893.

Year	Mill-hands, selected workers	All workers, divided into different wage groups ¹				Saw-adjusters
		a	b	c	d	
1864	220	267	—	—	—	—
65	406	362	—	—	—	—
66	385	384	—	—	—	—
67	309	363	—	—	—	—
68	393	409	—	—	—	—
69	425	419	—	—	—	—
—	—	—	—	—	—	—
1871	320	371	—	—	—	—
72	491	468	—	—	—	—
73	548	508	—	—	—	—
74	534	551	—	—	—	—
75	491	466	—	—	—	—
76	519	509	—	—	—	—
77	519	509	—	—	—	662
78	562	543	—	—	—	629
—	—	—	—	—	—	—
1881	420	387	—	—	—	632
82	568	553	—	—	—	654
83	536	536	—	—	634	695
84	541	555	—	—	693	708
85	532	520	—	472	607	701
86	533	537	—	477	734	797
87	547	549	—	475	714	776
88	561	584	—	489	771	764
89	663	650	—	511	916	865
1890	729	—	691	548	958	967
91	658	—	656	519	984	1010
92	671	—	671	562	1045	1200
93	654	—	656	524	1212	1200

The annual number of hours spent on time work, which indeed covers the entire sawing season, was on an average 174 days at the water-mill and on an average 243 days at the steam-mill in the case of the selected mill-hands. Moreover, the annual sawing season at the water-mill appears to have varied a good deal, the seasons being particularly short in 1864 and 1871, when the number of days worked on a time-wage basis was only 155 and 115 respectively. In 1881 most of the work seems to have consisted of day-jobs.

There is an almost complete agreement between the trend as well as the level of wages in the selected workers' series and those

¹ Cf. above.

shown in series *a* and *b*. The other series agree closely in regard to the cyclical fluctuations. After 1882 there occurs a distinct dispersion of the wage level, but as no occupations are given in the records except in the case of the saw-adjusters, the cause of this is not known. The wage level is practically unaltered during the years 1865—1869. Up to 1873 the wages rise steeply (in 1869—1873 the selected workers' 29 % and all workers' 21 %). They then drop when the depression sets in in 1875, as also do the wages at the steam-mills (in 1874—1875 selected workers' wages dropped 8 % and all workers' wages 15 %). After that year the wage level remains constant until 1878. A minor peak is noticed in 1884, but no appreciable movement in wages occurs until 1888—1890. The wage series now begin to expand, *d* and the saw-adjusters' series by 25 %, *b* and the selected mill-hands by 24 % and *c* by 12 %. The saw-adjusters' series and *d* continue to expand up to 1893 another 25 %, while the others fall on an average 12 %.

C. Robertsfors Sawmill.

The sawmill belonging to the above-mentioned ironworks,¹ situated in the county of Västerbotten, has furnished wage series for the period 1865—1907. This sawmill was driven by water-power and was thus at work for only a portion of the year. However, the many-sided activities carried on at the works made it possible to employ the personnel throughout the year. It is reported that when the river froze over, all work at the sawmill ceased and the workers were put to other uses, chiefly on work at the blast-furnace, which was usually blown in in the autumn of each year. The sawmill was modernized in 1873 and rebuilt altogether in 1892. In 1904—1907 98—127 full-year workers were employed there.

A yearly series has been computed for all the 8—18 workers who were employed at the sawmill during the season, and for the rest of the year were engaged on other jobs at the ironworks. The figures relate to annual earnings only; those workers whose earnings were too low or too varying have not been included in the series. However we have not with any certainty obtained a series containing exclusively full-year workers. Nor are there any particulars as to occupations, so there is no guarantee that the qualifications of the selected workers have not changed. The series agrees closely with the series relating to all the workers at the Robertsfors ironworks, in which the sawmill-hands are also included.

The trend of this series, including all workers, entirely follows that of a series representing 3 selected sawyers during the period 1865—

¹ See Chapter IV, p. 69.

1875. The number of hours spent by these workers on time-work is known, but there is no means of determining the length of the sawing season.

Selected workers' series are also worked out in respect of a number of occupations covering the period 1895—1907. Each series comprises 1—3 workers. Here the earnings are divided into time-wage and piece-work earnings, and for the most part there are time data relating to the periods 1895—1899 and 1904—1907. Certain series are not homogeneous, and, apart from the series relating to sawyers and sawyers' helpers, which are homogeneous, the only average published is one for the years 1895—1902 for unskilled workers. The three series thus obtained are in complete agreement as regards trend.

Table 102. Annual Earnings (in kronor) of Workers at Robertsfors Sawmill 1865—1907.

Year	All workers	Sawyers	Year	All workers	Sawyers	Sawyers' helpers	Unskilled workers
1865	312	303	1890	409	—	—	—
66	347	339	91	443	—	—	—
67	393	400	92	463	—	—	—
68	369	359	93	497	—	—	—
69	415	392	94	631	—	—	—
1870	402	384	95	—	617	571	622
71	399	413	96	—	559	545	575
72	434	452	97	—	574	534	572
73	483	510	98	—	618	586	573
74	503	546	99	—	614	557	605
75	448	—	1900	—	720	660	667
76	453	—	01	—	599	658	618
77	441	—	02	—	574	545	529
78	447	—	03	—	727	579	—
79	334	—	04	—	770	681	—
1880	421	—	05	—	738	684	—
81	451	—	06	—	771	654	—
82	440	—	07	—	850	756	—
83	436	—					
84	454	—					
85	456	—					
86	493	—					
87	429	—					
88	450	—					
89	458	—					

Finally, cross-sections embracing all workers have been drawn for the period 1904—1907. Here data are given concerning annual earnings and the working time expressed in hours. An average for all workers has been calculated. The cross-sectional data agree with the yearly series relating to sawyers' helpers but are somewhat higher than the sawyers' yearly series.

The benefits in kind consisted of free housing and in some cases a piece of ground to provide cow feed. Whether the workers were entitled to purchase grain at a reduced price from the works, or not, is uncertain, but according to information from the works the system of reduced prices probably was in practice.

In the beginning of the nineties, 1892 or 1893, the number of working hours was shortened from 12 to 11 a day and was reduced to 10 at the end of the decade. During the first years of this century it is said to have been 9. With regard to the number of working days *per annum*, it would appear from the material that the sawing season in the nineties lasted about 200 days.

The annual earnings at this water-driven sawmill are on a considerably lower level than the average computed for the steam-driven sawmills in Norrland. In 1884—1893 the latter is 40—70 % higher. In later years, however, the earnings apparently come nearer to this average, which between 1895 and 1902 is about 45 % higher than the selected workers' series and only about 20 % higher than the average for the cross-sections in 1904—1907. Their mutual agreement as regards cyclical variations is however striking, 1889 being a peak year, a pronounced maximum being reached in 1900 and a minimum in 1902.

E. Domsjö Sawmill.

This steam sawmill is situated on the coast in the Örnsköldsvik shipping district. The factory was founded in 1856 as a water-sawmill with 3 frames, and was rebuilt in 1877 and extended in 1882, 1895 and 1912. In 1925 the steam-power was converted into hydro-electric power. In 1886 the mill possessed 5 sawframes and 9000 stds were sawn a year;¹ in 1906 there were 7 frames and the output was 11,000 stds.

The number of workers during the season were as follows:

Year	At the sawmill	In the timberyard	In the planingmill	Total
1886	63	73	28	164
1895	59	—	16	—
1905	92	33	23	148
1925	—	—	—	about 250

The earnings have been extracted from the following series of lists, each separate list covering 14 days.

¹ R. Hörnell, Katalog över Sveriges sågverk. Stockholm 1886.

"Earnings at the sawmill", relating to the ordinary work performed in the sawmill and giving the occupation, name, turns at the saw, number of sawn logs and wage per log in the case of piece-work workers and the number of hours in that of workers paid by the hour, and, finally, the total earnings. "Sundry contract work", recording the worker's home-district and name, the nature of the work, the piece-work rate and the earnings during the period. Work in the timberyard is recorded here, as well as jobs done at an hourly wage, in which case the number of hours is stated. "Day-job list", recording extra work performed for a time-wage, the following details being given: the worker's home-district and name, the number of hours worked on the different days of the week, and the nature of the task. The workers at the sawmill have earned no wages for agricultural labour at the concern's farms, for which there is a separate list.

The number of days spent on work in the timberyard has been estimated in the cross-sections, i. e. the averages for all workers in 1886, 1895 and 1905 fortnightly on the basis of the figures representing the earnings.

Three yearly series for sawyers, edgers and plank-pilers, covering the period 1882—1925, have been obtained, each relating to one selected worker. It is stated by the concern, that all the workers within these groups received the same income. The series only refer to piece-work done at the saw, the data being taken from the above-mentioned list of "earnings at the saw". In the earlier years the difference between piece-work wages earned at the saw and the total earnings *per annum* was undoubtedly considerable, but from 1890 onwards it was generally only slight owing to the extension of the sawing period (see the comparison with the cross-sections below). The edgers' and the sawyers' series have been combined into one, the former up to 1909 having been corrected with the aid of the cross-sections, which show that the edgers earned precisely the same income as the sawyers.

All the above-mentioned lists have been used when drawing up averages for all workers (cross-sections) in the years 1886, 1895 and 1905. These are found to agree with the yearly series except for the total earnings on piece-work at the sawmill in 1886, which are considerably lower than the cross-sections, and they have accordingly been raised with the aid of the latter.

The only cross-section in which a considerable number of seasonal workers occur is that for 1886, the seasonal workers being distinguished from the full-year workers. The workers have been divided into three groups: skilled, semi-skilled and unskilled workers. The figures not within brackets refer to the sawmill only, those within brackets to both sawmill and timberyard.

Table 103. Annual and Daily Earnings (in kronor) of Workers at Domsjö Steam Sawmill 1882-1925.

Y e a r	Standard annual earnings		Standard daily earnings	
	Sawyers and edgers	Plank-pilers	Sawyers and edgers	Plank-pilers
1882	500	553	2.84	3.14
83	448	506	2.96	3.42
84	527	665	2.76	3.47
85	—	—	—	—
86	565	616	2.65	2.89
87	608	662	2.72	2.96
88	586	624	2.77	2.95
89	707	793	2.81	3.15
1890	814	942	2.97	3.44
91	809	934	2.96	3.42
92	877	1012	3.16	3.63
93	—	—	—	—
94	862	994	2.93	3.38
95	852	977	3.01	3.44
96	831	963	3.30	3.82
97	—	—	—	—
98	897	1037	3.30	3.81
99	936	1088	3.33	3.88
1900	954	1119	3.60	4.22
01	961	1112	3.42	3.96
02	909	1047	3.48	4.01
03	848	977	3.61	4.15
04	1063	1252	3.80	4.47
05	906	1093	3.81	4.59
06	1096	1269	3.99	4.62
07	1109	1226	4.25	4.70
08	1119	1209	4.30	4.65
09 ¹	700	731	4.37	4.57
1910	1181	1297	4.33	4.75
11	1170	1211	4.76	4.92
12 ²	1009	1149	4.55	5.17
13 ²	1179	1269	5.04	5.42
14	1431	1520	5.26	5.59
15	1474	1563	5.43	5.77
16	1565	1648	5.57	5.87
17	1663	1744	6.65	6.98
18	1977	2107	7.92	8.37
19	2761	3003	10.80	11.70
1920	3680	3971	13.12	14.16
21	2406	2570	12.56	13.44
22	2341	2554	8.80	9.60
23	2458	2631	8.56	9.12
24	2359	2512	8.48	9.04
25	2077	2224	8.88	9.52

¹ Stoppage.

² Saw rebuilt.

Table 104. Earnings of all Workers (in kronor Steam Sawmill in Cross-Sectional Years 1886, 1895, and 1905)
a. Full-year Workers in Sawmill and Timbery

	Number of workers	Total annual earnings	Total daily earnings
1886			
Skilled workers	(9)	(689)	(2.48)
Semi-skilled workers	7	712	2.55
Unskilled workers	8	507	2.06
	(18)	(599)	(2.32)
	11	635	2.49
<i>All workers</i>	(35)	(601)	(2.30)
	26	616	2.37
1895			
Skilled workers	18	813	—
Semi-skilled workers	17	658	—
Unskilled workers	25	834	—
<i>All workers</i>	60	778	—
1905			
Skilled workers	18	947	3.76
Semi-skilled workers	(39)	(800)	(3.09)
	31	782	3.03
Unskilled workers	(34)	(945)	(3.68)
	25	990	3.87
<i>All workers</i>	(91)	(883)	(3.44)
	74	892	3.49

the
king
rom
t to

and
120
d in
The
ght-
ime
work
3.0
tain
—
lies
3.0
—
tly
3.9
ed.
—
ut
3.55
h
de

Cross-sections have likewise been drawn up for the planing works attached to the sawmill. In 1886 only a minor part of the workers at the planing-works were employed all the year round, whereas in 1905 all were full-year workers.

b. Full-Year Workers in the Planing-Works.

	Number of workers	Total annual earnings	Total daily earnings
1886			
Skilled workers	—	—	—
Semi-skilled workers	6	572	2.12
Unskilled workers	—	—	—
1905			
Skilled workers	6	1003	3.84
Semi-skilled workers	8	779	3.07
Unskilled workers	9	990	3.91

*The Season's Wages at the Sawmill and in the Timberyard
in 1886.*

	Number of workers	Total season's earnings	Total daily earnings	Standard daily earnings
<i>Sawmill</i>				
Skilled workers	6	553	2.48	2.61
Semi-skilled workers	4	422	1.97	2.04
Unskilled workers	13	504	2.46	2.50
<i>Timberyard</i>				
Skilled workers	19	315	2.10	—
Semi-skilled workers	—	—	—	—
Unskilled workers	44	397	2.51	—
<i>Sawmill and timberyard</i>				
Skilled workers	25	372	2.19	—
Semi-skilled workers	4	422	2.04	—
Unskilled workers	57	421	2.50	—
<i>All workers</i>	86	407	2.39	—

In the cross-sectional year 1886 the season lasted from the middle of May to the beginning of December. In subsequent cross-sections there are no typical seasonal workers apart from a few in the timberyard.

In percentage of the total annual earnings the extra earnings on work outside the sawmill, paid for on a time-wage and piece-work basis, represented for full-year workers in 1886 13, in 1895 0 and in 1905 5. For the seasonal workers they represented in 1886 11 %. In the years 1895 and 1905 there were no seasonal workers employed. The figures show the substantial decline in wages paid for extra earnings due to the prolongation of the sawing period.

Benefits in kind consisted of free housing and firewood. These are valued by the concern at 75 kronor up to 1899, at 150 kronor up to 1919 and after that year at 200 kronor.

The number of hours of work *per diem* was stated to have been 12 up to 1890, 11 during the period 1891—1899, 10 in 1900—1916, 9½ in 1917, 9 in 1918—1919, and after that year 8 hours. These figures apparently apply to the actual sawing period only. The working day was shortened during the winter — in 1886, for instance, to 10 hours, as will be observed in the cross-sections.

The number of days worked *per annum*, calculated on five-year averages, was as follows:

1882—84, 1886, 1887	194	max. 224
1888—92	258	• 278
1894—96	276	• 294
1898—1902	272	• 281
1903—07	258	• 280

1908	260	—
(1909) ¹	160	—
1910—14 ²	249	max. 272
1915—20	266	281
(1921	191)	—
1922—25	267	288

It is evident that from the beginning of the nineties the sawing period was extended to its present length, sawing taking place even during the winter. The cross-sections show that from that time onwards merely seasonal work was not carried out to any considerable extent.

F. Lugnvik Sawmill.

This sawmill, on the River Ängermanälven, in the Härnösand shipping district, was founded in 1874. In 1890 there were 120 employees at the mill in the winter and 170 in the summer and in 1905 there were on an average 105 men employed at the mill. The available data, taken from the concern's payrolls, refer to fortnightly earnings divided into piece-work and time-wage earnings. The time spent on "time-work" is recorded in hours, that spent on piece-work at the mill in whole days and portions thereof. It is not certain that the same number of working days per fortnightly period applies to piece-work in the timberyard as at the mill, and consequently the number of working days in the timberyard has been estimated. There are no records of the hours spent on extra piece-work, but as such work is generally confined to certain periods during which the mill has not been working, it has been possible to estimate the hours of work on such jobs.

The yearly series cover the periods 1876—1878 and 1889—1912.

The sawyers' series embraces 3—4 workers, i. e. about one-half of the entire number of workers in the group. Only 3 replacements took place in the series throughout the period.

The sawyers' helpers series embraces 2—3 workers, i. e. about one-third of the entire number of workers in the group. Replacements of workers in the series were numerous in 1899—1901, but otherwise few.

These two series are published as being representative of the hourly wage-rate applied to highly skilled and semi-skilled workers. As will be seen, their trend is in complete agreement. The sawyers' wages are 20—25 % higher.

Other occupations representative of the skilled workers are as follows, these series however not being published:

¹ Stoppage.

² The sawmill was rebuilt in 1912 and 1913.

Adjusters received at one time the same wage as sawyers, sometimes even higher, as in 1891—1896 25—30 %. Their wages subsequently fall as compared with the other workers', and from the year 1905 are similar to the earnings of the sawyers' helpers.

One sorters' series, which is fairly weak (containing only one worker), and relating to the annual wages, is on the same level as the sawyers' helpers' series. During the period 1876—1906 their wage-rate is unchanged at 25 öre per hour, with the exception of the 1900 season, when it was raised to 30 öre. In 1907 the hourly wage rate is increased to 30 öre, at which it remains for the rest of the period.

To represent the unskilled workers a series is published containing two series weighted together: plank-pilers and loaders.

The plank-pilers, who besides piling up the logs performed the task of transporting them on trucks, are 10 in number and are represented by 5 selected workers. The loaders' series relates to 1—2 workers. There are no figures showing the total number of full-year workers in the latter group, but during the season in 1890 there were about 15. The earnings at periods outside the season varied a good deal from year to year and between one worker and another. Averages have been struck for workers whose earnings on loading jobs have been the same. As regards the relative quality of the series, the plank-pilers' series is assigned double the weight in the average. The loaders' annual earnings are as a rule 10—25 % below those of the plank-pilers. In 1909 their earnings were far lower, owing to the general strike. Their daily earnings on the other hand show a decline as compared with the plank-pilers' (see below).

The loaders are also represented in 1900—1913 by a series of seasonal workers relating to one selected worker. The working time has generally been 160—170 days. Their earnings for the season amount on an average to 65 % of the full-year workers' earnings.

For the period 1889—1895 there exists a series relating to charcoal-wood carters, embracing 1—2 workers. The annual and daily earnings of these workers are the same as those of the sawyers' helpers.

The benefits in kind allowed to permanent employees consist of one room and kitchen or one room, free firewood and free medical services for the workers and their families. Seasonal workers were accommodated in barracks rent-free.

The daily working time is stated to have been at the most 12 hours in the summer, but in winter it fell to about 10 hours for sawmill-hands and 7 hours for timberyard workers. The working hours varied according to the hours of daylight. In the case of the sorters, their hours of labour are recorded fortnightly. The average number of hours a day has been computed at 11.6 in 1876—1878, 11.5 in 1889—99, 11.0 in 1900—04 and 10.4 in 1906—07. These

figures probably apply equally to the other workers in the sawmill.

The sawyers' annual working time in days was:

	Average sawing period	Maximum sawing period	Total average working time
1876—1878	210	219	255
1889—1892	248	265	275
1893—1897	247	256	269
1898—1902	247	261	276
1903—1907	241	258	280
1908	209	—	260
1910—1914	—	—	265

The sawyers' annual working time is somewhat longer than that of the other groups, mainly because they had more extra jobs to do when the mill was not working.

Sawing was done in the winter from the year 1889. There was an interval between the winter and spring sawing seasons lasting for 1—2 fortnightly periods in April. The timberyard loaders' season lasted from the latter part of May to October.

The wage system appears to have been the usual one operating at sawmills, viz. a common piece-work wage in the sawmill and an individual piece-work wage for certain workers in the timberyard. Sorters worked for a time-wage. The others have performed time-work mainly at the beginning and end of the year and during the transition period from the winter to the summer season in April and May. The hourly wage rate paid for such work was 16 öre in the seventies, 15 öre from 1889 to 1895, and after that it was increased to 20 öre.

Seeing that the time worked *per annum* at this sawmill changed but little during the period 1889—1914, any variations there may be in the annual earnings are attributable direct to changes in the total daily earnings. These latter fell about 10 % in 1884—90, afterwards rising consistently up to 1900 (20—25 %), they then dropped about 20 % (12 % in the case of the sawyers) until 1902, and by 1912 they had increased by 45—60 %, the strongest rise occurring in 1902—1904. The total increase in the earnings of sawyers and sawyers' helpers between 1890 and 1914 is about 65 %. The daily earnings of the timberyard workers, adjusters, sorters and loaders, show a relatively smaller increase. In earlier years they were somewhat higher than those of the other workers, but in 1903—1904 they fell to the same level as the others'.

Table 105. Annual and Daily Earnings (in kronor) of Workers at Lugnvik Sawmill 1876-1914.

Year	Annual earnings			Daily earnings on piece-work at the sawmill		Total daily earnings		
	Sawyers	Sawyers' helpers	Plank-pliers and loaders	Sawyers	Sawyers' helpers	Sawyers	Sawyers' helpers	Plank-pliers and loaders
1876 . . .	826	615	636	3.44	2.49	2.99	2.32	2.64
77 . . .	859	739	723	3.73	3.18	3.38	2.87	3.24
78 . . .	789	628	618	3.21	2.69	3.11	2.56	2.77
—								
1889 . . .	793	680	716	3.08	2.61	2.87	2.52	2.92
1890 . . .	691	575	638	2.65	2.25	2.56	2.22	2.70
91 . . .	720	609	653	2.62	2.23	2.55	2.20	2.67
92 . . .	708	594	686	2.75	2.33	2.59	2.24	2.75
93 . . .	727	630	708	2.92	2.40	2.81	2.38	2.88
94 . . .	733	649	740	2.82	2.38	2.66	2.40	2.87
95 . . .	728	615	703	2.84	2.37	2.79	2.41	2.92
96 . . .	785	647	734	2.92	2.45	2.84	2.36	2.87
97 . . .	807	678	765	3.03	2.68	2.95	2.61	3.11
98 . . .	812	696	782	3.22	2.71	3.06	2.53	2.98
99 . . .	878	733	802	3.24	2.72	3.11	2.62	3.13
1900 . . .	896	770	845	3.29	2.83	3.15	2.80	3.20
01 . . .	787	662	756	3.06	2.58	2.93	2.50	2.99
02 . . .	749	632	712	2.95	2.48	2.68	2.34	2.89
03 . . .	887	736	862	3.29	2.71	3.12	2.61	3.17
04 . . .	888	757	849	3.53	3.12	3.14	2.86	3.30
05 . . .	896	757	851	3.50	2.97	3.31	2.86	3.20
06 . . .	937	767	896	3.50	3.02	3.34	3.01	3.50
07 . . .	948	812	863	3.75	3.19	3.38	3.06	3.38
08 . . .	919	780	882	3.90	3.33	3.54	3.18	3.73
09 . . .	969	763	829	—	—	3.69	3.32	3.57
1910 . . .	1022	833	948	—	—	3.66	3.19	3.68
11 . . .	1008	859	957	—	—	3.71	3.28	3.83
12 . . .	1016	889	938	—	—	3.92	3.73	4.10
13 . . .	921	786	—	—	—	3.73	3.49	—
14 . . .	1035	823	—	—	—	3.89	3.58	—

G. Skönvik Sawmill.

The Skönvik Sawmill, situated in the Sundsvall shipping district was founded in 1860 and was reconstructed in 1889, the same year as that in which the wage series begins. In the eighties and nineties the sawmill was the largest in the sawmill district. In 1886 the output was about 15,000 stds¹; in 1906 about 10,000 stds were produced, the mill then employing 120 hands.

¹ K. Hörnell, Katalog öfver Sveriges sågverk. Stockholm 1886.

The material available consists of fortnightly payrolls, containing details as to earnings and, from the year 1911, the number of hours worked at the sawmill. With regard to the plank-pilers, there are particulars of their daily wage rate and the number of working days. As no data regarding hours of work are recorded, the time spent on piece-work has been calculated on the basis of the number of wage periods and the earnings during those periods. For the few fortnightly periods during which work was suspended at the mill and the workers were engaged on jobs on a time-wage basis we only have records of the hourly rate, so that the earnings during the period have had to be estimated; these earnings are, however, small.

The earnings are said to have been the same for all workers within the different occupational groups.

The following yearly series cover the period 1889—1913: One series for skilled workers, sawyers and edgers, comprising 10—16 workers. One series for semi-skilled workers, sawyers' helpers, edgers' helpers, plank and lath carters, totalling 12—22 workers. Log-catchers, log-haulers, measurers' helpers and waste-carters, receive the same wages as the workers in this series. And finally one wage series for plank-pilers, representing unskilled workers and comprising as a rule 18 workers.

Resident workers generally had free dwellings, except those (5—10 %) who owned their own houses. Both for economic reasons and also on account of the amenities provided, the latter were preferred, as the workers else had to live in barracks, each containing a large number of families. As the trade unions became more influential, demands were put forward for a rent allowance for those not living in the company's houses. An allowance of 50 kronor was granted in 1908; the local price in the same year appears to have been about 100 kronor. Bachelors and family breadwinners during the first years of marriage had only one room. Subsequently, when they had bettered their position or their family had increased they were allowed one room and a kitchen. Seasonal workers, whose numbers depended upon whether a double or a single shift system was in operation in the summer, were housed in the barracks. According to an account of conditions in Sundsvall during the year of the strike in 1879,¹ there were barracks at Skönvik accommodating 32 families, besides a number of single lodgers. Such barracks seem to have been common in the Sundsvall district at that time and are described as having been unsuitable. It was also quite common for seasonal workers to lodge with some resident family, where they also received board. Free firewood was allowed to all workers who lived near enough to be able to take it home, but it had to be transported at their own cost. The company allotted uncultivated ground for growing potatoes, and this ground has

¹ *Isidor Kjellberg, Sågverksarbeten i Norrland, Linköping 1897.*

been cultivated and is still at the disposal of the workers at the sawmill.

The working time during the years under review varied between 9 and 10 hours a day, 9 hours in the winter, and, in some years on Saturdays throughout the year.

Extra earnings paid on an hourly wage basis have been considerable, in certain years no extra wages being earned at all.

The series show complete agreement as regards the annual variations. The level of wages is the same for sawyers and plank-pilers.

Table 106. Annual and Daily Earnings (in kronor) of Workers at Skönlvik Sawmill 1889—1913.

Year	Annual earnings				Daily piece-work earnings at the mill				Total daily earnings			
	Skilled workers	Semi-skilled workers	Semi-skilled workers	Unskilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers
1889	920	—	751	4.13	4.10	3.38	3.93	—	3.25			
1890	945	—	741	3.86	—	3.02	3.86	3.65	3.02			
91	857	915	689	3.60	—	2.89	3.53	3.51	2.84			
92	848	—	723	4.00	—	3.30	3.53	—	3.01			
93	—	—	—	—	—	—	—	—	—			
94	1124	—	833	4.03	—	2.98	3.94	—	2.92			
95	972	—	736	3.77	—	2.85	3.77	—	2.85			
96	1098	—	803	4.03	—	2.94	3.99	—	2.91			
97	991	—	748	3.67	—	2.77	3.67	—	2.77			
98	949	—	727	3.57	3.74	2.73	3.57	—	2.73			
99	982	—	786	3.71	—	2.97	3.71	—	2.97			
1900	1123	1098	808	4.23	—	3.39	4.13	4.04	3.30			
01	1107	—	890	4.20	—	3.36	4.10	—	3.30			
02	1111	1104	835	4.20	—	3.15	4.11	3.99	3.09			
03	1098	1093	824	4.11	—	3.09	4.11	4.03	3.09			
04	1162	1128	881	4.30	—	3.26	4.30	4.03	3.26			
05	1152	1165	864	4.11	—	3.09	4.11	4.02	3.09			
06	1168	1141	866	4.24	—	3.15	4.17	4.07	3.09			
07	1144	1206	887	4.16	—	3.23	4.16	4.25	3.23			
08	1019	—	815	3.88	—	3.10	3.88	—	3.10			
09	945	—	757	3.99	—	3.16	3.89	—	3.12			
1910	1173	—	939	4.30	—	3.44	4.07	—	3.40			
11	1213	1259	951	4.25	4.40	3.35	4.15	4.40	3.31			
12	1300	1320	1050	4.34	4.55	3.51	4.28	4.55	3.50			
13	—	1347	—	—	4.64	—	—	4.64	—			

H. Sund Sawmill.

This sawmill, situated just north of Sundsvall, employed on an average 23—50 workers during the years 1861—1865. The sawmill at that time possessed 4 frames and 1 700 stds were sawn *per annum*.¹ Later on the concern was considerably enlarged.

Yearly wage series have been obtained from the sawmill in respect of sawyers and plank-pilers covering the period 1862—1910, and cross-sections for 1865 and 1875. The yearly wage series comprise annual earnings and daily piece-work earnings at the sawmill (standard daily earnings), of which however the annual earnings seem to have been computed too high and are therefore of no value. The standard daily earnings are published in Table 107 below.

Table 107. Standard Daily Earnings (in kronor) of Workers at Sund Sawmill 1862—1910.

Year	Sawyers	Plank-pilers	Year	Sawyers	Plank-pilers
1862 . . .	2.16	2.35	1890 . . .	2.96	3.32
63 . . .	2.43	2.54	91 . . .	2.82	3.14
64 . . .	1.70	1.77	92 . . .	3.03	3.36
65 . . .	1.73	1.77	93 . . .	2.94	3.42
66 . . .	1.60	1.60	94 . . .	2.86	3.44
67 . . .	1.46	1.46	95 . . .	2.93	3.57
68 . . .	2.06	2.06	96 . . .	3.05	3.05
69 . . .	2.45	2.45	97 . . .	3.09	3.26
—			98 . . .	3.28	3.60
1872 . . .	3.52	3.52	99 . . .	3.20	3.45
73 . . .	3.86	4.28	1900 . . .	3.30	3.67
—			01 . . .	3.17	3.65
1880 . . .	2.64	2.86	02 . . .	3.13	4.36
81 . . .	2.91	3.22	03 . . .	3.23	3.77
82 . . .	3.30	3.04	04 . . .	3.10	3.03
83 . . .	2.78	3.02	05 . . .	3.11	—
84 . . .	2.61	2.86	06 . . .	3.58	—
85 . . .	2.70	2.95	07 . . .	3.82	—
86 . . .	2.73	2.98	08 . . .	3.56	—
87 . . .	2.81	2.98	09 . . .	3.42	—
88 . . .	2.67	2.94	1910 . . .	3.69	4.72
89 . . .	3.10	3.42			

The 1865 cross-section is particularly useful as the details are very complete. Cross-sections for 1865 and 1875 are given below.

¹ Kungl. Maj:ts befallningshavandes femårsberättelser 1861—1865. (The Lords Lieutenant quinquennial reports 1861—1865).

Table 108. Earnings of Workers (in kronor) at Sund Sawmill in the Cross-Sectional Years 1865 and 1875.

Occupation	Number of workers	Number of days at ordinary sawmill-work	Annual earnings at ordinary sawmill-work	Standard daily earnings
1865				
<i>Full-year workers</i>				
Sawyers	4	184	318	1.72
Stoker	1	205	311	1.52
Edge-sawyers	4	180	332	1.73
Slab-drawer	1	171	333	1.85
Plank-pilers	2	165	321	1.77
<i>Seasonal workers</i>				
Sawyers	5	88	159	1.74
Withdrawers	2	72	143	1.98
Edge-sawyers	2	83	144	1.74
Slab-drawer	1	76	137	1.80
Log-sorter	2	86	148	1.72
Stoker	1	69	120	1.50
Plank-pilers	2	98	181	1.77
Timberyard-workers	8	132	226	—
1875				
<i>Full-year workers</i>				
Log-sorter	1	211	768	3.64
Sorters' helper	1	188	618	3.29
Sawyers	6	200	778	3.89
Edgers	2	207	877	4.25
Stokers	2	199	710	3.57
Sawyers' helper	1	208	701	3.37
Edge-sawyer	1	197	786	4.00
Plank-drawers	4	206	831	4.03
Layer-on	1	187	751	4.03
Plank-pilers	4	192	857	4.46

The 1865 cross-section and the yearly wage series agree closely as far as the daily earnings are concerned.

The workers' earnings are recorded for the year 1865 in two books, one for the saw and one for the timberyard. The former contains specifications as to occupation, name, also the number of logs sawn each week, the number of days of work and the earnings. The timberyard book, which mainly comprises a record of the timber transported from the yard, gives the workers' names and earnings per week. The same workers may earn pay both from the saw and from the timberyard, as well as in several occupations in the saw-

mill. Sawing is carried on during the period $^{21}/_1$ — $^{23}/_{12}$, from $^{12}/_5$ to $^{20}/_9$ in double shifts.

Up to $^{12}/_5$, i. e. during the first 12 weeks, the system of pay is on a basis of joint piece-work. A certain price was paid per log sawn at the sawmill, the total sum thus paid for the whole production each day being divided between all workers participating in the production. The proportion, that was allotted to the workers in each occupation was practically the same for them all. At the saw there were 5 sawyers, 2 stokers, 1 withdrawer, 4 edge-sawyers, who receive 1 öre, 2 plank-pilers, who receive 1.1 öre and 2 slab- and lath-drawers, who get 1.2 öre — all per log. There were on an average 19 workers engaged at the sawmill during this period. The daily earnings increased during these weeks from 1.65 kronor to 2.20 kronor at the date when the double shift was introduced. The number of men at work was then doubled. The average number of workers employed during the 15 weeks of double shift was 43. At the same time a fixed daily wage rate of 1.75 kronor was introduced, which approximately corresponds to 1 öre per log. This daily wage rate was applied throughout to all workers except the stokers, who received 1.50 kronor (although a seasonal worker got 1.75 kronor). Two withdrawers, who were seasonal workers, earned 2 kronor a day. The double shifts ceased on $^{23}/_9$ and a week or two later the piece-work wage system was again introduced. From $^1/_{11}$ — $^{24}/_{11}$ the piece-work rate was 1 öre per log and from $^{25}/_{11}$ — $^{27}/_{12}$ it was 0.9 öre per log; the daily wage rate now worked out at an average of only 1.45 kronor.

The reason for altering the wage system during the year may have been that, when the sawing period was extended into the winter, owing to the irregularity of the work during that season of the year, it was necessary to abolish the old system of daily wage rates, which continued to be applied in the summer. A daily wage rate was applied prior to the sixties by, for instance, the Kramfors, the Ljungå and the Oxsjö sawmills.

In the timberyard there were no full-year workers. The number of full-season workers was 8. Besides these there were many temporary workers. When the sawmill was not working, particularly at the turn of the year and during the transitional periods to and from the double shift system, the workers at the sawmill were given temporary employment in the timberyard. Before the high season began between 5 and 15 casual workers have earned pay in the timberyard in the course of the different weeks, though often they have probably worked for only a part of the week. In the height of the season the number of workers drawing pay was generally 25—30. During the weeks $^1/_{11}$ — $^{22}/_7$ about 40 workers were employed.

There is also a cross-section worked out for 1875, the year in which the record drop in prices occurred following upon the peak reached in 1874. For the year 1875 we have only taken the

wage book relating to the sawmill for purposes of compilation, using the same particulars as for 1865, except as regards the number of sawn logs. Sawing was carried on during the period $11\frac{1}{12}$ — $20\frac{11}{12}$, there being two shifts between $12\frac{1}{5}$ and $4\frac{1}{10}$. In 1869 the 2 old double frames had been replaced by 5 single frames. According to the quinquennial reports of the Lords Lieutenant of the county¹ there were 6 frames at Sund, but it is evident that not more than 5 frames were operating in 1875.

As compared with the conditions in 1865, those working the single shift were augmented by 3 log-sorters, 4 sawyers' helpers (who took the place of the withdrawer), and 1 board-sorter, the 4 edge-sawyers have been replaced by 2 foreman edgers and 1 edge-sawyer, and to these have been added 1—2 edgers' helpers, besides which the personnel has been increased by the addition of 2 plank-drawers, 2 layers-on, 5 plank-pilers, 3 lath-drawers, 1 plank-carter and 1 waste-carter, the two latter apparently youths. For the double shift there were twice as many workers employed in each occupation.

Wages are evidently paid on a joint piece-work basis per number of logs sawn. During the early part of the year the average daily earnings at the mill came to 2.50—3.00 kronor. As the double shift was introduced the earnings rose rapidly, ranging for most of the time between 4.50 and 5.00 kronor. (max. $\frac{3}{8}$ — $\frac{3}{4}$: 5.28 kronor; the plank-pilers: 6.20 kronor). The daily earnings then fell slightly during the last few weeks.

During the double shift period the workers had night-work every alternate week.

It is evident that, maybe under the pressure of the good times prevailing in the seventies, the division of labour became much improved as compared with the system applied in 1865. In that year the sawyers were alone responsible for running the "saw-frames", whereas in 1875 they were assisted by an equal number of helpers, whose job was apparently to help in inserting and withdrawing the timber. A similar improvement had been effected at the "edge-saws". It seems probable that in 1865 the sawyers also looked after the sorting of the logs, which was now carried out by specially trained workers. Moreover, a number of new occupations had arisen, evidently as a result of the splitting up of the old occupation of plank-piling. A special man was told off to sort the sawn planks, a couple more lifted them on to the trucks, special workers unloaded the planks in the timberyard, and it only remained for the plank-pilers to carry them up on to the piles.

