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# OUTLINES OF RAILWAY ECONOMICS



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# OUTLINES OF RAILWAY ECONOMICS

BY

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## PREFACE

THIS book owes its origin to a course of lectures on "Economics with special reference to Railways," which I gave at the Midland Railway Institute, Derby, and at the University of Sheffield, during the past winter. Each week a resumé of the lecture was published in *The Railway News*, and these resúmes form the basis of the book. I owe my best thanks to Mr. Frederick M'Dermott, the Editor of *The Railway News*, for kindly allowing me to make what use I wanted of the resúmes. I have revised the whole of them, eliminated the lecture form, divided the matter up into chapters, re-written certain portions, and made various additions and alterations.

I have approached railway problems from the standpoint of an economist, and have sought to show how the economic principles which underlie business and industry in general apply to railways in particular. Either I had to assume that the reader had a knowledge of general economics, or I had to devote space to the discussion of certain

portions of economic theory ; I selected the latter alternative. As a consequence, the book includes a good deal of matter which would ordinarily be excluded from a book on railways, but its inclusion has the advantage of emphasising the connection between general economics and railway economics. The book is based primarily on a study of railway conditions in this country, but reference is frequently made to conditions abroad, particularly in Prussia.

My obligations are very numerous. In what concerns those parts of the book which deal with general economics, my primary obligation is to Professor S. J. Chapman of the University of Manchester, who first taught me the subject. I also owe much to various economists whose ideas I have assimilated since I began to study economics, and especially since I began to prepare lectures. In most cases, I can no longer say to whom I owe a particular idea ; there are, however, two acknowledgments of this kind which I should like to make. Mr. Macrosty's account of industrial combinations in this country, and Professor Pigou's treatment of the subject of differential charging, have been especially helpful to me in writing certain chapters.

For the information concerning railways, I am indebted to three sources : in the first place, to numerous authors who have dealt with different aspects of railway economics ; in the second place,

to various parliamentary papers, a list of which, as also of the authors consulted, will be found at the end of the book. In the third place, I am indebted to many of the railwaymen who attended my lectures at Derby and at Sheffield, as in the essays which they wrote, and in the discussions which they raised at the end of lectures, they were kind enough to supplement and correct, in a way which it is only possible for railwaymen to do, information which I had obtained from other sources. In particular, I am under a great obligation to three of my students of the Midland Railway staff, Mr. H. Curwen of the Goods Department, Sheffield; Mr. E. Falconer of the Chief Goods Manager's Office, Derby; and Mr. T. Radford of the Chief Goods Manager's Office, Derby. These gentlemen took the trouble of going through the resumés in *The Railway News* after the lectures were finished, and made many valuable suggestions and criticisms which have been of great assistance to me in preparing the manuscript for the press.

I am further under obligation to my colleagues, Dr. J. D. Jones and Mr. T. S. Ashton; and to Mr. E. Falconer and Mr. K. L. Gould, for their great kindness in reading the proof-sheets of the book while it has been passing through the press.

DOUGLAS KNOOP.

SHEFFIELD, *June*, 1913.



## INTRODUCTION TO THE 1923 EDITION

DURING the ten years which have elapsed since the first edition of this book was published, the position of the railways in Great Britain has undergone great changes, which have not yet fully worked themselves out. Three phases of this recent transformation of the British railway system can be distinguished :

1. The first began at midnight on August 4th/5th, 1914, and lasted until August 15th, 1921. This was the war period, during which the principal railways of Great Britain were "controlled" by the Government, which guaranteed to the companies their 1913 net revenue, subject to certain modifications. It was a period of rapidly rising prices, which necessitated the payment of higher wages and increased outlay on coal and materials; the working expenses of the railways increased by leaps and bounds and the deficits to be made good by the government became greater and greater. During the war, cheap fares were abolished and ordinary fares were raised, though probably both

these steps were taken as much with the object of discouraging civilian traffic, as in the hope of securing more revenue. After the Armistice, fares were further raised and rates and other charges were approximately doubled with the object of making railway revenue meet railway expenditure : these readjustments reduced, but did not eliminate, the unfavourable balances which had to be met out of the National Exchequer. The expenditure shown in the *Finance Accounts* under the heading of " Railway Agreements " was £59,800,010 in 1919-20, £38,253,427 in 1920-21, and £72,748,077 in 1921-22, the last sum presumably including the first of two instalments of £30,000,000 payable in liquidation of all claims in connexion with the " de-control " of the railways.

One of the many problems which had to be solved by the Government shortly after the Armistice was what to do with the railways, as the war-time system of " control " could hardly continue indefinitely. The conditions prevailing made it practically impossible to restore the pre-war arrangements. On the other hand, the Government did not appear anxious to nationalize the railways ; perhaps the heavy deficits which were being incurred, in conjunction with the pressing need for economy in State expenditure, had something to do with this decision. In any case, the Government took a middle course, which may be briefly described

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as the State regulation of privately owned monopolies. Both the monopoly element and the state regulation element had existed under pre-war conditions, but they were to be greatly intensified under the new system as established by the Railways Act, 1921.

2. The second phase began on August 16th, 1921, and lasted until December 31st, 1922. It was the interregnum between the war-time system of Government "control" and the new system to be set up under the Railways Act, 1921. During this comparatively short period, the railways were once again under the management of the old companies, which were engaged in the double task of trying to restore their undertakings to a sound financial position, whilst at the same time negotiating the terms of the amalgamations and absorptions which were to come into force with the inauguration of the new system on January 1st, 1923.

3. The third phase began on January 1st, 1923; it is the new system in process of being set up; some time must elapse before it is firmly established. At the moment, therefore, the railways of Great Britain are passing through a transitional stage, several of the most important changes provided for in the Railways Act, 1921, not having yet been put into force. Even when this has been done, it will not be until general economic conditions in the country become more normal that the railway

situation is likely to settle down to a position of comparative stability. In view of the uncertain and fluctuating character of the present railway position, no attempt has been made to deal with it in the text of the book, which remains as in the previous edition. The leading features of the new system must, however, be described :

(i.) The principal railways in Great Britain have been merged into four great groups, viz., (a) the *Southern Railway Co.*, which includes the London and South Western Railway Co., the London, Brighton and South Coast Railway Co., the South Eastern Railway Co., and the London, Chatham and Dover Railway Co.; (b) the *Great Western Railway Co.*, which includes the old Great Western Railway Co., the Barry Railway Co., the Cambrian Railway Co., the Cardiff Railway Co., and the Taff Vale Railway Co.; (c) the *London, Midland and Scottish Railway Co.*, which includes the London and North Western Railway Co., the Midland Railway Co., the Lancashire and Yorkshire Railway Co., the North Staffordshire Railway Co., the Furness Railway Co., the Caledonian Railway Co., the Glasgow and South Western Railway Co. and the Highland Railway Co.; and (d) the *London and North Eastern Railway Co.*, which includes the North Eastern Railway Co., the Great Central Railway Co., the Great Eastern Railway Co., the Great Northern Railway Co., the Hull and Barnsley

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Railway Co., the North British Railway Co., and the Great North of Scotland Railway Co. Roughly, each group has a monopoly in its own area, as is the case with the French railways, though there remains competition where the areas touch, or where they overlap. It is expected that very considerable economies will result from this consolidation of the railway undertakings, and that these, whilst to some extent benefitting the shareholders, will to a much larger extent benefit the general public, by enabling the charges to be reduced. Obviously some time must elapse before the full economies can be effected.

The terms of most of the amalgamations and absorptions were reached by agreement between the companies concerned and merely submitted to the Railways Amalgamation Tribunal for approval. In two cases, however, viz., those of the amalgamation of the North Staffordshire Railway Co., and of the Caledonian Railway Co., with the London, Midland and Scottish Railway Co., the Amalgamation Tribunal which was set up under the Railways Act, 1921, had to settle the terms, as the companies concerned were unable to reach agreement.

(ii.) The principles which should govern the fixing of tolls, rates and charges for the carriage of merchandise by freight and passenger trains and for other services were considered by the

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Rates Advisory Committee, set up under Section 21 of the Ministry of Transport Act, 1919. This Committee, after an inquiry which lasted 40 days, reported that the existing general scheme of railway rates gives satisfaction and that it should be continued. Consequently, no change in this respect is made in the Railways Act, 1921.

(iii.) The classification of merchandise is to be revised. In the first instance, the new classification is to be settled by the Rates Advisory Committee. The Committee in determining the class into which any particular merchandise is to be placed shall (in the words of the Act), in addition to all other relevant circumstances, have regard to value, to the bulk in comparison to weight, to the risk of damage, to the cost of handling and to the saving of cost which may result when merchandise is forwarded in large quantities. Considerable progress with the revision has been made by the Committee, which appears to be taking as a basis a proposed classification of merchandise by goods train divided into 21 classes instead of the old 8 classes. This new scheme was put forward by the railway companies, the object of the additional classes being, so far as possible, to merge exceptional rates into the new standard rates. The draft classification, as determined by the Committee, is now nearly ready for final approval and issue.

(iv.) When the Rates Advisory Committee re-

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ported in December, 1920, they stated that the great increase in the cost of materials and wages during the last few years rendered necessary new adjustments of rates which would involve sweeping away the maximum scales of rates and charges embodied in the Railway Rates and Charges Orders Confirmation Acts, 1891 and 1892, and the limitation on tolls for the use of railways imposed by the Special Acts. They recommended that in future the principle of fixing maximum scales and allowing the railway companies to fix actual rates within those maximum scales should be abandoned, and that the actual standard rates and tolls should be fixed by an independent tribunal. This recommendation was accepted by the Government, and incorporated in the Railways Act, 1921. By sections 30, 31 and 32 of that Act, schedules of standard charges, formed according to the new classification, are to be submitted by the amalgamated companies to the newly-constituted Rates Tribunal, which, after considering objections by interested parties, is finally to settle the schedule of charges and appoint a day when the same shall come into operation. On and after the "appointed day" the companies will be obliged to charge the standard charges, unless they put into force an exceptional rate or exceptional fare granted in accordance with the provisions of the Act. At the end of January, 1923, the Tribunals had not received the proposed schedules from the companies, but certain

preliminary questions of principle had been under discussion.

(v.) On and from the "appointed day," all then existing exceptional rates will cease to operate (subject to certain modifications laid down in the Act), with the exception of those which comply with the three following conditions, viz., (a) that they are not less than 5 nor more than 40 per cent. below the standard rates; (b) that they have been continued by agreement in writing between the railway company and the trader concerned; and (c) that they have actually been applied during 1921 or 1922. As from the same date, the companies will be allowed to grant new exceptional rates provided (a) that they are not less than 5 nor more than 40 per cent. below the standard rates, and (b) that they are reported within fourteen days to the Minister of Transport, who may refer them to the Rates Tribunal for decision. Where an exceptional rate has been fixed by the Tribunal, it cannot be increased or cancelled without the consent of the Tribunal, though it can be reduced by the company, but not to more than 40 per cent. below the standard rate, provided the reduction is reported to the Minister. Where an exceptional rate has been granted without reference to the Tribunal, it can be increased or cancelled by the company, on giving thirty days' notice, subject to the right of any interested party to appeal to the Tribunal. In view of the great increase in the



number of classes under the new classification. it is probable that far less traffic will be carried at exceptional rates than has been the case in the past.

(vi.) The independent Tribunal for the fixing of rates and fares, the establishment of which was recommended by the Rates Advisory Committee. has been set up under Section 20 of the Railways Act, 1921. It consists of three permanent members, one of whom must be a person of experience in commercial affairs, one a person of experience in railway business, and one, the president, an experienced lawyer. There has also been constituted a General Panel of 36 persons, and a Railway Panel of 12 persons. For the purpose of any particular case, one person from each panel may be added to the Tribunal, such additional members exercising all the powers and functions of a permanent member. The decisions of the Tribunals are by a majority of the members, including the additional members.

The main functions of the Railway Tribunal are :—

(a) To complete the general revision of railway charges commenced by the Rates Advisory Committee, by determining in the first instance the standard charges, and in certain cases the exceptional rates, to be charged by the railway companies, and by settling standard terms and conditions of carriage. The charges are to be so fixed in the first instance that with good management they, together with the other sources of revenue, will yield an

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annual net revenue (to be called the standard revenue) equal to the aggregate net revenues of the constituent companies in 1913, together with (approximately) 5 per cent. on the capital expenditure incurred since 1913 or not fully remunerative in 1913.

(b) To review periodically such standard charges and exceptional rates. These are to be readjusted periodically (i) by raising the charges to provide the standard revenue, with an allowance for additional capital, if there is found to be a deficiency which is likely to continue, and (ii) by lowering the charges so as to reduce the subsequent excess by 80 per cent. if there is found to be an excess which is likely to continue. If at one revision an excess is found, the basis for a future revision, in the case of a further excess, is to be the standard revenue, with an allowance for additional capital, *plus* 20 per cent. of the previous excess, which is to be known as the "increased standard." Such "increased standard" may be increased as the result of subsequent excesses.

(c) To determine questions relating to railway charges brought before the court both before and after the "appointed day." Twelve such applications, mostly asking for a reduction of particular rates, were brought before the Tribunal during 1922.

The existing powers of the Railway and Canal Commission, in so far as they are exercisable by the Rates Tribunal under the Railways Act, 1921, will

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cease to be exercisable by that Commission, as from the "appointed day."

For more details concerning the Railways Act, 1921, the reader is advised to consult the Act itself and the first Annual Report of the Railway Rates Tribunal for 1922.

Reference must be made to one other development which has considerably affected the position of the railways in Great Britain during the past ten years, viz., the great extension of road transport by motor. This has become particularly acute since the Armistice, with the release of vast numbers of motor vehicles from the army and the removal of the petrol restrictions. Much motoring is indulged in for its own sake, so that a good many of the people who may be seen motoring on a fine afternoon cannot be regarded as potential passengers who have been lost to the railway companies. The same is true of motorists who now use cars instead of carriages and horses. On the other hand, a great many people who have to travel for business reasons, or who wish to reach particular destinations for pleasure purposes, do avail themselves of charabancs, motor buses, motor cars and motor cycles, so that the railway companies must lose a large amount of traffic. In the case of the transport of goods by motor, some represents traffic formerly conveyed by horse-drawn vehicles, but much has been captured from the rail-

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ways. In some cases it is the manufacturer or wholesaler who maintains his own fleet of vans ; in others, it is a firm of carriers which has established itself in the motor transport business. The possibility of delivering goods from consignor to consignee without transshipment or intermediate handling enables considerable economies to be effected in time and packing. It is high class, rather than low class traffic, and small, rather than big consignments which are concerned, though it is obvious that a very large number of small consignments of high class goods lost to the railway companies is a very serious matter to these companies. In the case of both passengers and goods it is short distance rather than long distance traffic which has been diverted from rail to road, though the long distance road traffic is by no means negligible.

Motor transport has made great headway, partly because of the real facilities it offers in certain cases both in respect of promptness of delivery and saving in packing, and partly because of its lower cost. This lower cost is probably due largely, if not entirely, to the fact that the motor-owner does not bear his full share of the expense of providing and maintaining the roads he uses. Motor taxation meets some of this cost, but the bulk of it falls upon the local ratepayer and the general taxpayer. People who travel by motor or send their goods by motor are really being subsidised by the local and national exchequers.