At the same time the quantity of sawn logs per saw-frame was considerably increased. According to the concern's account books the average number of logs sawn per saw-frame in 1865 was 13,000, while according to the quinquennial reports of the Lords Lieutenant

¹ Kunglig Maj:ts Befallningshavandes femårsberättelser 1866—1870.

of the county¹, the average number for the period 1871—1875 amounted to 23,000 logs per saw-frame *per annum*, that is to say, an increase of 57 %. This increase may possibly be attributed to improved and more rapidly operating saw-frames. On the other hand, it cannot be due to the frames' being in longer use each year during the seventies, as even in 1865 the sawing period lasted practically the entire year, allowing only for necessary stoppages. It is probable however that the increase is also a result of the division of labour being carried to greater lengths than before.

I. A Medium-sized Sawmill, Situated on the River Angerman-älven in the Shipping District of Härnösand.

The number of workers in this sawmill was: 1865 25 full-year workers; 1875 in January 60, in February 40 and in August 140 workers; 1885 32 full-year workers, in August 160 workers; 1888 in January 135, in July 171; 1894 in January 70, in August 190 workers; 1900 in August 215; 1901 and 1903 about the same number and 1905 in August 107 workers.

Cross-sections, i. e. averages for all workers at the sawmill, were drawn up for 1865, 1885, 1895 and 1905. Of these the 1865 cross-section does not illustrate the general wage conditions, 1865 being the first year in which the steam-saw was working. The only particulars for that year relate to annual income and the dates at which the individual workers began and finished their work.

There is available a "daily list" for the year 1885, giving the number of "watches" for each fortnightly period. The earnings on work apart from the sawing on a piece-work and time-wage basis are recorded, the number of hours of labour being given in respect of the latter. Besides this, there are records of the workers' occupation and place of domicile. The number of days has been estimated in the case of those workers the number of whose "watches" is not recorded and who probably took no part in the piece-work at the saw. If the correlation between their earnings each fortnight and the earnings of those workers whose watches are stated has been satisfactory, they have been assumed to work the same number of days as the latter. The number of hours of labour is stated in respect of smiths and certain sundry workers, whose work has been paid for by the hour. The number of hours they have worked per day and the number of days *per annum* have been estimated. The extra incomes have been gained firstly during the period when no sawing was done and secondly on overtime worked during the sawing. In the *former* case the work has consisted of certain jobs connected with laying the foundations of the piles, jobs on quays,

¹ Kunglig Maj:ts Befallningsshavandes femårsberättelser 1871—1875.

barges and railway lines, also snow-shovelling, and in the *latter* case of the resetting and sharpening of saw-blades etc. No estimate has been made of the time spent on extra piece-work. It is true that the earnings per unit of time on work of such a nature were probably somewhat lower than the other average earnings, but this is offset by the fact that such work was partly performed on the same days as the ordinary sawing was carried on. Moreover, this income represents but a small proportion of the earnings (see below). It is probable, then, that it does not materially affect the size of the average daily earnings.

For 1895 there are "wage lists", which only cover earnings per 14 days and the name of the worker, the nature of the work not being stated. The number of days of labour has been estimated. The wages of seasonal workers have been computed from the average of the wages paid to all workers for the different fortnightly periods, the seasonal earnings being taken to equal the sum of the average earnings during the season. The seasonal earnings thus arrived at have proved to be exactly the same as those obtained by dividing the individual workers into full-year and seasonal workers and computing the latter's average earnings. This reveals the fact that full-year workers and seasonal workers had the same average earnings during the season.

The 1905 cross-section is based on 1) a "sawing-list" in which are recorded the fortnightly earnings at the sawmill, the form of employment, name, domicile, number of hours at the mill, income; 2) a list of extra piece-work wages, earned mainly in the timberyard, particulars being given of fortnightly earnings, name, domicile, and the nature of the work (no working time is recorded). The number of hours of labour *per diem* and of days *per annum* have been estimated from the number of hours at the mill. On the other hand, only when the extra piece-work wages have been particularly high (as for instance when sawmill workers have been occasionally engaged on work in the timberyard) have the corresponding number of days been computed. The number of days of work performed by the timberyard workers have been estimated on the basis of the earnings per wage period.

As regards the yearly series, which, with certain gaps, cover the period 1861—1914, data regarding hours of work have been extracted only after 1888, from which year they are recorded as in the 1905 cross-section, i. e. only in respect of the piece-work earnings at the sawmill. Before 1888 the wage data have been extracted from books of the kind that serve as a basis for the 1895 cross-section. We have therefore had to estimate the total number of days from the fortnightly earnings. It has been possible to distinguish between the sawyers' piece-work wages at the mill and their extra earnings by working out the average hourly earnings at various periods in respect of which the earnings at the mill correspond-

ing to the number of hours were either known or could be approximately estimated. These average hourly earnings have been multiplied by the number of hours at the mill *per annum*, thus giving the total earnings at the mill. The remainder of the total annual wages then consists of extra piece-work wages. The number of working days has been estimated per fortnight, a comparison being made with the recorded number of days spent in sawing.

Some scattered details concerning the old water-sawmill covering the period 1860—1863 have been available. The wages of sawyers and edgers, etc. were at that time paid at a fixed daily rate, during the years in question 1.75 kronor, besides which there was paid for work at the mill a certain "share in the sawmill piece-work wage", an equal share to each of the workers actually employed at the mill, bringing the daily earnings, in 1863 for instance, up to 2.62 kronor. As regards the selected workers, there are only available particulars of their annual earnings, and as it is not known for how long sawing went on during the year and the higher daily earnings were operative, it is impossible to compute the number of working days.

The average wages paid to selected sawyers and edgers were as follows:

Year	Number of workers	Annual earnings Kronor
1861	15	535
1862	9	507
1863	15	477

The daily earnings of plank-pilers, who did piece-work only, were 2.50 kronor in 1863; two plank-pilers had the same annual income, viz. 367 kronor.

It has proved difficult to draw up wage series for full-year workers during the first few years at the new steam-sawmill, as in some years there were hardly any workers engaged throughout the year. The series relating to annual earnings are consequently somewhat lacking in uniformity.

Year	Pilers and loaders in the timberyard		Sawyers and edgers	
	Number of workers	Annual earnings Kronor	Number of workers	Annual earnings Kronor
1867	3	438	2	455
1868	—	—	—	—
1869	6	500	2	584
1870	9	368	9	576
1871	9	556	5	654
1872	3	705	4	766
1873	2	694	2	660
1874	—	—	3	873
1875	7	689	2	708

In the following years the work at the sawmill was of such a seasonal character that it has been impossible to get good series relating to full-year workers, so that only series from the year 1885 are published.

The highly skilled occupational group includes sawyers and edgers. These groups consist of 8—10 workers and are represented in the series by 3 workers. The assistant workers, sawyers' helpers and edgers' helpers, number about 10 and are represented by 2—4 selected workers. The unskilled workers are represented by plank- and board-pilers and also loaders and truckmen, totalling 18 workers represented in the series by 4—6 selected workers. The primary series are particularly homogeneous. For some years the chain index method has been used in order to obtain a homogeneous average.

A series relating to "loaders in the loading-gang" for the period 1884—1890, which has not been included in the average, shows particularly close agreement with the other series as regards both annual and daily earnings. For instance, the strong rise ending in a peak in 1889 is reproduced there. Both the annual and the daily earnings of this group of unskilled workers are about 10 % higher than those of the highly qualified group included in the tables. The trend of the earnings in the three groups into which the material has been divided is very similar. Maxima and minima for the period 1885—1914 occur during the following years:

Annual earnings	Daily earnings
1889 max.	1889 max.
1892 min.	1892 min.
1896 and 1897 max.	1896 and 1897 max.
1898 min.	1898 min.
1900 max.	1900 max.
1902 min.	—
1903 max.	—
—	1904 max.
1905 min.	—
1907 max.	—
—	1908 max.
1909 min.	—
—	1910 min.
1911 max.	—
1913 min.	1913 max.

The common features in the trend of the daily earnings in 1884—1914 are: the substantial rise of 20—30 % in 1888—1889, followed by a somewhat less pronounced decline until 1890, an increase of 20—30 % in 1892—1896, the wages remaining on the whole unaltered up to 1903 with a slight drop to 1904, a 25—35 % rise between 1905 and 1908; then a minor decrease in 1910 and a rise of about 15 % up to 1913. After 1909 the dispersion of the wages has di-

Table 109. Annual and Daily Earnings (in kronor) of Workers at Sawmill I 1884—1914.

Year	Annual earnings					Daily piece-work earnings	Total daily earnings				
	Skilled workers	Semi-skilled workers	Unskilled workers	Loaders	—	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers	Loaders	
1884	—	—	—	655	—	—	—	—	—	2.98	
85	595	477	—	665	—	—	2.64	2.09	—	2.96	
86	608	493	—	645	—	—	2.64	2.13	—	2.63	
87	617	514	—	708	—	—	2.47	2.10	2.30	2.72	
88	667	525	557	563	728	—	2.59	2.17	2.27	2.75	
89	805	660	709	855	—	—	3.04	2.69	2.91	3.23	
1890	747	540	571	786	—	2.78	2.87	2.30	2.34	3.02	
91	732	540	560	755	—	—	2.87	2.30	—	—	
92	706	543	549	—	3.09	—	2.78	2.28	2.20	—	
93	767	577	628	—	3.30	—	2.89	2.40	2.56	—	
94	799	629	698	692	—	3.42	3.02	2.57	2.80	—	
95	774	600	667	—	—	3.41	3.10	2.53	2.89	—	
96	852	650	729	—	—	3.53	3.41	2.74	3.09	—	
97	863	660	721	—	—	3.53	3.39	2.73	2.82	—	
98	827	664	683	—	—	3.56	3.31	2.69	2.81	—	
99	943	717	799	—	—	3.42	3.37	2.77	2.98	—	
1900	947	789	838	—	—	3.58	3.38	2.98	3.12	—	
01	873	732	790	—	—	3.38	3.30	2.79	2.96	—	
02	869	672	756	—	—	3.31	3.28	2.70	3.04	—	
03	923	726	806	—	—	3.32	3.30	2.65	3.02	—	
04	814	646	701	—	—	3.22	3.07	2.54	2.74	—	
05	807	632	730	—	—	3.26	3.23	2.70	3.15	—	
06	946	720	768	—	—	3.67	3.64	2.88	3.41	—	
07	1067	839	923	—	—	3.98	3.81	3.04	3.46	—	
08	868	727	717	—	—	3.96	3.95	3.40	3.51	—	
09	745	628	605	—	—	4.08	3.92	3.25	3.50	—	
1910	1028	896	942	—	—	3.76	3.79	3.20	3.41	—	
11	1080	940	1010	—	—	—	3.79	3.30	3.54	—	
12	1064	925	999	—	—	3.91	4.02	3.49	3.77	—	
13	999	820	922	—	—	4.05	4.15	3.63	4.01	—	
14	1102	963	1065	—	—	3.92	3.94	3.43	3.74	—	

minated. The difference between the highest and lowest group is in early years 20—25 % of the lower wage, but after 1909 it is less than 15 %.

In the cross-sections the workers have been divided into full-year and seasonal, and averages have been struck for the different qualitative groups:

A. Full-year Workers.

	1885				1905			
	Number of workers	Annual earnings Kronor	Daily earnings Kronor	Hourly earnings Ore	Number of workers	Annual earnings Kronor	Daily earnings Kronor	Hourly earnings Ore
Skilled workers	11	591	2.59	22.1	25	800	3.08	32.1
Semi-skilled workers . . .	9	500	2.08	17.9	25	615	2.47	25.7
Unskilled workers	9	538	2.42	21.2	53	649	2.64	27.5

The annual wages of the selected workers in the yearly series as a percentage of the annual wages of corresponding groups in the cross-sections, weighted together with the same weights as in the yearly series, are as follows:

	1885	1905
Skilled workers	106	99
Semi-skilled workers	103	102
Unskilled workers	—	102

The wages from the yearly series in percentage of the average wages of all workers combined within the respective qualitative groups in the cross-sections give the following figures:

	1885	1905
Skilled workers	101	101
Semi-skilled workers	105	103
Unskilled workers	—	112

These figures show that the yearly series of skilled and semi-skilled workers have not materially altered in relation to the occupational groups at the sawmill that they represent. Therefore, at any rate the secular trend which the yearly series exhibit is probably characteristic for all wages within these groups.

An average for all workers — which is the only one obtainable from the 1895 cross-section — shows that the following were the earnings of the full-year workers:

Year	Number of workers	Annual earnings		Daily earnings		Hourly earnings	
		Average Kronor	Index	Average Kronor	Index	Average Ore	Index
1885	29	546	100	2.38	100	20.5	100
1895	77	637	117	2.51	105	21.6	105
1905	103	677	124	2.71	114	28.2	138

B. Seasonal Workers.

The following dates roughly mark off the various seasons in the years of the cross-sections:

1885	$\frac{8}{5} - \frac{1}{11}$
1895	$\frac{10}{5} - \frac{21}{11}$
1905	$\frac{8}{5} - \frac{2}{11}$

The dates on which the seasons begin are thus approximately the same in all cross-sectional years.

The number of seasonal workers and their earnings within the different groups are as follows:

	1885				1905			
	Number of workers	Annual earnings Kronor	Daily earnings Kronor	Hourly earnings Ore	Number of workers	Annual earnings Kronor	Daily earnings Kronor	Hourly earnings Ore
Skilled workers	14	412	3.00	25.0	3	570	3.39	33.9
Semi-skilled workers . . .	11	325	2.36	19.7	7	548	2.97	29.7
Unskilled workers	30	369	2.73	22.8	21	556	3.15	31.5
All workers combined	55	371	2.72	22.7	31	556	3.13	31.3

The corresponding figures relating to all seasonal workers combined in 1895 are respectively: 46 workers, 444 kronor, 2.74 kronor and 24 öre.

The number of seasonal workers in percentage of the total number of workers was:

1885	65
1895	37
1905	23

The relative number of the seasonal workers has thus been considerably reduced.

In 1885 and the other early years sawing was only carried on during the summer, the full-year workers being employed during the rest of the year on various jobs. In 1905, however, and even in preceding years, the sawing period (see below) was extended beyond the summer, and there was no extension of the sawing during the summer. There was thus no sawyer amongst the seasonal workers that year, and the number of skilled seasonal workers was reduced from 25 % in 1885 to 10 % in 1905 in percentage of the total number of skilled workers.

The number of working days *per annum* for full-year workers has gradually been extended. During the period 1865—1875 sawing

began in one case in February, in two cases in March, in two cases in April and in one case in May, ending in two cases in October and in two cases in November. The average sawing period during the years 1867—1875 is about 174 days. In 1884 and 1885 the sawing season begins in April and ceases in November. From the beginning of the nineties it seems to have lasted from the middle of January until the middle of December. The following is the number of days on which the sawyers worked at the sawmill (average for the 5-year periods stated):

	Average	Maximum
1888—1892 ¹	220	235
1893—1897	212	218
1898—1902	229	239
1903—1907	237	260
1910—1914	257	267

In 1908 there were 205 working days and in 1909, when the general strike lasted from the end of July to the 7th September, 175 working days. No work was done on Sundays, nor apparently was the system of double shifts ever in practice.

Up to 1897 the working hours at the saw were 12 a day, (10 hours on Saturday, at any rate from 1888) and in 1897—1900 11 hours a day (10 hours, on Saturday), in 1901—1914 10 hours on all days of the week, the number being reduced to 9 hours on Saturday from 1907 inclusive. The 1905 cross-section reveals an average of 9.6 hours in the case of full-year workers and 10 hours in that of the seasonal workers. Plank-pilers and others who were engaged on independent piece-work often worked shorter hours. On other jobs, including work in the timberyard when the sawmill was not working (snow-shovelling etc.), the number of hours of labour varied, according to the length of the period of daylight, from 12 hours in summer to 7—8 hours in winter.

Only some of the full-year workers received free housing, usually one room; how large a proportion of the workers it is difficult to determine, but it is stated to have been $\frac{1}{3}$ during the summer months. The seasonal workers generally lived in barracks. Sometimes a number of them were boarded with workers living on the spot. Some kept their families in a village in the neighbourhood. It has not been possible to make an estimate of the value of the housing benefit. Allowances in lieu of free accommodation did not become operative until after 1914.

Besides this, the workers living on the spot received free firewood. Free medical services were given from about the year 1900. Milk was obtainable from the concern's dairy at the price current in the district. Moreover, in 1867 and 1869, when the harvest

¹ There are no particulars available for 1891.

failed, the workers were able to obtain grain from the concern, though whether at a reduced price or not is not known.

The workers at the sawmill were paid, when engaged in sawing, a piece-work rate per log, while the plank-pilers, loaders and others had special piece-work rates; smiths and others were paid exclusively on a time-wage basis. During the sixties the share in the piece-work wages earned at the sawmill was the same for at any rate the main groups engaged at the sawmill, and it was not until later that any differentiation was made.

Prior to the nineties, when as a rule no sawing was done in the winter, the sawmill-hands are said to have taken part in the winter work in the forests. Only a few were employed at the mill on various extra jobs. The following figures illustrate how the income is divided into earnings on sawing piece-work and extra earnings in the 1885 and 1905 cross-sections:

	Full-year workers 1885	workers 1905	Seasonal workers 1885	workers 1905
Extra earnings in percentage of total earnings	28	12	9	15

The comparison shows that the proportion representing ordinary earnings increased in the case of the full-year workers. This is obviously due to the prolongation of the sawing period. The trend of the seasonal workers' earnings, on the other hand, was in the contrary direction. This is apparently attributable to the fact that, as mentioned above, the seasonal workers in 1885 included many highly skilled regular sawmill workers, sawyers etc., whereas in 1905 the seasonal workers were engaged to a greater extent on carrying out such extra work as had to be done during the summer. Contrary to what was the case in 1885, the seasonal workers actually had more extra jobs than the full-year workers.

It was explained above (p. 458) how the sawyers' wages were divided up into piece-work wages at the saw and extra earnings. The following figures indicate the extra earnings in percentage of total earnings in averages covering the same periods as the figures above (p. 464) giving the length of the sawing season. These averages exhibit the same trend as that revealed in the cross-sections:

Years	Extra earnings in percentage of total earnings
1885	27
1888—1892	16
1893—1897	12
1898—1902	13
1903—1907	10
1908—1909	6
1910—1914	6

K. A Medium-sized Sawmill in the Härnösand Shipping District.

This sawmill, which is now closed down, was founded in 1868 and rebuilt in 1882, when 5 frames were erected. The output in 1886 was 6,000 stds according to the first available report in the Catalogue of Swedish Sawmills.¹ At the beginning of the nineties 75 men were employed at the sawmill during the winter. In the summer, when there was evidently a double shift working at the sawmill, 170 men were employed. In 1925 the annual output was the same, viz. 6,000 stds and 160 permanent workers were employed.² The sawmill is said to have been noted for its extremely low costs of production.

Wage data are available in the following forms: a) "Sawing records" for 1890—1894, with details of the piece-work wages paid to the different workers at the mill, and the number of shifts at the mill in each fortnightly period. b) Summaries of the wages at the mill during the period 1895—1903, containing normal hours of labour and normal earnings, the latter calculated from the number of "saw-days" (watches), the number of sawn logs and the piece-work rates applied thereto. c) "Earnings", i. e., particulars of the total annual earnings of the workers, are recorded for the periods 1895—1898 and 1903—1911, the annual working time however not being stated. d) Fortnightly payrolls for 1912 and 1913, containing the total income.

For those years in which records have been kept only of the piece-work earnings at the mill, the total earnings have been estimated after drawing a comparison between the total earnings and piece-work earnings at the mill in years in respect of which these figures were known. Similar estimates have been drawn up for the periods 1890—1894 and 1899—1902.

Otherwise the series are good. They comprise a large number of workers, and the variations in wages within the different groups are in almost complete agreement with one another. They have been combined into the following groups:

Skilled workers: sawyers, edgers, boxboard-sawyers, boxboard-trimmers and boxboard-pilers.

Semi-skilled workers: sawyers' helpers and edgers' helpers.

Unskilled workers: plank-carriers, board-carriers and truckmen.

An adjusters' series, containing a large number of selected workers, has not been included in the average. For the period 1895—1898 the level of wages is the same as that of the semi-skilled group, but from the year 1903 it is the same as that of the skilled group. Incomes earned on work not in connection with sawing have represented 10—15 % of the total earnings.

¹ R. Hörnell, *Katalog över Sveriges sågverk*. Stockholm 1886.

² *Svensk industrikalender*. Stockholm 1926.

Table 110. Annual and Daily Earnings (in kronor) of Workers at Sawmill K 1890—1913.

Year	Annual earnings			Daily piece-work earnings				Total daily earnings			
	Skilled workers	Skilled workers	Semi-skilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers	Skilled workers	Skilled workers	Semi-skilled workers	Unskilled workers
1890	778	646	735	3.08	2.55	2.87	—	—	—	—	—
91	739	622	702	2.73	2.23	2.50	—	—	—	—	—
92	726	593	684	2.77	2.18	2.47	—	—	—	—	—
93	780	597	690	3.02	2.24	2.54	—	—	—	—	—
94	729	600	676	2.85	2.26	2.52	—	—	—	—	—
95	751	627	678	2.67	2.14	2.42	—	—	—	—	—
96	814	668	763	2.84	2.27	2.57	—	—	—	—	—
97	840	694	825	3.07	2.56	2.90	—	—	—	—	—
98	929	803	927	3.20	2.68	3.05	—	—	—	—	—
99	1004	818	943	3.27	2.66	3.03	—	—	—	—	—
1900	920	747	876	3.39	2.80	3.24	—	—	—	—	—
01	914	758	898	3.08	2.59	3.03	—	—	—	—	—
02	878	697	825	3.09	2.48	2.91	—	—	—	—	—
03	920	739	885	3.32	2.69	3.15	3.18	2.62	3.14	—	—
04	914	742	854	—	—	—	3.14	2.57	3.01	—	—
05	925	765	881	—	—	—	3.20	2.65	3.07	—	—
06	950	810	915	—	—	—	3.30	2.80	3.19	—	—
07	988	807	939	—	—	—	3.42	2.84	3.35	—	—
08	988	746	916	—	—	—	3.44	2.67	3.26	—	—
09	897	719	824	—	—	—	3.34	2.81	3.22	—	—
1910	1058	842	983	—	—	—	3.64	2.91	3.42	—	—
11	1079	842	968	—	—	—	3.65	2.90	3.39	—	—
12	—	856	1054	—	—	—	—	3.00	3.63	—	—
13	—	937	1055	—	—	—	—	3.21	3.63	—	—

Both the permanent employees and the seasonal workers at the sawmill throughout the entire period 1890—1913 were in receipt of free housing and free firewood. The housing provided for a worker with a family consisted of one room and kitchen, and for an unmarried worker one room, generally shared with another. The concern estimates the value of these benefits at 125 kronor and 50 kronor respectively. From 1901 the workers were allowed free electric light. In return for certain day-jobs performed by women they were allowed to grow potatoes on the concern's farmland, the allowance being $\frac{1}{4}$ barrel of seed-potatoes in return for 2 day-jobs done by the women.

The sawmill was in operation on an average:

in 1890—1892 239 days — max. 247 days
 • 1893—1897 245 " " 259 "
 • 1898—1903 262 " " 282 "

The total working time during the period 1904—1913 was about 290 days for sawyers and a somewhat shorter period for the other groups.

The number of working hours per day varied during the years 1895—1903 between 9 and 11, in 1895—1900 the average number of hours of work during the whole year was from 10.2 to 10.9 hours. In 1901—1903 it was approximately 9.5 hours.

A small advance is observable in the daily earnings of the unskilled workers' in relation to the earnings of the other workers, the difference ranging from 10—18 % in 1890—1896 to about 5 % in later years.

WOOD-PULP (CHAPT. VIII).

A. Delary Sulphate Mill.

This sulphate mill, situated in Kronoberg County, was among the first of its kind in Sweden. It was started in 1875, reconstructed in 1876, destroyed by fire in 1899, but was again rebuilt and expanded. The average number of workers according to the cross-sections for all workers in 1897 was 95, and in 1905 the average was 101. The production of wood-pulp was later on combined with the manufacture of paper.

The wage data consist of payrolls in which are given the earnings, divided into those for time-work and those for piece-work, and the number of hours spent on time-work. Besides these details, the number of shifts performed on piece-work is recorded from the year 1902. The average annual income earned by all workers has been computed by dividing the total earnings by the average number of workers. In the sundry workers' group all workers paid at an hourly wage rate of not exceeding 9 öre up to 1899 and not exceeding 11 öre from 1900 have been excluded as being non-adult workers.

Yearly series have been drawn up for the period 1897—1910 in respect of 3—4 selected workers and, for the purpose of control also of all workers in the occupational groups: cooks, furnace workers and sundry workers. It frequently occurs that all the four workers employed at the furnaces earn the same incomes on piece-work, and it is only the small amount of time-wages that makes the annual earnings differ between the selected workers. The selected workers' series likewise agrees almost entirely with the all-workers' series, which up to 1908 contains 8—13, and after that 8, workers. The selected cooks, who at the same time represent all the workers in the digester-house, are generally divided into pairs earning the same income on piece-work, and it is probable therefore that the series relates to two 1st cooks and two 2nd cooks. The earnings of the selected sundry workers are on very different levels. The average hourly earnings of the selected workers and those of all workers combined, however, tally. The trend of the annual earnings' series shows divergences at numerous

points, the selected workers' annual earnings generally being 10—15 % higher.

Table III. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Delary Sulphate Mill 1897—1910.

Year	Annual earnings			Hourly earnings		
	Furnace workers	Cooks	Sundry workers	Furnace workers	Cooks	Sundry workers
1897	574	542	438	—	—	13.7
98	659	628	433	—	—	14.3
99	677	623	454	—	—	15.1
1900	676	637	468	—	—	15.2
01	822	714	473	—	—	15.2
02	895	784	460	23.7	21.5	15.6
03	913	806	487	24.3	22.1	15.7
04	966	853	564	24.7	22.4	16.7
05	931	816	562	24.6	22.3	17.5
06	923	823	611	24.6	22.5	18.6
07	956	848	632	25.5	23.2	19.7
08	1011	891	627	27.2	24.4	20.3
09	1021	888	638	27.2	24.4	20.8
1910	1022	894	662	27.2	24.4	21.4

The variations in the wages of the different occupational groups are parallel. The strongest rise is that of the cooks' and furnace workers' annual earnings in 1898—1904 (about 45 %). It was within that period (1899), it will be remembered, that the mill was destroyed by fire and a new one built. The fortnightly wages earned on piece-work normally amounted to about 22 kronor in 1897, 23—28 kronor in 1898, 26—30 kronor in 1899, about 30 kronor in 1900 and 1901 and about 36 kronor in 1904, involving a rise during the years 1897—1904 of about 65 %. The hourly earnings of those engaged on piece-work show a weaker rise than those of the sundry workers, who worked on a time-wage basis, the former having increased about 14 % and the latter 37 %.

The number of days worked a year by the women workers in the machine-room is very irregular, and their series are therefore not published. In 1897—1899 they were chiefly engaged on piece-work, and subsequently exclusively on a time-wage basis. The hourly rate for time-wage work in 1897 and 1898 was 7 öre, subsequently rising 1 öre per hour each year up to 1901—1903, when it was 10 öre per hour.

The cross-sections in respect of all workers in 1897 and 1905, which are here published in summary form, reveal a considerably larger increase in the wages of the unskilled workers than in the other wages.

	Number of workers		Annual earnings kronor		Hourly earnings öre	
	1897	1905	1897	1905	1897	1905
Skilled workers	37	34	551	897	—	24.0
Unskilled workers	15	10	391	791	—	21.4
Craftsmen	19	18	517	560	17.3	19.3
Sundry workers	21	35	374	486	14.8	17.3

The unskilled workers' wages, which in 1897 are on a level with those of the sundry workers, have by 1905 increased 102 %. The skilled workers' wages advance only 63 % and the craftsmen's wages only 8 %.

A small number of workers, namely 15 with families and 4 unmarried men, were accommodated in the concern's dwelling-houses at a rent of 3 kronor per month for a room and kitchen (the unmarried men paid 1.50 kronor per month for a single room). There were no other benefits in kind.

Cooks and furnace workers were for the most part engaged at a purely piece-work wage, except in the years 1899—1900, following upon a fire in the mill; the latter, however, also regularly earned a small sum (20—30 kronor *per annum*) in time-wages, divided equally between the different wage periods during the year. The women workers at the drying machine changed over from piece-work wage to time-wage in 1901. The sundry workers were chiefly engaged on a time-wage basis.

Cooks and furnace workers worked in shifts. They apparently worked 12 days a fortnight and in that period they normally worked 17 $\frac{1}{2}$ 8-hour shifts, i. e., an average working time of 11.7 hours a day.

Besides these shifts, the furnace workers did additional two hours of work per week for a time-wage (16 öre up to 1907 and after that 20 öre). According to the 1905 cross-section, all the other workers except skilled men and sundry workers had the same system of shifts. Like the furnace workers, the firemen and hands at the chippers had two hours' extra work for a time-wage. These workers thus worked normally 310 days *per annum*.

B. Ed Sulphate Mill.

The Ed sulphate mill lies on the coast in the northern part of Kalmar County. In 1905 the mill employed 67 full-year workers according to information in the archives of the Board of Trade.

Extracts have been made from the wage books in which each wage period covers one month and in which are recorded the time- and piece-work wages and the hours of labour. The latter data are

divided into regular hours and days and overtime. In order to arrive at the total number of working days *per annum* the regular working hours per day have been estimated, and the number of days thus obtained has been added to the regular days and Sundays worked.

Yearly series have been worked out for the years 1891 and 1893—1913 relating to furnace workers, mixers and outdoor workers, four in each occupation.

Table 112. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Ed Sulphate Mill 1891—1913.

Year	Annual earnings			Hourly earnings	
	Furnace workers	Mixers	Outdoor workers	Furnace workers	Mixers
1891	534	522	—	—	—
93	628	749	440	17.0	19.5
94	776	776	411	20.5	20.9
95	702	751	424	18.4	20.0
96	655	775	418	17.4	20.4
97	624	801	409	16.4	21.2
98	721	818	402	19.8	22.0
99	722	678	436	20.4	19.3
1900	761	775	448	20.3	21.3
01	752	833	456	20.2	22.2
02	765	805	473	20.5	21.9
03	864	824	480	22.6	21.7
04	899	842	496	23.5	22.4
05	1014	919	496	26.2	24.6
06	1232	1018	534	31.3	27.3
07	1170	1041	651	33.3	28.2
08	1209	1136	735	32.9	31.2
09	984	1002	563	32.4	31.0
1910	953	891	668	28.1	26.6
11	1048	916	828	28.4	25.6
12	1122	945	913	30.8	26.7
13	1152	1038	877	32.1	29.4

Besides this, a cross-section, including all workers employed during 1905, has been drawn for that year comprising all workers:

	Number of workers	Annual earnings kronor	Hourly earnings öre
Skilled workers	25	968	25.7
Unskilled workers	13	782	25.4
Outdoor workers	25	552	—
Craftsmen	4	779	—
<i>All male workers</i>	67	765	—

In the yearly series the furnace workers' wages are well concentrated around their average, while the others' are more scattered, so that some of them have had to be excluded. Only in the outdoor workers' series do any large number of replacements occur, wherefore that series must be regarded as uncertain. A comparison with the 1905 cross-section shows that the selected skilled workers' series are representative and that the annual earnings are only respectively 0.4 and 1.1 % higher than in the cross-section. The outdoor workers' group is a particularly unstable group, as is seen from the 1905 cross-section, in which the number of outdoor workers varies in the different months between a minimum of 14 in March and a maximum of 36 in July, without any regular seasonal variation. The selected workers' annual earnings work out at a level far below the average for full-year workers in the cross-section, being 90 % thereof, probably due to the fact that the cross-section includes workers whose proportion of earnings on piece-work is greater than that of the selected workers, viz. 31 % as compared with 8 % on an average.

The wages remain fairly constant between 1893 and 1903, after which there is a substantial rise, the peak being reached in 1906—1908. In most cases the maximum is not reached until 1908, but the furnace workers' annual wages are highest in 1906 and the hourly earnings in 1907. The total rise in the hourly earnings of those working in shifts from 1903 to 1908 is 45 %, and the rise in their annual earnings is 39 % (outdoor workers 53 %). The participation in the general strike 1909 is not clear from the wage-records, but the work is in any case irregular that year and the annual earnings show an average decline of 13 %. Owing to a decrease in their hourly earnings, those working in shifts continue to experience a slight drop in their wages in the years 1909—1910, after which there is a gradual rise, which goes on until 1913. In that year however the wages are 7 % below the level of 1908. On the other hand, a substantial rise takes place in the annual earnings of the outdoor workers, the total increase in the period 1910—1913 being 37 %, and it was at this period, it will be remembered, that they changed over to a purely piece-work system. The outdoor workers' series now comes well into line with the other workers' series, the latter's wages up to 1909 being on an average 75 % higher than the outdoor workers', and there being but little change in the relative level of wages. Thanks to the above-mentioned strong rise that followed, the margin is reduced, until in 1911—1913 it is on an average only 19 %. Whether this shifting of the relative positions is typical or not is doubtful, owing to the fact that the outdoor workers' series is not strictly representative.

No actual benefits in kind were granted, but housing and fire-wood were obtained at very low prices.

All the skilled workers received both a time-wage and a piece-

work wage in the form of a bonus (cf. p. 175). The furnace workers' bonus never exceeded 10 % of their wages except in 1903 and 1904, when it was 40 % thereof. Of the mixers' wages the bonus during the period 1893—1904 represented 30—40 %, but afterwards it fell to an insignificant percentage. As mentioned above, the size of the outdoor workers' piece-work wage varied. The selected workers were given a bonus up to an amount not exceeding 10 % of their wages; the bonus was abolished in 1909, and they received instead an increasing proportion of purely piece-work wages, which finally amounted in 1913 to $\frac{2}{3}$ of the total wages. Sunday shifts were paid for at a 25 % higher rate.

The skilled workers are recorded as having worked a 12-hour shift *per diem*, although certain indefinite intervals are undoubtedly included. The outdoor workers' hours of labour varied between 9 and 12 a day, but were usually 10 a day. With regard to those working in shifts, the number of working days *per annum* is generally 300—315, plus at the most 50 hours' overtime a year; that of the outdoor workers appears to have ranged around 270 days. The latter's overtime varied considerably; in certain years it amounted to a good many hours, as for instance in 1896, when the selected workers worked on an average 295 hours' overtime *per annum*.

C. A Medium-sized Sulphite Mill.

This sulphite mill was founded in 1886 and is one of the oldest working sulphite mills in Norrland. The mill has twice been destroyed by fire, in 1894 and in 1901. It was rebuilt and extended after the last fire. In 1912 machinery was erected for the manufacture of paper. According to the 1905 cross-section the average number of workers was 142. In 1925 about 250 men were employed at the mill.¹

Particulars are available for each fortnightly period as to the number of hours of work, also the earnings divided into time-wage and piece-work wage. The piece-work wage was earned partly as a "bonus" (cf. p. 175) at the same time as the time-wage, partly on extra piece-work. The normal number of hours of labour per day has been estimated on the basis of the number of hours worked each fortnight, and where the number of hours exceeded the highest possible number of ordinary hours per fortnight the excess hours have been taken to represent overtime.

Yearly series have been drawn up relating to male workers in the chip-house, digester-house, engine-room and acid-house, and to women workers in the machine-room. Besides these, there are series for the following craftsmen: smiths, joiners, lead-solderers and

¹ Svensk industrikalender. Stockholm 1926.

repairers. Each series embraces 2 workers. Sometimes the wages of these workers, as for instance cooks, chip-house workers and smiths, are on such different levels that they have been divided into different series, probably corresponding to 1st and 2nd cooks, smith and smith's helper etc. After certain corrections, which have been made owing to the replacement of workers in the series, the trend of the different series agrees well. They have been combined into three different average series for annual earnings and hourly earnings:

- 1) An average for skilled occupations, the composition of which is unchanged throughout, comprising 1st cook, sulphur-burners and machine-room workers.
- 2) A series which in addition embraces all the other mill-hands (except craftsmen) without any correction being made to offset varying composition.
- 3) An average for the craftsmen.

Table 113. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Sulphite Mill C. 1893—1915.

a. Groups of Occupations.