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Thus, in so far as the railway companies are large ratepayers, they are actually contributing substantial amounts towards the subsidies granted to their competitors. As under the Railways Act, 1921, railway charges are to be fixed so as to yield to the companies their 1913 net revenues, together with an allowance for additional capital expenditure, it may perhaps not unreasonably be urged, that it does not matter very much to the railway companies. They will recoup themselves by higher charges, and the public, which travels by railway and which uses goods transported by rail, will have to bear the burden. Whether justice, however, is thus meted out to all the parties concerned is somewhat problematical.

DOUGLAS KNOOP.

SHEFFIELD, *July*, 1923.

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## CHAPTER I.

### INTRODUCTION

*Subject-matter of economics.* Economics is the study of the problems arising out of the acquiring and spending of income. As most men and many women and children are engaged in earning their livelihoods, and as the great majority of people have occasion to spend money for the purpose of purchasing food, clothing, housing accommodation and a large variety of other things, our subject-matter is very comprehensive. Owing to the fact that economics deals with people's activities in their ordinary everyday occupations, about which almost everyone must necessarily have some knowledge, it is thought by some to be too commonplace to call for study. This attitude, however, entirely overlooks the complex character of modern social organisation.

If society consisted of nothing but self-sufficing individuals or families, there would be few economic problems. Actually, even a small farmer desirous of leading the simple life is compelled to obtain from outside his holding some of the necessaries and

comforts of life, such as salt, sugar, tea, tobacco and rice, as well as implements and tools. In other words, he must sell some of his products in order to buy other things which he requires. The question then arises, on what terms are the various exchanges to be effected, or how are the prices of the different articles determined? In this age of specialisation, nearly everybody depends entirely upon others to obtain, by exchange, the things he requires; people no longer produce for their own consumption, but for sale; consequently, the problem of price is very large indeed.

Other economic problems are caused by the fact that industry is no longer carried on in workshops by small independent producers, master craftsmen assisted by one or two journeymen and apprentices, but is conducted in large factories in which employment is found for hundreds and even thousands of workpeople. How is the remuneration of these workers determined?—that is the problem of wages. What return is to be made to the capitalists who have provided the means for building and equipping the factory?—that is the problem of interest. The economist is also concerned with the rent which must be paid for the use of the land and the profits which constitute the employer's remuneration for undertaking the business.

*Definition.* Having indicated a few of the problems with which economics is concerned, we may

pass to a formal definition of our subject. Economics, or political economy as it was formerly called, is the science of man in relation to wealth. By wealth is understood all such means of satisfying human wants as are transferable. Thus wealth includes, amongst other things, all desirable material commodities that are capable of appropriation, such as food, clothing, houses and machinery, and also all rights or opportunities to use or derive benefit from material commodities, such as mortgages, shares in companies, and patents. On the other hand, personal abilities and attainments are excluded from our conception of wealth.

As has just been stated, economics is a science. Every science does three things: it observes, it classifies, and it explains certain groups of phenomena. The phenomena with which economics is concerned are social facts relating to wealth. The final end of every science is to explain, *i.e.* to find uniformities or laws as they are called. We have a natural law, when the results of a certain action under identical circumstances are always the same, *e.g.* the law of gravitation. A natural law is a general uniformity; so, too, is an economic law, only the uniformities which we are able to discover in economics are not as rigid as those in some of the natural sciences; a stone thrown into the air must inevitably fall to the ground, but an individual, under any particular circumstances, is free to act as



he chooses. In economics we can ascertain only a general tendency or uniformity which is true in the aggregate ; if X sells books at net prices and Y next door allows a 25 per cent. discount, it will be safe to say that there will be a general tendency to buy books from Y ; but there will probably be some people who, for one reason or another, will buy from X. Although economic laws are not universally true, they are sufficiently accurate to be of great service in helping to explain many complex problems.

In every science there are two points of view, the positive and the normative, from which the facts may be regarded. The positive point of view traces the causes and effects of phenomena, and seeks to establish uniformities. A positive science is a body of systematised facts concerning what is ; as, for example, chemistry, which is the science which ascertains the nature and composition of different bodies. From the normative point of view judgments are passed on people's actions, and facts are judged by a standard. A normative science is a body of systematised knowledge relating to criteria of what ought to be ; it is concerned with the ideal ; as, for example, ethics, which is the science of conduct.

Economics, in the widest sense of the term, includes a positive and a normative science and something else in addition. Since, economically, all people act in pretty much the same way, economics

includes a positive science in which we establish economic laws or uniformities ; as long as people have aspirations, economics must include some criticism of economic ideals, which is a normative science ; and inasmuch as people are reasonable, there will be in addition an organised study of practical questions, a more or less systematised treatment of the methods by which economic ideals can be realised, these economic precepts or suggestions constituting the art of economics.

Two illustrations may be given of the different ways in which economic phenomena can be regarded, the one concerning wages, the other concerning railway rates. To ascertain the laws which determine wages is part of the positive science of economics ; to consider whether a particular wage is a fair wage, is a matter for the normative science of economics ; to show how unduly low wages can be brought up to a reasonable level, belongs to the art of economics. To ascertain how railway rates are determined is part of the positive science of economics ; to consider whether a particular rate or system of rates is fair, falls within the province of the normative science of economics ; to suggest how a fair system of rates can be established is part of the art of economics. In this book we shall be concerned almost exclusively with the positive science of economics.

*Methods of economics.* The methods of economics are the same as those of other sciences ; either we

may reason from general propositions to their particular applications, *i.e.* employ deduction, or we may sum up a number of particular propositions in a general conclusion, *i.e.* employ induction. In economics we usually combine the two methods. We resort to induction to establish general propositions or premises. They are generally borrowed from other sciences, such as psychology or physics; *e.g.* other things being equal, man prefers a greater to a lesser gain; man prefers to satisfy his desires by making a lesser rather than a greater sacrifice. From our premises obtained under simple conditions by means of induction, we argue deductively to show what happens under more complex conditions. Our last step is to verify our results by induction, whenever that is possible.

*Application of economics to railways.* The question remains to be considered, how is the economist concerned with railways? The railway industry, as one of the greatest in the country, employing as it does some 600,000 men and boys, and representing a capital outlay of more than £1,100,000,000, would naturally call for the attention of the economist. But there are at least three special reasons for studying the railway industry. In the first place, railways are of enormous importance to society; on the one hand, transportation has some share, great or small, in the production of all commodities, so that practically all producers and consumers are directly

interested in the price of railway services ; on the other hand, railways have a great influence on the distribution of population, and are consequently a matter of much social concern. In the second place, the railway industry affords illustrations of some of the most interesting problems of price determination ; the principle of differential charging can be seen at work in other industries, but nowhere is it so fully acted upon as in the case of railways. In the third place, the railway industry, partly owing to its widespread influence on the welfare of other industries and of the country generally, and partly owing to its tendency to be monopolistic in character, has been marked out for special attention by the State throughout the world ; governments either exercise considerable supervision over railways or actually own them.

An ordinary treatise on economics contains comparatively little or even no reference to railways ; when the economist seeks to establish the general principles underlying the production, distribution, exchange and consumption of wealth, what he has particularly in mind are these four processes in relation to agriculture and manufactures. In some cases, the theories based on the observation of particular industries can be applied to other industries without any difficulty ; no special treatment of the subject is called for. For example, once a general theory of wages has been formulated, it should

suffice to explain how wages are determined in any particular industry, without an analysis of the conditions prevailing in that industry. In other cases, it is by no means obvious how some general theory applies to a particular industry. This not infrequently happens in connection with the railway industry. It is often necessary to consider in some detail the organisation and working of a railway undertaking in order to show that the same principles underlie it as underlie other industries. A study, with reference to railways, of those economic principles which require special treatment, in order that their application to the railway industry may be made clear, forms part of the subject-matter of railway economics. In addition to the study of these theoretical questions, railway economics comprises the discussion of various economic problems of a more descriptive character, *e.g.* the State in relation to railways, methods of railway administration and finance, and the taxation of railways. Railway economics is often interpreted in a much wider sense to include problems of construction and operation, but these are outside the province of the economist *qua* economist; they are for engineers and technically trained railwaymen to deal with.