Year	Annual earnings ¹			Hourly earnings		
	Skilled workers	All mill-hands	Craftsmen	Skilled workers	All mill-hands	Craftsmen
1893	886	886	1156	24.2	24.3	30.3
95	905	926	1249	23.3	23.7	31.4
96	1013	997	1243	25.4	26.4	32.2
97	1048	1021	1157	28.1	29.4	33.6
98	1203	1077	1208	28.6	27.9	34.9
99	1197	1029	1243	32.8	30.2	36.9
1900	1319	1006	1307	32.8	28.2	37.9
01	885	872	1164	32.9	30.1	36.7
02	1191	1058	1253	32.2	29.9	37.4
03	1327	1151	1268	33.6	30.8	37.9
04	1321	1151	1288	33.3	30.9	37.6
05	1365	1155	1315	33.9	31.0	37.9
06	1348	1115	1280	33.9	30.9	37.5
07	1384	1183	1299	34.2	31.7	38.3
08	1361	1201	1289	34.9	32.4	38.7
09	1065	958	1171	34.6	32.7	38.5
1910	1456	1372	1399	33.5	34.7	43.0
11	1449	1335	1421	38.2	38.3	43.8
12	1378	1297	1458	37.6	38.1	43.1
13	1227	1194	1536	40.4	40.5	46.3
14	1557	1339	1590	43.9	42.6	47.5
15	1524	1382	1497	43.3	42.5	47.3

¹ Periods of suspension of work (cf. p. 478).

b. *Special Occupations.*

Year	Annual earnings ¹			Hourly earnings		
	Machine-room workers	Sulphur-burners	Women workers	Machine-room workers	Sulphur-burners	Women workers
1893	763	1020	319	22.8	24.4	10.0
—	—	—	—	—	—	—
95	765	1078	333	21.5	24.9	12.0
96	836	1255	437	23.0	28.2	12.0
97	863	1304	414	25.0	32.3	12.0
98	986	1566	402	28.0	36.6	11.0
99	897	1610	406	27.5	41.7	11.5
1900	1016	—	423	26.0	41.5	12.0
01	521	1506	225	26.0	41.8	12.0
02	993	1295	297	27.0	33.3	14.0
03	1031	1542	481	26.5	37.0	14.0
04	1056	1503	472	27.0	36.6	—
05	1089	1569	511	28.0	37.0	—
06	1076	1570	503	29.0	37.1	14.0
07	1139	1548	471	30.0	37.2	14.0
08	1107	1474	458	30.0	36.8	14.0
09	803	1355	292	29.5	35.3	14.0
1910	1262	1474	581	—	—	—
11	1317	1470	—	—	—	—
12	1216	1488	—	32.0	38.6	—
13	985	1569	—	35.0	39.9	—
14	1368	1696	—	38.0	43.4	—
15	1278	1815	—	36.0	46.6	—

A cross-section comprising 84 full-year workers and 225 part-year workers has been worked out for 1905. Most of the part-year workers are engaged in the chip-house, namely, 80 male workers, whose combined hours of work correspond to that of 24.4 full-year workers, and 32 women workers engaged in the packing of chips, their hours of work corresponding to that of only 1.3 full-year worker. Their work has thus been of a very casual nature. This applies also to the women workers in the machine-room, in which 27 women worked on an average only 64 hours *per annum*. The hourly earnings of the women chip-packers were 15.5 öre, and of the machine-room women 14.0 öre. Apart from 45 temporarily employed snow-shovellers, yardmen and railway workers, there are in the remaining ordinary occupations 40 part-year workers. The hourly wages of these latter are lower — though only slightly lower — than those of the corresponding full-year workers, which is probably due to the fact that they belong to the less skilled workers within the respective occupational groups.

¹ Periods of suspension of work (cf. p. 478).

Of the different occupational groups represented by full-year workers in the 1905 cross-section only the most important ones are published separately.

Occupation	Number of workers	Annual earnings kronor	Thereof:		Hourly earnings öre
			Time-wage kronor	Piece-work wage kronor	
Sulphur-burners	2	1564	1442	123	36.9
Furnacemen	10	1263	1263	—	33.3
Digester-house workers	6	1463	1463	—	35.3
Filter-house workers	4	1128	983	145	31.9
Machine-room workers	9	1269	1167	202	35.6
Skilled workers	31	1305	1249	85	34.4
Unskilled workers	26	939	939	—	27.9
<i>All mill-hands</i>	57	1138	—	—	31.4
Craftsmen	17	1341	1256	85	35.9

The unskilled workers' average covers 25 workers in the chip-house and one worker engaged on loading and unloading. The average for craftsmen comprises 1 greaser, 1 electrician, 1 chipper, 1 lead-solderer, 4 mechanics, 1 smith, 1 smith's helper, 1 moulder, 4 joiners, and 2 masons. The highest wages are earned by the masons, whose annual earnings are 1,846 kronor, and their hourly earnings 42 öre when engaged on time-wage work. The figures in the cross-section agree very closely with the yearly series relating to the craftsmen, and it is also apparent that an average of the cross-section tallies with that of the yearly series, an agreement which indicates that the latter are representative. A comparison between the yearly series of skilled workers and the skilled workers' average in the 1905 cross-section exhibits close agreement, in the yearly series the annual and hourly earnings being respectively 4 and 2 % higher. The series of all mill-hands shows a deviation from the average for all mill-hands in cross-section not exceeding 2 %. As the composition of this series did not change between 1901 and 1915, the series probably represents the average wage level in respect of mill-hands at this period.

A purely time-wage and piece-work wage system and a combined time-wage and "bonus" system (cf. p. 175), have been in operation alternately. The sulphur-burners received a time-wage plus a bonus. The latter was a very small percentage of the entire earnings in 1893—1896, in 1897—1902 about 3 %, in 1903—1909 about 9 %, in 1913—1915 about 50 %. Digester-house workers chiefly worked on a purely time-wage basis up to 1913, when a bonus was introduced. Machine-room workers changed over from time-wage

to a combined time-wage and bonus in 1904. Up to 1912 the bonus represented 3—10 % of the wages, and after that year 40—60 %. The workers in the chip-house were paid on a purely time-wage basis except for one worker in 1913—1915, who received a bonus as well. Women workers in the machine-room earned their income on a mixed piece-work and time-wage basis. (In 1910 the wages generally consisted of a purely piece-work wage plus a certain wage per ton of pulp produced at the mill.) A change has thus generally been made from a purely time-wage system to a combined time-wage and bonus system where the bonus has shown a considerable relative increase.

The work was performed in 12-hour shifts. As regards the earliest years, the number of working hours is generally recorded as 12 a day. The workers probably took their meal during this period without any deduction being made for intervals for meals. Later on the workers in certain occupations had definite times off for meals, and they then worked 10 $\frac{1}{2}$ hours *per diem*. The hours were similarly shortened in the case of women workers in the machine-room in 1901 and in that of chip-house workers, in part, from the year 1896. In 1905—1910 one worker in the digester-house, probably the 2nd cook, worked 180 hours every 14 days, apparently representing 12 hours *per diem* and in addition one double shift or else two extra half shifts. According to a collective agreement between the concern and the workers, which came into force at this mill in 1909, the skilled men worked 10 hours a day on 5 days of the week and 9 hours on Saturday. According to the same agreement the washery workers and the skilled craftsmen were allowed two fixed intervals of one hour each, while "the other departments take their times off for meals in the course of the work as opportunity occurs."

The number of hours of work per 14 days varied slightly according to the varying number of free days. As a rule the sulphur burners had no free days. The digester-house workers in the early days had alternately one free day and no free day each fortnight and it is not until 1913 that they regularly get two free days each fortnight. All the machine-room workers had alternately one and two free days and those in the chip-house two free days a fortnight. Overtime, as calculated in the manner stated above, was not very frequent at the mill.

Extracts have also been taken from the concern's books showing the wages paid to the workers fortnightly, divided into output of pulp, repairs and sundries. It is possible to deduce from these figures the fairly numerous occasions on which working at the mill was suspended. Total or partial suspensions occurred during the following periods: $\frac{17}{6}$ — $\frac{13}{7}$, 1899, $\frac{11}{7}$, 1901— $\frac{15}{5}$, 1902, $\frac{9}{6}$ — $\frac{17}{8}$ and $\frac{3}{7}$ — $\frac{23}{6}$, 1909, partially $\frac{9}{4}$, 1911— $\frac{26}{7}$, 1912, and $\frac{17}{5}$ — $\frac{25}{6}$, 1913.

The craftsmen's wages show a considerably reduced dispersion

from the beginning of the period to its close, as is illustrated by the following percentages of dispersion (average percentage deviation). The dispersion of the annual wages diminished from 22 % in 1893 to 15 % in 1900 and from 15 % in 1900 to 8 % in 1915, the last comparison covering one series less than the immediately preceding one. The corresponding figures in respect of the hourly wages are: in 1893—1900 26 % and 12 %, and in 1900—1915 13 % and 6 %. The lead-solderer, whose wage is highest, receives the whole time about 50 öre an hour, while his annual wage decreases somewhat during the period under review.

PAPER; BOOK-PRINTING AND BOOK-BINDING (CHAPT. IX).

I. PAPER INDUSTRY.

A. *Klippan Papermill.*

Klippan is one of the oldest papermills in Sweden, having been founded in the sixteenth century. It is situated in the northwestern district of Scania. Already at an early stage of its career this mill had begun to use, besides rags, wood-pulp, which was manufactured at its own mechanical pulpmill from the year 1866. During the sixties there was only one paper-making machine, but an additional one was set up in 1872—1873. Around the year 1870 about 70 % of the output consisted of printing paper. By the middle of the eighties more pulp began to be mixed with the paper and then the manufacture of newsprint was taken up. As however the machines were out-of-date, too narrow and too slow-working for manufacturing newsprint, in the nineties the mill took to utilizing finer quality rags and cellulose. During that decade the plant was thoroughly worn out and old-fashioned, and, besides, the water-power was frequently exhausted. In 1898 the establishment was modernized, and in 1905 a modern paper-machine was erected for making typewriting and copying paper.

Wage-data have been taken from the concern's payrolls, covering earnings on ordinary time and overtime jobs, daily wage, the number of regular working days and, for certain years, the number of hours worked overtime. Prior to 1881 no distinction is made between overtime and ordinary time, the working time per week being sometimes stated as 7 or 8 days, in which case there was obviously a certain amount of overtime, which has been converted into days at the rate of 12 hours *per diem*. A small number of overtime hours are accounted for covering the period 1881—1896, though Sunday work is still counted as ordinary time, and the number of working days recorded in the case of beatermen and cutters is in one or two years more than 365, in which case certain double shifts or some other form of overtime have clearly been reckoned as ordinary time and accounted for as ordinary working days. On the other hand, from the year 1897, all hours worked beyond the regular hours of work per week are recorded separately as overtime. In the case of

the finishing room girls no working hours are recorded for the period 1902—1909 and no overtime to correspond to the overtime earnings during the years 1910—1914. There are series relating to machine-tenders, firemen, beatermen, cutters and finishing room girls, covering the period 1860—1914, and also relating to foremen at the beaters from 1890 to 1914. The position of foreman at the beaters was initiated in 1880 and the foremen earned higher pay than the other beatermen. They subsequently assumed in reality a foreman's rank. It seems also that, later on at any rate, the machine-tenders likewise assumed foreman's rank, and in 1910 they received wages on a monthly basis. Each series comprises 2 selected full-year workers, the foremen of the beater's series however relating to only one worker. The wages of the two workers included in the different series generally agree closely, and there appear to have been no replacements in the material to disturb the continuity. The best in these respects are the beatermen's series and the machine-tenders' series, whereas the cutters' series occasionally exhibits considerable differences in the wages of the workers involved. In order to give a general idea of the trend of wages, an average has been struck, based on the chain index method, of all selected male workers, excluding the machine-tenders from the year 1910. The weights assigned to the different series included herein are the same as those used in the average for the entire paper industry. The index series has been raised to the same level as the direct average in the years 1860—1889.

At the 150 years' jubilee of the concern a history of its development was composed¹. From this monograph we have extracted the total number of workers and the total wage-sum for each of the years 1860—1914. On the basis of these amounts the average annual earnings for all workers combined have been worked out, which will also be found in Table 114 a.

¹ *G. Clemensson, Klippans pappersbruk 1773—1923. Lund 1923.*

Table 114 a. Annual Earnings (in kronor) of Workers at Klippan Papermill 1860—1914.

Year	Ma- chine- tend- ers	Beater- men	Fore- man at the beaters	Cutt- ers	Fire- men	Finish- ing room girls	All selected male work- ers	All workers combined	
								Number of work- ers	Earn- ings
1860	313	274	—	275	295	128	287	98	286
61	299	313	—	299	313	141	306	101	319
62	301	309	—	306	316	152	307	96	347
63	306	325	—	312	324	137	317	103	301
64	293	325	—	311	315	128	312	101	319
65	300	339	—	307	326	132	320	100	347
66	303	345	—	315	337	147	326	99	337
67	315	333	—	327	335	141	327	105	342
68	321	338	—	322	340	143	330	107	324
69	308	322	—	316	323	142	317	98	322
1870	311	324	—	319	327	147	320	101	334
71	321	343	—	318	348	147	332	105	348
72	340	365	—	348	389	167	358	105	373
73	435	471	—	449	466	218	456	120	411
74	661	532	—	518	546	207	563	163	368
75	696	553	—	532	650	212	596	163	376
76	705	558	—	533	661	217	601	161	365
77	711	508	—	515	646	200	578	111	566
78	669	375	—	437	561	157	487	117	416
79	745	432	—	438	595	156	532	107	475
1880	768	453	—	445	583	211	546	108	526
81	755	473	—	479	600	212	561	120	512
82	749	453	—	478	553	224	546	142	503
83	778	463	—	517	568	226	568	207	291
84	747	467	—	487	612	224	560	202	350
85	719	471	—	497	587	219	554	180	426
86	681	418	—	453	555	199	510	185	352
87	774	424	—	485	588	201	547	208	362
88	759	454	—	502	576	198	558	225	382
89	679	448	—	473	578	206	528	255	364
1890	786	527	688	520	619	214	602	255	378
91	799	546	691	502	610	219	607	230	433
92	793	570	737	515	621	214	623	215	463
93	790	564	706	521	614	227	617	221	482
94	788	526	675	532	665	213	609	233	453
95	803	555	720	520	685	202	625	236	477
96	808	555	719	545	675	206	631	266	440
97	848	560	765	553	694	266	650	243	501
98	913	657	805	631	713	284	726	236	531
99	982	652	870	656	784	279	754	243	585
1900	1012	706	960	677	741	321	788	316	513
01	964	705	978	648	777	413	776	334	622
02	962	679	895	607	847	452	757	294	730
03	922	652	844	624	802	477	733	275	703
04	1063	670	869	622	864	405	778	288	702

Table 114 a. (Cont.). Annual Earnings (in kronor) of Workers at Klippan Papermill 1860—1914.

Year	Ma- chine- tenders	Beater- men	Fore- man at the beaters	Cut- ters	Fire- men	Finish- ing room girls	All selec- ted male work- ers	All workers combined	
								Number of work- ers	Earn- ings
1905	1029	667	874	643	1006	442	791	275	787
06	1118	743	943	702	1060	543	862	330	766
07	1304	799	1011	731	1168	614	947	310	896
08	1249	780	999	778	1242	600	945	283	966
09	1040	657	874	680	1162	530	815	274	862
1910	1550	811	1113	812	1287	684	979	273	990
11	1680	850	1132	806	1301	688	1000	267	1001
12	1800	909	1297	836	1307	738	1062	265	1108
13	1800	904	1212	877	1324	706	1062	297	1013
14	1800	986	1312	941	1309	666	1132	299	991

Table 114 b. Hourly Earnings (in öre) of Workers at Klippan Papermill 1860—1914.

Year	Mach- ine- tenders	Beater- men	Foreman at the beaters	Cutters	Firemen	Finishing room girls	All selected male workers
1860	8.3	8.3	—	8.3	8.3	5.0	8.3
61	8.3	8.3	—	8.3	8.3	5.0	8.3
62	8.3	8.3	—	8.3	8.3	5.0	8.3
63	8.3	8.3	—	8.3	8.3	5.0	8.3
64	8.3	8.3	—	8.3	8.3	5.0	8.3
65	8.3	8.3	—	8.3	8.3	5.0	8.3
66	8.3	8.3	—	8.3	8.3	5.0	8.3
67	8.3	8.3	—	8.3	8.3	5.0	8.3
68	8.3	8.3	—	8.3	8.3	5.0	8.3
69	8.3	8.3	—	8.3	8.3	5.0	8.3
1870	8.3	8.3	—	8.3	8.3	5.0	8.3
71	8.3	8.3	—	8.3	8.3	5.0	8.3
72	9.0	9.1	—	9.5	9.6	5.6	9.2
73	11.7	11.8	—	12.1	12.2	7.3	11.9
74	18.2	13.6	—	14.1	14.1	7.5	14.9
75	19.2	14.0	—	14.6	16.7	7.5	15.8
76	19.4	14.1	—	14.6	16.7	7.5	15.9
77	19.4	13.9	—	14.5	16.7	7.2	15.8
78	18.2	11.8	—	12.5	14.6	6.5	13.9
79	19.1	12.0	—	12.5	14.5	6.5	14.2
1880	20.2	12.1	—	12.5	14.5	7.5	14.5
81	20.3	12.6	—	12.6	14.6	7.5	14.8
82	20.2	12.2	—	12.6	14.6	7.5	14.6
83	20.0	12.5	—	14.0	14.5	7.5	15.0
84	19.8	12.7	—	13.2	14.6	7.5	14.8

Table 114 b. (Cont.). Hourly Earnings (in öre) of Workers at Klippan Papermill 1860—1914.

Year	Machine-tenders	Beater-men	Foreman at the beaters	Cutters	Fire men	Finishing room girls	All selected male workers
1885	19.7	12.8	—	13.3	15.4	7.5	15.0
86	18.5	11.6	—	12.0	14.0	6.9	13.7
87	18.6	11.4	—	11.9	14.4	6.8	13.7
88	18.5	11.4	—	12.0	14.8	6.8	13.8
89	18.4	11.5	—	12.0	14.9	6.8	13.8
1890	21.1	12.1	16.2	13.0	15.3	7.4	15.0
91	21.9	12.5	16.5	13.3	15.4	7.5	15.4
92	21.9	12.5	16.6	13.3	15.4	7.5	15.4
93	21.9	12.5	16.7	13.3	15.9	7.5	15.5
94	21.9	12.5	16.7	13.3	16.7	7.5	15.6
95	21.9	12.5	16.6	13.3	16.7	7.5	15.6
96	22.0	12.5	16.7	13.3	16.7	7.5	15.6
97	23.4	14.5	19.7	15.0	17.5	9.3	17.4
98	24.9	16.3	21.6	16.7	18.4	10.5	19.0
99	25.9	16.8	23.0	17.1	19.4	11.3	19.8
1900	26.1	17.1	23.7	17.2	19.1	11.4	20.0
01	26.1	17.7	24.3	17.8	19.7	11.3	20.4
02	26.0	18.2	23.9	17.7	20.7	—	20.6
03	25.8	17.8	23.6	17.6	20.7	—	20.4
04	28.2	18.1	23.5	17.6	21.2	—	21.1
05	29.6	19.5	25.4	19.3	24.1	—	22.8
06	30.4	20.4	26.2	20.3	26.0	—	23.8
07	37.0	22.7	29.5	22.1	28.5	—	26.9
08	36.3	23.3	30.6	23.0	30.2	—	27.5
09	36.0	23.4	30.6	23.2	30.8	—	27.6
1910	—	23.6	31.0	23.4	30.4	—	27.6
11	—	23.8	33.5	23.5	30.6	—	28.2
12	—	24.3	34.9	24.1	30.6	—	28.8
13	—	25.8	35.2	26.7	30.8	—	30.3
14	—	27.0	35.7	27.6	30.8	—	31.3

The following table shows the average earnings of all workers at the concern in the years 1865, 1885 and 1905 for which years cross-sections have been compiled.

Table 115. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at the Klippan Papermill in the Cross-Sectional Years 1865, 1885 and 1905.

Occupation	1865			1885			1905		
	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings
<i>Male workers.</i>									
Machine-tenders	—	—	—	4	846	20.9	4	992	28.3
Cutters	7	292	8.3	9	518	14.0	15	646	19.6
Cooks	4	299	8.3	5	459	12.3	7	668	20.1
Bleachers	3	310	8.3	5	473	12.6	6	615	19.2
Beatermen	3	320	8.5	14	556	14.0	20	658	19.8
Firemen	2	316	8.3	2	604	15.3	4	1067	25.0
Helpers	8	298	8.3	11	439	12.3	6	596	19.1
Finishing room workers	—	—	—	10	456	11.7	—	—	—
Joiners	5	329	9.5	5	606	15.4	7	796	23.6
Smiths	3	315	9.0	4	599	15.3	6	1124	28.4
Sundry male workers	—	—	—	4	532	15.7	16	619	19.7
Cleaners	—	—	—	—	—	—	4	740	20.1
Grinders	—	—	—	—	—	—	4	920	26.1
Supercalender men	—	—	—	—	—	—	7	669	20.3
Pasteboard machine workers	—	—	—	—	—	—	7	661	20.7
Packers	—	—	—	—	—	—	4	615	19.2
Bundlers	—	—	—	—	—	—	4	931	—
Porters	—	—	—	—	—	—	10	744	20.8
Dampers	—	—	—	—	—	—	6	666	19.4
Drivers	—	—	—	—	—	—	4	745	20.0
<i>Female workers.</i>									
Finishing room girls	20	134	4.3	39	230	6.3	—	—	—
Rag-cutters, female	30	156	—	31	238	—	—	—	—
<i>Average.</i>									
Skilled workers	24	307	8.4	49	536	13.8	88	717	20.8
Unskilled workers ¹	8	298	8.3	15	463	13.2	36	649	20.6
Handicraftsmen ²	8	324	9.3	9	603	15.4	13	947	25.8
Women	50	147	4.3 ³	70	234	6.3 ³	—	—	—

In 1865 there is a very close agreement between the different yearly series for selected workers and the average earnings of all workers shown in the cross-section, only the beatermen's and the cutters' series being 5 or 6 % higher than the corresponding groups in the cross-section. In 1885, on the other hand, the yearly series

¹ In 1865 only assistants. — ² Joiners and smiths. — ³ Finishing room girls only.

were lower throughout. Thus, the annual earnings of machine-tenders and beatermen are as much as 15 % lower, cutters and finishing room girls 5 % lower, firemen 3 % lower. The hourly earnings tally satisfactorily. In 1905, on the other hand, the series agree well with the cross-section, the widest deviation, that of the firemen, being 5 %. The general impression from the series is that they form a very valuable body of material, the only perceptible weakness being the lack of agreement with the cross-section in 1885. If the average for all selected male workers is placed in relation to an average for all skilled male workers in the cross-sections, we arrive at the following figures:

	1865	1885	1905
Annual earnings	104	103	110
Hourly earnings	100	109	110

The average appears, then, to illustrate clearly the trend of wages in the concern. As the cross-sections show, the number of occupations has increased considerably in the course of years owing to the addition of less highly skilled workers. For these occupations no yearly series have been compiled, which may account for the somewhat higher comparative figures in respect of later years.

The trend of the different series for selected workers tallies well as far as the short-period movements are concerned, while the course of the secular movements is slightly different, characterized by a strong concentration during the first half of the seventies which is dispersed in the end of the seventies, and finally by a less pronounced concentration towards the close of the period.

All the male workers are in receipt of a similar daily wage during the period 1860—1871, and the annual earnings differ only slightly from one another (see also the cross-section table.). During this period the wages remain practically unaltered, the only exception being a slight decline in 1869. Up to 1873 they all follow suit; the average rise in 1871—1873 is 37 % in the case of the annual wage and 44 % in that of the hourly wage. It was during these years that the mill was modernized and extended. Subsequently the rise continues up to 1875, but now the rapidity of the rise differs in different occupations. The percentage increase during the period 1873—1875 is as follows:

	Annual earnings	Hourly earnings
Machine-tenders	+ 60	+ 64
Firemen	+ 39	+ 37
Cutters	+ 19	+ 21
Beatermen	+ 17	+ 19
<i>Average of all workers</i>	+ 31	+ 33

That is to say, the relative rise for the highest group is three times as great as that for the others. The wages then decline from the year 1878 up to 1880, and now the fall is on the contrary heaviest in the case of the lower paid groups the percentage increase during the period 1877—1880 being:

	Annual earnings	Hourly earnings
Machine-tenders	+ 8	+ 4
Firemen	— 10	— 13
Cutters	— 14	— 14
Beatermen	— 11	— 13
<i>Average of all workers</i>	— 6	— 8

Thus, in spite of the decline in the earnings of all other occupations, there was actually a rise in the case of the machine-tenders, after a small decline in 1877—1878. The wages are subsequently on almost the same level right up to 1897, except for a minor decline in 1885—1886 of, on an average, 8 % in annual earnings and 9 % in hourly earnings, and in 1889—1890 an increase of 14 % in annual earnings and of 9 % in hourly earnings. On an average for the period, the hourly earnings of the most highly paid group, the machine-tenders, represents 168 % of the wages of the lowest paid skilled group, the beatermen. In 1897 however there sets in a strong rise in wages, which is probably connected with the labour dispute in this year touched upon below. It is true that the machine-tenders' and firemen's wages also rise at this time, but the strongest rise is now shown by the other occupational groups, who, apart from the foreman at the beaters, have lower wages than the first-mentioned workers. Between 1896 and 1899 they show an average increase of 51 % in their hourly earnings (the finishing room girls 49 %), while the hourly wages of firemen and machine-tenders rise on an average no more than 11 %. The annual wages increase at a somewhat slower pace, reaching the peak in 1900, the average rise in 1896—1900 being 18 % for firemen and machine-tenders, and 30 % for the other male workers. The annual earnings then show a slight decline up to 1903, after which the wages rise during the period 1904—1907, the average hourly wage of all male workers increasing by 28 % and the annual wage by 26 %. After the strike of 1909 the rise continues, the annual earnings going up nearly 25 % on an average during the period 1907—1914, machine-tenders not included, they being paid a monthly wage as from 1910. In spite of the hourly wage of the lower paid workers rising most during the period 1896—1914, the annual earnings of the higher paid workers show the greatest increase owing to the number of hours of work having been extended.

The hourly wage of the finishing room girls varies in complete conformity with that of the beatermen, whose wages are about 60 % higher. The wages paid during the boom prevailing in the beginning

of the seventies prove an exception, those of the finishing room girls being increased by only 50 % in 1871—1874, though, as a result of a further increase of 15 % in 1879—1880, they recover what they had lost. The annual earnings show a somewhat more irregular variation as compared with the annual earnings of the male workers. Up to 1900 the earnings of the beatermen, for instance, are 110—160 % higher. From the year 1901 we find a strong relative rise in the annual earnings of the finishing room girls, with the result that the beatermen's wage level is only 29 % higher between the years 1906 and 1914. The records regarding working time for these years are incomplete, but the earnings on overtime went up considerably; during the period 1910—1914 they are stated to represent on an average 40 % of the entire wages. It is possible that the women workers started Sunday work in 1901.

The secular percentage increase in the earnings of the different occupational groups will be seen from the following table.

	1860—1864/ /1892—1896		1892—1896/ /1910—1914		1860—1864/ /1910—1914	
	An- nual earn- ings	Hourly earn- ings	An- nual earn- ings	Hourly earn- ings	An- nual earn- ings	Hourly earn- ings
Machine-tenders	+163	+164	+117 ¹	—	+471 ¹	—
Firemen	+109	+96	+100	+88	+318	+269
Beaterman	+79	+51	+61	+99	+188	+200
Foreman at the beaters	—	—	+71	+104	—	—
Cutters	+75	+60	+62	+88	+184	+202
Finishing room girls	+55	+50	+228	—	+408	—
<i>All selected male workers</i>	+103	+87	+69	+88	+242	+252

The average of annual earnings for all workers combined exhibits a marked agreement with the selected workers' average, except at periods when the upward tendency of the trade cycle is strongest: in 1874—1876, 1883—1884, 1900—1901 and 1906. In these years, which in the selected workers' series are characterized by upward movements of the wage curve, the average annual earnings, on the other hand, fall heavily, though they rise again rapidly towards the close of the periods mentioned; the result is that deep troughs are formed in the wage curve during the booms. We find an explanation of this phenomenon if we examine the series relating to the number of workers. This series is interesting on account of the distinct cyclical variations it reflects, the number of workers remaining

¹ Foreman earning a monthly wage from 1910. Not included in the average of all male workers.

unaltered in the sixties and maxima being reached in 1874—1876, 1884, 1889—1890, 1900—1901 and 1906. The troughs in the series showing the trend of annual earnings are here replaced by waves rising steeply at the beginning of the said periods. It is probable that the extra workers accounted for consisted of part-year workers, who caused a decline in the average annual earnings, as several circumstances go to show. For instance, the number of workers diminishes in 1876—1877 from 161 to 111, whereas the total of wages paid rises from 58,737 kronor to 62,858 kronor. In the same years the annual earnings of the selected full-time workers show a general decline, so that the 111 workers would appear to correspond to a larger number of full-time workers than the 161 of the year 1876. The proportion between women and men changes but little during these periods, and consequently the deviation from our wage series cannot be caused by fluctuations in this proportion. Apart from this, the variations in the average earnings are in very close accord with the average in respect of the selected occupations, both as regards the cyclical variations, when the number of workers follows a steady course of development, and as regards the secular trend. From the sixties to the period 1910—1914 the increment shown by the two series is exactly the same. The average for all workers however falls somewhat as compared with the average for selected full-time workers in the middle of the eighties, but at about the turn of the century it again comes up to a level with the index for the earnings of the selected workers. This may be accounted for by the fact that the relative number of women workers is increased at the former period, whereas at the latter period there occurs the strong relative increase in the annual earnings of the women workers which we have indicated above.

Prior to 1897 a small number of the workers, some of the foremen and the older workers, were housed free. In 1897, the year of the strike mentioned below, the free housing benefit was abolished, and from that time on all workers received an allowance for rent. In earlier years a large number of workers had a small potato patch at their disposal.

All the workers included in the series were paid at time rates. During the nineties the mill was not run on rational lines, with the result that the unusable paper that had to be thrown away amounted to as much as one-third of the quantity produced. The workers were accused of wastefulness and with a view to encouraging the exercise of greater care in the work, an attempt was made in 1897 to introduce, in addition to the time-wage, a piece-work bonus calculated on the basis of the output. In 1896 a trade union had been founded at the mill, and this union demanded the abolition of the bonus system as well as an increase in wages. When this was refused, the union began a strike. The strike was settled after the lapse of a month, when the bonus was abolished and the time

wage was increased by the amount that would have been represented by the bonus¹.

The manner of recording the overtime has been described above. In the period 1881—1896 the workers received for the considerable number of overtime hours recorded an increased wage of 25 öre in the case of men and of 8.5 öre in the case of women. In 1897—1900 the increase in wages paid for overtime varied between 50 and 75 %, thereafter remaining constant at 100 %.

The male workers have worked in 12-hour shifts. The finishing room girls worked 10 hours a day. It is said not to have been a regular practice to work on holidays, though on occasions work was done then on a large scale. 4 or 5 hours of overtime are said to have been frequent on weekdays, but it is not known how the amount of overtime recorded was apportioned as between holidays and weekdays. Work was suspended on account of strikes for 1 month in 1897, from $\frac{3}{4}$ to $\frac{3}{8}$ in 1905 and from $\frac{4}{8}$ to $\frac{27}{8}$ in 1909, and also, on account of a lockout, during the period 22—31 July 1907.

B. Lessebo Papermill.

The Lessebo papermill is situated in the south-eastern part of the County of Kronoberg. The concern has had a long history as a hand-made paper mill, but the selected series relate only to workers engaged on the paper-making machines. Up to 1897—1898 the concern possessed one out-of-date paper-making machine only, but then the mill was modernized and an additional paper-making machine was erected. In 1905—1906 the concern established its own wood-pulp mill. According to the cross-sections comprising all workers at the papermill, the number of adult male workers employed throughout the year was 35 in 1865, 75 in 1885, and 149 in 1905. Besides these, the concern employed a number of adult women workers — finishing room girls, viz. 7 in 1865, and about 45 in 1885 and 1905.

The wage data are taken from monthly summaries of the mill's wage lists, the latter being no longer preserved. Overtime, which comprises all hours worked apart from the regular number of hours per week, is accounted for separately during the periods 1860—1891 and 1897—1914, and the corresponding earnings are recorded separately for the years 1860—1891. The yearly series cover machine-tenders, beatermen and firemen for the period 1860—1914 and mechanics for the period 1906—1914. The series comprise only two workers each. As at times the two workers are on very different wage levels, and as the trend of their wages also differs, it has not been considered worth while to publish the series for the different occupations separately. The beatermen's series however, is,

¹ G. Clemensson, Klippans pappersbruk 1773—1923, Lund 1923.

up to 1884, so far homogeneous that an exception has been made in their case. In the cyclical variations, however, the different series generally exhibit a fair measure of agreement, and an average in which the incidental changes in the quality of the components are not so very marked will probably afford a good picture of the trend of wages at the concern. Such an average has been compiled for all the occupation series. When these series show obvious changes in quality, the chain index method has been employed in striking the average. The annual earnings of the firemen are not included in this average prior to 1866 as the selected workers were not employed throughout the year. In the periods 1897—1899, 1902 and 1903 the average is somewhat uncertain, while there are no data regarding the hours of work.

Table 116. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Skilled Workers at Lessebo Papermill 1860—1914.

Year	Annual earnings			Hourly earnings			Year	Annual earnings			Hourly earnings		
	Beater-men	selected workers	All	Beater-men	selected workers	All		Beater-men	selected workers	All	Beater-men	selected workers	All
1860	325	382		8.4	8.1		1890	—	731	—	—	17.4	
61	319	369		8.2	8.1		91	—	815	—	—	19.3	
62	315	372		8.3	8.5		92	—	763	—	—	20.2	
63	297	418		8.4	9.6		93	—	762	—	—	20.4	
64	312	419		8.4	9.5		94	—	796	—	—	20.4	
65	307	410		8.3	9.6		95	—	765	—	—	20.3	
66	311	414		8.7	9.2		96	—	584	—	—	20.4	
67	337	455		8.4	9.7		97	—	1040	—	—	—	
68	333	433		9.3	10.7		98	—	988	—	—	—	
69	366	464		8.9	10.4		99	—	1080	—	—	—	
1870	353	448		8.9	10.1		1900	—	1022	—	—	25.1	
71	351	476		8.9	10.6		01	—	990	—	—	24.2	
72	405	518		9.9	11.8		02	—	1059	—	—	—	
73	440	566		10.9	12.3		03	—	1069	—	—	—	
74	489	610		12.3	13.7		04	—	1046	—	—	28.1	
75	505	623		12.2	13.7		05	—	1076	—	—	28.2	
76	519	591		12.6	13.7		06	—	1091	—	—	29.0	
77	489	576		12.7	14.5		07	—	1124	—	—	30.5	
78	490	554		13.1	15.4		08	—	1141	—	—	31.2	
79	483	560		12.4	14.6		09	—	979	—	—	31.9	
1880	479	549		12.3	14.4		1910	—	1294	—	—	34.4	
81	480	557		12.4	14.5		11	—	1292	—	—	33.8	
82	477	562		12.4	14.3		12	—	1414	—	—	36.4	
83	461	537		11.3	14.3		13	—	1366	—	—	36.4	
84	509	621		13.7	14.6		14	—	1348	—	—	36.3	
85	—	631		—	15.8								
86	—	642		—	16.2								
87	—	671		—	16.5								
88	—	679		—	16.8								
89	—	702		—	17.1								

Further, cross-sections comprising all workers at the concern have been drawn for the years 1865, 1885 and 1905. In 1885 and 1905 several of the workers were in receipt of both time-wage and piece-work earnings, and, as far as the latter is concerned, the number of working hours is unknown. It has therefore only been possible to calculate hourly earnings for the year 1865. There is often a considerable difference (up to 22 %) between the selected series and the cross-sections, which is not surprising as the earnings of the two selected workers in each series differ so widely from one another. On the other hand, a comparison between the yearly series for all selected workers and an average for all male skilled workers gives more satisfactory results:

Year	Cross-section			Yearly series in percentage of cross-section	
	Number of workers	Annual earnings Kronor	Hourly earnings Öre	Annual earnings	Hourly earnings
1865	23	312	8.3	131	116
1885	48	531	—	119	—
1905	113	878	—	123	—

The shifting of the selected skilled workers' wages in relation to those of all the skilled workers employed at the mill is manifestly inconsiderable when compared with the substantial secular rise that took place during the period, and which will be explained later on.

The variations in the average for all selected workers during the sixties are inconsiderable. The annual earnings rise 39 % in 1870—1875, but by 1880 they have again fallen 12 %. The hourly earnings continue to rise until the year 1878, the total increase from 1870 being 53 %, but this is followed by a slight decline up to the year 1880. From 1884 to 1891 and 1892 a fresh steady rise sets in, being particularly strong in the case of the hourly earnings during the period 1890—1892. By 1891 the annual earnings have gone up 31 % and by 1892 the hourly earnings have gone up 38 %. The prosperity prevailing in 1900 and 1907 is not reflected in the wage series. There was a considerable rise in the wage level around the turn of the century, but, as already mentioned, the wage data for that period are incomplete. The breaks in the wage curve in 1883 and 1896 are apparently due to restricted production owing to the rebuilding of the mill. The secular trend will be seen from the following indexes (1860—69 = 100):

	Annual earnings	Hourly earnings
1886/1895	177	198
1904/1908 and 1910/1914	295	347

The selected workers all worked on a time-wage basis. The number of workers in receipt of piece-work wages is reported to have been about one-fifth of the total number of workers in 1865, about one-third in 1885 and about one-half in 1905. No distinction is made between regular earnings and overtime earnings after 1892, but prior to that year it appears that only firemen received any increase in wages for overtime work, the rate being about 40 % above the standard wage. A beaterman's overtime earnings are the same as the regular hourly earnings, while the machine-tenders' hourly overtime rate seems to have been actually lower than ordinary working hour rate. According, however, to the 1907 agreement at the papermill published in an enquiry by the Board of Trade¹, all workers were paid a 25 % increase for overtime on weekdays and a 75 % increase for work on Sundays, calculated on the basis of one-tenth of the ordinary wage per day or shift.

A married worker received as benefits in kind free housing (usually one room and a kitchen), firewood and a potato patch. Most families kept a cow and pigs of their own. From July 1, 1909 those workers whom the company were unable to accommodate received a money allowance in lieu of free housing, married workers being paid 6 kronor a month and unmarried workers over 21 years of age 2.50 kronor a month.

The mill has gradually abandoned the system of day-work in favour of that of double shifts. The number of hours worked by the day-workers is stated to have been 12 hours prior to 1890, 11 hours in 1890—1901 and 10 hours from 1902 to 1914. Beatermen and firemen had worked in double shifts ever since 1865; from 1885 the machine-tenders and four other occupations, and from 1905 the engine-tenders and two other occupations, started working in shifts. Throughout the entire period therefore the selected workers had a 12-hour working day. There was but little Sunday work done. On the other hand, a good deal of overtime work was done on weekdays, this applying especially to the machine-tenders, who, prior to the introduction of the double-shift system, worked as much as 17 hours a day if the overtime is spread over the stated number of days worked. It is possible however that this figure is somewhat excessive, as there may have been work done on a few Sundays which has been included in the amount of overtime. All the same, it is quite possible that these workers may at times have exceptionally worked as long as 17 hours a day in all, as they had to run their machine without being relieved until the prepared quantity of pulp was finished. The work was however fairly easy and the workers probably took turns to rest while the work was going on. Curiously enough, as mentioned above, the hourly earnings derived from this overtime work were lower than the regular earnings.

¹ Kollektivavtal. Arbetsstatistik V. Stockholm 1908.

The number of days worked *per annum* has ranged very irregularly around 300. The firemen prior to 1866 form an exception. At certain periods during that time the mill was driven by water-power, and the firemen were then given leave of absence. In 1896 the work at the mill seems to have been generally curtailed.

C. Munkedal Papermill.

Wage material has been obtained from the Munkedal papermills in North Bohuslän, covering the period 1880—1909. From the beginning of this period the concern manufactured paper out of pulp produced in their own mechanical pulp mills. In 1890 they established also a sulphite mill in connection with the paper mill. In 1880 there were 3 paper-making machines; additions were made in 1892, 1897 and 1904, and by the close of the period there were 6 machines working. Up to 1901 the mills derived their power direct from a small watercourse. The fact that the supply of water was irregular serves to explain the breaks in the wage curve. In 1897 the concern employed 367 workers and manufactured about 3000 tons of paper and 900 tons of wallboard.¹

The wage series relate to machine-tenders, backtenders, and workers in the beaterroom. The particulars of wages, which are extracted from the payrolls, are recorded fortnightly, details also being given of the earnings on a time-wage basis, earnings on piece-work and on overtime, the regular hours of work and the amount of overtime. Each series comprises two workers, whose wages are invariably very uniform. The series are homogeneous in other respects also, though possibly the machine-tenders' series is slightly too low during the period 1885—1889 owing to the replacement of both workers in 1884.

For the year 1882 there are particulars of the average wages earned by all workers combined according to the superintendent's payroll, which may serve as a cross-section. In it are given the daily wage rate, the piece-work rate and the corresponding estimated daily earnings, and also the amount of the rent paid by workers living in the concern's dwelling-houses. The skilled workers, excluding foremen and non-adults, are divided into the following groups:

	Number of workers	Daily wage kronor
Machine-tenders	3	3.17
Firemen	2	2.50
Backtenders, workers in the size-cooking room, at the rewinding-machines, in the beaterroom and at the pulp-containers	12	1.50—1.78
Backtenders, workers at the cutters and in the digester-house, pulp-carters and workers in the mechanical pulp-mill	36	1.27—1.46

¹ K. Key-Åberg, Sveriges industri. Stockholm 1898.

Table 117. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Munkedal Papermill in 1880—1909.

Year	Annual earnings			Hourly earnings		
	Beatermen	Machine tenders	Back-tenders	Beatermen	Machine tenders	Back-tenders
1880	441	898	497	12.4	24.0	13.3
81	510	989	548	13.7	25.6	14.0
82	504	976	542	14.1	26.1	14.4
83	510	957	556	14.1	26.4	14.8
84	536	998	563	15.0	27.0	15.4
85	547	888	524	17.0	25.1	15.3
86	490	844	527	13.3	22.6	14.4
87	524	876	538	14.5	23.3	14.6
88	553	891	571	15.1	23.6	15.1
89	585	945	591	16.3	25.0	15.8
1890	623	1100	616	18.0	29.3	16.5
91	676	1115	653	18.7	29.5	17.4
92	679	1137	712	18.7	30.0	18.7
93	669	1061	647	18.6	28.5	17.5
94	655	1200	695	18.5	32.0	19.3
95	676	1312	766	19.3	34.1	20.0
96	666	1255	740	19.3	33.8	19.6
97	767	1370	786	22.0	35.6	20.6
98	692	1364	772	21.8	35.5	20.5
99	726	1268	740	21.7	33.9	19.4
1900	808	1460	791	23.2	38.5	21.5
01	659	1168	723	22.3	34.5	20.4
02	846	1531	823	24.1	40.4	21.9
03	830	1520	847	24.0	41.1	22.7
04	865	1513	853	24.1	40.9	22.7
05	905	1658	854	25.4	44.6	22.8
06	907	1576	908	25.3	42.8	24.2
07	1002	1655	971	27.4	44.7	25.6
08	910	1592	909	26.7	44.4	25.3
09	497	825	513	29.3	47.0	29.6

The wages of the craftsmen are on a level with those of the first two groups. If the daily wage rate is converted into an hourly wage rate, we find that it corresponds very closely to the hourly earnings in the yearly series. The latter, as applied to machine-tenders, backtenders and beatermen, represents respectively 99, 98 and 105 % of the former. Among the beatermen in the cross-section there are two groups whose daily earnings are respectively 1.50 and 1.20 kronor. The beatermen's earnings as measured by the yearly series are only 2 % higher than the former of these groups.

Only certain foremen have received benefits in kind during this period. It is seen from the cross-section for 1882 that a small number of workers were housed in the concern's workmen's dwellings, the rent for which varied between 1.50 and 6 kronor per month, according to the position of the worker.

The most usual wage system at the papermills has been a purely time-wage, but the Munkedal mills, as also papermill I., constitute an exception in this respect. At Munkedal, as is usually the case in the wood-pulp industry, a combined system of time-wage and piece-work wage was employed. Besides a fixed daily wage there was paid a certain monthly piece-work wage, calculated on the basis of the quantity by which the output of the paper-machines exceeded a certain fixed quantity. This quantity was evidently calculated in respect of all the paper-machines combined, and this served as a gauge for the piece-work wage payable not only to those working on these machines, but also to those employed in the beaterroom, the mechanical pulpmills and the sulphite mill. One or two other skilled men, such as joiners and vice-hands, also participated in this piece-work wage. The machine-tenders' share is considerably larger than that of the other workers; thus during the years 1891—1909 it was regularly 150 % higher than that of the backtenders. The period 1885—1899 proved an exception, as in those years a couple of new workers in the machine-tenders' series earn a piece-work wage that is no higher than that of the other workers.

Overtime consists for the most part of work on Sundays, much time being then spent on cleaning the machinery. The hourly wage for overtime generally amounts to one-tenth of the daily wage rate. This may possibly indicate that the working time, which is given as 12 hours a day when the work was done in shifts, included a couple of hours off for meals. This however is not certain and there is no direct confirmation of it. All workers embodied in the series, as well as all those engaged on the paper-cutting and rewinding machines, worked in two shifts per 24 hours. Repairers, joiners, and those engaged in sorting and packing paper, all worked in the daytime only, their working hours being $10\frac{1}{2}$ a day. Work at the mills seems to have proceeded practically without interruption, and the number of working days is close on 300 a year. Only towards the end of 1901 and for a short time in 1898 the mill was partially closed down.

Both the cyclical variations and the secular growth that are exhibited by the wage series are preeminently caused by fluctuations in the size of the bonus. The daily wage rate paid to machine-tenders remained unaltered at 2.50 kronor throughout the period, while that paid to backtenders and beatermen was increased in 1891, 1897, 1906 and 1909, although during the period 1880—1908 it had only risen 27 % and 36 % respectively. Comparatively small amounts were earned on overtime work, the ratio for machine-tenders being on an average 4 % of the wages, for backtenders 5 % and for beatermen only 1 %. The rate shows fairly regular cyclical variations, maxima being reached in 1891, 1899 and 1907, and minima in 1893 and 1905.

The bonus increases far more rapidly than the time-wage and represents the following percentage of the annual earnings for the periods stated:

	1880—1884	1904—1908
Machine-tenders	19	51
Backtenders	15	35
Beatermen	20	40

Bonuses that are closely bound up with the degree of productive intensity may be expected to show pronounced cyclical variations. The bonus falls generally in 1884—1886, rises in 1886—1890 on an average 260 %, then declines somewhat up to 1893, rises in 1893—1895 on an average 57 %, rises 36 % in 1899—1900 and is reduced by 26 % in 1900—1901. The peak reached in 1900 has however become pronounced by the fact that production was suspended in 1899 and 1901 owing to lack of waterpower.¹ In 1904—1907 the bonus is increased by 21 %, but it again shows a falling tendency up to 1908.

All these variations are reflected, although considerably attenuated, in those of the annual and daily earnings, as will be seen from the following table (as far as the annual earnings are concerned):

	Percentage variation of annual earnings							
	1884/ 1886	1886/ 1890	1890/ 1892	1892/ 1893	1893/ 1895	1899/ 1900	1900/ 1901	1904/ 1907
Machine-tenders	-15	+30	+3	-7	+24	+15	-20	+9
Backtenders	-6	+17	+16	-9	+18	+7	-9	+14
Beatermen	-9	+27	+9	-1	+1	+11	-18	+16

The figures below show the rise in percentage that took place in the annual and hourly earnings between the periods 1880—1884 and 1904—1908.

	Annual earnings	Hourly earnings
Machine-tenders	+ 65	+ 68
Backtenders	+ 66	+ 68
Beatermen	+ 84	+ 86

The agreement between the trend of machine-tenders' earnings and that of the earnings of backtenders, who work together on the paper-machines, is complete. The wages of those engaged in the beaterroom, which at the beginning of the period are the lowest, increased slightly more than those of the other workers.

¹ Molæ Chartariæ Suecanæ. Svenska Pappersbruksföreningens tjugufemårsskrift 1—2. Stockholm 1923.

2. BOOK-PRINTING AND BOOK-BINDING.

A. Bonnier's Book-Printing Office in Stockholm.

From the concern's pay-rolls wage data have been extracted for compositors and printers. The compositors' series comprises 5 selected workers, that of the printers 1-3 workers for 1860-1886 and 5 workers for 1887-1900.

Table 118. Annual Earnings (in kronor) at Bonnier's Book-Printing Office in 1860-1900.

Year	Selected compositors	All compositors	Selected printers	Year	Selected compositors	All compositors	Selected printers
1860	750	612	—	1880	653	633	—
61	736	629	—	81	702	757	—
62	723	627	—	82	710	746	—
63	725	620	—	83	779	827	—
64	731	603	—	84	793	747	—
65	797	753	—	85	816	815	—
66	689	595	—	86	765	749	—
67	683	658	—	87	848	833	1084
68	711	646	—	88	838	852	1099
69	652	625	—	89	900	938	1084
1870	678	647	—	1890	906	826	1200
71	700	667	—	91	916	868	1209
72	655	670	—	92	949	925	1246
73	835	776	—	93	1011	1034	1279
74	781	719	—	94	1044	1083	1326
75	885	793	—	95	1079	1124	1335
76	857	768	—	96	1088	1104	1343
77	853	741	—	97	1167	1177	1351
78	836	707	—	98	1205	1198	1479
79	660	629	—	99	1270	1257	1600
				1900	1327	1303	1643

The prosperity that prevailed in the middle of the seventies is clearly reflected in the trend of wages. Between 1869 and 1875 the annual earnings of the selected compositors rose 36 %, and those of all workers 27 %. This rise in wages applies also to printers. The annual earnings of one printer (a foreman), for instance, increased by no less than 91 % between the same years. After 1875 the earnings began to decline until 1879, most steeply between 1878 and 1879. As affecting the selected compositors, this decline amounted to 25 %, and for all workers in that occupation to 21 %. The above-mentioned printers' annual earnings fell in the same years 17 %. From 1880 the earnings advanced at a fairly con-

stant pace up to 1900. Slightly more rapid progress may be noted during the latter half of the nineties. From 1887 to 1900 the earnings of the three series moved parallel to one another. The selected compositors' annual earnings went up 56 %, those of all compositors 56 % and the printers' 52 %.

The wage data were procured in the form of details of weekly earnings, but no information whatsoever was furnished as to hours of work. An estimate of the number of days of work *per annum* has been made on the basis of the variations in weekly earnings, but the daily earnings thus obtained are too uncertain to be published here. Instead, the annual earnings have been compiled in respect of entire years, though this has entailed the filling up of gaps to a fairly large extent. The weekly earnings of compositors, who were chiefly engaged on piece-work, vary considerably, and this need not be attributable to corresponding variations in the hours of work but is generally due to the fact that payment for piece-work was not evenly spread over the different weeks. When engaged on a piece-work job lasting several weeks, the compositors would often draw more pay during the first week or two than corresponded to the work they had done, so that they received less pay for the last few weeks. At about the turn of the century the compositors were employed more and more on a time-work basis (75 %), and the linotype compositors, whose occupation only came into existence towards the close of the nineties, were employed almost exclusively on a time basis. The printers were engaged entirely on time-wage work, and their weekly earnings were fairly constant. On the other hand, the printers' annual average earnings are so heterogeneous and uncertain that it is not worth while publishing any daily earnings computed on that basis. Thus, in 1863 one selected worker earned 488 kronor, another earned 759 and a third 893 kronor. From the year 1864 one worker is added (probably a foreman), whose wages are more than double those of the others. As in fact all the printers employed in the concern have been included in the series, it has been impossible to avoid this heterogeneity. For these reasons the averages are published as from 1887 only. As regards the compositors also, it has been difficult to obtain really homogeneous data in respect of earlier years. The series becomes homogeneous from the year 1886, when 4 new workers were added.

To enable a comparison to be made with the selected compositors' series, a series covering all workers (10—15) in that occupation has also been compiled by dividing the total amount paid in wages during the year by the average number of workers. On the whole, the figures of the two series tally as far as variations in wages are concerned. After 1880 the difference between the annual earnings is negligible, but prior to that year the annual earnings of the selected workers are about 15 % higher than those of all workers combined.

B. Hægström's Book-Printing Office in Stockholm.

The wage data and the method of compilation are in the main the same as for Bonnier's. The compositors' series comprises 6—7 selected workers, the printers' series only 2.

Table 119. Annual Earnings (in kronor) of Compositors at Hægström's Book-Printing Office in 1864—1916.

Year	Com- positors	Year	Com- positors	Year	Com- positors
1864	751	1882	1307	1900	1640
65	808	83	1440	01	1583
66	778	84	1250	02	1533
67	784	85	1386	03	1512
68	800	86	1334	04	1636
69	802	87	1251	05	1690
1870	771	88	1421	06	1607
71	806	89	1462	07	1697
72	844	1890	1468	08	1705
73	820	91	1363	09	1747
74	1329	92	1374	1910	1686
75	1416	93	1396	11	1871
76	1477	94	1528	12	1840
77	1411	95	1687	13	1923
78	1618	96	1456	14	1705
79	1187	97	1659	15	1688
1880	1514	98	1452	16	1696
81	1317	99	1594		

The wages of the two printers are on a very different level (at times the one earns double as much as the other), and after a substantial rise in the seventies their wage level is very nearly constant and considerably above that of the other workers. Only the average annual earnings of the compositors are therefore given above. The annual earnings of the individual workers show very wide variations from year to year, replacements in the series are frequent and gaps often have to be filled up, so that, for earlier years in particular, the series is not reliable. The substantial rise of 62 % in wages in 1873—1874 is doubtful, as the rise in wages of the individual workers varied between 12 and 80 %. In this way the compositors' wage figures at Hægström's printing-works for this period show far higher earnings (almost double) than those in a similar occupation at Bonnier's. The difference was however considerably lessened during the succeeding years. During the period 1887—1900 the annual earnings of the compositors at Hægström's rose 31 %, the corresponding percentage for Bonnier's being 56.

No series covering all workers have been compiled for this concern. Instead, cross-sections including all workers have been drawn for the years 1865, 1885 and 1905, with the following results:

	1865		1885		1905	
	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor	Number of workers	Annual earnings kronor
Compositors . .	9	773	28	1283	28	1443
Printers . . .	—	—	11	1262	14	1455

We find, then, that the annual earnings of selected compositors are 5 %, 8 % and 17 % above the corresponding figures in the cross-sections for the years 1865, 1885 and 1905. According to the enquiry made by the Board of Trade¹ into the working conditions at the printing-works in Sweden, the average annual earnings of manual compositors in Stockholm in 1905 amounted to 1518 kronor, and those of printers to 1544 kronor, which figures do not differ very much from our averages. The corresponding figures in the provinces were 1092 and 1368 kronor.

According to the same enquiry, the standard number of hours of work per week was shortened in the case of the Stockholm printing-works by about 23 % between the years 1860 and 1915. From 1860 to 1869 it was 66 hours, in 1890—1900 57 hours (60 hours in the winter and 54 hours in the summer), in 1901—1902 56 hours (58 in winter and 54 in summer), in 1903—1913 54 hours and in 1914—1915 51 hours.

C. Åkerdahl's Book-Bindery in Stockholm.

The wage series from this concern have been formed on similar lines to those from the printing-offices in Stockholm. No detailed specification of occupations has been given, but the series comprise 5 male and 5 female workers in the book-bindery.

The male workers were engaged on time-work and the female on piece-work, but the trend of wages is nevertheless parallel. The influence of the trade cycles is clearly discernible. From 1898 to 1900 the annual earnings increased by 20 % and 26 %, and in 1905—1907 by 12% and 18 % for male and female workers respectively. Evidently, as is usually the case, the piece-work earnings are more easily affected by the cyclical changes. Between the years 1898 and 1916 the annual earnings of the male

¹ Undersökning av tryckerier och därmed förenad hantering i Sverige. Arbetsstatistik A: 7. Stockholm 1909.

workers advanced 53 % and those of the female workers 77 %. The breaks in the curve in 1899, 1908 and 1909 are due to suspensions of work lasting for 3, 16 and 5 weeks respectively. The standard number of working hours per week in 1898 was 60.

Table 120. Annual Earnings (in kronor) at Åkerdahl's Book-Bindery in 1898—1916.

Year	Male workers	Female workers	Year	Male workers	Female workers
1898	1102	605	1908	1038	746
99	1093	603	09	1425	909
1900	1322	762	1910	1639	952
01	1370	831	11	1640	971
02	1386	823	12	1634	986
03	1193	862	13	1605	998
04	1447	832	14	1640	980
05	1427	858	15	1681	886
06	1502	918	16	1691	1068
07	1594	1011			

FOOD PRODUCTS (CHAPT. X).

A. *Arlöf Sugar Factory.*

This concern is represented by smiths, carpenters, unskilled workers and female workers. Two workers have been selected from the payrolls to represent each occupation, particulars being available as to the daily or hourly wage rate for regular work, hourly wage rate for overtime, working time during the year recorded in days or hours, and overtime in hours. From these data the annual earnings have been computed. For years prior to 1898, when the working time was stated in days, the hourly earnings have been estimated on the basis of the normal number of working hours *per diem*, while for subsequent years, when all the time worked was recorded in hours, the calculation of the hourly earnings has presented no difficulties.

It is remarkable how small the difference is between the wages of the skilled and the unskilled workers; indeed, this observation can be applied generally to all sugar works. The more rapid growth of the women's wages as compared with the men's earnings is distinctly noticeable. Thus, around the year 1890 the male workers earned double as much as the female workers, whereas around 1912 they earned only about 50 % more. The rapid development of the sugar industry during the close of the eighties and the beginning of the nineties is also clearly reflected in the trend of wages, the annual earnings of skilled male workers between 1888 and 1892 showing a rise of about 35 %.

Arlöf is one of the oldest sugar-works in Sweden. During the unfavourable years 1879—1883 it was the only raw-sugar works in the country. As far as these earlier years are concerned, we only have data of the standard daily wage rate. In the case of carpenters this was 1.82 kronor in 1871, rising to 1.85 in 1874, to 1.98 in 1878 and to 2.10 in 1881, this latter figure still representing the value in 1888. (There are no particulars covering the years 1883—1887.) The unskilled workers received a daily wage of 1.10 kronor in 1871, increasing to 1.50 in 1874. In 1883 it was 1.60. The female workers' daily wage rate was 65 öre in 1871, rising to 70 öre in 1874, to 80 öre in 1881, and in 1888 it was 90 öre.

The number of hours worked *per annum* varied considerably from year to year; sometimes it could be as much as 362 days and 3900

Table 121. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Arlöf Sugar Factory 1883—1914.

Year	Annual earnings				Hourly earnings			
	Smiths	Carpenters	Unskilled male workers	Female workers	Smiths	Carpenters	Unskilled male workers	Female workers
1883	—	—	525	—	—	—	15.1	—
84	—	—	570	—	—	—	16.0	—
85	—	—	621	—	—	—	15.8	—
86	—	—	612	—	—	—	15.8	—
87	—	—	628	—	—	—	15.8	—
88	626	706	660	300	15.1	20.0	15.8	8.6
89	696	762	715	328	15.4	20.0	16.6	9.2
1890	783	873	777	413	16.7	21.8	17.6	12.0
91	856	876	754	447	20.1	23.0	18.5	12.4
92	892	875	786	400	20.7	23.0	19.4	12.4
93	—	—	—	—	—	—	—	—
94	846	852	838	402	22.0	22.9	20.7	12.5
95	700	766	734	384	21.4	22.7	20.2	12.5
96	856	755	803	344	22.8	23.4	20.8	12.4
97	861	962	799	389	22.8	24.9	20.5	12.6
98	846	879	777	485	25.1	28.0	23.3	15.2
99	807	856	804	472	25.2	30.4	24.1	15.1
1900	1080	990	928	483	27.7	30.3	26.7	15.2
01	1093	1020	812	524	27.7	30.4	26.1	17.1
02	1074	980	888	528	27.9	30.2	26.6	17.1
03	1048	1028	926	511	28.6	31.3	27.7	17.0
04	1033	1020	869	509	28.6	31.3	27.2	18.0
05	1076	981	896	531	30.4	31.2	29.0	18.0
06	1144	1037	971	612	31.5	32.2	30.3	20.0
07	1162	1012	962	647	31.6	32.1	30.3	22.0
08	1267	1124	1151	677	36.8	36.2	36.0	22.0
09	959	968	920	565	36.3	36.1	36.2	26.0
1910	1127	1112	1155	706	36.3	36.2	36.3	26.0
11	1088	1082	1036	621	36.1	36.0	36.1	26.0
12	1056	1084	1137	763	36.0	36.0	36.7	26.0
13	1054	1053	1390	745	36.0	36.0	36.8	26.0
14	1066	1045	1244	688	36.1	36.3	36.9	26.0

hours (smiths). The number of hours of overtime, for which the workers were paid at a rate of about 25 % above the standard hourly wage, also varied widely (unskilled workers worked up to 908 hours overtime in 1889, and smiths 875 hours in 1890). The volume of overtime work diminished considerably after 1897. The following figures show the average time worked *per annum*.

	Smiths	Carpenters	Unskilled workers	Female workers	
Working days	1888 (83)—1897	334	320	314	307
Working hours	1897 —1914	3378	3091	3215	2895
Overtime hours	1888 (83)—1914	324	187	390	48

The standard number of working hours per day for those not working in shifts was 10¹/₂ in 1871—1907 and 10 in 1908—1914. Foremen and unskilled workers when employed in shifts worked 12 hours a day, but this doubtless included intervals for meals, and therefore, when computing the hourly earnings, we have taken their hours to be the same as for the other occupations.

As the above-mentioned data indicate, the wage material is not of the highest quality. Nevertheless, the wage series run so parallel that the series may be regarded as representative. A comparison with particulars published in the Statistics of the Swedish Employers' Association, relating to the same concerns and applying to the year 1912, gives the same result, as is shown in the table hereunder.

Comparison of Earnings at Arlöf Sugar Factory in the Year 1912 according to Table 121 and to the Swedish Employers' Association's Statistics for the Same Year.

	Smiths			Unskilled male workers			Female workers		
	Number of workers	Annual earnings Kronor	Hourly earnings Öre	Number of workers	Annual earnings Kronor	Hourly earnings Öre	Number of workers	Annual earnings Kronor	Hourly earnings Öre
1) According to Table 121	2	1056	36.0	2	1137	36.7	2	763	26.0
2) According to the Swedish Employers' Association's statistics	3	1095	39.8	88	1167	38.2	6	815	30.7
1) in percentage of 2)	—	96	90	—	97	96	—	94	85

Thus, the wages of the selected workers at Arlöf sugar factory in 1912 are consistently somewhat low, the difference being however slight.

B. Hasslarp Sugar Factory.

Hasslarp sugar factory was founded in the nineties. It is represented by the following occupational groups: smiths and repairers (2 selected workers), stokers and machinists (2—3 selected workers), unskilled workers (3—4 selected workers) and female workers (4 selected workers). For these groups averages of annual and hourly earnings are published in Table 122.

Table 122. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hasslarp Sugar Factory 1897—1913.

Year	Annual earnings				Hourly earnings			
	Smiths and repairers	Stokers and machinists	Unskilled male workers	Female workers	Smiths and repairers	Stokers and machinists	Unskilled male workers	Female workers
1897	940	919	783	414	26.0	26.1	23.6	13.1
98	909	902	835	419	26.7	25.8	24.1	13.4
99	901	859	813	461	27.4	25.6	24.2	13.5
1900	976	855	854	406	28.7	25.6	24.9	13.8
01	1067	955	896	526	30.4	27.1	26.7	14.6
02	1029	917	903	509	30.4	27.1	27.2	14.8
03	1035	934	868	469	31.0	27.7	27.0	15.6
04	1032	963	905	525	31.1	28.3	27.5	15.5
05	1100	1002	879	508	32.5	29.3	27.1	15.8
06	1182	1151	984	619	34.6	30.1	29.1	17.5
07	1266	1258	1185	706	37.0	36.0	34.5	20.5
08	1347	1141	1111	685	39.0	37.0	35.5	22.0
09	1272	1184	1148	819	40.5	38.0	36.0	23.5
1910	1463	1308	1297	848	41.8	41.0	38.0	25.0
11	1385	1354	1346	899	41.8	42.0	38.8	26.7
12	1381	1374	1286	842	41.8	42.0	38.8	26.7
13	1377	1347	1227	820	41.8	42.0	38.8	26.7

The payrolls have furnished particulars of time-wage earnings, the corresponding standard working time in days up to the year 1906, and in hours in 1905, 1906 and 1907, overtime (in hours) per week, also the piece-work earnings in the aggregate for each year. No time is stated in the records for work done at piece-work rates, so that it has only been possible to work out the average hourly earnings paid for time-wage work. However, the piece-work earnings represent only a small proportion of the total annual earnings. The smiths and repairers had no piece-work, while the stokers, machinists and unskilled workers earned slightly more than 3 % of their annual income on piece-work, the corresponding figure for women workers being 8 %. This percentage of piece-work varied greatly from year to year, but in view of the comparative smallness of these piece-work earnings the time-wage hourly earnings may be considered representative of the development of the hourly earnings. After 1907 the payrolls contain no particulars whatsoever as to working time, so that in regard to these subsequent years the hourly earnings have been estimated partly on the basis of the annual earnings and partly on that of the hourly earnings in 1912 in respect of the occupations in question at Hasslarp as published in the Swedish Employers' Association's statistics, the same relations

being observed as were stated on p. 207 in regard to the annual earnings.

A cross-section has been drawn for the year 1905 including the wages of all workers within certain of the occupations represented. It should be noted, however, that the average annual earnings of those employed all the year round, which have been computed from the cross-section, are not directly comparable with the annual earnings that have been computed in respect of the selected workers. During the "kampanj" a great many fresh hands are engaged, and in the cross-section these cannot be distinguished from the permanent workers, for the cross-section gives the number of workers, their working hours and earnings only in respect of each week. In calculating the average annual earnings we must assume that on an average the permanent workers earn as much as the newly engaged hands during the "kampanj". Subject to the modifications in the value of such estimated annual earnings, which the above reasoning suggests, a comparison is made below between these averages and the annual earnings of the selected workers in the year 1905.

	Stokers and machinists		Unskilled male workers	
	Number	Annual earnings kronor	Number	Annual earnings kronor
1) Selected workers	3	1002	4	879
2) Cross-section	13	1034	65	874
1) in percentage of 2)	—	97	—	101

A comparison of the selected workers' earnings and corresponding figures from the Swedish Employers' Association's statistics for 1912 gives the following result.

	Smiths and repairers		Stokers and machinists		Unskilled male workers		Female workers	
	Number of workers	Annual earnings kr.	Number of workers	Annual earnings kr.	Number of workers	Annual earnings kr.	Number of workers	Annual earnings kr.
1) According to Table 122	2	1381	3	1374	3	1286	4	842
2) According to the Swedish Employers' Association's statistics	5	1460	15	1358	43	1220	5	835
1) in percentage of 2)	—	95	—	101	—	105	—	101

Both comparisons show a remarkable agreement between the figures in Table 122 and corresponding figures from the two other sources, an agreement which seems to indicate the value of the results reached by the selected workers method.

The working time *per annum* for male workers usually varied between 290 and 310 days (3200 and 3400 hours, assuming a $10\frac{1}{2}$ hour day), and that for female workers was about 290 days (3050 hours). A number of workers were involved in a strike lasting for about $13\frac{1}{2}$ weeks in 1908 and for 7 weeks in 1909. The normal number of working days per week was 6, but during the "kampanj" period, which generally commenced in the beginning of October, the workers often worked 7 days and 6 days per week alternately throughout the period. Moreover, the number of hours ordinarily worked per day was generally extended during the "kampanj", the employees often working 12 hours a day (that is to say, sometimes 84 hours a week), while during other seasons of the year the usual working time seems to have been about 10 hours, though frequently 11 and 12, especially at the beginning of the year during the "efter-kampanj" season. These figures apply to the latter half of 1905 and to 1906. It seems reasonable to assume an average standard working time of $10\frac{1}{2}$ hours a day. Overtime work was almost exclusively confined to the "kampanj" (see below) and ranged around an average of 162 hours *per annum* for stokers and machinists, 193 for smiths and repairers and 98 for women workers, an additional wage usually being paid for overtime (up to 50 % of the normal hourly rate).

The "kampanj" at Hasslarp sugar works has been investigated more in detail. The enquiry covers the following periods: $^{29}/_6$ 1898— $^{27}/_6$ 1899, 1905, and $^{29}/_7$ 1908— $^{27}/_7$ 1909. For the first two years covered by the enquiry the payrolls give particulars as to the number of workers, the number of working days, the amount of overtime and the weekly earnings. For the years 1908—1909 the payrolls only furnish a record of the number of workers and the total weekly earnings.

The commencement of the "kampanj" is clearly disclosed by the number of workers in employment. In the cross-section for 1898—99 the number of male workers ranged around 170 in July and August 1898, during half of March and up to July 1899, but during September and October it gradually increased, and between the last week in October and the first week in November it rose from 227 to 346, reaching the maximum — 404 workers — during the week $14/12$ — $20/12$. During the weeks around Christmas the number of workers dropped to 275 but again went up after the New Year, remaining at about 340 until the middle of February — the period of the "efter-kampanj". After that time the number on the whole decreased during the remainder of the year under review, the minimum being reached in the last week, when there

HASSLARP SUGAR FACTORY

509

Number of Workers and Earnings (in kronor) at Hasslarp Sugar Factory during the "kampanj's" in the Years 1898—1899, 1905 and 1908—1909.

	Period	Number of workers	Weekly earnings	Daily earnings	
<i>1898—1899</i>					
Male workers	off-season . . .	$\frac{29}{6}-\frac{1}{11}$	187	16.88	2.81
	"kampanj" . . .	$\frac{2}{11}-\frac{26}{11}$	378	19.33	2.98
	"efter-kampanj" . . .	$\frac{6}{2}-\frac{14}{2}$	316	17.53	2.74
	off-season . . .	$\frac{15}{1}-\frac{27}{1}$	165	15.12	2.67
Female workers	off-season . . .	$\frac{29}{6}-\frac{1}{11}$	6	8.31	—
	"kampanj" . . .	$\frac{2}{11}-\frac{26}{11}$	44	9.73	—
	"efter-kampanj" . . .	$\frac{6}{2}-\frac{14}{2}$	5	7.49	—
	off-season . . .	$\frac{15}{1}-\frac{27}{1}$			
<i>1905</i>					
Unskilled male workers	"efter-kampanj" . . .	$\frac{6}{1}-\frac{21}{1}$	100	15.68	—
	off-season . . .	$\frac{1}{1}-\frac{17}{10}$	65		—
	off-season . . .	$\frac{25}{10}-\frac{21}{10}$	175	18.57	—
	"kampanj" . . .	$\frac{1}{11}-\frac{16}{11}$	289	24.78	—
Iron-workers	off-season . . .	$\frac{6}{1}-\frac{26}{9}$	11	18.75	—
	"kampanj" . . .	$\frac{27}{6}-\frac{14}{11}$	11	27.16	—
Stokers and machinists	"efter-kampanj" . . .	$\frac{6}{1}-\frac{21}{1}$	31	18.91	—
	off-season . . .	$\frac{1}{1}-\frac{17}{10}$	13		—
	"kampanj" . . .	$\frac{25}{10}-\frac{16}{11}$	52	25.60	—
Female workers	off-season . . .	$\frac{6}{1}-\frac{21}{10}$	4	8.98	—
	"kampanj" . . .	$\frac{1}{11}-\frac{16}{11}$	60	15.52	—
<i>1908—1909</i>					
All workers	off-season . . .	$\frac{22}{9}-\frac{12}{10}$	214 ¹	20.86	—
	"kampanj" . . .	$\frac{16}{10}-\frac{21}{11}$	539	28.23	—
	"efter-kampanj" . . .	$\frac{20}{11}-\frac{16}{2}$	411	24.35	—
	off-season . . .	$\frac{17}{1}-\frac{27}{7}$	188	21.42	—

were only 150 workers. A distinctly seasonal movement is also traceable in the weekly and daily earnings. These started to rise at the same time as the number of workers, but the true rise in earnings ceased before the actual "kampanj" commenced. The daily earnings were already at the "kampanj" level by the middle of September, while it was not until 3 weeks before the "kampanj" that the weekly earnings reached that level. However, the average weekly earnings attained their maximum of 20.6 kronor at the same time as the number of workers reached the top of the curve, whereas in the off-season of that year the weekly earnings were in the neighbourhood of 16 kronor. The daily earnings reached their

¹ From $\frac{15}{1}$; strike during the first 3 weeks.

maximum for the "kampanj" period one week later ($^{21}/_{12}$ — $^{27}/_{12}$), when they stood at 3.10 kronor, but they were at a higher level in the week immediately preceding the "kampanj" ($^{20}/_{10}$ — $^{27}/_{11}$), viz. 3.18 kronor. The "etter-kampanj" is likewise easily recognizable. For a week after the beginning of the New Year the daily earnings remained at the "kampanj" level. The weekly earnings fluctuated between 17 and 18 kronor during the "etter-kampanj", but, like the daily earnings, fell about a week before the decline in the number of workers. This seasonal variation in the weekly and daily earnings was due not to corresponding variations in the average standard daily and hourly wage rate but primarily to variations in the number of hours worked per day. The average standard daily wage rate for male workers during the different periods in 1898—1899 works out as follows:

Off-season	$^{20}/_6$ — $^{1}/_{11}$	2.57
"Kampanj"	$^{27}/_{11}$ — $^{20}/_{12}$	2.55
"Efter-kampanj"	$^{6}/_2$ — $^{14}/_3$	2.56
Off-season	$^{15}/_3$ — $^{27}/_6$	2.59

This however does not prevent a rise in the daily wage rate of the selected workers usually occurring in conjunction with the "kampanj". It frequently happened also that their standard daily wage rate fell after the "kampanj" had closed. Piece-work, which on the whole was only performed during the "kampanj" and the "etter-kampanj", may also have been a contributory factor in the seasonal oscillation. The maximum piece-work earnings were however only 1 krona per worker and week.