In this book no attempt is made to cover the whole ground of railway economics; it is restricted almost entirely to the more theoretical aspects of the subject. After a brief consideration of the

principles underlying the organisation of industry and the determination of price in general, the application of these same principles to the railway industry is discussed. As it is impossible to treat adequately of the determination of the price of railway services without referring to the control exercised by the State over railway charges, it has been necessary to touch upon one side of the large question of the State in relation to railways. Under these circumstances, it has been thought best to refer also to the other side of the question. Accordingly in the last chapter the State ownership and management of railways is briefly considered.

## CHAPTER II.

### THE DEMAND FOR COMMODITIES AND SERVICES

BEFORE considering how people spend their incomes, it might seem more natural to consider how they earn them, but when we remember that people only produce commodities and services in order to satisfy their own wants or those of other people, it will be realised that it is not illogical to treat of the character of the demand for goods and services, before considering how these goods and services are supplied. If we ask ourselves why we desire or want any particular commodity or service, the answer is because it gives us pleasure, *e.g.* a cigarette; or because it is of use to us, *e.g.* a dentist's services. As we are not concerned in economics with people's motives for wanting a thing, we say quite generally that a person desires a thing because it gives him satisfaction or possesses utility for him. If a man desires a whisky and soda more keenly than he does a cup of cocoa, we say that the former possesses greater utility for him than the latter, the term "utility" implying no ethical judgment.

*The law of diminishing utility.* The most fundamental observation that we are able to make about a person's wants is that the more a person has of any particular commodity, at any one time, the less keenly does he desire additional quantities of it, each several want being limited. In other words, if at any one time the units of a particular commodity in a person's possession are increased, the extra satisfaction which he derives from each additional unit will be less and less ; his total satisfaction will increase, but at a diminishing rate. This general tendency is known as the law of diminishing utility. The last unit of the commodity which a man purchases may be described as his marginal purchase, as he is on the margin of doubt whether to purchase or not ; the utility he derives from this marginal purchase may be described as the marginal utility ; and the law of diminishing utility may be stated as follows : The marginal utility of a thing to anyone diminishes with every increase in the amount of it which he already possesses. Two motor cars possess a greater utility for a man than one motor car, but the utility he derives from two cars is not double that derived from one ; the addition of a third car would increase his satisfaction by a less amount than the addition of the second. A visit to a variety show on Monday may be very enjoyable ; a repetition of the visit on Tuesday will hardly provide the same enjoyment ; if a person returns to the same



show on Wednesday, he is more likely to be bored than entertained, his desire for this particular type of amusement being practically satiated. In economic language, the marginal utility of visits to a particular variety show may become nothing, or even less than nothing; in the latter case, we should say a person derived disutility from his visit to the theatre.

Some of a person's wants are more easily satiated than others; the desire for food is satiated far sooner than that for clothing or articles of finery. The desire for money is practically unlimited, as it is the means by which various wants can be satisfied, and the variety of a person's wants is endless. Nevertheless, as the wants satisfied by means of the money become less urgent, a person's desire for more money becomes less eager, i.e. the law of diminishing utility applies to money, though there is an exception in the case of the miser whose craving for money becomes greater, the more he has.

*Individual and market demands.* The law of diminishing utility has a most important practical application. Owing to the fact that a man derives less and less satisfaction from additional units of a commodity at any one time, he is prepared to offer only smaller and smaller sums in exchange for the additional units. The different sums which a person is willing to offer for different quantities of a commodity constitute his demand for that com-

modity. The higher the price, the less a person will buy; the lower the price, the more a person will buy. A family's demand for coal might be four bags per month at 2s. 6d. per bag, five bags at 2s., six bags at 1s. 6d., and eight bags at 1s.; according to the price, the family would purchase more or less coal.

In measuring utility in terms of money, care must be taken in interpreting the figures. Because X and Y both spend one shilling on a book, this does not imply that the book possesses equal utility for both; X may be a rich man to whom a shilling means very little, Y a poor man to whom a shilling means a great deal. The same applies to an equal expenditure by any one person at different times; his income or his tastes may have changed in the interval; a shilling spent on a book to-day may indicate less satisfaction than a shilling spent on a book a year ago. Furthermore, the fact that a man's monthly expenditure on two articles, say, tea and tobacco, is equal, does not show that he derives equal utility from them; the consumption of two pounds of tea in a month may afford a man far greater satisfaction than the consumption of eight ounces of tobacco. If, however, we know that a man spends an equal sum on his marginal purchase of two articles, say, sixpence for the last quarter of a pound of tea, and sixpence for the last ounce of tobacco, then we can assume that he expects to

derive equal utility from these two marginal purchases. If this were not the case, and he obtained more satisfaction from the last sixpence spent on tobacco than from the last sixpence spent on tea, it would pay him to curtail his consumption of tea and to increase his consumption of tobacco, until the utility obtained from his marginal purchases was equal.

From the demands of different individuals for a commodity a market demand can be ascertained, which indicates the different quantities of a commodity which a group of buyers will be willing to purchase at different prices. A market demand is subject to the law of diminishing utility in the same way as an individual demand; consequently, it is true of a market demand as of an individual demand that a fall in price is accompanied by an increase in consumption, and a rise in price by a decrease in consumption.

A demand relates to a particular time; if a period elapses it may change in character. At any one time a rise in the price of coal diminishes the consumption, as was clearly shown during the coal strike of 1912; to-day the consumption of coal is much greater than formerly, although the price is higher, the explanation being that during the lapse of time the character of the demand has changed.

*Elasticity of demand.* As has already been stated, the consumption of an article varies with every

change in price ; the amount of the variation differs according to the article. Where the consumption varies much with a small change in price, the demand is said to be elastic ; where the consumption varies little with a small change in price, the demand is said to be inelastic. If the price of the cheapest quality of butter rises above one shilling per lb. a serious falling off in the consumption may be expected, many people substituting margarine for butter. On the other hand, a drop in the price of butter greatly encourages consumption ; some people consume more than they did previously, and others, who previously consumed none, now buy it. In the case of tea, the fluctuations in price, occasioned by the alterations in the duty, have little influence on the quantities consumed.

The formal distinction between an elastic and an inelastic demand rests upon the influence of a change in price upon the total takings ; if a fall in price increases, and a rise in price diminishes, the total takings, the demand is said to be elastic ; if a rise in price increases, and a fall in price diminishes, the total takings, the demand is said to be inelastic. A fall in the price of butter from 1s. 0d. to 11d. per lb. might increase the sales in a particular market from 1,000 to 1,200 lbs., and the total takings from £50 to £55 ; whereas a rise in price to 1s. 1d. might diminish the sales to 900 lbs., and the total takings to £48 15s. On the other hand, a fall in the price of

tea from 1s. 0d. to 11d. per lb. might increase the sales in a particular market from 1,000 to 1,050 lbs. only, thereby diminishing the total takings from £50 to £48 2s. 6d. ; whereas a rise in the price of tea from 1s. 0d. to 1s. 1d. per lb. might reduce the sales to 960 lbs. only, the total takings rising to £52. Under these circumstances, the demand for butter would be described as elastic, and that for tea as inelastic. Where the demand for an article is such that the total takings remain constant as the quantity consumed varies, the elasticity of the demand is said to be one, or unity ; *e.g.* whether 1,000 lbs. of sweets were sold at 1s. per lb., or 1,200 lbs. at 10d., or 800 lbs. at 1s. 3d. the total takings would be £50. Generally speaking, the demand for necessaries and costly luxuries is inelastic, and the demand for comforts and moderate luxuries is elastic ; or, putting the matter differently, where people can do without an article entirely, or where a substitute for it exists, the demand for it is elastic ; where people must have an article, or where the demand for it is satiated, the demand for it is inelastic. The demand for an article may be inelastic at high prices, elastic at moderate prices, and inelastic at low prices.

The elasticity of demand is of great practical importance, both to governments in selecting commodities on which taxes are to be levied and to producers in deciding upon their selling policies. A government by raising a duty and indirectly, there-

fore, raising the selling price of an article, may so seriously diminish the consumption of an article that the yield of the tax is but little increased, or possibly even diminished. Recent alterations of the tea and spirit duties afford an interesting contrast. On April 20, 1904, the customs duty on tea was raised from 6d. to 8d. per lb., yet the consumption of tea increased slightly from 255,300,000 lbs. in 1903 to 256,500,000 lbs. in 1904, although the increase was less than is normally the case between one year and another when the price remains unchanged. On April 30, 1909, the excise duty on spirits was raised from 11s. to 14s. 9d. per proof gallon, and the amount of British-made spirits retained for home consumption fell by nearly 20 per cent. from 31,400,000 gals. in 1908 to 25,500,000 gals. in 1909. It is true that the consumption of spirits had a tendency to fall before the price was raised, but whereas the average decrease in consumption between 1900, when it was at a high level, and 1908 was some 700,000 gals. per annum, in the year immediately following the rise in price, the decreased consumption was nearly 6,000,000 gals. From observing these facts, we reach the conclusion that, at prevailing prices, the demand for tea is much more inelastic than the demand for spirits.

A producer who, to some extent at least, is in possession of a monopoly, has frequently occasion

to consider what the effect of a change in price on the consumption of the article he produces would be. A publisher has to estimate the probable sales of a book at different prices, *i.e.* gauge the elasticity of the demand for the book, in order to fix the price. A tramway undertaking, in fixing fares, has to consider how many passengers it can hope to carry at different fares, so that the total takings at the different fares may be estimated; a larger gross revenue is obtained by carrying 5,000,000 passengers at 1d. than by carrying 2,000,000 at 2d. When tram fares are comparatively high, a reduction in fares is likely to lead to such a considerable increase in traffic as to be remunerative, after proper allowance has been made for the extra cost of providing any additional service which may be required.

*The elasticity of the demand for railway services.* Another type of undertaking which is closely concerned with the elasticity of the demand for its product is a railway. In considering the probable effects of alterations in the price of railway services on the amount of the traffic and of the receipts, it is desirable to deal separately with goods rates and passenger fares. As far as rates are concerned, there are at least three points to be considered. In the first place, it is necessary to ascertain what proportion the freight charge forms of the selling price of each particular article; if it represents a very small part only of the cost of the article, *e.g.* in the

case of tobacco, an alteration of the rate, in one direction or the other, is not likely to have any effect on the sales of the article, or, consequently, on the amount of the traffic; a rise in rates would increase and a fall in rates would decrease the receipts. If, on the other hand, the freight charge accounts for an appreciable proportion of the selling price of the article, *e.g.* in the case of coal in non-mining districts, a second point calls for consideration. It is necessary to ascertain the character of the demand for the particular article: will a change in price be likely to have much or little influence on the consumption? In the former case, a reduction in the rate might considerably enlarge, an increase in the rate might considerably diminish the traffic. Such a change in traffic might be at the expense of, or in favour of, some substitute. A rise in the rate for building stone might diminish the traffic in stone, but increase that in bricks, which would be a serious matter if the brick traffic happened to be principally in the hands of a competitor. In the case where a change in price has little effect on consumption, a rise in the rate should increase and a decrease in the rate should diminish the receipts. In the third place, in all cases the competition of other methods of transit, such as canal boats, coasting steamers and motor lorries must be borne in mind; a small alteration in a rate may suffice to influence a considerable amount of traffic where



competitive methods are available. It is impossible to generalise on the question of the effects of alterations in rates ; the circumstances of each case must be considered separately.

Regarding alterations in passenger fares, the first point to ascertain is whether people are travelling for business or for pleasure ; in the latter case higher fares are much more likely to discourage, and lower fares to encourage, traffic than in the former case. Further, it is necessary to remember that railways provide different qualities of service, *e.g.* first class and third class, and that the passenger is free to choose which quality he likes. In a well-arranged theatre a play can be seen and heard from all seats, whether in the stalls or the dress circle, the pit or the gallery, but one seat is better upholstered than another, it is more spacious, it is more easily reached, it can be reserved in advance, the people sitting near by are more select. On account of these and other considerations, different people are willing to pay different prices for different seats. With railway travelling it is similar—the destination can be reached whether a person travels with a first-class, third-class, or excursion ticket, but the conditions under which the journey is completed differ ; to be free to travel when he likes, a person may select to travel with an ordinary rather than with an excursion ticket ; on account of considerations of upholstery, or space, or neighbours, or for other reasons, he

may decide to travel first class rather than third. Although real differences in the comforts and conditions associated with different classes of travelling undoubtedly influence a person's selection of class, the prices of the various tickets also have considerable influence in determining by what class a person will travel. Where the general level of fares is comparatively high, much use is likely to be made of the inferior qualities of service, and this will particularly be the case if the standard of comfort of the inferior qualities of service is very considerable. Where there is more than one quality of service, a general rise in fares is likely to increase the proportion of passengers availing themselves of the inferior qualities. Finally, the competition of other types of transit must be considered; in the case of suburban traffic, motor cars, motor omnibuses and trams, and, in the case of longer journeys, motor cars, may be available for passengers.

*The joint character of an individual's demands.*

Up to this point an individual's demand for some particular article or service has been considered apart from his other demands; strictly speaking, there is no such thing as an isolated demand. Expenditure in one direction necessarily curtails power of spending in another direction, so that unless the sum involved is very small in proportion to a person's means, he cannot buy anything without considering, either deliberately or automatically,

how it will affect his other purchases. Much of the expenditure of a man of small or moderate means is determined for him ; he must have food, clothing and shelter, and in selecting these he will be guided by what he has been accustomed to and by what other people of his own class do. Subject to these limitations, a man presumably disposes of his income in the way which gives him the greatest satisfaction or utility ; he will curtail that part of his expenditure which appears to yield little satisfaction, and increase that which appears to yield more, until finally he feels that he is getting as much satisfaction for his money as is possible.

Although all the demands of an individual are linked together, we cannot always consider them as a whole ; from observing such complex data we could obtain few results. We prefer to regard every demand as occupying one of two relationships to some other demand or demands ; a demand is either alternative or joint. Where two articles are substitutes, we regard the demand as being alternative. A person demands either tea or coffee, either beef or mutton ; a person who dwells in the suburbs and works in town demands either a railway or a tramway ride. Where two articles are complements, such as a golf club and a golf ball, the demand for them is joint. Where the demand for one thing necessarily implies the demand for another, the two

things may be demanded in a fixed ratio, *e.g.* one right boot and one left boot, or in a variable ratio, *e.g.* tea and milk, some people preferring more milk than others in their tea. Most joint demands are of this latter character ; there are different ways in which people's desires for two things can be satisfied. For example, a person wishing to travel from London to Belfast has a joint demand for railway services and shipping services, but there are various ways in which he can combine the two ; he may select a long railway journey and short sea crossing and travel via Stranraer-Larne, or a shorter railway journey and a longer crossing and travel via Heysham. In making his choice of route he will be influenced, amongst other things, by the price, a ticket via Stranraer-Larne costing more than one *via* Heysham. Similarly, a would-be passenger from London to Cologne has a joint demand for railway and shipping services, and there are various ways in which his demand can be satisfied. A journey via Folkestone-Flushing or Harwich-Hook of Holland involves about a six hours' crossing, via Dover-Ostend about a three hours' crossing and a somewhat longer rail route, and via Dover-Calais about an hour's crossing and a distinctly longer rail route. In this case also, the shorter the sea and the longer the rail route the higher the fare. This is doubtless explained, partly by the fact that conveying passengers by rail is more costly than conveying

them by sea, and partly by the fact that many people desire any crossing they may have to make to be as short as possible and the whole journey to be as quick as possible, and that they are prepared to pay for these advantages.