The extension of the number of working days per week, which was usual in the case of those employed all the year round, is also observable during the "kampanj's". Whereas normally the working time per week during off-season varied between 5.8 and 6 days, during the "kampanj" and "etter-campanj" it varied between 6 and 6.5 days, rising in the week in which it attained its maximum ($^{14}/_{12}$ — $^{20}/_{12}$) to as much as 7 days. But it is the overtime more than anything else that varies according to the season. The trend of the daily earnings seems to depend primarily upon the number of hours worked overtime. Like the average daily earnings, the number of hours worked overtime rose steadily from $^{29}/_6$, the increase in both cases being strongest from the week $^{21}/_6$ — $^9/_6$ to the week $^{14}/_6$ — $^{20}/_6$ a fortnight later, when the average number of hours worked overtime showed a weekly rise from 2.4 to 7.1 hours and the daily earnings from 2.71 to 3.05 kronor¹. The maximum number of hours worked overtime

¹ The rise in the weekly earnings however did not take place until later, as this is also dependent upon the number of days worked per week, a factor that did not become operative until the "kampanj" had begun.

was already reached a week prior to the "kampanj" and amounted to 9.6 hours. During the "kampanj" the number varied between 7 and 8 hours, during the "efter-kampanj" period between 3 and 5 hours, and then dropped to a quarter of an hour during the week $\frac{11}{6}$ — $\frac{27}{8}$.

As the "kampanj" commenced the number of women workers increased considerably, from 5 in the last week of October to 10 during the next week and 45 during the week $\frac{9}{11}$ — $\frac{15}{11}$, that is to say, a week later than in the case of the male workers. The number of workers ranged around this number until $\frac{14}{8}$, after which it fell to 4—5 at the same time as the number of male workers diminished. The weekly earnings did not rise until the end of November, reaching their maximum of 11.48 kronor in the middle of February, whereas during the off-season periods of the year they ranged around 8 kronor. They dropped to their normal level a week prior to the close of the season. In this respect therefore no difference is noticeable between the "kampanj" and the "efter-kampanj".

The cross-section for the year 1905 consists of wage data regarding a number of the selected skilled categories. The unskilled workers constitute by far the predominating group at the factory, and the one that above all others is most strongly affected by seasonal conditions. The "efter-kampanj" apparently went on during January, when the number of unskilled workers was 109 throughout the four weeks. In the first week in February the number fell to 71, subsequently ranging around 65, with a gradually falling tendency towards the close of September (60 workers), and increasing again in the middle of October to 74. The "kampanj" commenced with the week $\frac{26}{10}$ — $\frac{31}{10}$, when the number of unskilled workers rose from 74 to 175, increasing in the next week to 288, at which figure it remained until the end of the year. It has not been possible to compute the daily earnings for the different weeks of the year, the working time as from since $\frac{25}{10}$ is stated in hours, and no reliable information has been obtainable as to the number of hours worked per day. On the other hand, a seasonal movement in the average weekly earnings is clearly traceable. Simultaneously with the increase in the number of unskilled workers from 175 to 288, the weekly earnings rose from 18.57 to 23.82 kronor, afterwards varying normally during the "kampanj" season between 24 and 25 kronor and reaching a maximum of 25.68 kronor during the week $\frac{9}{12}$ — $\frac{13}{12}$, while the weekly earnings during the remainder of the year ranged around 16 kronor. No higher weekly earnings can be discovered during the "efter-kampanj". The amount of overtime per worker and week was, on an average, $\frac{1}{4}$ hour up to the beginning of August, rising to 1 hour in the middle of August, to 2.7 hours during the last week of September, to 3.8 the next week and to 5.5 two weeks before the "kampanj", remaining in the neigh-

bourhood of 6 hours during the "kampanj". Here too, then, we note that the amount of work done in overtime hours began to increase for the most part prior to the "kampanj". The amount of piece-work performed likewise attained greater proportions during the "kampanj" (an average of 40 öre per worker and week up to the beginning of the "kampanj", and after that 3 kronor). But in this case the variation in the weekly earnings is the result not merely of overtime and piece-work; the standard weekly earnings (time-wage work only) also rose strongly during the "kampanj" (from about 15 kronor to 18—19 kronor).

Stokers and machinists and female workers likewise show clearly the influence of the "kampanj", not only on their numbers but also on their weekly earnings. In their case too the greater part of their piece-work and overtime work was performed during the "kampanj", though the higher level of overtime worked by the male employees had already commenced in September. The number of iron-workers, on the other hand, remained constant throughout the year, while the rise in their weekly earnings, which already started in the course of September, was exclusively the result of overtime.

The data from the year ²⁹/₇, 1908—²⁷/₇, 1909 embraces, on the whole, all workers. During the first three weeks of the year under review there was a strike, so that only about 90 workers were entered in the payrolls. The number of workers varied between 200 and 220 up to ⁹/₁₀, went up in the following week to 272 and to 532 in the week ¹⁴/₁₀—²⁰/₁₀, which marks the inauguration of the "kampanj". The number remained in the neighbourhood of 540 up to ²²/₁₂, after which it dropped to about 400, standing at that level until the middle of February. Then followed a gradual decrease in the number of workers up to about the middle of March, when the minimum was reached (140 workers). During the rest of the year the number rose, until it culminated in about 200 on ²⁷/₇. The seasonal movement exhibited by the weekly earnings is more distinct for this period than in 1898—99 and 1905. The average weekly earnings varied between 19 and 21 kronor up to the middle of September, after which they rose steadily to 25 kronor up to the week preceding the commencement of the "kampanj". We find therefore that the weekly earnings showed a tendency to rise before the number of workers increased. During the "kampanj's" the weekly earnings varied between 28 and 29 kronor, reaching their maximum of 29.40 kronor in the final week of the "kampanj". During January and the first week of February they remained in the neighbourhood of 26 kronor, but started falling a week before the number of workers declined, remaining for the rest of the year under review somewhere between 20 and 23 kronor.

The following index numbers show the changes in the number of workers and weekly earnings at Hasslarp sugar factory

between "kampanj's" and off-seasons in the years 1898—1899, 1905 and 1908—1909 (the off-season period of each year = 100).

	Number of workers			Weekly earnings		
	Off-season	"Kampanj"	"Efterkampanj"	Off-season	"Kampanj"	"Efterkampanj"
1898—99 Male workers . . .	100	214	179	100	120	109
Female workers . .	100	786	786	100	122	122
1905 Unskilled workers .	100	445	—	100	158	—
Stokers and machinists	100	400	—	100	135	—
Iron-workers	100	100	—	100	145	—
Female workers . . .	100	1500	—	100	173	—
1908—09 All workers	100	276	211	100	133	115

C. Hälsingborg Sugar Factory.

Hälsingborg Sugar Factory is represented by sugar-boilers (2 workers), stokers and machinists (4 workers), unskilled workers (4 workers) and female workers (4 workers). In respect of each worker and week the payrolls furnish particulars regarding the standard weekly earnings (time-wage work only, there being no piece-work) and the standard working hours. The working time is during the period 1892—1899 recorded in days; in the latter year the system was started of payment by the hour, and the working time is thenceforward recorded in hours. Overtime (in hours) and earnings on overtime work are stated in respect of each worker in the form of a sum total for the year.

Sugar-boilers — a skilled category typical for the sugar-works — are represented from 1897 to 1900 by one worker only. During earlier years the series is of minor value, as the wages varied widely within that group. From the year 1901 the selected workers' annual earnings were on approximately the same level, and from 1906 they were exactly the same. Up to 1909 the sugar-boilers received a weekly wage, and after that year a monthly wage.

Throughout the period under review the standard number of working hours *per diem* was 10. Overtime occurred on a large scale, especially in the stokers' and machinists' occupations, the average number of hours worked overtime in their case being 542 *per annum*, the unskilled workers averaging 241 and the women workers 20 hours overtime. This applies to the women workers in the period after 1898. Prior to that year no time is recorded in respect of overtime work, so that the number of hours is only an estimate. During the peak year 1907 the number of hours worked overtime by both stokers and machinists and unskilled workers was 751

Table 123. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Sugar Factory 1892—1914.

Year	Annual earnings				Hourly earnings			
	Sugar-boilers	Stokers and machinists	Unskilled male workers	Female workers	Sugar-boilers	Stokers and machinists	Unskilled male workers	Female workers
1892	1197	—	—	—	39.0	—	—	—
93	1248	824	765	474	41.0	23.9	22.4	14.4
94	1241	837	650	453	41.0	23.9	20.1	14.2
95	1254	852	778	534	41.0	24.0	22.6	15.8
96	1404	888	893	614	46.0	25.0	24.4	17.4
97	1248	977	985	636	41.0	27.1	27.9	18.6
98	1248	1072	952	748	41.0	28.7	27.8	21.1
99	1248	1096	914	576	41.0	30.4	28.9	18.7
1900	1248	1060	964	567	41.0	30.1	28.8	18.5
01	910	1048	949	549	30.0	30.3	28.4	18.5
02	901	1023	820	470	33.0	30.6	28.8	18.4
03	1207	1158	962	546	39.0	30.3	29.0	18.5
04	1274	1192	950	570	42.0	32.4	29.4	19.0
05	1286	1439	956	590	42.0	33.1	30.5	20.0
06	1370	1380	936	562	45.0	34.5	31.5	20.7
07	1649	1686	1137	706	54.0	38.5	33.8	24.2
08	1689	1219	944	533	55.0	39.6	36.5	25.4
09	1860	1486	1094	702	61.0	41.0	37.6	27.0
1910	1860	1538	1197	781	61.0	41.0	37.9	27.2
11	1860	1454	1178	723	61.0	40.9	37.8	27.6
12	1860	1523	1222	678	61.0	41.1	38.1	26.3
13	1860	1500	1156	760	61.0	41.3	37.8	27.1
14	1860	1412	1170	760	61.0	40.9	38.4	26.9

and 362 respectively. Overtime was frequently paid for at a rate more than 50 % above the standard hourly wage rate.

The number of days worked *per annum* was somewhat irregular owing to frequent strikes and lockouts. Thus, in 1902 there was a lockout which lasted for about a month and a half, in 1906 there was a strike for 20 days, in 1908 a 3 months' strike, and in 1909 a strike from $\frac{1}{8}$ to $\frac{1}{2}$. In normal years the number of days worked by stokers and machinists was about 316, by unskilled workers about 302 and by the women workers about 294 days. Sometimes during the "kampanj" the period worked per week was prolonged, especially for the unskilled workers, though occasionally also for the women workers, the usual practice in that case being alternate working weeks of 7 and 6 days. Stokers and machinists generally worked on this basis throughout the year.

A cross-section has been drawn for the year 1905, which shows in detail the seasonal variation. As usual this variation was most marked for the unskilled workers both as regards number of

workers employed and earnings. The number of workers varied during January, when some kind of "efter-kampanj" was going on, between 140 and 150; it then fell fairly steadily to about 120 by the middle of August, after which the fall was more rapid up to the end of September, when the number dropped to 75. The "kampanj" commenced in the week $^6/_{10}$ — $^{12}/_{10}$, when the number of workers rose to 213, remaining in the neighbourhood of 220 until the end of the year. The average weekly earnings ranged around 17 kronor and showed no tendency to rise prior to the "kampanj", as they did in the cross-sections for the other sugar factories. They were even as low as 15.35 kronor in the first week of the "kampanj", but they rose to 21.26 kronor during the following week. The maximum was 22.94 kronor and was reached during the week $^{17}/_{10}$ — $^3/_{11}$. The weekly earnings varied between 21 and 22 kronor throughout the "kampanj" (not of course during the weeks around Christmas). Their seasonal variation is due entirely to variations in the working period; there was no piece-work. The standard hourly wage rate is, in fact, 30 öre for all workers throughout the entire year. The standard number of working hours was thus prolonged during the "kampanj", the maximum being reached in the same week during which the weekly earnings were at their highest. During the "kampanj" the standard working time was about 61 hours, being normally 58—59 during the rest of the year. It is primarily however, the amount of overtime that varies according to the season. During the period up to the beginning of the "kampanj" the amount of overtime per worker per week was, on an average, 0.9, but this increased during the "kampanj" to about 9, and reached a maximum of 9.5 hours during the above-mentioned week when the weekly earnings were at their highest point. As to the other occupational categories represented, the essential points will be gathered from the table that follows.

Number of Workers and Earnings (in kronor) at the Hälsingborg Sugar Factory during the "Kampanj" in the year 1905,

	Period	Number of workers	Weekly earnings	
Unskilled male workers	{ off-season	$^3/_{11}$ — $^5/_{10}$	117	17.17
	{ "kampanj"	$^6/_{10}$ — $^{21}/_{12}$	222	21.80 ¹
Smiths and iron-workers	{ off-season	$^6/_{11}$ — $^5/_{10}$	14	23.13
	{ "kampanj"	$^6/_{10}$ — $^{21}/_{12}$	16	29.86
Stokers and machinists	{ off-season	$^6/_{11}$ — $^6/_{10}$	41	20.80
	{ "kampanj"	$^6/_{10}$ — $^{21}/_{12}$	56	23.33
Female workers	{ off-season	$^6/_{11}$ — $^5/_{10}$	53	12.24
	{ "kampanj"	$^6/_{10}$ — $^{21}/_{12}$	69	11.79

¹ From $^{12}/_{10}$.

The following index numbers show the changes in the number of workers and weekly earnings at Hälsingborg sugar factory between "kampanj" and off-season during the year 1905 for different occupations (the off-season period = 100).

	Number of workers		Weekly earnings	
	Off-season	Cam-paign	Off-season	Cam-paign
Unskilled male workers	100	190	100	127
Stokers and machinists	100	137	100	112
Smiths and iron-workers	100	114	100	129
Female workers	100	130	100	96

The figures in Table 123 have been partially controlled by comparing them both with a cross-section, including earnings of all workers in the occupations in question, for the year 1905 and with the Swedish Employers' Association's statistics relating to the year 1912.

Such a comparison of earnings in the year 1905 according to Table 123 and to the cross-section for the same year gives the following results:

	Stokers and machinists		Unskilled male workers		Female workers	
	Num-ber of work-ers	An-nual earn-ings	Num-ber of work-ers	An-nual earn-ings	Num-ber of work-ers	An-nual earn-ings
1) According to Table 123	4	kronor 1439	4	kronor 956	4	kronor 590
2) According to the cross-section	40	1139	120	934	57	596
1) in percentage of 2)	—	126	—	102	—	99

The fact that the figures for stokers and machinists do not agree so well is due to the selected workers in Table 123 having longer working-time, above all a greater amount of overtime.

The comparison of earnings in the year 1912 according to Table 123 and to the Swedish Employers' Association's statistics is given here under.

	Sugar-boilers			Stokers and machinists			Unskilled male workers		
	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings
		Kr.	Öre		Kr.	Öre		Kr.	Öre
1) According to Table 123	2	1860	61.0	4	1523	41.1	4	1222	38.1
2) According to the Swedish Employers' Association's statistics	4	1710	57.4	22	1482	40.9	93	1172	38.2
1) in percentage of 2)	—	109	106	—	103	100	—	104	100

This comparison likewise shows a satisfactory measure of agreement.

Averages for annual and hourly earnings at all the three above-mentioned sugar factories, are published in the Swedish Employers' Association's statistics for the year 1912. If in the same way we strike averages of the figures for 1912 in Tables 121, 122 and 123, we find a still better agreement between the two sets of averages, as shown below.

	Skilled workers			Unskilled male workers			Female workers		
	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings
		Kr.	Öre		Kr.	Öre		Kr.	Öre
1) According to Tables 121, 122 and 123	13	1327	39.8	9	1224	38.0	10	761	26.4
2) According to the Swedish Employers' Association's statistics	155 ¹	1354	42.7	224 ²	1180	37.9	14 ³	830	28.7
1) in percentage of 2)	—	98	93	—	104	100	—	92	92

¹ In respect of hourly earnings 143. — ² In respect of hourly earnings 216. — ³ In respect of hourly earnings 15.

It should be noted that workers at Hälsingborg sugar factory are in general (with the exception of the women workers) on a higher level than those in corresponding occupations at Arlöf and Hasslarp sugar factories, and that from 1905 the annual earnings of workers at Arlöf factory lag behind the others'. This latter circumstance seems to be due primarily to the fact that the workingtime was shorter at that concern than at the other factories, and this is confirmed by a comparison with the Employers' Association's statistics for 1912. Taking as our basis of calculation the figures given in that publication for the said year, we find that the average number of hours worked *per annum* by male employees at Arlöf was 2989, but 3297 at Hasslarp, the corresponding figures relating to female employees being 2654 and 3151. The hourly earnings are also on a more equal level.

D. Landskrona Sugar Factory.

Landskrona Sugar Factory is exclusively a sugar refinery; the working conditions thus being in certain respects different from those in the sugar factories treated in the three preceding monographs. The workers at the Landskrona factory are represented by coopers, smiths, unskilled male workers and female workers, for the period 1861—1880 and the period 1906—1914. During the former period the women workers were in general employed for only a small part of the year, usually some weeks in January and the last three weeks of the year. For this earlier period particulars have been obtained as to the number of days worked and the weekly earnings. Further, a summary for the whole year provides information concerning overtime earnings and overtime (expressed in days).

The results of the compilation are published in Table 124 a and Table 124 b.

During the years preceding 1875 the coopers did a considerable amount of overtime (40—60 days), for which they received 30—100 % above the standard daily wage rate. Their earnings are accordingly far in excess of the smiths' and unskilled male workers' earnings, the latter category not having had any overtime work prior to 1875, although the regular earnings of the smiths and the coopers were on a similar level. Subsequently the smiths' overtime amounted to 58 days and the unskilled workers' to 25 days (in 1877), while the coopers' overtime fell to 32 days in the same year. During the period 1906—1914 all records regarding working time are in hours. During the period 1860—1880 there is no piece-work recorded at Landskrona sugar factory, but during the period 1906—1914 piece-work came to be done on a fairly large scale. Wherever the time spent on piece-work has not been stated it has

LANDSKRONA SUGAR FACTORY

519

Table 124 a. Annual and Daily Earnings (in kronor) of Workers at Landskrona Sugar Factory 1860—1880 and 1906—1914.

Year	Annual earnings				Daily earnings			
	Coopers	Smiths	Un- skilled male workers	Female workers	Coopers	Smiths	Un- skilled male workers	Female workers
1861	572	394	364	—	1.87	1.28	1.17	—
62	558	395	382	—	1.82	1.28	1.22	—
63	597	405	384	—	1.95	1.31	1.23	—
64	573	420	412	—	1.85	1.36	1.32	—
65	564	434	422	—	1.84	1.39	1.35	—
66	568	436	422	—	1.83	1.40	1.35	—
67	540	436	423	—	1.78	1.40	1.36	83
68	596	444	437	—	1.94	1.40	1.37	83
69	563	453	429	—	1.82	1.45	1.38	—
1870	572	457	442	—	1.88	1.46	1.42	83
71	565	464	441	—	1.84	1.51	1.41	83
72	624	507	478	—	2.03	1.63	1.53	83
73	674	568	514	—	2.21	1.82	1.65	83
74	722	590	520	—	2.36	1.93	1.67	83
75	736	615	536	—	2.31	1.95	1.69	84
76	620	541	452	—	2.09	1.85	1.54	—
77	691	929	550	—	2.29	3.07	1.81	1.00
78	687	708	570	—	2.27	2.38	1.86	1.00
79	657	860	572	—	2.13	2.73	1.83	1.00
1880	—	—	—	—	—	2.81	1.87	1.00
—	—	—	—	—	—	—	—	—
1906	1594	1170	967	636	5.18	3.89	3.08	2.14
07	1348	1252	950	620	4.54	4.36	3.09	2.12
08	1119	1164	911	610	4.51	4.41	3.94	2.58
09	1046	1331	988	751	4.38	5.10	4.15	3.12
1910	1583	1384	1089	892	5.44	4.79	3.74	3.05
11	1546	1482	1059	578	5.22	5.01	3.58	2.70
12	1622	1515	1161	671	5.46	5.10	3.91	2.71
13	1636	1501	1190	620	5.45	5.02	3.98	2.76
14	1680	1594	1271	705	5.79	5.53	4.38	2.81

had to be estimated. Smiths and women workers had very little piece-work, but those hours that unskilled male workers and female workers spent on piece-work were recorded up to 1910, after which year it had to be estimated. About 60 % of the unskilled male workers' earnings consisted of pay for piece-work. The coopers' earnings on piece-work represented as a rule 75 % of their total earnings, but during the years 1907, 1908 and 1909 they dropped to about 10 % simultaneously with the shortening of the hours of work. No estimate has been made of the time spent on piece-work by this occupational category. The hourly wage rate for overtime exceeded the regular hourly wage by about 40 %. During the earlier years the standard working time generally varied between 306 and 312 days

per annum, during the period 1906—14 for male workers normally between 280 and 300. There was however a strike lasting about 13 weeks in 1908 and 8 weeks in 1909. In 1906, 1907 and 1910 the women workers were employed for about 290 days *per annum*, while in other years their working period was reduced to between 210 and 250, due, apart from strikes, to a suspension of work for a few weeks in the late summer.

The regular working hours per day during the earlier years is not known. During the later period it was 10 hours.

The material obtained thus allows the computation of hourly earnings only of smiths, unskilled male workers and female workers for the years 1906—1914. They are published hereunder.

Table 124 b. Hourly Earnings (in öre) of Workers at Landskrona Sugar Factory in 1906—1914.

Year	Smiths	Unskilled male workers	Female workers
1906	35.1	30.2	18.8
07	38.0	30.7	19.2
08	40.6	39.3	24.4
09	45.2	40.5	28.6
1910	44.6	37.4	28.1
11	44.8	35.7	27.0
12	45.1	39.1	27.1
13	44.7	39.1	27.4
14	45.9	42.0	28.0

Cross-sections of all the workers' earnings have been drawn up for the years 1865 and 1905. A comparison of the results of these compilations and the corresponding figures in Tables 124 a and 124 b gives the following result:

	Coopers		Smiths		Unskilled male workers		Female workers	
	Number of workers	Earnings	Number of workers	Earnings	Number of workers	Earnings	Number of workers	Earnings
1865: annual earnings.		Kr.		Kr.		Kr.		Kr.
1) According to Table 124 a	4	564	4	434	4	422	—	—
2) According to the cross-section	10	552	6	489	105	380	—	—
1) in percentage of 2)	—	102	—	89	—	111	—	—

	Coopers		Smiths		Unskilled male workers		Female workers	
	Number of workers	Earnings	Number of workers	Earnings	Number of workers	Earnings	Number of workers	Earnings
<i>1906: annual earnings.</i>		Kr.		Kr.		Kr.		Kr.
1) According to Table 124 a	4	1594	4	1170	4	967	3	636
2) According to the cross-section	8	1617	13	1127	149	1124	114	684
1) in percentage of 2)	—	99	—	104	—	86	—	93
<i>1865: daily earnings.</i>								
1) According to Table 124 a	4	1.84	4	1.39	4	1.35	—	—
2) According to the cross-section	10	1.81	6	1.58	105	1.22	—	—
1) in percentage of 2)	—	102	—	88	—	111	—	—
<i>1906: hourly earnings.</i>		Öre		Öre		Öre		Öre
1) According to Table 124 b	—	—	4	35.1	4	30.2	3	18.8
2) According to the cross-section	—	—	13	34.6	149	29.9	114	21.0
1) in percentage of 2)	—	—	—	101	—	101	—	90

A comparison with the Swedish Employers' Association's statistics can be made only as to the earnings of unskilled male workers for the year 1912. According to these statistics 100 unskilled workers (factory hands) received on an average 1164 kronor *per annum* and 40.4 öre per hour. As measured by the series relating to 4 selected unskilled workers in Tables 124 a and b, their corresponding earnings were 1161 kronor and 39.1 öre.

Both comparisons thus give a very satisfactory agreement, showing the reliability of the methods used.

F. Hälsingborg Grinding-Mills.

With regard to the milling business, wage data have been furnished by Hälsingborg Grinding-mills and in a very summary form by Upsala Grinding-mills.

The Hälsingborg concern is represented by mill-hands and storemen, each series relating to two selected workers. They are published hereunder.

Table 125. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Grinding-Mills in 1886—1914.

Year	Annual earnings		Hourly earnings		Year	Annual earnings		Hourly earnings	
	Mill-hands	Storemen	Mill-hands	Storemen		Mill-hands	Storemen	Mill-hands	Storemen
1886	768	619	—	20.0	1900	1050	908	—	27.5
87	805	688	—	20.0	01	1050	919	—	27.5
88	805	689	—	20.0	02	1050	928	—	27.5
89	828	638	—	20.2	03	1050	925	—	27.5
1890	930	705	—	21.7	04	1050	877	—	27.5
91	930	764	—	22.5	05	1050	929	—	29.0
92	930	739	—	22.5	06	1060	988	—	30.4
93	919	754	—	22.5	07	1175	1177	39.4	34.4
94	930	759	—	22.3	08	1210	1139	40.3	33.6
95	938	749	—	22.6	09	1191	1027	45.1	34.2
96	990	796	—	24.0	1910	1272	1155	41.4	36.6
97	846	810	—	24.8	11	1222	1173	39.5	37.6
98	990	935	—	26.5	12	1415	1311	45.2	42.4
99	990	896	—	26.5	13	1545	1246	49.5	40.7
					14	1599	1416	51.2	43.5

Up to 1907 the mill-hands received a monthly wage, and the working time was recorded in months; the storemen were paid a daily wage, the time worked being recorded in the payrolls in days. From 1907 the time is stated in hours. Only time-work was done at the mill. The time worked by the mill-hands per week is stated to have been normally six weekdays and half Sunday. As to the storemen, the one selected worker usually worked six days a week and the other seven. The one storeman thus worked 3710 hours (including overtime) and the other 3130 hours in 1907. After 1909 the former's working hours fell to 3200 *per annum*. The mill-hands' working time varied after 1906 between 3000 and 3200 hours *per annum*. The standard working hours *per diem* was for storemen 10 hours throughout the entire period, for mill-hands 12 hours up to 1907, after that year 10 hours. Overtime work was done at the mill, especially by the mill-hands (who earned up to 300 kronor *per annum* at such work) and was paid for after 1906 at a rate 25 % higher than the regular hourly wage rate for the first hour of overtime, and 50 % for subsequent hours. It has not been possible to compute the hourly earnings of the mill-hands prior to 1907 owing to lack of details as to the number of hours worked.

Cross-sections, including earnings of all workers, have been drawn up for the years 1887 and 1905. A comparison of the cross-sectional figures and the selected workers series in Table 125 gives the following result.

	Foremen		Mill-hands		Storemen		
	Number of work-ers	An-nual earn-ings	Number of work-ers	An-nual earn-ings	Number of work-ers	An-nual earn-ings	Hourly earn-ings
<i>1887</i>		Kr.		Kr.		Kr.	Öre
1) According to Table 125	—	—	2	805	2	688	20
2) According to the cross-section	2	890	7	794	7	676	20
1) in percentage of 2)	—	—	—	101	—	102	100
<i>1905</i>							
1) According to Table 125	—	—	2	1050	2	929	29
2) According to the cross-section	6	1217	18	1041	17	798	29
1) in percentage of 2)	—	—	—	101	—	116	100

The annual earnings relate to those employees who have worked throughout the year. The close agreement between the 'cross-section' and the 'selected workers' series is apparent.

H. Örebro Biscuit Factory.

Örebro Biscuit Factory is represented by female workers in the wafer-bakery and the confectionery department during the period 1911—1925. These years are mainly later than the period covered by the investigation in general, but in view of the scanty material regarding this industry, it has, however, seemed practical to publish the monograph. Each series relates to 4—5 workers selected from the payrolls, which provide details in respect of each worker as to the hours worked on a time-wage basis, time wage, piece-work earnings, amount of overtime and earnings on overtime per wage period (week).

The hours worked on a time-wage basis are not always recorded in full, and as most of the work was done on a piece-work basis, no working time being stated, the number of hours worked *per annum* has had to be calculated from the number of weeks worked and the working hours per week. The hourly earnings computed in this way are not quite certain, as the working hours per week were somewhat variable and the exact number of full weeks can never be calculated.

As benefits in kind may be regarded the workers' right to buy flour and various other necessaries direct from the factory. Medical services and medicine have always been provided free.

Table 126. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Female Workers at Örebro Biscuit Factory 1911—1925.

Year	Annual earnings		Hourly earnings	
	Wafer-bakery	Confectionery department	Wafer-bakery	Confectionery department
1911	685	—	24.4	—
12	795	328 ²	27.7	17.3
13	932	461 ⁴	32.7	19.7
14	925	—	34.9	—
15	969	—	32.5	—
16	914	471	30.6	16.2
17	1032	615	34.3	21.1
18	112 ²	991	37.6	34.0
19	1560 ³	1700	84.4	58.5
1920	2771	2728	117.7	118.5
21	2699	1575 ⁴	127.1	83.8
22	2194	—	99.9	53.2
23	2295	—	102.9	63.9
24	2217	—	100.0	68.1
25	2264	—	100.2	70.3

In the wafer-bakery 60—70 % of the selected workers' annual incomes were earned on piece-work. In the confectionery department the workers selected for our purpose were employed only at a time-wage in 1912 and 1913; after that 70—90 % of their work was piece-work. It may be noted as a curious fact that the workers at this factory were often able to earn more per week on time-work than on piece-work. A bonus to cover the high cost of living was paid weekly on a rising scale as from 1915 up to 1921 amounting, in the wafer-bakery, to 634 kronor in 1920 and 1360 kronor, i. e. the half of the total wage in 1921.

The workers in the wafer-bakery worked 100—140 hours *per annum* overtime up to 1918, thereafter only 30 hours at the most. There was often no overtime work in the confectionery department (a maximum of 12 hours *per annum*). Overtime was paid for at a rate about 70 % above the standard hourly wage in the early years and about 30 % in post-war years.

As a rule the factory used to stop work for three weeks around Christmas and the New Year and for one week at Midsummer, though the workers received full pay for the latter week. Moreover, there were certain interruptions in the work. In 1918 the wafer-bakery was only working up to $\frac{2}{3}$, and in 1919 it did not recommence until $\frac{10}{8}$. The confectionery department first started pro-

¹ Worked 5 weeks. — ² Worked 32 weeks. — ³ Worked 33 weeks. — Worked 41 weeks. — ⁴ Worked 40 weeks.

ducing on $^{17}/_8$ 1912 and was closed down on $^{31}/_{10}$ 1913, and it did not start working again until 1916; in 1921 it did not begin working until $^{1}/_3$, in 1922 production there was going on for about 24 weeks, in 1923 for 35 weeks, in 1924 not until after $^{11}/_2$, and in 1925 work ceased on $^{22}/_8$. Apart from the fact that in these years the annual earnings are of no great significance, there was often a replacement of workers in the series, so that the variations in the hourly earnings are also somewhat irregular. In 1916, for instance, 5 entirely new workers were taken into the series. According to the collective agreement of 1907 the standard working time was to be 59 hours per week; in the years 1911—1920 it was 58 hours (8 hours on Saturdays).

Cross-section embracing all workers have been drawn up for 1913.

	Number of workers	Annual earnings Kronor	Hourly earnings Öre
<i>Male workers.</i>			
Biscuit department	5	965	38.6
Confectionery department	5	1147	47.3
Decoration department	1	621	24.8
Sundry workers	8	891	34.5
<i>Female workers.</i>			
Biscuit department	9	503	22.8
Confectionery department	5	469	21.5
Wafer department	5	899	33.6
Piece-work	22	495	22.4
Packing-room	9	513	21.6

The figures relate only to full-year workers. It should however be noted in this connection that the normal annual working-time is short, on an average 40 weeks in the case of female, and 43 in the case of male workers. The hourly earnings are calculated on the same basis as those of the selected workers referred to above. The workers engaged for only part of the year, whose figures are not published here, earned far less as a rule, the female workers' weekly earnings being 20 % and the male workers' 40 % below those of the full-year workers.

I—K. Hamburger Brewery in Stockholm and Pripp Brewery in Gothenburg.

The Hamburger Brewery in Stockholm is represented by wage series in respect of brewers' draymen, covering the period 1912—1925, and brewery workers, male and female (the latter from Dalecarlia), during the period 1895—1925.

Before 1912 the draymen had assistants, whom they themselves engaged and paid, and there is no possibility of finding out how much of the total wages received by a drayman was paid in wages

to his assistants. The draymen had in fact almost a position as independent employers in regard to the assistants. The wage data regarding draymen subsequent to 1912 are recorded in a somewhat abridged form, the only particulars given being the number of employees and the aggregate wages as an abstract for the whole year. The trend of wages, however, is parallel to that of the women workers, so that the series may certainly be regarded as representative.

The male brewery workers' series comprises 3 selected workers, who however are replaced in the series too seldom (one worker is represented throughout the period 1895—1922) their earnings thus probably not being always representative. The men worked entirely on a time-wage basis, being paid weekly from 1895 to 1898, no working hours being recorded, while during 1899—1902 the working time was stated in days. From 1902 to 1913 they received fortnightly wages, but there are no particulars as to the number of hours worked. From 1913 the working time is given in hours. Overtime in hours and overtime earnings are recorded throughout the entire period 1897—1925. In the event of sickness the workers received a certain proportion, about 70 %, of their wages. When filling up gaps, therefore, we have had to ensure that this was not based on the stated number of days of absence without first subtracting the sick benefit. The hourly earnings covering the period 1895—1912 are calculated on a fairly certain basis, seeing that the number of hours spent on time-wage work was very constant and is estimated on the basis of the corresponding working time during later years; moreover, the variable overtime is specifically recorded.

For the period 1896—1913 there are weekly records concerning the female workers as to the number of workers and the total amount of wages paid. The annual earnings have been computed by dividing the total wages for the year by the average number of workers. As from the year 1914 individual data are available concerning 4 selected workers. The brewery women workers were employed for bottle-washing and exclusively on piece-work; they had no overtime work until after 1919. The working time is not recorded in hours until 1914, and we have not worked out the hourly earnings in respect of earlier years, as the time spent on piece-work varies very considerably and it is impossible to form any reliable estimate. There has been a good deal of sickness among the women workers, and gaps have often had to be filled up.

Both men and women brewery workers had free housing, and the former were entitled to three litres of ale *per diem*, the latter to two litres. The brewery draymen were not in receipt of benefits in kind.

The regular working time was 10 hours a day up to 1920, and after that year 8 hours. This does not however apply to the brewery draymen, who were paid on a commission basis according to the number of bottles sold + a small monthly wage in money,

and who had no fixed working hours. The male brewery workers did a great deal of overtime work. The number of hours worked overtime *per annum* increased steadily from the year 1897, when it was 124 hours, to a maximum of 876 hours per worker in 1901. Thereafter the number fell to 280 hours in 1904, but rose again on the next cyclical wave, reaching a fresh maximum of 572 hours in 1907. The number of overtime hours then remained at about 300 up to 1920, after which they fell again, and by 1925 they were no more than 50 in the year. In 1924 there was a strike, which lasted for a month, but the workers afterwards made up for the loss by working overtime (336 hours). Overtime was paid for at a percentage over the standard hourly wage rate that varied greatly, but in general it was apparently about 30 %.

The brewery business is distinctly seasonal, the high season being during the summer months. The seasonal tendencies are observable in the material that has been collected relating to women workers during the period 1896—1913, particulars being furnished as to the number of workers and the total earnings per week. In the first two years the number of workers increased by about 40 % during the summer months, but in the subsequent years the increased demand was only discernible in the form of a marked rise in the average weekly earnings. An average struck for the years 1904—1913 (1909 excepted) exhibits a steadily progressive rise in the average weekly earnings from January to May. It worked out at an average of 17.33 kronor in January, 18 kronor in February, 19.57 in March, 21.11 in April, 22.66 in May, 24.61 in June, 24.17 in July, 24.46 in August, 24.55 in September, 22.80 in October, 20.75 in November and 21.15 in December. Taking the years individually we find that the earnings vary widely from week to week, due mainly to changes in the weather conditions.

The Pripp Brewery, in Gothenburg, has furnished very summary particulars from 1868 to 1910 concerning one selected brewery worker, one malthouse worker and one female bottle-washer. The reason why only one worker has been selected is that the wages of the other workers within the same occupation were on approximately the same level. Only the annual earnings have been taken into account. As far as the male workers are concerned, the data apply to the same worker throughout the whole period, while the bottle-washer was replaced once in the series. The right to consume two litres of malt liquor a day may be regarded as a benefit in kind. On the subject of working hours the concern was unable to give any information beyond the fact that from 1900 their employees worked 10 hours a day and around the year 1898 11.5 hours.

The data from these two breweries complement each other in certain respects and the results of their compilation are therefore combined in the same table below.

Table 127. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hamburger Brewery 1896—1925 and Pripp Brewery in 1868—1910.