## CHAPTER III.

### THE AGENTS OF PRODUCTION

HUMAN beings cannot create matter ; by production we understand changing the *form* of matter from a condition in which it is less useful into one in which it is more useful, *e.g.* converting a tree into a table ; changing the *place* of matter from where it is less useful to where it is more useful, *e.g.* digging coal out of the ground, or transporting coal from the pit-mouth to the works where it is required ; keeping matter from a *time* when it is less useful to a time when it is more useful, *e.g.* storing corn in elevators until it is required ; transferring matter from the *possession* of a person to whom it is less useful to the possession of a person to whom it is more useful, *e.g.* transferring goods from a manufacturer, who has no facilities for distributing them, to a wholesale merchant who has facilities. A commodity is not fully produced until it is in the hands of the consumer, and the railway company which transports goods, the dealer who stores them, and the merchant who sells them, as well as the

carpenters, coalminers, and farmers, must be regarded as producers.

If we seek to analyse production, we ascertain that it is carried on by the co-operation of certain factors, commonly called the agents of production, viz. land, or more accurately, gifts of nature, labour, capital, and organising and undertaking power. The last is only a secondary agent, as it is a specialised kind of labour, which, however, owing to its importance, is deserving of separate treatment. Capital, *i.e.* wealth set aside to assist future production, is also a secondary agent; the original capital was due to the efforts of land and labour, and all subsequent capital to the combined efforts of land, labour, and the then existing capital. Land and labour are the primary agents of production.

*Land.* Gifts of nature, of which land is the most important, others being materials such as coal and iron ore, and forces such as water-power and wind, all possess a common characteristic, viz. that they cannot be increased by human effort, though they can be modified by it. If we consider land a little more in detail, we find that the primary consideration about it is the fertility of the soil, which in old countries has been greatly modified by mechanical and chemical means. Another consideration, which has gradually grown in importance, is its situation, *i.e.* the position it occupies with regard to centres of population. The situational advantages of land

are increased for agricultural, and, to some extent, also for building purposes, if it enjoys good transit facilities to centres of population ; for building purposes, the primary consideration is generally proximity to centres of population. As the fertility and situation of agricultural land can be modified by human efforts, the demand for it can be greatly influenced. One case may be mentioned by way of illustration. Improved railway and water transit facilities have led to a great increase in the demand for land in the West of Canada and of the United States, and a considerable falling off in the demand for land for agricultural purposes in the East of those countries. The situational advantages of building land, and consequently the demand for it, can also be modified by human efforts. The value of land for building purposes is constantly being increased in the neighbourhood of large towns by improvements in transit facilities. In some cases, transit facilities are deliberately improved with a view to developing estates for building purposes.

*Labour.* In considering labour as an agent of production, we are chiefly concerned with its efficiency, which, briefly, may be said to depend upon its physical, mental and moral capacities. These are undoubtedly hereditary to some extent, both as concerns races as a whole and as concerns individuals within any particular race ; but they are also acquired to some extent, and it is in the influence



which environment exercises on workers' capacities that we are especially interested. The physical capacities of labour include good health, strength, powers of endurance. These capacities depend, in the first place, upon the worker's early home conditions, the care and nourishment which he has received in childhood; in the second place, upon his present home conditions, including such things as the supply of food and clothing, the character of the housing accommodation, its cleanliness and its sanitation; in the third place, upon the conditions under which he works, upon the workrooms being properly heated, lighted and ventilated, free from dust, and not overcrowded.

Good conditions in the home and in the works give the worker the best chance of keeping fit and of working well; it is as much to his employer's interest as to his own that he should be efficient. Many employers clearly recognise this, and seek to provide a good environment for their workers. Another thing which influences the physical capacity of labour, is the amount of wages earned; if a worker is underfed and badly housed, he cannot be very efficient; an increase in wages sufficient to enable adequate nourishment to be obtained will increase a man's physical efficiency. An employer may recognise this and yet not raise the wage, partly owing to the fact that he has no guarantee that the extra wage would be spent in securing more nourishment

for the worker, and partly because time must elapse between the raising of the wage and any increase in efficiency, and the employer has no certainty of recouping himself for this extra wage, as the worker may change employers on becoming more efficient. A further important factor affecting the physical efficiency of a worker is the length of the working day and the amount of leisure which he enjoys. It is more convenient to consider this point in connection with the law of diminishing returns, and consequently the consideration of it is postponed until the next chapter.<sup>1</sup>

Mental capacity or intelligence is called for in all but the very lowest class of manual work. Intelligence depends very largely on education ; this may be of the systematic kind acquired in schools or by apprenticeship, or it may be of the more casual kind picked up by coming in contact with men and things, and usually described as " experience." Most people receive some education of both sorts. The training afforded by schools is either general, or of a trade or technical character. That a general education, a knowledge of the three R's, and so forth, is not absolutely essential for good workmanship, is shown by the excellence of the work done by craftsmen in the Middle Ages ; on the other hand, a rapid spread of improvements and new methods is greatly facilitated by general education, as it provides an easy

<sup>1</sup> See page 42.

means of communication. With the decay of apprenticeship and the growth of specialisation, the need for trade and technical instruction in schools is becoming more and more urgent; and although much knowledge can be acquired by practical experience only, a good theoretical training should render easier the acquisition of practical knowledge.

As regards moral capacities the economist, *qua* economist, is interested only in those habits and qualities, which influence the worker's efficiency, *e.g.* honesty, temperateness, perseverance, tidiness. The worker's best chance of acquiring these qualities is whilst he is young; practical demonstrations at home are likely to be more effective than theoretical expositions in school.

*Capital.* The need for capital to assist in production, if life is to be raised above the level of that of animals, has been recognised since very early times. Gradually capital has taken more and more forms, and has come to play a bigger and bigger part in production. On the one hand, it helps to provide goods and services which, without it, could not be obtained, *e.g.* the elaborate transit facilities of the present day; and on the other hand, where it is used in large quantities, in the form of machines and appliances, it enables production to be effected with less effort, and consequently more cheaply, than where it is used in small quantities only; *e.g.* a machine-made watch is much cheaper than a

hand-made watch. In this way the accumulation of capital does not benefit merely those who have saved it, but also society as a whole. We may use gas or electricity to light our rooms, and we may use railways to travel on, although we have not provided one penny to establish the undertakings.

The supply of capital depends upon people's savings; saving involves a sacrifice, as it necessitates the deferring of present pleasures to some future time. Nevertheless, people do save, and they do so principally for two reasons. Firstly, a man may save in order to provide against being worse off; he may have in mind emergencies which will temporarily prevent his earning or involve him in extra expense, *e.g.* illness, accidents, unemployment; or he may have in mind his wife and family if he should die, or his own old age; it is these latter considerations which lead to the most saving. Secondly, a man may save in order to be better off; he may have in mind some temporary enjoyment which he cannot gratify out of current income, *e.g.* a holiday trip to Switzerland, or he may have in mind some permanent improvement in his position, *e.g.* establishing himself in business.