Year	Hamburger Brewery					Pripp Brewery		
	Annual earnings			Hourly earnings		Annual earnings		
	Brewers' draymen	Brewery workers		Brewery workers		Male brewery workers	Male malt-house workers	Female bottle-washers
		Male	Female	Male	Female			
1868	—	—	—	—	—	416	—	260
69	—	—	—	—	—	409	—	—
1870	—	—	—	—	—	402	—	—
71	—	—	—	—	—	442	—	—
72	—	—	—	—	—	442	—	—
73	—	—	—	—	—	484	—	—
74	—	—	—	—	—	520	—	—
75	—	—	—	—	—	520	—	—
76	—	—	—	—	—	546	—	286
77	—	—	—	—	—	598	—	312
78	—	—	—	—	—	598	—	312
79	—	—	—	—	—	598	598	—
1880	—	—	—	—	—	598	605	—
81	—	—	—	—	—	598	624	—
82	—	—	—	—	—	598	628	—
83	—	—	—	—	—	572	621	—
84	—	—	—	—	—	574	632	—
85	—	—	—	—	—	572	646	312
86	—	—	—	—	—	598	648	312
87	—	—	—	—	—	624	676	365
88	—	—	—	—	—	624	665	365
89	—	—	—	—	—	624	674	365
1890	—	—	—	—	—	624	689	365
91	—	—	—	—	—	624	683	365
92	—	—	—	—	—	624	685	365
93	—	—	—	—	—	650	678	390
94	—	—	—	—	—	676	683	390
95	—	872	—	30.9	—	676	686	445
96	—	866	684	30.7	—	676	683	415
97	—	997	713	33.9	—	676	687	415
98	—	1086	816	32.8	—	676	675	420
99	—	1196	842	35.3	—	780	688	445
1900	—	1310	815	37.2	—	832	845	465
01	—	1363	834	36.9	—	910	865	525
02	—	1361	793	37.4	—	936	910	590
03	—	1234	822	37.9	—	936	925	550
04	—	1173	864	37.8	—	936	945	525
05	—	1356	1030	40.3	—	962	930	585
06	—	1442	1210	42.8	—	1014	990	625
07	—	1453	1339	42.8	—	1092	1115	745
08	—	1549	1165	47.7	—	1144	1150	685
09	—	1426	975	50.9	—	1144	1150	630

Table 127. (Cont.). Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hamburger Brewery 1896—1925 and Pripp Brewery in 1868—1910.

Year	Hamburger Brewery					Pripp Brewery		
	Annual earnings		Hourly earnings			Annual earnings		
	Brew-ers' dray-men	Brewery workers		Brewery workers		Male brew-ery work-ers	Male malt-house work-ers	Female bottle-washers
		Male	Female	Male	Female			
1910	—	1544	1063	50.8	—	1144	—	885
11	—	1566	1105	50.8	—	—	—	—
12	2882	1567	1174	50.4	—	—	—	—
13	2993	1695	1285	52.5	—	—	—	—
14	3165	1803	1283	57.6	42.7	—	—	—
15	3113	1794	1068	56.5	41.6	—	—	—
16	2923	1824	1037	55.1	41.1	—	—	—
17	3468	2194	1437	68.6	47.6	—	—	—
18	3750	2921	1659	97.2	85.7	—	—	—
19	5670	4112	2285	137.9	98.0	—	—	—
1920	7933	4630	3680	188.9	166.3	—	—	—
21	8052	5044	3852	201.1	182.6	—	—	—
22	6728	4211	3084	172.4	153.7	—	—	—
23	5264	2954	1852	121.6	105.9	—	—	—
24	5252	3271	1919	132.9	109.8	—	—	—
25	6113	3328	2702	138.2	120.9	—	—	—

L. Ljunglöf Snuff Factory.

The wage data furnished by Ljunglöf's Snuff Factory, of Stockholm, consist of payrolls covering the periods 1850—1854, 1856—1866, 1901—1905. They contain weekly particulars of the time spent on time-wage work and piece-work, the income earned on time-work and on piece-work, and the worker's occupation. The following occupational groups have been selected:

3 male tobacco-workers (piece-work)	1850—1853, 1858, 1862
5 male tobacco-workers (daily wage)	1850—1853, 1858, 1862
5 male tobacco-workers (daily wage)	1901—1905
6 male cigar-makers	1850—1854, 1856—1857, 1859—1861, 1865
4—6 "cigar-boys"	1850—1854, 1856—1858, 1861, 1865
5—6 "spinner-boys"	1850—1853, 1860—1866, 1901—1905
2—6 female cigar-makers	1850—1854, 1856—1857, 1859, 1861, 1865
1 female tobacco-worker	1850—1853, 1856, 1862

The selected spinner-boys and cigar-boys are youths and their earnings differed widely according to their age; we have selected workers from these occupations earning high, low and medium-sized incomes. As is but natural, replacements in the series occur fre-

Table 128. Annual Earnings (in kronor) of Workers at Ljunglöf Snuff Factory in 1850—1905.

Year	Male tobacco-workers earning a piece-work wage	Male tobacco-workers earning a daily wage	Male cigar-makers	Cigar-boys	Spinner-boys	Female cigar-makers	Female tobacco-workers
1850	404	327	840	102	123	251	150
51	439	341	867	136	193	290	155
52	485	345	886	123	161	254	157
53	463	344	911	148	196	282	157
54	—	—	951	211	—	325	—
55	—	—	—	—	—	—	—
56	—	—	982	185	—	327	—
57	—	—	1025	149	—	304	—
58	417	378	—	177	—	—	—
59	—	—	939	—	—	251	—
1860	—	—	847	—	215	—	—
61	—	—	956	213	279	285	—
62	606	394	—	—	257	—	171
63	—	—	—	—	233	—	—
64	—	—	—	—	207	—	—
65	—	—	841	216	222	336	—
66	—	—	—	—	228	—	—
1901	—	952	—	—	436	—	—
02	—	947	—	—	430	—	—
03	—	991	—	—	484	—	—
04	—	1022	—	—	476	—	—
05	—	1054	—	—	442	—	—

quently in these groups. In earlier years "rent money" and "holiday money" was paid to the workers in small sums in the course of the year (not however to the well paid cigar-makers), the amount varying between 2 and 7 kronor *per annum*. In the later period (1901—05) holiday money was paid to an amount of 5 kronor and a sum of 90 kronor *per annum* for rent to the tobacco workers, the corresponding amounts paid to the spinner-boys being 5 and 20 kronor. Besides this, the workers were granted an allowance in the event of sickness, and during the fifties the spinner-boys were given "school-money" (6 öre per week). The form in which wages were paid to the different workers varied according to the occupation. The cigar-makers were engaged on piece-work, the cigar-boys on time-wage work, while about two thirds of the spinner-boys' work consisted of piece-work during the earlier years, though in 1901—05 it consisted mostly of work on a time-wage basis; the female cigar-makers' work was half the one and half the other, and the female tobacco-makers performed time-work only. Sometimes only the period spent on piece-work is recorded in the payrolls, the piece-work earnings being booked in a lump-sum for all workers

engaged in each particular occupation. In that case we have apportioned the piece-work earning to the different workers according to their daily time-wage rate. We have not been able to obtain any particulars as to the hours of work apart from the time spent on time-wage work, which is occasionally recorded. Employees receiving a daily wage worked about 330 days *per annum* (for 1 krona a day) in 1850—1853 and in 1901—1905 about 302 days (for an average of 3.30 kronor a day). The spinner-boys worked on an average 280 days *per annum* for a daily wage of 85 öre during the period 1860—1866, the women workers about 300 days, earning only 50 öre a day.

Cross-sections have been drawn up combining all workers in certain occupations for the years 1865 and 1905. A comparison of corresponding figures in these cross-sections and in Table 128 is given below.

1865.

	Cigar-sorters		Cigar-boys			Spinner-boys			Female cigar-makers		
	Number of workers	Annual earnings	Number of workers	Annual earnings	Daily earnings	Number of workers	Annual earnings	Daily earnings	Number of workers	Annual earnings	Daily earnings
	Kr.	Öre	Kr.	Öre		Kr.	Öre		Kr.	Öre	
1) According to Table 128	—	—	6	216	—	5	222	—	6	336	—
2) According to the cross-section	20	799	—	—	—	19	197	71	11	304	94
1) in percentage of 2)	—	—	—	98	—	—	113	—	—	111	—

1905.

	Male tobacco-workers			Spinner-boys		
	Number of workers	Annual earnings kronor	Daily earnings kronor	Number of workers	Annual earnings kronor	Daily earnings kronor
1) According to Table 128	5	1054	—	4	442	—
2) According to the cross-section	43	1299	4.27	18	420	1.47
1) in percentage of 2)	—	81	—	—	105	—

The lack of agreement in the case of the tobacco-workers is due to the selected workers' having been engaged on a time-wage

basis, whereas the annual income of the corresponding group in the cross-section of 1905 was earned to the extent of more than half on piece-work. During the latter period no distinction is made in the payrolls between cigar-makers and tobacco-workers, so that both occupations are included in the cross-section as tobacco-workers.

THE TEXTILE INDUSTRY (CHAPT. XI).

A. *Drufvefors Weaving Mills.*

Drufvefors Weaving Mills in Borås city in Älvsborg County manufacture cotton textiles. Four women workers have been selected for the weavers' series. No replacements have taken place and the series is of a homogeneous character. The annual working time is primarily stated in hours in respect of each worker. The series are given hereunder.

Table 129. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Female Workers at Drufvefors Weaving Mills 1907—1925.

Year	Female weavers		Year	Female weavers	
	Annual earnings	Hourly earnings		Annual earnings	Hourly earnings
1907	662	22.7	1916	843	29.3
08	625	23.0	17	758	32.4
09	651	24.1	18	131	32.8
1910	634	23.4	19	1638	69.1
11	675	23.3	1920	2602	117.0
12	659	23.6	21	1563	86.8
13	737	25.6	22	1475	64.9
14	729	25.8	23	1435	62.1
15	734	25.1	24	1387	60.6
			25	1213	60.4

All the workers concerned lived rent-free (one room, the rent is valued by the concern at 50—60 kronor *per annum*) during the period 1907—1919.

The normal number of working hours per week was: 1907— $\frac{1}{4}$ 1919 60 hours; $\frac{1}{4}$ — $\frac{31}{12}$ 1919 57 hours; and after that date 48 hours. The number of days worked *per annum* has generally varied between 270 and 290. In 1918 the mill was closed down for the greater part of the year owing to a lack of cotton yarn.

B. Rydboholm Mills.

The Rydboholm Mills in Älvsborg County were founded in 1834 and were the first of the textile factories in the Mark district,

Table 130. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Rydboholm Mills 1865—1914.

Year	Annual earnings			Hourly earnings		
	Dyers	Printers	Female workers	Dyers	Printers	Female workers
1865	282	302	139	8.7	9.1	5.8
66	247	286	124	8.7	9.4	6.3
67	258	250	101	8.7	9.4	6.3
68	274	293	91	8.7	9.4	5.8
69	269	302	89	8.7	9.4	5.8
1870	288	337	146	8.7	9.4	5.8
71	269	323	156	8.7	9.4	5.8
72	273	329	158	8.7	9.8	5.8
73	293	366	144	8.9	10.7	5.8
74	354	431	174	10.5	12.4	6.4
75	366	410	144	10.9	12.6	6.5
76	359	523	169	10.9	14.8	6.5
77	362	521	135	10.9	14.8	6.5
78	346	513	117	10.9	14.8	6.5
79	334	514	159	9.7	14.8	6.3
1880	313	497	180	9.1	13.7	5.8
81	333	588	164	9.7	16.2	5.8
82	348	577	170	10.0	16.4	5.8
83	337	575	186	10.0	16.1	6.5
84	340	587	189	10.0	16.1	6.5
85	335	568	200	10.0	16.1	6.5
86	337	557	198	10.0	16.1	6.5
87	328	564	194	10.0	16.1	6.5
88	328	567	190	10.0	16.1	6.5
89	338	508	196	10.0	14.1	6.5
1890	392	545	191	11.5	15.7	6.5
91	413	518	182	12.7	15.7	6.8
92	417	492	183	12.7	14.8	6.8
93	419	487	191	12.7	14.8	6.8
94	419	495	209	12.7	14.8	7.5
95	423	483	199	12.7	14.4	7.6
96	426	486	204	12.7	14.4	7.6
—						
1906	671	890	351	22.0	29.0	12.0
07	746	939	379	25.0	31.5	14.0
08	757	1049	424	25.0	35.0	15.0
09	761	1023	459	25.0	35.0	15.0
1910	785	1122	449	25.0	35.0	15.3
11	794	1039	472	25.0	35.0	17.0
12	800	1075	447	26.0	35.5	16.3
13	814	1121	457	26.5	37.0	17.0
14	797	1067	444	26.5	37.0	17.0

which is an old centre of textile manufacturing in Sweden, organized from the beginning mainly in the form of a domestic industry. The wages and other labour conditions at the Rydboholm factory are typical for the whole district. The factory, which developed rapidly, comprises bleach-works, finishing-works, dye-works and printing-works for cotton textiles.

Two workers have been selected from each of the occupations represented: dyers, printers and female workers. The wages of the selected workers in the dyers' and female workers' series are of a homogeneous character, and replacements in the series are very few. During the period 1876—1882 the two selected printers earned widely divergent incomes, the earnings of the one rising strongly in 1875—1881, while the other's declined. The annual working time is recorded each year, from 1865 to 1896 in days and from 1896 to 1914 in hours. For the years 1897—1905 there is no material available. The wage series are published in Table 130.

Dyers and printers were allotted one room and a kitchen rent-free up to 1889, and a free potato patch throughout the period under review. From the year 1890 a very small rent was charged according to the condition of the dwelling. The women workers were not in receipt of benefits in kind.

The standard number of working hours *per diem* was: 1865—about 1890, 11.5 hours; about 1890—February 1901, 11 hours; and after that date up to the time of the introduction of the 8-hour day, 10 hours. The working time for male workers ranged generally between 290 and 310 days *per annum*. The women workers' working time was shorter and more irregular, particularly in the earlier years: normally between 140 and 240 days in the sixties and seventies, between 240 and 270 days in the eighties and nineties, and in 1906—1914 between 270 and 290 days.

C. Stigen Woollen-Spinning and Woollen-Weaving Mills.

This establishment, comprising woollen-spinning and woollen-weaving mills and finishing works, is situated in Färgelanda, Dalsland. Two to four workers have been selected for the occupational groups represented here: spinners, weavers, finishers, women spinners and women weavers.

The figures in Table 131 have been controlled by a comparison of series comprising all the workers in some of the occupations and a cross-section, including the wages of all workers at the factory, for 1905. These comparisons show that the series given in the table may in general be regarded as representative. The earnings of the two selected finishers and those of all finishers combined (2—11 workers) move in closely parallel lines,

Table 131. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Stigen Woollen-Spinning and Woollen-Weaving Mills 1896-1915.

Year	Annual earnings				
	Male workers			Female workers	
	Spinners	Weavers	Finishers	Spinners	Weavers
1896	—	550	491	—	—
97	—	553	503	—	—
98	—	576	544	—	—
99	—	603	540	—	—
1900	570	583	538	—	—
01	581	686	540	—	271
02	617	700	589	—	286
03	602	624	554	—	292
04	596	580	519	—	240
05	967	580	538	—	287
06	872	648	609	237	323
07	895	717	615	276	405
08	1142	750	674	311	485
09	1165	735	675	339	489
1910	1148	800	689	393	506
11	1248	830	718	433	533
12	1370	880	762	434	588
13	1429	832	750	430	599
14	1391	909	760	432	576
15	1740	973	836	481	675

Year	Hourly earnings				
	Male workers			Female workers	
	Spinners	Weavers	Finishers	Spinners	Weavers
1896	—	14.7	14.2	—	—
97	—	15.2	14.7	—	—
98	—	17.0	16.1	—	—
99	—	19.1	18.4	—	—
1900	18.9	19.8	18.5	—	—
01	19.8	22.5	18.5	—	9.5
02	20.0	23.4	19.4	—	10.0
03	20.0	21.5	19.2	—	10.0
04	20.0	20.7	18.5	—	10.3
05	26.9	19.4	18.6	—	10.0
06	26.6	20.9	20.4	8.1	11.0
07	27.4	25.0	21.4	9.7	14.2
08	36.0	23.3	22.8	10.9	16.9
09	37.0	21.3	23.0	11.8	16.9
1910	36.2	22.5	24.0	14.0	17.9
11	39.9	21.9	24.5	15.2	18.6
12	43.8	23.7	25.9	15.3	20.3
13	47.2	28.5	26.2	15.0	21.0
14	47.0	31.6	27.1	15.7	20.3
15	52.5	33.0	27.2	16.0	23.4

the selected workers' wages being on an average 7 % above. The selected weavers' series has been corrected for abnormal replacements in the period 1908—1912 by means of the series representing all weavers (10—15 workers). The percentage corresponding to the above is after correction as high as 16 %, due to the wide difference in 1907 and 1908; after 1912 the difference again becomes normal (7 %). Indeed, all weavers' wages showed the steepest rise in 1908—1909 (13 %). Each worker's annual working time is recorded primarily in hours.

The regular hours of work *per diem* were 12 in 1896—1898, and 10 in other years. Overtime was worked on a large scale, but generally nothing or only a very small amount was paid for overtime in addition to the ordinary time-wage rate. Spinners and weavers normally worked between 100 and 300 hours overtime *per annum*, but occasionally the number of hours exceeded 300, as when the spinners worked 632 hours overtime in 1905 (after the serious fire that occurred in 1904 the work became very intensive). The finishers' overtime was at the most 170 hours *per annum* though it was generally under 100 hours. The women spinners and weavers worked as a rule between 30 and 60 hours of overtime *per annum*. The annual working time varied between 270 and 290 days.

As a rule the workers lived rent-free in dwelling-houses belonging to the factory, and they also received firewood free. From the year 1908, however, the workers had to pay rent for their dwellings.

Before 1905 the spinners worked only at a time-wage rate. In 1905, when they first began to work on a piece-work basis, their piece-work earnings amounted to $\frac{1}{4}$ of the total earnings, and after 1908 they worked exclusively at piece-work rates. The weavers worked both on a piece-work and a time-wage basis, in later years their earnings on piece-work representing 75 % of their income. The women spinners did time-work, but the women weavers after 1905 went over more and more from time-work to piece-work, so that after 1910 more than half of their income was earned on piece-work.

D. Uddebo Knitting Mills.

These knitting mills, situated in Älvsborg County, are one of the factories now belonging to the Swedish United Knitting Mills.

Three workers have been selected to represent the tricot knitters, and four to represent the tricot seamstresses. The workers are not accounted for individually, so that nothing can be stated as to the homogeneity of the series nor as to replacements in the series. No exact data are available as to the annual working time, but it

is stated to have been in normal years approximately 290 days. This statement is however too uncertain to warrant the figure's serving as a basis for calculating the hourly earnings. The table below, therefore, only contains series of annual earnings of the above-mentioned occupations.

Table 132. Annual Earnings (in kronor) of Workers at Uddebo Knitting Mills 1887—1926.

Year	Tricot knitters	Tricot seam-stresses	Year	Tricot knitters	Tricot seam-stresses
1887	406	382	1907	752	541
88	410	392	08	727	484
89	422	376	09	734	425
1890	427	362	1910	846	569
91	418	381	11	911	567
92	416	383	12	977	594
93	444	394	13	909	577
94	441	420	14	921	584
95	453	430	15	874	630
96	504	398	16	1021	600
97	550	486	17	980	584
98	512	563	18 ¹	337	214
99	574	544	19 ¹	1697	1055
1900	608	541	1920	2686	1777
01	566	491	21	1052	1025
02	692	500	22	1801	1077
03	627	451	23	1807	1088
04	674	496	24	1878	1123
05	717	518	25	1883	1150
06	694	503	26	2020	1185

The number of hours of work per week was 68 (12 hours *per diem* except on Mondays 10.5 hours, and Saturdays 9.5 hours) up to the year 1895, 58.5 hours (10.5 hours *per diem*, except Mondays 9 hours and Saturdays 7.5 hours) from 1896 to 1899, and 57.5 hours (daily hours of work as before, except 6.5 hours on Saturdays) from 1900 to 1919.

Up to 1901 the workers paid for housing and fuel at the rate of 50 öre a month. After 1901 the workers purchased their own firewood and paid 20—40 kronor rent for one room and a kitchen.

F. Gamlestaden Cotton-Spinning and Cotton-Weaving Mills, Gothenburg.

From Gamlestaden Mills in Gothenburg material has been collected from as far back as 1860. The annual earnings that

¹ Suspension of work.

have been calculated for dyers, female spinners and female weavers are, however, not very certain. The figures cover only an approximate average weekly wage earned by two workers in each occupation and the annual earnings have been estimated from these figures. For the years 1863—1865 there are no wage data available. The series are published below in Table 133.

Table 133. Annual Earnings (in kronor) of Workers at Gamlestaden Cotton-Spinning and Cotton-Weaving Mills 1860—1926.

Year	Dyers	Female spinners	Year	Dyers	Female spinners	Female weavers
1860 . . .	484	200	1892 . . .	716	400	423
61 . . .	496	238	93 . . .	690	418	447
62 . . .	447	241	94 . . .	824	392	525
—	—	—	95 . . .	731	336	508
66 . . .	435	—	96 . . .	676	447	510
67 . . .	435	—	97 . . .	676	421	525
68 . . .	435	—	98 . . .	806	394	499
69 . . .	412	261	99 . . .	771	476	528
1870 . . .	386	290	1900 . . .	769	467	528
71 . . .	473	386	01 . . .	798	389	563
72 . . .	412	386	02 . . .	902	400	508
73 . . .	435	371	03 . . .	771	470	551
74 . . .	484	400	04 . . .	821	409	528
75 . . .	635	339	05 . . .	821	513	592
76 . . .	580	339	06 . . .	1064	583	650
77 . . .	580	452	07 . . .	1064	577	513
78 . . .	609	444	08 . . .	821	624	548
79 . . .	563	473	09 . . .	957	519	670
1880 . . .	—	389	1910 . . .	957	583	499
81 . . .	—	464	11 . . .	1105	560	539
82 . . .	—	423	12 . . .	1163	516	711
83 . . .	531	435	13 . . .	1209	661	835
84 . . .	531	423	14 . . .	1114	589	655
85 . . .	580	365	15 . . .	1122	760	818
86 . . .	563	368	16 . . .	1206	716	887
87 . . .	580	380	17 . . .	1180	754	893
88 . . .	603	452	18 . . .	1325	789	1566
89 . . .	644	493	19 . . .	1871	1450	2018
1890 . . .	644	441	1920 . . .	3051	2071	2433
91 . . .	635	447	21 . . .	2459	2021	2459
			22 . . .	2204	1592	1934
			23 . . .	1905	1305	1873
			24 . . .	1673	1728	1766
			25 . . .	1995	1670	1940
			26 . . .	1995	1415	1958

The regular number of hours worked weekly was 67.5 prior to 1886, 60 in 1886—1908, 57 in 1909—1919, and after that 48. The workers were not in receipt of benefits in kind.

G. Claes Johansson & Co.'s Weaving Mills.

This establishment comprises cotton-spinning and cotton-weaving mills in Krokslätt, Mölnådal, and bleach-works, dye-works, printing-works and finishing-works in Mölnlycke, near Gothenburg. Two workers have been selected to represent each of the two occupational groups finishers and female weavers. The series may be regarded as representative, as the wages of the selected workers are typical of the wages paid in general in the occupations in question. The annual working time is recorded in the case of each worker up to 1907 in days and after that in hours.

Tab. 134. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers in Claes Johansson & Co.'s Weaving Mills 1890—1911.

Year	Annual earnings		Hourly earnings	
	Finishers	Female weavers	Finishers	Female weavers
1890	571	436	19.1	14.5
91	591	435	19.6	14.6
92	619	400	20.2	13.4
93	628	388	20.4	13.5
94	713	409	22.0	13.6
95	759	431	22.2	14.6
96	844	504	24.5	16.6
97	953	495	26.6	16.3
98	863	493	25.5	16.3
99	914	481	26.7	16.0
1900	755	454	25.2	15.0
01	766	442	26.0	15.3
02	805	474	26.9	16.0
03	805	499	26.6	16.6
04	790	561	27.8	18.6
05	892	643	29.5	21.2
06	971	613	30.5	21.3
07	976	668	32.0	22.6
08	928	624	32.6	22.1
09	856	—	34.0	—
1910	1076	—	36.5	—
11	1250	—	40.0	—

The male workers were paid a time-wage; the female workers were paid by piece-work.

The ordinary working time was 60 hours for male workers in 1890—1900 and for female workers in 1890-1906. In the other years under review the working time was 59 hours. The finishers often worked overtime. During the latter half of the nineties, the

number of hours of overtime rose to as much as about 500 *per annum* (the maximum being 555 in 1897), but thereafter it fell to 30—50 hours; by 1906 and 1907 the number of hours had again gone up (maximum 212 in 1906), and in 1911 another maximum is reached (376 hours). Here then we find an obvious connection between trade conditions and overtime. In 1900 no addition was made to the ordinary hourly wage rate for overtime, but after that year it was paid for at a rate 20—30 % higher. The women weavers had no over-time work.

There were no benefits in kind.

H. A Cotton-Spinning Mill near Gothenburg.

This establishment is engaged in manufacturing textile products of many kinds. The present enquiry is, however, concerned only with the wages of workers in the cotton-spinning mill.

The following occupations are represented by a number of workers varying from 2—5 in each occupation: carders, grinders, workers in the blowing-room, female spinners, female winders and female warpers, also female slubbing-frame tenders and drawing-frame tenders. The extracts from the wage records do not give any individual data, so that it has not been possible to make any comments about the homogeneity of the series or of replacements. Up to 1917 the annual working time is recorded in days, and after that year in hours. Hourly earnings in earlier years have been obtained by dividing the daily earnings by the regular number of working hours per day. Overtime work occurred frequently and has been accounted for in the annual number of hours worked (prior to 1917 converted into days). No particulars regarding the wages in the years 1902—1906 have been available.

The somewhat summarized figures available relating to all workers in 1865, 1885 and 1906 agree closely with the wage series in Table 135. The average annual earnings of 35 women workers in 1865 thus amounted to 164 kronor, while the corresponding figure in Table 135 is 169 kronor. The average annual earnings of women carders, spinners, drawing-frame tenders and reelers (43 workers) in 1885 were 262 kronor, this figure agreeing exactly with the figures in the two series of selected women workers in the table. The average annual earnings of 28 male workers (hacklers, pasters, carders) in 1906 were 628 kronor and of 62 women workers (slubbing-frame tenders, hacklers, reelers, spinners etc.) amounted to 456 kronor. The series in the table have, as already mentioned, no figures for that year, but the above-mentioned figures agree with the general trend of the series.

The normal number of the hours of work *per diem* was 11 in 1865—1881, 10 in 1882—1909, 9.5 in 1909—1920, and since then

Table 135. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Cotton-Spinning Mill H. 1865—1925.

Year	Annual earnings			Hourly earnings		
	Male workers	Female workers		Male workers	Female workers	
		Spinners, rollers and warpers	Slubbing-frame tenders and drawing-frame tenders		Spinners, rollers and warpers	Slubbing-frame tenders and drawing-frame tenders
1865	312	169	205	9.7	5.0	5.8
66	300	176	200	9.5	5.5	5.7
67	322	191	209	9.8	5.6	5.7
68	285	186	198	9.5	5.8	5.9
69	301	178	206	9.6	5.7	6.0
1870	306	186	221	9.6	5.6	6.5
71	313	207	230	9.2	6.3	6.6
72	331	208	234	9.7	6.2	6.8
73	392	209	241	10.6	6.5	7.1
74	413	218	252	11.3	6.7	7.5
75	430	229	236	12.1	7.0	7.3
76	443	241	270	12.3	7.4	7.8
77	451	256	269	12.6	7.6	8.0
78	350	213	216	12.5	7.6	7.8
79	354	216	231	12.4	7.5	7.9
1880	405	241	265	12.5	7.5	7.9
81	404	244	251	12.4	7.5	7.6
82	415	249	253	13.8	8.3	8.4
83	448	258	263	14.1	8.4	8.5
84	413	254	260	13.5	8.7	8.5
85	439	262	262	14.3	8.8	8.6
86	423	255	274	14.4	8.9	9.5
87	418	258	330	14.2	9.0	11.5
88	428	273	365	14.1	9.2	12.0
89	438	291	369	14.2	9.7	12.1
1890	412	292	376	13.8	10.0	12.7
91	448	295	389	14.5	9.9	13.0
92	461	305	392	14.9	10.1	12.7
93	432	316	368	14.4	10.7	12.6
94	435	330	366	14.5	11.0	12.4
95	445	335	375	14.8	11.2	12.5
96	438	334	358	15.2	11.3	12.1
97	452	346	354	15.5	11.6	11.9
98	488	369	358	16.1	12.5	12.1
99	517	399	374	17.2	13.9	13.4
1900	523	406	394	17.8	13.9	13.3
01	497	378	351	17.9	13.8	13.3
—						
07	610	497	533	20.7	16.8	18.0
08	643	509	566	21.2	17.4	19.1
09	622	517	598	22.7	19.0	21.9

Table 135. (Cont.) Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Cotton-Spinning Mill H 1865—1925.

Year	Annual earnings			Hourly earnings		
	Male workers	Female workers		Male workers	Female workers	
		Spinners, rollers and warpers	Slubbing-frame tenders and drawing-frame tenders		Spinners, rollers and warpers	Slubbing-frame tenders and drawing-frame tenders
1910	641	532	628	23.1	20.3	23.5
11	629	526	636	23.4	20.6	23.7
12	693	573	641	23.9	21.6	23.5
13	741	594	642	25.3	22.2	23.4
14	733	572	617	26.5	23.1	24.7
15	788	611	694	26.9	23.5	25.7
16	912	701	722	31.5	26.3	27.4
17	1093	687	727	45.0	31.0	32.0
18	1525	858	824	57.0	35.0	35.0
19	2016	1136	1165	74.0	42.0	46.0
1920	2428	1460	1785	111.0	68.0	83.0
21	1876	1181	1495	105.0	66.0	83.0
22	1852	1229	1608	81.0	54.0	75.0
23	1746	1137	1417	78.0	51.0	66.0
24	1592	1114	1282	78.0	56.0	64.0
25	1589	1086	1231	78.0	54.0	64.0

8 hours. The annual working time was very variable, amounting in certain years to as much as 330 days, but normally ranging around 290—300 days. The women workers appear on the whole to have had the same working hours as the men, the average working time being for male workers 298 and for female workers 294 days.

The workers lived as a rule rent-free in the dwelling-houses belonging to the factory, and they received free firewood and free medical attention. The housing accommodation consisted of two rooms and a kitchen for larger families and was together with firewood assessed for income tax purposes at 480 kronor, one room and a kitchen plus fuel for a married worker at 360 kronor and one room plus fuel at 240 kronor. Two cords of firewood were allotted annually to each set of rooms. The benefits, including also contribution to the sick fund, were assessed by the concern at an approximate value of 15 % of the average hourly earnings.

M. Drag Woollen-Spinning and Woollen-Weaving Mills, Norrköping.

The material consists of lists, on which notes were made of the workers' annual earnings, these notes probably serving as a

basis for income tax assessment. These data are doubtless not particularly satisfactory, and in the earlier years the annual earnings within each occupational group are recorded as a round figure applying to all workers. From 1885 in the case of the spinners and from 1894 in that of the dyers, finishers and female weavers, the various workers' earnings have been more carefully recorded and averages struck. However, the wage data recorded for 1877 are specified in detail and are reliable.

All the spinners have been included (6—7 workers). Dyers and finishers have been combined to form one series of 29—40 workers. In 1877 all the female weavers (120 workers) are included in the average earnings, but from the year 1894 about 20 women workers have been selected.

Table 136. Annual Earnings (in kronor) of Workers at Drag Woollen-Spinning and Woollen-Weaving Mills, Norrköping, 1877—1904.

Year	Spinners	Dyers and finishers	Female weavers
1877	612	390	458
—			
1885	650	525	—
86	650	525	—
87	700	550	—
—			
1894	665	797	535
95	585	799	575
96	640	751	550
97	—	767	—
98	670	—	570
99	815	784	555
1900	765	779	580
01	825	812	570
02	850	833	575
03	890	819	645
04	930	836	610

The regular daily working time was 11.5 hours (10.5 hours on Saturdays). The annual earnings of finishers and spinners, according to the above-mentioned more or less summary data, amounted to 400 kronor in 1869. It is interesting to note that in 1877 the female weavers earned more than the male workers, whereas in 1900 their annual earnings were about 25 % lower.

The workers received free housing accommodation and fire wood, and also their taxes were paid by the concern; these benefits being valued by the concern at 125—175 kronor for the year 1877 and at 300 kronor for subsequent years. They were abolished in 1907.

GÄVLE COTTON-SPINNING MILLS 545

Supplementing the scanty data given above we publish hereunder certain averages of male and female workers' earnings at a woollen and a cotton factory in Norrköping, the figures being taken from the abovementioned enquiry by Key-Åberg regarding the wages and housing conditions in the textile industry in Norrköping.¹

The group male workers at the woollen factory comprises: dyers, woollen-sorters, sizers, scutchers, carders, pressers, spongers and weavers (altogether 41 workers); the female workers' group contains: female weavers, burlers and cloth-storers (altogether 43 workers). In addition, the earnings of dyers (6 workers) and female weavers (23 workers) are published separately, as these occupations are best represented in the wage data. From the cotton factory it has only been possible to obtain a corresponding series relating to the female weavers (22 workers).

Year	Woollen Factory Annual earnings (in kronor)				Cotton Factory	
	Dyers	All male workers	Female weavers	All female workers	Female weavers	
					Annual earnings kronor	Daily earnings kronor
1890	624	718	470	481	387	1.54
91	687	720	471	479	430	1.57
92	687	610	408	426	455	1.63
93	703	618	474	490	471	1.69
94	732	712	463	529	482	1.73

N. Gävle Cotton-Spinning and Cotton-Weaving Mills.

The Gävle mills comprise cotton spinning-mill, weaving-mill, bleach-works, dye-works and finishing-works. The establishment was founded in 1849, during the period, culminating in 1869, that showed a remarkable development in the cotton industry, and during which many of the leading concerns in that line were first started.

The wage data have been extracted from the wage books containing particulars of earnings and working hours in respect of each worker per week. The time spent on time-wage work is given in days or hours; this is however not always the case with piece-work, which has then had to be estimated.

To represent the group male workers in the dye- and bleach-works, 4 workers have been selected who, generally speaking, form a homogeneous series without any abnormal breaks in the wage-series caused by replacements. In later years replacements do not

¹ Cf. p. 232.

Table 137. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Gävle Cotton-Spinning and Cotton-Weaving Mills 1854—1915.

Year	Annual earnings			Hourly earnings		
	Bleachers and dyers	Female workers		Bleachers and dyers	Female workers	
		Spinners	Weavers		Spinners	Weavers
1854	—	173	223	—	4.8	6.7
55	—	177	263	—	5.0	7.4
56	—	210	220	—	5.7	6.3
57	—	231	298	—	6.5	8.4
58	—	172	293	—	5.5	8.2
59	—	192	282	—	5.7	8.1
1860	—	260	357	—	7.1	9.6
61	—	229	397	—	6.4	10.7
62	—	161	306	—	5.5	10.2
63	—	142	198	—	4.9	6.6
64	—	153	207	—	4.5	5.9
65	—	236	249	—	7.0	6.8
66	—	320	273	—	9.0	7.4
67	—	277	265	—	8.5	7.3
68	—	240	240	—	6.8	6.6
69	484	238	258	12.0	7.1	7.2
1870	459	233	282	12.9	6.7	7.9
71	478	250	323	13.3	7.5	9.1
72	500	279	325	13.8	8.2	9.1
73	541	292	303	14.9	8.5	8.6
74	622	343	351	16.0	9.7	9.8
75	665	320	363	16.6	10.0	10.4
76	606	322	351	16.5	9.0	9.7
77	621	339	351	16.8	9.6	9.7
78	527	239	329	16.9	8.6	10.7
79	427	190	241	15.3	7.6	10.6
1880	576	216	296	16.3	8.4	12.6
81	552	281	361	17.0	9.0	11.5
82	653	282	345	17.1	9.8	12.2
83	677	269	321	17.2	9.7	11.5
84	671	333	361	17.4	11.1	11.9
85	632	313	366	17.3	11.0	12.6
86	592	324	313	16.2	11.0	10.7
87	583	351	336	16.2	11.0	10.5
88	588	386	346	16.2	12.4	11.1
89	596	426	359	16.5	13.6	11.5
1890	604	409	307	16.3	14.0	13.2
91	605	410	367	16.4	13.9	12.7
92	580	404	395	16.5	13.9	14.1
93	575	401	379	16.5	13.9	13.2
94	582	411	412	16.5	13.9	14.0
95	649	400	420	18.5	14.3	15.0
96	636	350	370	18.0	14.4	15.3
97	693	365	415	20.0	13.2	15.1
98	852	418	473	28.4	14.5	16.4
99	820	455	500	28.2	15.7	17.2

Table 137. (Cont.) Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Gävle Cotton-Spinning and Cotton-Weaving Mills 1854—1915.

Year	Annual earnings			Hourly earnings		
	Bleachers and dyers	Female workers		Bleachers and dyers	Female workers	
		Spinners	Weavers		Spinners	Weavers
1900	774	397	500	27.4	15.7	19.8
01	910	419	540	31.8	15.6	20.2
02	895	427	520	31.3	15.5	18.9
03	954	412	490	31.5	15.3	18.1
04	856	434	510	29.4	15.6	18.3
05	1017	437	540	34.0	15.3	18.9
06	1038	448	580	34.6	15.5	20.0
07	1005	524	580	33.8	19.0	21.4
08	1004	498	540	34.1	18.0	20.0
09	979	465	535	37.4	19.0	22.2
1910	957	457	505	32.9	19.0	21.0
11	1019	535	600	34.1	20.0	22.2
12	1167	552	685	38.9	20.0	25.3
13	1178	558	630	40.6	21.0	23.3
14	1009	503	590	37.8	19.0	21.8
15	—	—	540	—	—	20.0

occur frequently enough, with the result that the annual wage in the representative series in 1905 works out at a level slightly below the average annual earnings given by the cross-section for that year. As a rule, 5 female spinners and 4 female weavers have been selected.