*Organising and undertaking power.* The leader in industry corresponds to the general of an army; it is for him to combine the various agents of production in the best proportions. He is concerned with the organising, *i.e.* the building up, of a business,

and with the undertaking, *i.e.* the directing of the policy, of a business. It not infrequently happens in a business that is already well established, that the leader does no organising or pioneer work ; he contents himself with carrying on the business along the lines laid down by a more able and energetic predecessor. The leader in industry is sometimes referred to as an "undertaker," but more generally as an "entrepreneur." His efficiency or inefficiency often accounts for the difference between a successful and an unsuccessful business. The capable entrepreneur possesses imagination and courage, judgment and knowledge of men ; these qualities are inborn, and cannot be acquired, though they can be developed, by training and experience.

## CHAPTER IV.

### THE LAW OF DECREASING RETURNS

*Decreasing returns or increasing costs in agriculture.* Having examined the different agents of production, we may now investigate the general tendencies to which production is subject. In the first place, we will examine a particular type of production, viz. agriculture, and then seek to ascertain how far the general tendency or law relating to agriculture is true of other types of production. A farmer cultivates his land with labour and capital, e.g. tools, ploughs, machinery, seed, manure; the problem is how to cultivate a given area to the greatest advantage. If very little capital and labour are employed, the return will be very small, the land being under-cultivated; by doubling the capital and labour, the return can probably be more than doubled. This process cannot continue indefinitely, as there is a physical limit to the yield of a given area of land, however thoroughly it may be cultivated. The additional output due to additional applications of capital and labour may increase

for a time ; it will then tend to become constant, and finally it must diminish. A numerical illustration may be given :

Expenditure on labour and capital per acre.	Total return per acre.	Marginal return per acre.	Average cost per bushel.	Cost of marginal bushel.
s.	bushels.	bushels.	s.	s.
10	1	1	10-00	10-00
20	3	2	6-67	5-00
30	6	3	5-00	3-33
40	9	3	4-44	3-33
50	11½	2½	4-35	4-00
60	13	1½	4-62	6-67
70	14	1	5-00	10-00

The first column shows the increasing quantities of capital and labour (in terms of money) devoted to the cultivation of an acre of land ; the second column, the corresponding increases in the total product ; the third column, the amounts by which the output increases as a result of every additional ten shillings spent in the cultivation ; the fourth column, the average cost per bushel, obtained by dividing the total returns into the total expenditure ; the fifth column, the cost of the marginal bushel, ascertained by dividing the number of bushels in the marginal return into the sum spent on securing the marginal return, *i.e.* ten shillings.

The general tendency relating to agricultural production, known as the law of decreasing returns,

states that where additional quantities of capital and labour are devoted to the cultivation of a piece of land, the total product will be increased ; but that, sooner or later, the increments by which the output increases will diminish.

The law of decreasing returns is also known as the law of increasing costs, because the cost of production rises as the rate of output diminishes. To be more exact, it is the cost of the marginal return which increases simultaneously with a decrease in the rate of output ; the average cost of production does not begin to rise until shortly after the tendency to diminishing returns has commenced to operate. These points are illustrated in the numerical example ; as the expenditure per acre is increased from 40s. to 50s. and from 50s. to 60s., the marginal return per acre diminishes from 3 bushels to  $2\frac{1}{2}$  bushels, and from  $2\frac{1}{2}$  bushels to  $1\frac{1}{2}$  bushels. Corresponding to these decreases in the rate of output, the cost of the marginal bushel increases from 3.33s. to 4s. and from 4s. to 6.67s., whereas the average cost per bushel first decreases from 4.44s. to 4.35s., and then increases from 4.35s. to 4.61s. For every subsequent decrease in the rate of output, the cost of the marginal bushel and the average cost per bushel increase.

*Extensive and intensive cultivation.* When a farmer realises that the law of decreasing returns has begun to act upon his land, and he wishes to increase



his output, he must either bring new land under cultivation, *i.e.* adopt extensive cultivation, or apply more capital and labour to the existing land, *i.e.* adopt intensive cultivation. Whether extensive or intensive cultivation will be adopted, depends on the price of land on the one hand, and on the price of labour and capital on the other. Where the former is dear and the latter is comparatively cheap, as in old countries, intensive cultivation is adopted; where the former is cheap and the latter dear, as in new countries, extensive cultivation is adopted. By adopting extensive cultivation, the action of the tendency to diminishing returns can be avoided.

If a farmer decides in favour of intensive cultivation, he will seek to postpone the operation of the law of increasing costs by augmenting the normal productive capacity of his land, which it should be possible to do by an adequate expenditure of capital on amelioration and improvement schemes. One process commonly adopted in this country is drainage, which may involve an outlay of as much as £10 per acre. The opposite process of irrigation, which has to be undertaken in tropical countries, may easily prove more expensive. In some cases large dressings of lime, costing up to £5 per acre, are applied; in other cases artificial or farmyard manures are employed. The cost of cultivating the land will be greatly increased, when the interest on the capital outlay and the provision of a sinking

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fund for the redemption of the capital<sup>1</sup> are taken into account, but a very much larger output will be secured. Under favourable circumstances, it should be possible to obtain the larger output at a cost per bushel not exceeding, or even less than, that prior to the adoption of intensive cultivation. In the table which follows, the conditions on the land of our first illustration, after the costly improvements and ameliorations have been made, are represented numerically :

Expenditure on labour and capital per acre.	Total return per acre.	Marginal return per acre.	Average cost per bushel.	Cost of marginal bushel.
s.	bushels.	bushels.	s.	s.
120	29½	—	4·07	—
130	32	2½	4·06	4·00
140	35	3	4·00	3·33
150	37½	2½	4·00	4·00
160	39½	2	4·05	5·00
170	41	1½	4·15	6·67

Under the new system of cultivation, the lowest average cost per bushel is 4s., whereas under the old system it was 4·35s.<sup>2</sup> The lowest marginal cost under the new system is 3·33s. per bushel, secured by spending 140s. per acre on labour and capital.

<sup>1</sup> The sinking fund will be an important item, as the duration of the benefits to be derived from the capital expenditure will be comparatively short, and the capital outlay will have to be renewed again in a few years.

<sup>2</sup> See table on page 34.

Under the old conditions 3.33s. was also the lowest marginal cost, secured by spending 40s. per acre on labour and capital, but in the one case the yield per acre is 35 bushels, and in the other it was only 9.

The normal productive capacity of the land has been greatly increased, and the operation of the law of decreasing returns has been postponed. If, however, the expenditure on labour and capital under the new system of cultivation exceeds a certain amount, 140s. per acre in our illustration, the law of decreasing returns will be seen in operation. This fact will not deter the farmer from cultivating his land more intensively under the same system of cultivation, provided the normal productive capacity of the land has been raised to the highest point that is feasible or remunerative. How intensively a farmer will cultivate his land will depend upon the price that can be obtained for the produce; he will continue spending additional capital and labour until the sum realised by the sale of the additional output will only just cover the cost of producing the additional output. He will not spend 10s. on producing  $2\frac{1}{2}$  additional bushels per acre, unless  $2\frac{1}{2}$  bushels will sell for at least 10s. If the price of corn is 5s. per bushel, the farmer of our illustration would tend to spend 160s. per acre on capital and labour, and to secure a return of  $39\frac{1}{2}$  bushels per acre, as in these circumstances the cost of his marginal bushel would be 5s.