The wage series for the female workers are more uncertain than the male workers' series owing to the large number of replacements, particularly in the earlier years. Corrections for replacements in the series have been made, in the case of the female spinners, in 1868—1875 and 1895—1897, and in the case of the female weavers, in 1894—1897 and 1900—1915. The last correction is somewhat uncertain, as after 1900 a number of highly paid workers join the series, thus raising the average earnings, so that by 1905 it had grown to a figure 16 % above the average earnings according to the cross-section. Although the absolute level in the series of selected women weavers is thus somewhat uncertain, the variations from year to year may nevertheless be true.

The number of working hours as recorded for male workers and female spinners is, generally speaking, correct, and so consequently are the hourly earnings, seeing that, although piece-work occurs, the hourly earnings are recorded in the material in the case of the male workers, and by means of the figures for time-wage workers or time-wage work that usually appear side by side with the others, it is

possible to estimate the hourly earnings of the female spinners. After 1880, except in the case of a few isolated years, the time worked by the female weavers is not recorded, their working hours being taken approximately to equal the female spinners' hours. A direct estimate on the basis of the weekly earnings is hardly likely to yield any trustworthy result, as they vary very considerably from week to week without necessarily indicating corresponding variations in the working hours.

Cross-sections embracing all workers have been worked out for the years 1865, 1885 and 1905. Only those occupations that have been selected for the representative series, and the average earnings of all male and female workers, are published below:

	1865			1885			1905		
	Number	Annual earnings	Hourly earnings	Number	Annual earnings	Hourly earnings	Number	Annual earnings	Hourly earnings
		kr.	öre		kr.	öre		kr.	öre
Dyers and bleachers	—	—	—	12	593	16.1	31	1051	35.0
All male workers	39	475	12.8	80	526	16.2	134	778	25.9
Female spinners	36	189	5.6	60	295	10.2	14	426	15.2
Female weavers	50	238	7.0	92	360	12.4	99	465	16.6
All female workers	111	219	6.5	213	318	11.0	286	426	15.2

The hourly earnings of women workers in 1885 and of all workers in 1905 have been worked out by means of an annual number of working hours estimated on the basis of that applied to the corresponding selected workers and the recorded working hours applied to certain occupational groups in the cross-sections.

The figures hereunder show the average annual earnings of selected workers as published in Table 137 in percentage of the corresponding figures in the cross-sections.

	1865	1885	1905
Dyers and bleachers	—	107	97
Female spinners	125	106	103
Female weavers	105	102	116 ¹

There are no benefits in kind in the proper sense of the term. Up to about 1870 the women workers had to pay the concern 2.33 kronor per week for food, lodging and firewood, but from 1870 the rate was as a rule 2.80 kronor; these amounts are recorded in the wagebooks. After 1879 it was only in isolated cases that the worker paid for his board. A few workers were given a rent allowance and firewood money.

¹ The uncorrected figures give 160 %.

The forms in which wages were paid varied considerably, though there has been a patent tendency for piece-work to predominate more and more as time went on. Dyers and bleachers performed time-wage work up to 1895, then the piece-work system was started, which practically predominated after 1899. The female spinners worked almost exclusively for a time-wage up to 1906 (earnings on piece-work, amounting to as much as 100 kronor, nevertheless occurred in isolated years). In 1907 the mill went over to piece-work, with the result that only inconsiderable amounts were earned at a time-wage rate in subsequent years. Throughout the period the female weavers worked almost entirely on a piece-work basis, their earnings being only occasionally at a time-wage rate, mostly towards the close of the nineties (17 % of the total earnings). The same result is to be found in the cross-sections. In 1865 the male workers were paid exclusively at a time rate as in 1885 (a few cases of piece-work wages in the repair-shop), but in 1905 about 90 % of their total wages were earned on piece-work. As a rule the female workers had more piece-work allotted to them. In 1865 the work of the women reelers, of the workers in the blowing-room and of the female weavers was predominantly (80 %) piece-work, while the other occupational groups (in the press, the cardroom, the spinning-room etc.) worked for the most part (90 %) on a timewage basis. The 1885 cross-section showed a slight tendency to a fall in the proportion of piece-work, whereas in 1905 only those engaged in spinning and winding worked predominantly for a time wage.

The daily working time up to 1883 was 12 hours, between 1883 and 1906 10 hours, between 1907 and 1916 9 hours on Saturdays, in 1917—1919 7 hours on Saturdays with the same regular working hours, and from 1920 8.5 hours on ordinary days and 5.5 hours on Saturdays. These data are however apparently not generally applicable. In 1883 the workers did not go over uniformly to a 10-hour day, the male workers continuing up to 1898 to work 72 and 67 hours a week as often as 60 hours. An annual working time of about 3,500 hours was normal up to that year, after that on an average 3,000 or 2,900 hours. The hours of work vary considerably however as between the different occupations; in 1885 the total ranged between 2,800 and 3,800. The women workers had as a rule shorter working hours, 3,200—3,000 during the earlier period, falling during the later period to 2,700, though they varied very considerably from week to week and from year to year.

The cyclical conditions are very distinctly reflected in the wage series, particularly in the annual earnings of the male workers. Marked periods of prosperity are: 1875 with a rise of 39 % from 1870 and a fall of 36 % up to 1879; 1883—1884 with a rise of 58 % from 1879 and a fall of 14 % up to 1887; the wage level is then constant up to about 1895, when a substantial rise sets in

(46 % between 1894 and 1898), interrupted by a small drop in 1904 and continuing at a slackening pace until 1906. 1912—1913 are also obviously boom years (the rise from 1910 being 22 %). The women's wages exhibit on the whole the same trend, though generally the cyclical variations are less distinctly marked.

With regard to the secular trend, it is not possible here, as is often the case elsewhere, to observe any narrowing down of the margin between male and female workers' wages. The following figures show the percentage by which the bleachers' and dyers' annual and hourly earnings exceed those of the female spinners:

	1870/1879	1880/1889	1890/1899	1900/1909	1910/1914
Annual earnings . .	94	92	64	111	105
Hourly earnings . .	79	56	38	98	86

O. *Holma-Helsingland Linen-Spinning and Linen-Weaving Mills, Forsa (Gävleborg County).*

The following numbers of workers have been selected to represent the various groups: 2—3 bleachers, 4—5 female fine-spinners and 2—4 female reelers. The average earnings are in close agreement with the figures resulting from the 1911 cross-section embracing all the workers.

Table 138. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Holma-Helsingland Linen-Spinnign and Linen-Weaving Mills, Forsa, 1901—1911.

Year	Annual earnings			Hourly earnings		
	Bleachers	Female fine-spinners	Female reelers	Bleachers	Female fine-spinners	Female reelers
1901	—	453	—	—	15.9	—
02	—	506	—	—	17.7	—
03	910	499	404	29.5	16.9	14.0
04	991	477	402	35.0	15.9	13.9
05	765	577	500	26.9	20.0	17.8
06	864	563	524	31.4	19.3	18.5
07	875	563	551	31.0	19.8	19.5
08	954	497	546	33.1	17.5	19.5
09	919	596	544	32.3	22.0	19.4
1910	992	640	558	33.9	21.9	19.1
11	1024	629	533	35.1	22.1	18.9

The workers received free medical services. The occupations included were engaged on piece-work with the exception of the female fine-spinners in 1901 and 1902. The regular hours of work were 10 a day.

P. A. Ferd. Sjöberg & Company, Gävle.

For each of the series male spinners and female spinners 5 workers have been selected. The female operatives are frequently replaced, resulting in a number of irregularities. The steep rise in wages in 1906—1907 and in 1907—1908 is thus due in part to replacements in the series. Only a 13 % and a 1 % rise are apparently correct, if we eliminate these replacements, whereas the wage series as they stand show rises of 26 % and 9 % respectively.

Table 139. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at A. Ferd. Sjöberg & Company, Gävle, 1890—1912.

Year	Annual earnings		Hourly earnings
	Male spinners	Female spinners	Male spinners
1890	630	292	21.0
91	600	300	20.0
92	557	315	23.6
93	673	324	22.2
94	689	328	22.8
95	690	337	23.0
96	788	312	26.4
97	827	321	27.5
98	801	345	26.6
99	802	365	26.7
1900	837	389	27.7
01	850	369	28.3
02	853	350	28.2
03	831	360	27.7
04	887	384	29.6
05	904	413	29.9
06	956	405	31.7
07	926	511	31.0
08	1047	557	34.2
09	1020	546	33.7
1910	1036	588	34.5
11	1033	580	34.4
12	1028	583	34.5

The workers were not in receipt of any benefits in kind. The regular hours of work throughout the period were 10 hours a day, to which has to be added a small amount of overtime work (20—60 hours *per annum* in the case of the spinners). The annual working time of the male spinners is generally recorded (about 300 days), but in the case of the female spinners, who were mostly engaged on piece-work, it has not been possible either to ascertain or to estimate the number of days' work performed *per annum*.

LEATHER AND RUBBER; CHEMICAL INDUSTRY
(CHAPT. XII).

A. Ehrnberg Leather Factory, Simrishamn.

The wage data relating to this factory are derived from payrolls from 1898 (beginning in April) to 1914 inclusive. Extracts have been made from the wage records in respect of two selected workers within each of the groups journeymen and unskilled workers. Only workers earning a daily wage have been selected. There are moreover employees who have been engaged also on piece-work, but as the sums paid for piece-work are not specified in the payrolls in respect of each worker, but were paid out to one of the workers to be afterwards divided up between those who had carried out the piece-work job, it has not been possible to compute the annual earnings of such workers. Large bonuses (amounting generally to 50—100 kronor for journeymen and 10—50 kronor for unskilled workers, but frequently exceeding 100 kronor in both groups) were paid out practically every year in connection with the meeting of the shareholders or at Christmas.

Table 140. Annual and Daily Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Ehrnberg Leather Factory, Simrishamn, 1898—1914.

Year	Annual earnings		Standard daily wage rate		Hourly earnings	
	Journey-men	Unskilled workers	Journey-men	Unskilled workers	Journey-men	Unskilled workers
1898 ¹	779	550	2.33	1.66	27.0	19.2
99	812	544	2.66	2.00	26.3	19.4
1900	917	603	2.83	2.00	31.2	21.2
01	980	638	2.99	2.00	31.9	21.0
02	898	670	3.00	2.25	29.9	22.5
03	956	687	3.00	2.25	32.3	23.6
04	854	662	3.00	2.25	29.8	22.8
05	1023	740	3.00	2.33	34.3	24.9
06	1071	811	3.26	2.59	35.7	27.4
07	1095	886	3.66	3.00	36.7	29.6
08	1063	886	3.66	3.00	36.3	30.0
09	1034	881	3.66	3.00	36.7	30.0
1910	1101	941	3.66	3.00	38.4	31.7
11	1152	953	3.66	3.00	39.1	32.2
12	1167	951	3.66	3.00	39.0	32.2
13	1201	972	3.66	3.00	40.9	34.2
14	1202	1015	3.66	3.00	40.7	34.0

¹ Three quarters of the year only.

The selected workers thus received a daily wage, deduction being made for each hour of absence. The number of days *per annum* varied as a rule between 295 and 300. The regular number of hours of work per day during these years was 10. Only a small amount of overtime work was done (a maximum of 20 hours a year). The weekly earnings of workers within the same occupational group were practically equal, as a rule differing only as a result of varying periods of absence. An average of hourly earnings has been computed, including overtime earnings and bonuses, by dividing the annual earnings by the number of days *per annum* multiplied by the regular daily hours of work plus overtime. The hourly earnings thus obtained show a tendency to be too low as the number of days includes hours of absence. For purposes of comparison we have recorded the standard daily wage rate (exclusive of overtime and bonuses), which should also be generally applicable to all workers in the respective trades. According to a cross-section embracing all workers and drawn up for the year 1905, the average annual earnings of 77 unskilled workers were 749 kronor, while the average earnings of the two selected unskilled workers were 740 kronor.

B. Lilljedahl Leather Factory, Sölvesborg.

This establishment is represented by 3—4 (generally 4) workers in the dehairing shed and lime-house during the periods 1876—78 and 1885—1914 and by 2—4 workers (in 1904—06 only 1 worker) from the workshop during the years 1888—1914. Particulars have been obtained from the payrolls as to the workers' weekly earnings, divided into piecework earnings and time-wage, also the time worked in days and hours, which as a rule is only recorded in connection with time-wage and overtime work. For the period 1903—1912 the total time worked is stated for workers in the dehairing shed and the lime-house, but expressed partly in days and partly in hours; and as the factory was unable to furnish any particulars as to the number of hours of work *per diem*, we have not been able to calculate the hourly earnings with any degree of certainty.

The time worked seems generally to have ranged around 290 days *per annum*. Notes made in the payrolls would indicate that the number of hours of work per day in 1903 was 10.5 and in 1908 9. The workers were engaged on both piece-work and time-work, but to a very varying extent both as regards different workers in the same year and the same worker from year to year, and, seeing that those engaged on piece-work earned considerably higher annual incomes the averages are often somewhat heterogeneous. The proportion of piece-work jobs as compared with time-wage work

Table 141. Annual Earnings (in kronor) of Workers at Lilljedahl Leather Factory, Sölvesborg, 1876—1914.

Year	Dehairing shed and lime-house	Workshop	Year	Dehairing shed and lime-house	Workshop
1876	732	—	1900	870	975
77	637	—	01	972	958
78	612	—	02	617	1042
—	—	—	03	968	1113
1885	486	—	04	1036	1136
86	671	—	05	1080	1060
87	691	—	06	1101	1071
88	653	815	07	1099	988
89	689	740	08	1235	1095
1890	641	801	09	1131	1098
91	713	820	1910	1192	999
92	711	818	11	1146	1106
93	826	859	12	1165	732
94	781	815	13	1277	1269
95	810	877	14	1391	1357
96	836	915			
97	826	943			
98	921	1009			
99	943	1014			

seems to increase in prosperous years and diminish in bad years. Thus, during the years of general trade depression in the latter half of the seventies, the annual earnings of the selected workers from the dehairing shed (the same workers throughout these years) decreased by 17 % from 1876 to 1878, while at the same time the percentage proportion of the total earnings represented by piece-work earnings fell from 85 % to 49 %. The rise of 38 % in wages in 1885—1886 was connected with the growth of the proportion of piece-work from 38 % to 87 % (the same workers in both years). The rise of 12 % in 1897—1898 was the result of an increase in the proportion of piece-work from 90 % to 94 %, and when the wages increased by 12 % in 1900—1901 the proportion of piece-work grew from 68 % to 92 % (the same workers). After 1912 the workers in the dehairing shed and the lime-house were engaged exclusively on piece-work. The positive correlation between the proportion of piece-work to wage-level likewise applied pretty generally to those in the workshop. The rise of 7 % in wages in 1897—1898 corresponded to an increase in the proportion of piece-work from 70 % to 74 %, and the rise of 11 % in 1910—11 corresponded to an increase in the proportion of piece-work from 36 % to 85 %.

C. L. A. Matton Leather Factory, Gävle.

Gävle has of old been one of the centres of the leather industry in the country. In 1913 the establishment was the only leather manufactory in the town, and was at the same time the largest leather factory in Sweden.

The payrolls contain no particulars whatever as to occupations. To form the selected workers series, which has been compiled for the period 1882—1907, as a rule 5—7 workers have been chosen earning a relatively high income, so that they may without doubt be regarded as skilled workers. The earnings are recorded weekly or fortnightly, but there are no records of the hours of work. After 1907 the extracts concerning wages are more or less schematic, as the only details furnished are the number of skilled workers, and the average annual earnings, computed on the basis of summaries for the respective years (the number of workers rises from 11 in 1907 and 19 in 1908 to 44 in 1913). Further, similar particulars are available concerning unskilled workers (including non-adults, who however are reported as being so few in number that they do not affect the averages) to the number of 76—80 during the period 1908—1913, and the average annual earnings of all workers combined in 1902 (56 workers), in 1905 (75 workers), in 1906 (96 workers) and 1908—1913 (100—121 workers).

There is also a certain amount of summary information in respect of earlier years, extracted from an "account book" for work-people and servants, dating from the years 1860—1869. Some of the journeymen (tanners) earned about 230 kronor, while others earned about 500 kronor *per annum*. The difference consists partly perhaps in benefits in kind that have not been recorded in the books. One series relating to the years 1860—1868 and to a selected journeyman — the same throughout the entire period — is published in Table 142 below.

The heavy rise of 42 % in the wages of the selected workers in 1902—1906 is verified by the fact that the average earnings of all workers combined likewise rose steeply during the same period by as much as 43 %. In 1908—1913 the annual earnings of the skilled workers went up 7 %, while the earnings of the unskilled workers increased by 20 %.

The benefit of free housing was granted in comparatively few cases. The workers were entitled to free medical services. In the tannery a "boot allowance" had been granted from the early days, being payable monthly (1 krona).

The time worked *per annum* was normally about 302 days, according to information received from the concern. During the period 1907—1913 the number of hours of work per day was 10,

and 7 on Saturdays. There are no particulars relating to overtime which was not paid for at a rate above the standard hourly wage rate.

Table 142. Annual Earnings (in kronor) of Workers at L. A. Matton Leather Factory, Gävle, 1860—1913.

Year	Skilled workers ¹	Year	Skilled workers	Unskilled workers	All workers
1860	438	1893	800	—	—
61	436	94	840	—	—
62	442	95	947	—	—
63	435	96	834	—	—
64	523	97	839	—	—
65	520	98	993	—	—
66	518	99	1009	—	—
67	565	1900	1001	—	—
68	562	01	1164	—	—
—	—	02	1249	—	910
1882	694	03	1354	—	—
83	640	04	1541	—	—
84	750	05	1542	—	1199
85	723	06	1775	—	1304
86	766	07	1808	—	—
87	794	08	1750	1285	1373
88	789	09	1725	1258	1362
89	829	1910	1870	1450	1582
1890	813	11	1780	1385	1522
91	835	12	1800	1396	1530
92	813	13	1875	1545	1664

F. Hälsingborg Rubber Factory.

This establishment has specialized in the manufacture of galoshes, but in recent years they have also manufactured rubber balls and shoes. In 1905 the number of employees was about 500 and in 1925 about 1660.

In Table 143 below the skilled workers group comprised selected varnishers, bar-carriers¹ and clickers (4 out of each group). The earnings of 4 calender-men are given in a group by themselves, and those of all the female workers in the galosh-room form one series.

If we compare the trend of wages with the total output of galoshes stated in an official enquiry regarding the development of the

¹ 1860—1868 one journeyman.

¹ "Bar-carriers" (Sw. stångbärare) is the name given to those workers whose task it is to carry the lasts holding the rubber shoes, galoshes etc., which are suspended on special bars, from the working-tables to the trucks on which they are subsequently conveyed into the vulcanizing chambers.

HÄLSINGBORG RUBBER FACTORY 557

Table 143. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Hälsingborg Rubber Factory 1892—1927.

Year	Male workers				Female workers in the galosh-making department		
	Annual earnings ¹		Hourly earnings		Number of workers	Annual earnings ¹	Hourly earnings
	Skilled workers	Calender-men	Skilled workers	Calender-men			
1892	—	—	—	—	26	311	11.9
93	655	706	22.7	22.6	48	328	11.8
94	681	683	22.4	22.5	49	390	13.6
95	696	679	23.1	22.9	83	365	13.9
96	788	877	24.8	25.2	110	446	15.3
97	867	776	26.5	26.3	170	445	15.6
98	849	866	28.1	27.9	191	494	17.1
99	683	698	28.5	28.5	181	405	17.0
1900	790	760	29.2	28.8	139	484	16.6
01	845	843	28.9	29.0	160	540	18.7
02	881	826	31.9	29.1	163	540	19.2
03	1029	869	34.9	29.6	185	512	18.3
04	1206	848	39.9	29.5	200	523	18.4
05	936	807	36.0	30.4	234	462	17.4
06	1060	880	37.9	30.5	157	403	19.8
07	1122	903	40.6	32.9	158	580	20.9
08	1197	954	44.9	35.6	165	563	21.5
09	1252	926	49.8	36.8	183	380	23.0
1910	1500	1133	—	—	—	—	—
11	1518	1163	—	—	221	685	26.6
12	1808	1083	—	—	262	737	26.2
13	1662	1074	—	—	263	732	26.4
14	1668	1195	59.8	44.7	278	721	26.2
15	1824	1315	65.9	47.1	289	754	27.3
16	1901	1595	72.6	51.6	313	753	27.6
17	1369	1375	51.2	45.9	274	266	38.0
18	1664	1856	93.7	76.0	252	517	46.1
19	3361	3077	127.3	113.6	216	1632	65.5
1920	4509	3980	193.7	158.1	303	2562	105.7
21	4304	3695	194.3	156.7	320	2179	99.4
22	3873	2985	170.8	130.8	388	2032	80.8
23	3339	2537	146.8	107.2	521	1497	66.4
24	3487	2453	149.2	98.8	542	1794	78.1
25	3501	2576	156.2	111.0	709	1858	82.7
26	3371	2829	152.3	109.2	719	1972	85.3
27	3746	2459	164.1	103.9	786	2143	92.4

Swedish Rubber Goods Industry 1890—1913,² we find that the boom period 1895—1898 is clearly reflected in both series, but that afterwards their figures show a fall, remaining comparatively low up to about 1902—1903, after which there is a rapid rise. This cir-

¹ Stoppages of work occurred in 1895, 1899, 1900, 1905, 1908 and 1909.

² Statens offentliga utredningar 1922: 38. Den svenska kautschukindustriens utveckling 1890—1913.

cumstance is attributable to the fact that during these years the export to Norway was checked as a result of the annulling of the special trade agreement between Sweden and Norway; generally speaking, the rubber factories had serious difficulties to contend with during this period, as is shown by the fact that only one out of the five factories in the country was able to pay any dividend. However, the trend of wages shows no distinct traces of the rapid expansion during the years of prosperity that set in after 1910.

The weekly earnings and the number of hours of work of each selected male worker have been extracted from the payrolls week by week. In 1902 the wage data are recorded in another way, the average hourly piece-work wage for each group being then recorded together with the number of hours worked by the selected workers. The earnings of the workers engaged on a time-wage basis were recorded in the same way as before. From 1910 to 1927 particulars of time worked and wages earned have been available in the form of summaries for the whole year, though for the period 1910—1913 we have only been able to obtain figures representing the combined wage-income for the entire year from the factory's returns in connection with the employees' income tax assessments, the wage journals covering that period having been destroyed. As regards women workers, particulars have been furnished as to the total number of full working weeks, the corresponding total annual earnings, the number of weeks the department in question has been at work and the number of days during that period in which no work has been done.

Up to $\frac{6}{11}$ 1902 all categories worked on a time-wage basis. Subsequent to that date all groups, with the exception of the calendermen, were engaged on piece-work, except on the first and last days of the year, when they worked on a time basis. However, during the year 1917 all groups worked on a time basis. The hourly piece-work wages varied greatly from week to week, owing to the fact that the work is not paid for until the galosh or the shoe is completed. There was a fairly large amount of overtime work done by the employees earning time wages (up to 600 hours *per annum*), though the amount varied widely from year to year. In most cases the rate paid for overtime was some percentage (about 20 %) above the hourly wage rate.

Certain bonuses are included in the annual earnings.

The normal number of days worked *per annum* has ranged around 290. In some years however suspension of work on various occasions has caused a shortening of the working time. From the founding of the factory in 1891 up to $\frac{1}{7}$ 1918 the number of hours of work *per diem* was 10, from $\frac{1}{7}$ 1918 to $\frac{30}{8}$ 1920 it was 54.5 per week and thereafter 8 hours *per diem*.

For the years 1905 and 1925 cross-sections have been drawn showing the averages of all workers' earnings during these years.

HÄLSINGBORG RUBBER FACTORY 559

Table 144. Earnings of all Workers at Hälsingborg Rubber Factory in the Cross-Sectional Years 1905 and 1925.

Occupation	1905			1925		
	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings
<i>Skilled male workers.</i>						
Bar-carriers	7	Kr. 939	Öre 36.4	13	Kr. 3460	Öre 157.3
Clickers	13	946	36.7	26	3510	159.5
Varnishers	15	875	33.9	22	3229	146.8
Sole-cutters (hand)	9	881	34.2	14	3000	136.4
Sole-cutters (machine)	—	—	—	3	3165	149.3
<i>All workers in the group</i>	44	907	35.2	78	3318	151.0
<i>Unskilled male workers.</i>						
Storemen	6	776	30.1	29	2267	100.9
Sundry workers	28	870	31.8	61	2556	116.0
Cutters	6	689	28.0	16	1905	89.9
Workers in the technical department ¹	28	865	33.0	35	2666	112.5
Calender-men	25	820	31.4	87	2569	110.2
<i>All workers in the group</i>	92	837	31.7	227	2496	109.5
<i>Handicraftsmen</i>	—	—	—	45	2933	124.7
<i>Adult female workers.</i>						
Sundry workers	—	—	—	3	1355	59.8
Stitchers	—	—	—	108	1815	84.3
Workers in the technical department	11	372	14.8	29	1687	77.9
<i>All workers in the group</i>	11	372	14.8	140	1779	82.5
<i>Female workers in galosh-making department</i>	234	462	17.4	709	1858	82.7
<i>Young male workers.</i>						
Calender-men	19	350	14.1	20	1220	57.5
Storemen's assistants	9	264	10.7	19	1115	52.6
Sundry workers	26	275	11.1	22	1269	59.9
Lastmakers' mates	—	—	—	17	1764	83.2
Clickers	10	356	14.4	22	1107	52.2
Sole-cutters	6	—	—	6	1289	63.2
Packers	6	288	11.6	11	1507	71.1
Workers in the technical department	7	397	16.0	24	1099	51.8
<i>All workers in the group</i>	78	315	12.7	141	1266	59.8
<i>Young female workers.</i>						
Sundry workers	26	249	10.1	21	1031	48.7
Clickers	—	—	—	6	1154	54.4
Sorters	—	—	—	72	988	46.6
Cementers	19	247	8.4	41	1099	53.9
Workers in the technical department	—	—	—	29	1040	49.1
<i>All workers in the group</i>	45	248	9.4	169	1035	49.3

¹ Workers in the "technical" department, i. e. those engaged in manufacturing rubber balls, heels, soles and mechanical rubber goods. This department used also to make rubber goods for surgical and industrial purposes.

For the purposes of the cross-sections only such workers as have been employed for a more or less normal number of days during the year have been selected from the payrolls. In calculating the annual earnings we have determined the time worked *per annum* according to the number of hours worked by the selected workers.

A comparison of the cross-sections with the corresponding figures for selected workers gives the following very satisfactory result:

	Bar-carriers			Clickers			Calender-men		
	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings	Number of workers	Annual earnings	Hourly earnings
1905		kr.	öre		kr.	öre		kr.	öre
1) According to Table 143	3	963	36.3	4	983	36.8	4	807	30.4
2) According to Table 144	7	939	36.4	13	946	36.7	25	820	31.4
1) in percentage of 2)	—	103	100	—	104	100	—	98	97
1925									
1) According to Table 143	3	3493	158.2	4	3689	162.7	4	2576	111.0
2) According to Table 144	13	3460	157.3	26	3510	159.5	87	2569	110.2
1) in percentage of 2)	—	101	101	—	105	102	—	100	101

G. Liljeholmen Stearine Factory, Stockholm.

This factory is represented by wage series for workers within the occupational groups: raw-material melters (3 workers) for the period 1901—1915, glycerine workers (5—7 workers) 1879—1915, outdoor workers (16—28 workers) 1888—1915 and candle-moulders (40—60 workers) 1879—1915. The workers have not been followed up individually, but all workers whose absence has not exceeded a certain limit have been included for each week. As a check on this method we have extracted wage data relating to 5 selected workers engaged on outdoor jobs. This series agrees very closely with the cross-sectional series (see below) including the earnings of all workers for special years, being on an average 3 % above the latter. We also have particulars concerning a few earlier isolated years, but no continuous series.

The material is derived from day-job journals, containing particulars of the piece-work and time-wage earnings per worker and

LILJEHOLMEN STEARINE FACTORY 561

Table 145. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Liljeholmen Stearine Factory 1879—1915.

Year	Annual earnings					Hourly earnings					
	Skilled workers				Outdoor workers	Women candle-moulders	Skilled workers				Women candle-moulders
	Raw-material melters	Raw-material workers	Glycerine workers	Average			Raw-material melters	Raw-material workers	Glycerine workers	Average	
1879	—	834	—	—	—	328	—	20.8	—	9.8	
1880	—	839	—	—	—	327	—	22.6	—	9.6	
—	—	—	—	—	—	—	—	—	—	—	
1882	—	—	—	—	—	327	—	—	—	9.6	
—	—	—	—	—	—	—	—	—	—	—	
1888	—	967	—	—	925	389	—	26.6	—	10.9	
1889	—	1014	—	—	955	401	—	28.7	—	11.4	
—	—	—	—	—	—	—	—	—	—	—	
1901	1230	1350	1310	1245	509	41.0	43.6	42.7	—	18.5	
02	1350	1345	1347	1334	503	42.7	44.3	43.8	—	18.6	
03	1205	1333	1290	1290	602	39.3	43.6	42.2	—	19.6	
04	1242	1349	1313	1335	544	39.5	41.7	41.0	—	18.6	
05	1233	1322	1292	1333	543	41.1	42.4	42.0	—	20.3	
06	1323	1557	1479	1449	588	43.6	45.8	45.1	—	21.4	
07	1523	1627	1592	1449	630	49.9	47.4	48.2	—	24.3	
08	1605	1653	1637	1451	608	47.5	47.4	47.4	—	22.8	
09	1549	1587	1574	1441	660	48.1	47.5	47.7	—	25.9	
1910	1577	1554	1562	1548	661	48.6	44.7	46.0	—	23.1	
11	1465	1505	1492	1519	609	47.2	46.7	46.9	—	22.6	
12	1400	1566	1511	1532	604	46.6	47.4	47.1	—	22.9	
13	1513	1647	1602	1590	617	48.6	47.7	48.0	—	23.6	
14	1518	1632	1594	1575	720	48.5	47.8	48.0	—	24.1	
15	1553	1855	1754	1757	818	48.1	49.9	49.3	—	25.3	

week, contribution towards rent, age bonus, Midsummer bonus, Christmas bonus etc., as also the number of hours spent on time-work. Further, there is recorded for each occupational group an aggregate of workers' earnings and the time spent on the work. The hourly earnings, prior to 1897, are uncertain, as the working time is recorded in both days and hours and the data on which we have calculated the number of hours per day are doubtful. After 1897 all time worked is recorded in hours. Subsequent to 1905 the glycerine-workers earned about 4 % of their annual pay on piece-work and the candle-moulders 9 % in 1914 and 1915, so that the hourly earnings in those years do not correspond to the total annual earnings but represent hourly earnings on a time-wage basis; but this is of little consequence. We have not computed the hourly earnings of the outdoor workers; in any case they would be of little value, as these workers spent much of their time acting as

watchmen during certain years, and besides were engaged in doing a small share of the piece-work.

Up to October 1903 most of the workers had free housing and free firewood. Those male workers who were not accommodated in the factory's dwellings received instead a contribution towards rent amounting to 180—200 kronor *per annum*, plus 16 kronor for firewood in the case of unmarried workers and 32 kronor in that of married workers. One room and kitchen in the factory's workmen's dwellings were assessed at 150 kronor, and one room at 90 kronor. Female workers not living in the factory's houses received 1 öre higher pay per hour than the other women workers. From 1904 onwards most of the workers were allowed to hire apartments from the factory at a reduced rent. One room cost as a rule 125 kronor *per annum*, one room and kitchen about 225 kronor *per annum*, free heating being provided in addition. However, a certain number of the workers continued to receive a contribution towards their rent. In order to make the series uniform, the value of the free housing, as also contributions towards rent, are included in the annual and hourly earnings. As in regard to the women workers it has not been possible to ascertain how many of them have had free housing, this method of procedure could not be employed in their case. This has meant that, so long as the free-housing benefit was operative, the average is too low, but the error is not likely to be great, since there was no sudden increase in the money wages in 1903—04 in conjunction with the abolition of free housing, though it is clearly observable in the case of the other occupational groups. The earnings further include all the years of investigation, various kinds of bonuses, at Christmas (5 kronor), Midsummer (5 kronor), on festival occasions (3 kronor), sick benefits and age bonus (20—120 kronor), high-cost-of-living bonus (70—120 kronor in 1915), food allowance (when engaged on work outside the factory) amounting to considerable sums. The ordinary daily wage-rate was paid for work on holidays, work done on a holiday falling on a Sunday being paid for at double rates. Overtime occurred frequently and was paid for at a considerably increased hourly wage rate (up to 1902 the hourly wage rate for overtime was usually 50 öre, and after that year 60 öre).

The regular number of working hours per week was as a rule 70.5—72 hours prior to 1892, in 1892 about 68 hours, from 1893 to 1900 66 hours, from 1901 to 1915 60 hours. The women moulders generally worked fewer hours *per annum* than their male fellow workers, as their work was very often suspended for 1—5 weeks in July or August.

Cross-sections have been drawn for the years 1879 and 1905 resulting in the following averages for workers engaged in the manufacture of candles. In the year 1879 the value of free housing is not included.

	1879			1905		
	Average number of workers	Annual earnings kronor	Hourly earnings öre	Average number of workers	Annual earnings kronor	Hourly earnings öre
Male workers . . .	40	792	20.4	55	1367	41.0
Female workers . . .	45	337	10.0	126	592	18.4

H. *Zadig Soap Factory, Malmö.*

The concern is represented by soap-boilers (2 selected workers) during the period 1866—1908, and women workers (4 selected workers) during 1889—1907.

Table 146. Annual Earnings (in kronor) of Workers at Zadig Soap Factory, Malmö, 1866—1908.

Year	Soap-boilers	Year	Soap-boilers	Female workers
1866	316	1888	618	—
67	309	89	657	258
—		1890	653	300
69	385	91	640	350
—		92	658	363
1872	422	93	687	372
73	506	94	671	381
74	554	95	662	413
75	587	96	664	434
76	616	97	679	458
77	620	98	690	447
78	603	99	681	436
79	603	1900	685	451
1880	611	01	657	464
81	608	02	700	476
82	590	03	719	521
83	602	04	784	518
84	602	05	796	504
85	604	06	851	553
86	598	07	944	581
87	604	08	1026	—

The weekly earnings of each worker during a year have been quite constant, so that, as far as the selected workers are concerned, only the highest and the lowest weekly earnings for each year, together with the number of weeks worked, overtime worked and hourly wage paid for overtime have been extracted from the available data. The annual earnings have been calculated by multiplying the number

of weeks by the thus computed average weekly earnings and adding overtime earnings. Gaps in certain years have been filled up. Owing to numerous replacements in the series the women workers' wage series is not very satisfactory prior to 1889 and is not published for this period, and even afterwards it is heterogeneous, two of the women workers having far lower earnings than the other two. The daily hours of work are estimated by the concern at 12 in earlier years and 10 from the close of the seventies. During the first years of the seventies especially, overtime work was done on a large scale (about 20 days or nights and 250 hours *per annum*); subsequently an average of about 40 hours for soap-boilers and 120 hours for women workers. The rate of wages paid to soap-boilers for overtime was, on an average, 12.5 öre per hour from 1866 to 1873, 20 öre from 1874 to 1886, 25 öre from 1887 to 1891, 28 öre from 1892 to 1897, rising to 51 öre in 1908. For women workers this hourly rate rose during the same period from about 6 to 25 öre.

K. Reymersholm Superphosphate Factory, Hälsingborg.

For this concern we have selected 10 workers from the sulphuric acid factory, 10 superphosphate workers, 4—8 joiners and 3—9 mechanics, covering the period 1899—1927. We only have details of the annual earnings. As the four series are on about the same level of wages during all the years under review, we are only publishing an average representing the earnings of all these 27—37 workers.

Table 147. Annual Earnings (in kronor) of Workers at Reymersholm Superphosphate Factory, Hälsingborg, 1899—1926.

Year	Male workers	Year	Male workers	Year	Male workers
1899	1084	1910	1429	1920	4203
1900	1086	11	1427	21	4524
01	1086	12	1389	22	3086
02	1076	13	1439	23	2813
03	1072	14	1478	24	3082
04	1080	15	1536	25	2878
05	1188	16	1681	26	2858
06	1157	17	1982		
07	1272	18	2654		
08	1280	19	3957		
—	—				

There are no particulars in respect of 1909, the year of the general strike. In 1918 the mechanics were on strike for about 100

days. In 1921 and 1922 the workers in the superphosphate and sulphuric acid factories went on strike, and their annual earnings during those years are therefore not included in the averages.

The workers received a clothing allowance (25 kronor in the earlier years, 100 kronor from 1918 to 1920 and after that 75 kronor) and free medical services (prior to 1920 the concern paid 10 kronor *per annum* for a married worker and 5 kronor for an unmarried worker, and after that date 15 and 7.50 kronor respectively). The working hours are stated to have differed according to the occupational group. In the sulphuric acid factory, in which mainly older workers were employed, they worked 365 days up to 1920 and after that year 308 days *per annum*, the work being done in shifts of 12 hours from 1899 to 1901 and of 8 hours in subsequent years. As to the other workers, they are said to have worked 300 days and 10 hours a day during 1899—1918, 9.5 hours in 1919, and after that 8 hours. Only the workers in the superphosphate factory were engaged on piece-work (80 %), the others being paid on a time-wage basis. Overtime was paid for at a rate of 38 % above the regular wage rate.

L. Reymerholm Copper Works, Hälsingborg.

Wage data have been extracted concerning a number of different occupational categories covering the years 1901—1926, and consist of annual earnings and the number of working days (day-jobs) in respect of 2 workers within each occupation. The following occupations are represented: in the extraction works: crushers, pyritic-ore loaders, roasters, leachers, filtering men; in the briquette-works: burners, drivers, heaters, switchmen, pressers; in the smelting-works: heaters and refinery smelters; craftsmen: bricklayers, joiners, mechanics; and finally, unskilled workers represented by only 2 selected workers. Besides these, there is a series containing 2 dockers, but as these earned a far higher daily wage than the other occupational groups (about 70 % more than the craftsmen), they are not included in the averages. As the daily earnings represented in the various series follow one another pretty closely and are on about the same level, we have struck averages for workers in the extraction works (10 workers), the briquette-works and the smelting-works (14 workers except during the period 1902—1904 when the series comprises 4 workers) and craftsmen (6 workers). We have further made a summary of the daily earnings of all workers combined. The annual earnings are of minor value, as work was suspended on numerous occasions in the various departments, and when work was suspended in one department the workers were given work elsewhere. We therefore publish only an average of the annual earnings of all the selected

workers, gaps being filled in only where absence has obviously been casual.

Table 148. Daily and Annual Earnings (in kronor) of Workers at Reymersholm Copper Works, Hälsingborg, 1901—1926.

Year	Daily earnings					Annual earnings. All workers
	Extraction works	Briquette- and smelting-works	Craftsmen	Unskilled workers	All workers	
1901	2.97	—	—	—	2.97	—
02	2.92	2.92	2.92	2.93	2.92	986
03	3.00	2.90	3.60	3.00	3.15	980
04	3.14	2.99	4.12	3.36	3.40	764
05	3.41	3.34	4.18	3.71	3.54	1140
06	3.38	3.15	4.81	3.43	3.55	999
07	4.10	4.13	4.68	3.68	4.20	1083
08	4.33	4.23	5.49	4.06	4.46	1401
09	4.56	4.10	5.02	4.11	4.42	1216
1910	4.79	4.47	5.01	4.66	4.68	1574
11	4.87	4.39	5.55	4.47	4.76	1535
12	5.36	4.46	5.54	4.76	4.96	1752
13	5.30	4.69	5.07	4.88	4.96	1651
14	5.40	4.98	5.12	5.20	5.15	1619
15	5.50	5.26	6.04	5.31	5.48	1808
16	5.49	5.42	6.45	5.26	5.63	1847
17	6.49	6.76	8.31	7.03	6.98	2283
18	8.56	8.27	9.45	8.52	8.60	2621
19	11.26	10.84	12.34	11.23	11.28	3628
1920	12.79	12.09	13.94	11.53	12.62	3668
21	14.42	13.12	14.93	12.54	13.83	2640
22	8.47	8.81	9.11	7.65	8.69	2164
23	8.92	9.04	9.13	10.34	9.10	2786
24	9.21	9.06	9.58	10.35	9.29	2852
25	9.44	9.98	11.15	11.29	10.11	3117
26	9.50	10.14	11.61	10.72	10.25	3093

The workers obtained fuel at cost price, this benefit being valued at 30 kronor per worker *per annum*. They received, further, free medical services and medicine, valued at 20 kronor.

As indicated above, the number of hours of work *per annum* varied very considerably. In the extraction works in certain years the men worked as much as 350—360 days a year, but for the most part the number of working days ranged around 310—340 during the early years and 300—310 during the period 1923—1926. In the briquette-works the working time fluctuated, the burners usually working 365 days (in 1907 and 1921, 275 days), and subsequent to 1921 about 340 days. The other workers in the briquette-works

generally worked between 280 and 340 days a year. Those engaged in the smelting-works usually worked about 340 days during the early years and about 305 days after 1922. The craftsmen have as a rule had a shorter working time *per annum*, usually about 300 days.

The regular daily working time was: in the extraction, briquette- and smelting-works 10 hours from 1901 to 1904, after which period the 3-shift system was adopted, so that each man worked 8 hours. That of the craftsmen and the unskilled workers varied between 9.5 and 10 hours up to 1920, after which it was 8 hours. The extent of the overtime worked is not known, but it is said that overtime was paid for at a rate 40 % above the standard hourly wage.

*M. Stockholm Superphosphate Factory at Gäddviken,
near Stockholm.*

This factory is represented by one series of 4 selected workers and one series of all the sulphuric acid workers (7—19) from 1884 to 1910, certain years excepted. The payrolls contain records of earnings at time-wage rates and on piece-work, also the regular working time expressed in days, shifts or hours, and overtime — all per worker and week.

Those engaged in manufacturing sulphuric acid worked in shifts, the ordinary length of each shift being 12 hours, but each worker worked one shift of 18 hours each week, the total number of days worked being alternately 6 and 7 per week. Thus, in the course of 2 weeks they worked 14 shifts of 12 hours, equivalent to 13 days' work with an average of about 12.9 hours *per diem*. The average working time per week was thus 84 hours — 78 hours and 90 hours every alternate week. From 1907 the employees worked alternately 76 hours and 92 hours a week, though still on an average 84 hours a week. Besides this, there was overtime amounting to about 60 hours *per annum*. No record is kept of piece-work until the year 1907, but this is of little consequence in estimating the hourly earnings of the selected workers, as their earnings on piece-work amounted to 70 kronor at the most. The piece-work earnings as measured by the all-workers' series, on the other hand, fluctuated around 200 kronor, and their hourly earnings were not recorded prior to 1907, when the hourly earnings on a time-wage basis correspond very closely to those of the selected workers. The annual earnings of both series tally, those of the selected workers, being on an average 1 % lower. The hourly earnings of all workers combined, on the other hand, are far above those of the selected workers, on account of their larger share of piecework, and owing to the hourly rate for piece-work being nearly double as much, viz. 67 öre.

For the year 1907 we have worked out the average earnings of the rest of the workers in the factory (an average of 84), the result being

an annual earnings average of 1,282 kronor and an hourly earnings average of 43.6 öre, while 18 sulphuric acid workers earned respectively 1,407 kronor and 36.1 öre. The hours worked by the rest of the workers in the factory were thus considerably shorter.

We further publish in Table 149 below series showing the trend of the hourly wage rate during the period 1884—1910, which have been furnished by the concern.

Table 149. Annual Earnings (in kronor) and Hourly Wage (in öre) of Workers at Stockholm Superphosphate Factory at Gäddviken, 1884—1910.

Year	Annual earnings		Hourly earnings		Hourly wage						
	Sulphuric acid workers				Sulphuric acid workers	Sulphuric acid workers	Lead-solders	Plate workers	Superphosphate shops	Men in work-shops	Sheet-metal workers
	Selected	All	Selected	All							
1884	894	882	19.9	—	20	20	19	20	20		
85	—	—	—	—	20	20	19	20	20		
86	—	—	—	—	20	20	19	20	20		
87	—	—	—	—	20	20	19	20	20		
88	—	—	—	—	20	20	19	20	20		
89	877	892	21.1	—	21	28	19	23	20		
1890	831	832	22.5	—	23	35	21	26	21		
91	1009	1006	23.0	—	23	35	22	26	21		
92	988	985	22.9	—	23	35	22	26	21		
93	—	—	—	—	23	35	22	26	21		
94	1036	1006	23.0	—	23	35	22	28	21		
95	1041	1094	23.0	—	23	35	22	29	21		
96	—	—	—	—	—	35	22	29	21		
97	1120	1103	25.0	—	25	26	25	25	26		
98	1075	1109	25.0	—	25	26	25	25	26		
99	1155	1149	26.5	—	28	26	28	29	30		
1900	1196	1242	28.0	—	28	33	28	29	30		
01	1205	1305	28.0	—	28	33	28	29	30		
02	—	—	—	—	28	33	28	29	30		
03	—	—	—	—	28	33	28	29	30		
04	—	—	—	—	29	33	28	29	30		
05	—	—	—	—	29	33	28	29	30		
06	—	—	—	—	31	33	31	29	30		
07	1394	1407	33.6	36.1	33	51	33	36	39		
08	1493	1526	34.8	38.1	34	51	34	36	40		
09	1291	1240	36.2	38.7	34	51	34	36	40		
1910	1490	1522	35.9	40.6	34	51	34	36	40		

N. The Nitroglycerine Factory, Stockholm.

The factory's wage lists have furnished details of daily wages and the number of day-jobs per fortnight. From 1906 printed contract forms have been used. We publish only one series showing the trend of the daily wages of one nitroglycerine worker during the period 1870—1915, he being considered representative of the male workers as the daily wage-rate paid to them was generally fairly constant.

Table 150. Daily Wage (in kronor) of Workers at the Nitroglycerine Factory, Stockholm, 1870—1915.

Year	Nitro- glycerine workers	Year	Nitro- glycerine workers	Year	Nitro- glycerine workers
1870 . . .	2.06	1885 . . .	2.75	1900 . . .	3.50
71 . . .	1.84	86 . . .	2.75	01 . . .	3.50
72 . . .	2.13	87 . . .	2.75	02 . . .	3.50
73 . . .	2.65	88 . . .	2.75	03 . . .	3.50
74 . . .	2.81	89 . . .	2.75	04 . . .	3.50
75 . . .	3.00	1890 . . .	2.91	05 . . .	3.72
76 . . .	3.00	91 . . .	3.00	06 . . .	3.85
77 . . .	2.89	92 . . .	3.00	07 . . .	3.84
78 . . .	2.63	93 . . .	3.00	08 . . .	3.83
79 . . .	2.25	94 . . .	3.00	09 . . .	3.83
1880 . . .	2.42	95 . . .	3.00	1910 . . .	3.83
81 . . .	2.61	96 . . .	3.00	11 . . .	3.83
82 . . .	2.75	97 . . .	3.00	12 . . .	3.83
83 . . .	2.75	98 . . .	3.20	13 . . .	3.83
84 . . .	2.75	99 . . .	3.38	14 . . .	4.01
				15 . . .	4.10

As a rule the daily wage-rate undergoes but slight variations and affords a poor indication both of the workers' income and of the costs of labour. But in the present case, where presumably the workers were for the most part engaged on time-wage work, the rates are of value. The series representing the trend of the daily wage rate is certainly rather constant, but it clearly reveals the cyclical changes. In 1871—1875 the daily wage rate rose 63 %, then fell 25 % during the next four years, rose 22 % during the period 1879—1882, 9 % in 1889—1891, 17 % in 1897—1900 and 10 % in 1904—1906. Between the periods mentioned the daily wage rate remained constant. We have not calculated the annual earnings, as generally the nitroglycerine workers did not work throughout the summer on account of the enhanced risk of explosion during the hottest season of the year. From 1870 up to the close of the

eighties work was suspended during the period May-October, but subsequently the period of suspension was shortened, lasting sometimes for only a month. In the seventies the number of days worked varied between 60 and 220 *per annum*, in the eighties it was about 170 days, in the nineties about 230 and during the five years 1900—1905 250 days. The regular number of hours worked per day was 10, except on Saturdays, when it was 7.5.

A number of somewhat scattered details of wages have been compiled in respect of other occupational groups. During the period covered by the wage extracts (1870—1880), the sulphuric acid workers' daily wage-rate corresponded very closely to that of the nitroglycerine workers and need not be quoted separately. A lad earned 45 kronor a month in 1865, his wages subsequently rising to 50 kronor in 1867. Unskilled workers, who are represented by 3 workers, received about the same monthly wage. Their annual income was 479 kronor in 1865, 565 kronor in 1866, 630 kronor in 1867, 627 kronor in 1868 and 540 kronor in 1869. A bricklayer worked for 298 days in 1868, his daily wage being 1.60 kronor and his annual earnings 476 kronor; a sheetmetal-worker received in 1869 an annual income of 640 kronor; in 1866 the daily earnings of 3—4 carpenters amounted to 1.50 kronor, in 1867 to 1.56 kronor, and their annual wages 560 kronor, increasing in 1868 to 627 kronor.

O. Jönköping Match Factory, Jönköping.

Information concerning the aggregate annual earnings of, and the number of hours worked by, 2 male workers (setting up of splints for matches) and 2 female workers (sorting) has been furnished from this factory. During the period 1903—1908 the number of hours worked by the male workers varied between 2,900 and 3,000, up to 1918 between 2,700 and 2,900, in 1919 and 1920 between 2,400 and 2,500, and during the period 1925—1927 between 2,000 and 2,100. The women's hours of work showed a tendency to be somewhat longer than the men's, though they were shorter after 1920 (1,800 hours). Work was suspended in the following years during the periods mentioned: about 82 days in 1918, about 105 days in 1921, about 118 days in 1922, about 57 days in 1923 and 5 days in 1924. The number of hours of work per day is reported as having been 10 in 1903—1908, 9.5—10 in 1909—1914, 9.5 hours in 1915—1919 and 8 hours in 1920—1927.

Table 151. Annual Earnings (in kronor) and Hourly Earnings (in öre) of Workers at Jönköping Match Factory, 1903—1927.

Year	Annual earnings		Hourly earnings	
	Male workers	Female workers	Male workers	Female workers
1903	700	—	23.6	—
04	650	—	21.8	—
05	725	—	25.0	—
06	850	560	28.5	19.2
07	823	665	27.9	22.1
08	873	635	29.5	21.8
09	843	609	30.5	22.2
1910	858	602	30.2	21.5
11	770	567	29.9	22.0
12	838	650	28.9	22.4
13	893	618	31.1	21.1
14	853	690	30.6	24.7
15	898	735	32.1	25.8
16	1198	688	43.3	24.2
17	1548	908	58.0	34.0
18 ¹	1720	1090	95.6	58.9
19	2573	1602	103.0	62.3
1920	2953	1710	122.2	64.1
21 ¹	2125	1263	150.9	89.7
22 ¹	1515	950	126.0	84.9
23 ¹	1989	1179	111.2	68.4
24 ¹	2165	1306	111.0	71.8
25	2206	1416	107.2	77.9
26	2225	1381	108.6	74.0
27	2212	1473	106.0	80.4

P. The Scanian Vinegar Works, Perstorp.

The factory comprises coal-furnaces, distillery, acetic acid factory, glassworks and sawmills. From the payrolls we have extracted particulars of annual earnings divided into piece-work wages and time wages, also the time in days spent on time-wage work. The series includes 6 male workers of unknown occupation, no particulars as to occupation as a rule being recorded.

Quite a number of the workers were entitled to free housing during the period 1889—1905, the value of which was estimated at the rate of 5 kronor per month. There are no data showing the time spent on piece-work and the number of hours worked a day. According to a cross-section drawn for 1905, in which it was possible to group the workers in their different occupations, the average

¹ Suspension of work.

Table 152. Annual Earnings (in kronor) of Workers at the Scanian Vinegar Works, Perstorp, 1889—1905.

Year	Male workers	Year	Male workers
1889	505	1898	630
1890	460	99	645
91	485	1900	667
92	556	01	703
93	627	02	721
94	608	03	702
95	594	04	724
96	562	05	721
97	543		

annual earnings of all the 49 full-year workers were 786 kronor, compared with the 721 kronor as measured by the series; from this it is clear that less skilled workers were selected. No less than 108 part-year workers, who were engaged to work for more than 1 month, were employed during the year 1905, their average daily earnings being 2.26 kronor.

APPENDIX.

LIST OF OCCUPATIONAL TERMS USED IN THIS VOLUME, WITH SWEDISH EQUIVALENTS.

One of the greatest difficulties in translating this volume from Swedish to English has been caused by the different practices in the two languages in regard to occupational terminology. In Swedish industries there is a multiplicity of very detailed occupational sub-classes, each of which has a special name descriptive of its function, whereas in English and American industries the general rule seems to be to call by a single name many such occupational sub-classes. We have therefore found it necessary to construct special English equivalents (in many cases merely literal translations of the Swedish) for these Swedish occupations, and we therefore present the following list of our constructed English terminology with the exact Swedish equivalents in order that our Swedish readers may the more easily identify these English terms.

<i>English term</i>	<i>Chapter</i>	<i>Swedish term</i>
adjuster	IV, VII	justerare, reglerare
anchor-journeyman	IV	ankargesäll
anchor-master	IV	ankarmästare
anchor-master's helper	IV	ankardräng
anchor-smith	IV	ankarräckarmästare
anvil-hardener	IV	städhärdare
anvil-smith	IV	städsmed
assistant	IV	dräng, hantlangare
backtender	IX	passare
bar-carrier	XII	stångbärare
barge-builder	IV	skutbyggare
barge-man	IV	skutkarl
barker	VIII	barkare
beaterman	IX	valsare
blacksmith	IV, V	klensmed, smed
blacksmith's helper	IV	klensmedsdräng
blast-furnace worker	IV	hyttarbetare
blaster	VI	sprängare
bleacher	IX	blekare
blower	VI	upplåsare
board-carrier	VII	brädbärare
board-carter	VII	brädvagnare
board-piler	VII	brädstaplare
board-sorter	VII	brädsorterare
bottle-washer, female	X	sköljerska
box-maker	IV, VI	lådmakare, lådsnickare
boxboard-piler	VII	lådbrädstaplare
boxboard-sawyer	VII	lådbrädsågåre
boxboard-trimmer	VII	lådbrädskapare
breaking-down roller	IV	förvalsare
brewers' drayman	X	ölutkörare
brewery worker	X	bryggeriarbetare
bricklayer	IV, XII	murare

brickmaker	IV, VI	tegelslagare
brick-moulder	VI	tegelprässare
bundler	IX	buntare
burler, female	XI	nopperska
burner	XII	brännare
calciner	IV	rostare, rostbrännare
calenderman	XII	kallanderarbetare
candle-moulder, female	XII	stöperska
carder	XI	kardare, ruggare
carpenter	IV, V, X	slöjdare, snickare, timmerman, träarbetare
carter	VII	vagnare
catcher	IV	mottagare
cementer	XII	cementare
cement-burner	VI	cementbrännare
cement-miller	VI	cementmjölnare
cement-packer	VI	cementpackare
chainsmith	V	kettingsmed
charcoal-burner	IV, VII	kolare
charcoal-forker	VII	kolfatäre
charcoal-screener	IV	kolrisslare
charcoal-wood carter	VII	kolvedvagnare
charger	IV	uppsättare
chipper	IV, VIII	mejslare, spinklerman
cigar-boy	X	cigarrgosse
cigar-sorter	X	cigarrsorterare
cigar-maker	X	cigarrarbetare
cinder-carter	IV	slagggörare
clay-loader	VI	lerlastare
cleaner	IX	putsare
clicker	XII	tillskärare
cloth-storer, female	XI	tyglagerska
coal-carter	IV	koldragare, koldräng, kolfatäre
coal-catcher	IV	kolmottagare
coal-screener	IV	kolrisslare
coal-washer	IV	kolvaskare
coal-wheeler	IV	kolfatäre
cook	VIII, IX	kokare
cooper	VI, X	tunnbindare
composer	IX	sättare
compressor-minder	IV	kompressarskötare
conveyer	IV	frambärare
craftsman		yrkesman, hantverkare
craneman	IV	kranförare
crane-tender	IV	kranförare
crucible-maker	IV	degelmakare
crucible-works employee	IV	degelverksarbetare
crusher	VI, XII	krossare
crusher tender	IV	krossare
cutter	VI, IX, XII	skärare, uppskärare
dampier	IX	fuktare
digester-house worker	VIII	arbetare i kokhuset
dipper	VI	glaserare
dipper, female	VI	glasererska
dock labourer (docker)	VI, XII	hamnarbetare
drawing-frame tender, female	XI	sträckerska
driller	IV	borrare
drilling-machine worker	IV	bormaskinsarbetare

driver	IX, XII	kusk, utkörare
dyer	XI	färgare
edge-polisher	VI	kantslipare
edge-sawyer	VII	kantsågare
edger	VII	förkantare
edger's helper	VII	hjälpkantare
electrician	IV, VIII	elektriker
emery grinder	V	smerglare
engine-cleaner	VI	lokomotivputsare
engine-driver	VI	lokomotivförare
engine-fireman	VI	lokomotiveldare
engine-fitter	V	maskinuppsättare
engine tender	IX	maskinist
engineer	IV	maskinarbetare, maskinist
file-cutter	V	filbuggare
filter-house worker	VIII	arbetare i silhuset
filtering man	XII	kopparfällare
finisher	XI	beredningsarbetare
finishing room girl	IX	salsarbeterska
finishing room worker	IX	salsarbetare
fireman	IV, VI, VIII, IX	eldare
foreman-straightener	IV	rätarmästare
foundry worker	IV	gjuteriarbetare
furnace master	IV	masmästare
furnace worker	VIII	sodabrännare, sodaugnsarbetare
furnaceman	IV	eldare, ugnskarl
gas-firemen	VI	gaseldare
gas-maker	IV	eldare, uppsättare
glass-blower	VI	glasblåsare
glass-blower's mate	VI	anfångare
glass-carrier	VI	glasbärare
glass-etcher	VI	glasetsare
glass-designer	VI	glasritare
glass-house labourer	VI	hyttdräng (i glasbruk)
glass-melter	VI	glassmältare
glass-packer	VI	glaspackare
glass-painter	VI	glasmålare
glass-polisher	VI	glasslipare
glass-sorter	VI	glassorterare
glycerine worker	XII	glycerinarbetare
greaser	IV, VIII	smörjare
grinder	IX	holländare
hackler	XI	slipare
half-melter	IV	häcklare
handicraftsman		halvsmed
hand at the chipper	VIII	yrkesman, hantverkare
handler, female	VI	huggare
haulier	VI	hänklerska
head-roller	IV	dragare
heater	IV	ställare, valsmästare
heater's helper	IV	vällare, värmare, glödgarer
heating-furnace bricklayer	XII	generatoreldare
heavy scrap breaker	IV	bakvärmare
helper	IV	vällugnsmurare
		klotsprångare
		dräng, hantlangare, uppsassare
		(i smedja)
hewer	VI	kolhuggare

hodman	VI	hantlangare
horse-shoer	IV	hovslagare
ingot-weigher	IV	gjutjärnsvägare
inspector	IV	järnsynare
inspector's helper	IV	stämplare, synare
iron-carter	IV	järndragare
iron-mould maker	VI	järnförmakare
iron-worker	VI	järnarbetare
joiner	V, VI, VIII, IX, X, XII	snickare
journeyman	XII	gesäll
keeper	IV	hyttdräng
labourer	IV	dagkarl, dräng
ladleman	IV	skänkförare
ladle-liner	IV	skänkmakare
Lancashire foreman	IV	smedsmästare
(Lancashire) foreman's helper	IV	mästersven
Lancashire melter	IV	Lancashiresmed
lath carter	VII	ribbvagnare
lath-drawer	VII	ribbdragare
lathe-hand	IV	svarvare, valssvarvare
lastmaker's mate	XII	lästpojke
layer-on	VII	påläggare
leacher	XII	lakare
lead-solderer	VIII, XII	blylödare
lever-man	IV	upplyftare
limestone-breakers	IV	kalkslagare
loader	IV, VI, VII	lastare
log-catcher	VII	timmersnarare
log-hauler	VII	timmerspelare
log-sorter	VII	bomkarl, timmersortare
machine adjuster	IV	ställare
machine-tender	VIII, IX	maskinförare
machine-worker	V	maskinarbetare
machinist	IV, VI, X	maskinist, maskinarbetare, maskinskötare
malthouse worker	X	mälteriärbetare
mason	VI, VIII	murare
master mechanic	IV	verkstadsförman
measurer	VII	tummare
measurer's helper	VII	hjälpummare
mechanic	IV, VI, VIII, XII	järnarbetare, maskinist, maskinreparatör, mekaniker, verkstadsarbetare
melter	IV, VI	smed, smältare
melter's helper	IV	hjälpmed, hjälpsmältare, smedsdräng
mill-hand	X	kvarnarbetare
mine-constructor	IV	gruvbyggare
miner	IV, VI	gruvarbetare, gruvbrytare
mixer	VIII	mixare
moulder	IV, V, VIII	gjutare
mould-stripper	IV	flaskurslagare
nailcarter	IV	spikkörare
nailer	IV	spikare
nail-packer	IV	spikpackare
nailsmith	IV	spiksmed
odd-job man (odd-man)	IV	hantlangare
open-hearth labourer	IV	martinarbetare
open-hearth melter	IV	martinismältare

open-hearth worker	IV	martinarbetare
ore-breaker	IV	malmslagare
ore-hoist man	IV	malmspelare
ore-loader	IV	malmstare
ore-picker	IV	skrådare
ore-transporter	IV	malmskjutare
ore-unloader	IV	malmlossare
ore-washer	IV	malmsovrare, vaskeriarbetare
ore-wheeler	IV	malmskjutare
oven-man	VI	ugnsarbetare
packer	IV, VI, IX, XII	packare
pastor	XI	klustrare
pasteboard machine worker	IX	kartongarbetare
pattern-maker	IV	modellsnickare
pig-iron weigher	IV	tackjärnsvägare
piler	IV	uppläggare
	VII	stabbläggare
pit-boy	VI	draggoose
pitman	IV	kokillresare, måttresare
planer	IV	hyvlare
plank-carrier	VII	plankbärare
plank-carter	VII	plankskjutare, plankvagnare
plank-drawer	VII	plankdragare
plank-loader	VII	planklastare
plank-piler	IV, VII	plankstaplare, stabbläggare
porter	IX	bärare
potter	VI	fajansarbetare, lerkärlsarbete
		tare
presser	V, XI, XII	pressare
printer	IX, XI	tryckare
pump-hand	IV	pumpskötare
pyritic-ore loader	XII	kislastare
quarryman	VI	stenbrytare
quarter-melter	IV	fjärdedelssmed
rag-cutter, female	IX	lumpristerska
reeler, female	XI	hasplerska, härverska
refinery smelter	XII	raffinadsmältare (i kopparverk)
repairer	VIII, IX, X	reparatör
roaster	XII	rostare
roller	IV	rullare (i spikfabrik), valsare
roller's helper	IV	valsaredräng
rolling-mill foreman	IV	valsmästare
rolling-mill worker	IV	valsverksarbetare
roll-turner	IV	valssvarvare
sack-brusher	VI	säckborstare
sack-cleaner	VI	säckrensare
sand-grinder	IV	sandmalare
saw-adjuster	VII	sågställare
saw-sharpener	IV	sågsåarpåre
sawyer	IV, VII	försågare, ramsågare, sågare
sawyer's helper	VII	hjälpågare
seamstress	XI	sömmerska
screwman	IV	skruvare
scutcher	XI	anslagare
shaft-head boy	IV	lavpojke
shaft-house worker	IV	lavstatsarbetare
shearer	IV	klippare
sheet-iron worker	V	plåtslagare

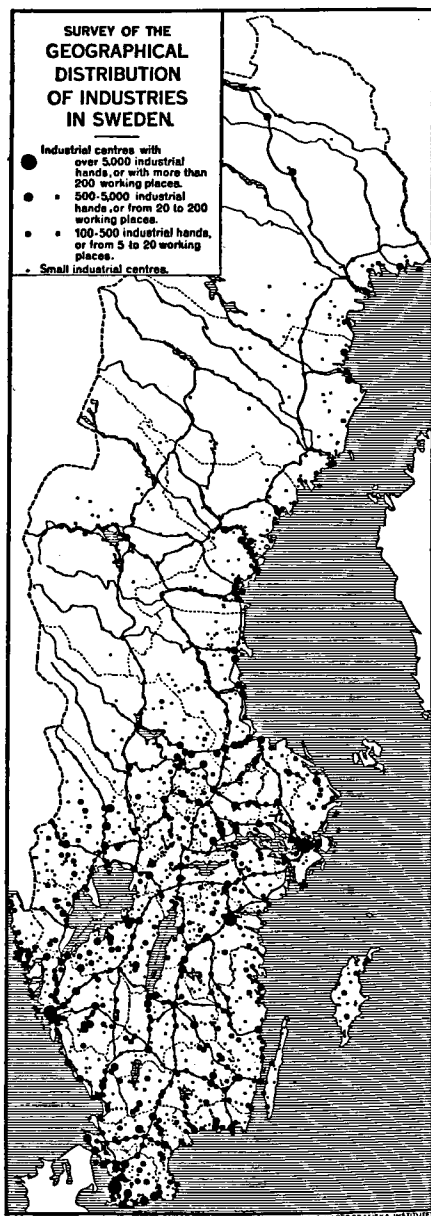
sheet-metal shearman	IV	stålklippare
sheet-metal worker	IV, V, VI, XII	plåtstagare
shingler	IV	hopstagare
sinkhead liner	IV	boxmakare
sizer	XI	limmare
slab-drawer	VII	bakdragare
slag-wheeler	IV	slaggskjutare
slagman	IV	slaggdräng
sledge-hand	IV	släggare
sliphouse-man	VI	massaslagare
slubbing-frame tender, female	XI	slubberska
smith	IV, V, VI, VII, VIII, IX, X	smed
soap-boiler	XII	tvåkokare
sole-cutter	XII	sulskärare
sorter	IV, VI, VII	sorterare
spinner	XI	spinnare
spinner, female	XI	spinnerska
spinner-boy	X	spinnargosse
sponger	XI	dekaterare
steel-blower	IV	stålblåsare
steel-inspector	IV	stålsynare
steel-shearer	IV	stålavhuggare
steelsmith	IV	stålsmed
steel-sorter	IV	stålsorterare
steel-weigher	IV	stålvägare
stem-maker	VI	benmakare
stitcher, female	XII	nätlerska
stoker	VI, VII, X	eldare
stonemason	IV	stenarbetare, stensättare
stone-quarryman	VI	stenbrytare
stopper	VI	stoppare
storeman	IV, VI, X, XII	förrådsarbetare, magasinsar- betare, uppläggare
straightener	IV	rätare
sugar-boiler	X	sockerkokare
sulphur-burner	VIII	svavelbrännare
sulphuric acid worker	XII	svavelsyrearbetare
supercalender man	IX	glättare
superphosphate worker	XII	superfosfatarbetare
switchman	XII	växlare
tanner	XII	garvare
threshing-machine fitter	V	tröskverkssnickare
tilter	IV	knippare, räckare
tilting smith	IV	stålräckare
timber sorter	IV	timmerskiljare
tobacco worker	X	tobaksarbetare
tool-maker	IV, V	verktygsarbetare
top-filler	IV	uppsättare
transport worker	IV, X	götvägare, indragare, järn- bärare, transportarbetare
tricot knitter	XI	trikåstickare
tricot seamstress	XI	trikåsömmerska
trimmer	IV	skrotare, tackjärnsskrotare
truckman	IV, VII	vagnare, vagnskarl
turner	V	svarvare
varnisher	XII	fernissare, lackerare
vice-hand	IV, V, IX	filare
warper, female	XI	varperska
waste-carter	VII	spåndragare, spånvagnare

APPENDIX

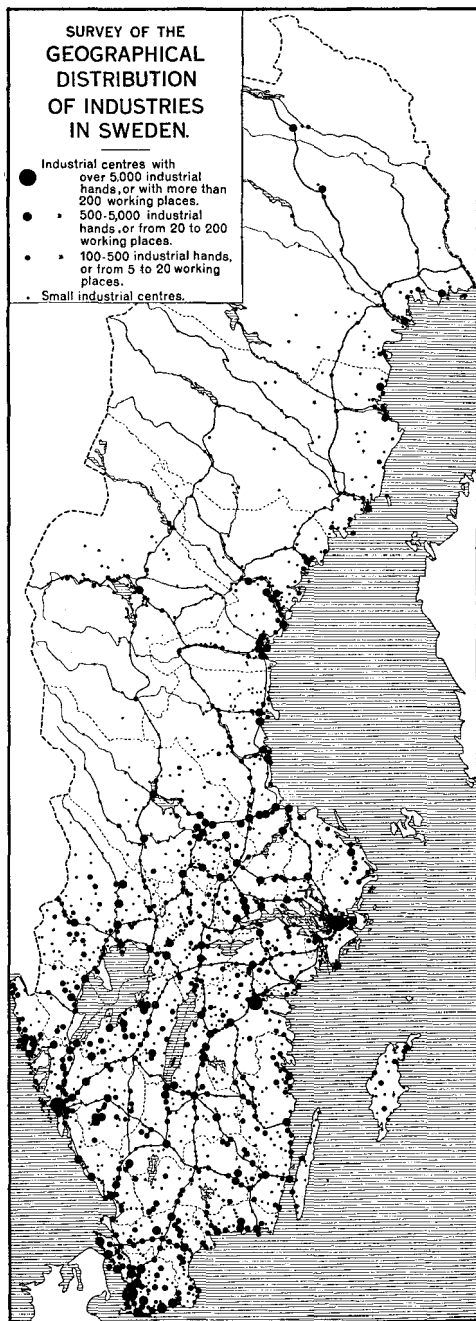
579

waste-remover	IV	spånskjutare
watchman	IV	eldvaktare
weaver	XI	vävare
weaver, female	XI	väverska
weigher	IV	(skrot)vägare, ämnesvägare
welder	IV	vällare
winder	IV	uppfordrare
winder, female	XI	härverska, rullerska
windlassman	IV	spelstyrare
	VI	gamsare
wire drawer	V	tråddragare
withdrawer	VII	uttagare
woolen-sorter	XI	ullsorterare

Survey of the Geographical Distribution of Industries in Sweden. 1924.

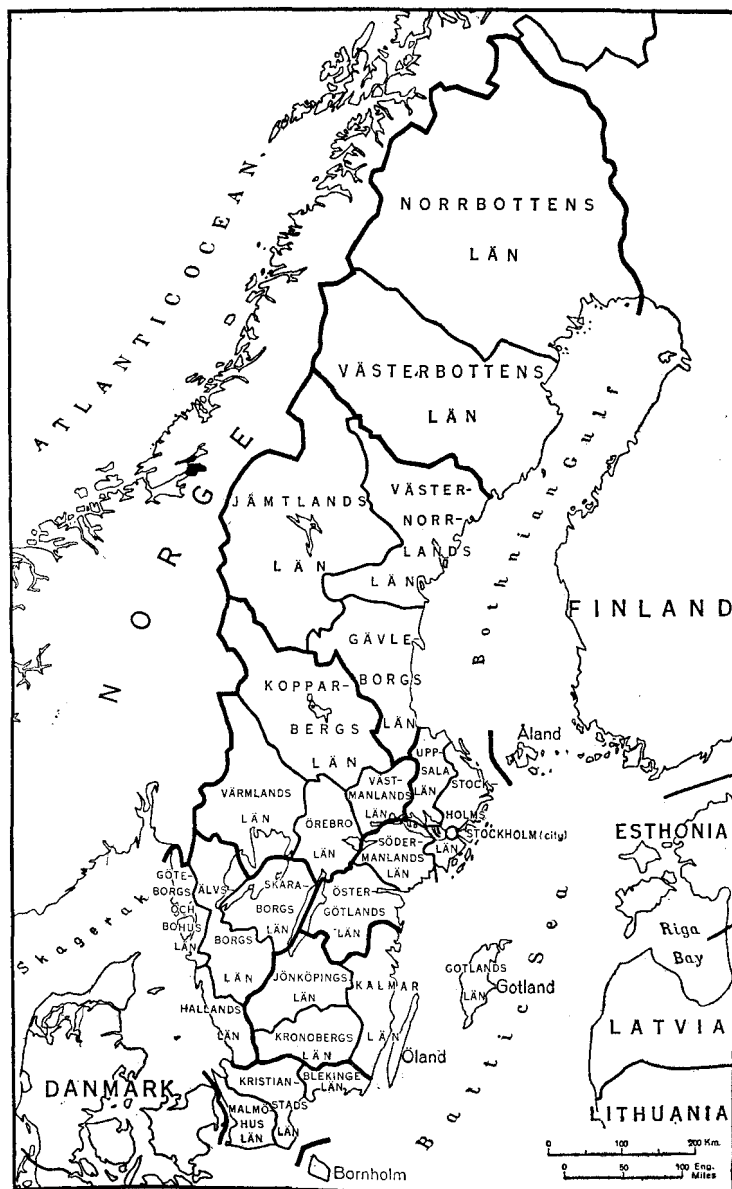


Survey of the Geographical Distribution of Industries in Sweden. 1924.



A.-B. KARTOGRAFISKA INSTITUTET

The Swedish Counties ("län").



A.-B. KARTOGRAFISKA INSTITUTET

The Swedish Counties ("län").



The Swedish Counties ("län").



CHECKED
8060-08

X:946.571.N3 G3-2.1 81869

BAGGE (Gosta) etc.

Wages in Sweden, 1860-1930.

Pt. 1.

Name of borrower	Lent on	Recei ban

**SERVANTS OF INDIA SOCIETY'S LIBRARY
POONA 4.**

1. Books taken from the Library may not be retained for more than a fortnight.
2. Borrowers will be held strictly responsible for any damage done to books while the books are in their possession.