*General application of the law of decreasing returns.* There are various ways in which land, labour and capital may be combined in the production of corn, one more productive than another; but it does not follow that the most productive, or the one of the greatest normal productive capacity, will be that adopted, as it may give a higher cost per unit of output than some less productive combination. The most economical system of production will be adopted, and the selection of system depends therefore upon the prices at which the various agents of production can be secured. Once a particular system of production has been adopted, e.g. extensive cultivation, or intensive cultivation of a certain degree, it is still possible to vary the proportions in which the agents of production are combined without altering the system. In varying the agents in this way, there is a tendency to overwork a particular agent, and thus cause production to become subject to diminishing returns. On the farms of old countries, where the supply of land available is limited, the attempt is made to increase the output by applying more capital and labour, and sooner or later the law of decreasing returns begins to operate.

Land is not the only agent which may be overworked and cause increasing costs. The same tendency applies equally to other agents of production. As soon as one necessary agent is fixed in

amount, and the other agents are increased with a view to increasing the output, such increase will be secured, sooner or later, at a diminishing rate or increasing cost. At any one time it may be possible to introduce an entirely new productive system which involves no addition to the supply of one particular agent, and which has an increased normal productive capacity; but ultimately, if the supply of one of the necessary agents of production is limited, it will prove impossible to devise a new system which is more productive than the old and at the same time economical. In order to obtain additional output, it will be necessary to overwork one agent, with the result that the tendency to diminishing returns will operate.

The operation of the law of decreasing returns in manufacturing may be illustrated with reference to land, to particular forms of capital, or to labour. Where an employer seeks to increase his output by crowding more men and more machinery into a workshop, people and machines must sooner or later get into each other's way, and the rate of output per person and per machine will tend to fall. In this case, it is the overworking of the fixed amount of workshop accommodation which leads to diminishing returns. Similar results will be observed where an office is overcrowded. Where the quantity of machinery is fixed, an increased output may be obtained by employing more people to mind it and

by running it at higher speeds ; but the cost of obtaining the additional output will necessarily increase, sooner or later, as there are physical limits to the productive capacity of any particular machine, however carefully it may be minded. In practice, owing to the liability of the quality of the output to suffer as the speed is increased beyond a certain point, it is unlikely that machinery will be worked at that speed at which the maximum total output could be obtained.

*Application of the law of decreasing returns to labour.*

There are at least two ways in which the application of the law of decreasing returns to labour can be observed. In the first place, the quantity of labour being fixed, more and more capital in the form of machinery and plant may be supplied to co-operate with it. The total output will increase, but at a diminishing rate, as a worker cannot look after two machines as thoroughly as one, or three machines as thoroughly as two. This is the converse of the previously-mentioned case where the amount of capital was fixed and the amount of labour was increased. The entrepreneur will tend to combine capital and labour according to the cost of each agent. Where capital is comparatively dear and labour comparatively cheap, as in the East, much labour is employed in proportion to capital, with the object of obtaining a high return per unit of capital, or, in other words, few labour-saving

machines are used. Where capital is comparatively cheap and labour comparatively dear, as in the United States, much capital is employed in proportion to labour, with the object of obtaining a high return per unit of labour, or in other words, much labour-saving machinery is used.

In the second place, labour may be worked during longer hours. A man's rate of production during the different hours of a working day varies. During the first hour or two, whilst he is warming to his work, the rate of output tends to increase; then it tends to become constant for a time at its highest level; finally, as the man becomes tired, it tends to diminish. It is well known that overtime is comparatively unproductive, and it is highly probable that the last hour or two of the normal working day are not much more productive. The amount by which a man's rate of output will vary according to the hour of the working day, will depend both upon the individual worker and upon the particular industry.

*Length of the working day.* An employer, wishing to utilise his buildings and plant as fully as possible, so as to reduce the standing charges per unit of output, but unable to adopt the shift system, seeks to obtain the maximum output per worker. Formerly, it was believed that this was secured by working long hours, even though the output in the last hours was small. It is now recognised that this is not

necessarily so, as the rate of output depends not merely upon the particular hour of the working day, but also upon the length of the normal working day. A man can work harder during the seventh hour of a ten hours' day than during the seventh hour of a twelve hours' day ; as the length of the normal working day is diminished a man is able to work at higher pressure or more intensively, and this may more than compensate for the shorter hours ; the total output in a ten hours' day may exceed that in a twelve hours' day.

There is more than one explanation why the rate of output may be expected to increase as the length of the working day is reduced ; the explanations are partly technical, partly personal. There are three chief technical reasons. In the first place, the pauses in the work, between the finishing of one piece and the commencing of a new piece, may be reduced, the need for rest having diminished. In the second place, the machinery may be speeded up, the workers being able to stand during shorter hours the increased strain involved. In the third place, owing to the reduction in hours, it may be possible to rearrange the hours so that there shall be only one mealtime ; in this way the loss involved in stopping and restarting work at mealtimes will occur once only, and the unproductive hours before breakfast can be abolished entirely. These considerations practically apply to machine workers



only; there is not the same scope for effecting economies in the case of hand workers. Work predominantly physical can probably be done in shorter hours at higher pressure, but combined physical and mental work, such as handloom weaving, cannot be so done; the quality of the work would immediately suffer. The chief personal reasons are two. In the first place, people arrive at work feeling fresher, owing to the longer period of leisure. In the second place, the physical exertion will be less, as it depends not so much upon the output, as upon the length of time during which the worker has to stand or bend at his work.

In all cases time must be allowed to elapse before the effects due to a change in hours will be felt. If overtime is worked fairly constantly, this practically amounts to an extension of the working day, and the rate of output throughout the day will tend to diminish. If short time had to be worked during a depression of trade, and this were done by starting work later, or ceasing earlier than usual, it would amount to a reduction of hours, and the rate of output would gradually tend to increase. The possibility of this is appreciated by producers who, when they wish to secure a curtailment of output by a system of short time, generally arrange that their factories shall be closed for a whole day, or whole days at a time, and not for a short period each day.

As hours are reduced, the rates of output will no

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doubt increase, but the total output must diminish sooner or later as one reduction of hours succeeds another. By working harder and faster a man may do as much work in ten hours as previously in eleven, or even in nine hours as previously in ten, but it is pretty certain that he cannot do as much in four hours as he previously did in five. It is impossible to foresee what length of working day will give the maximum output ; experiments would have to be made and sufficient time allowed to elapse for the change in hours to influence the rate of output. Of this, however, we can be certain : the length of working day which corresponds to the maximum total output per worker, will vary from industry to industry according to the opportunities offered by each industry for working at high pressure.

## CHAPTER V.

### THE LAW OF INCREASING RETURNS

*The economies of large-scale production.* Emphasis has been laid on the fact that where one necessary agent of production is fixed in quantity, and it is sought to extend the output by employing more of the other agents, the rate at which the output increases will diminish, sooner or later. Where all the agents of production can be increased at the will of the entrepreneur, which, generally speaking, is true of manufacturing, the cost of producing additional output tends to diminish owing to the greater possibilities of specialisation and the better utilisation of the plant. Where the expenditure on land, labour and capital employed in an industrial undertaking is increased, there is a tendency for the output to be increased in a greater proportion, or, in other words, for the cost per unit of output to diminish. This tendency is known as the law of increasing returns or decreasing costs. Everybody is vaguely aware that it is cheaper to do things on a large scale than on a small scale; it is for the economist to show why this really is so.

*Specialisation or division of labour.* The first economy of large-scale production is the specialisation or division of labour which it renders possible. Specialisation has the effect of making labour more skilled, and consequently, more productive; in other words, practice makes perfect. A master tailor who employs several journeymen can increase the output of his shop by letting one cut out the cloth, and some make up coats, some waistcoats and others trousers, instead of letting each man cut out and make up whole suits. He may introduce still more specialisation, and arrange that one worker shall do nothing but make dress coats; but whether this is feasible will depend upon the number of dress coats which he can hope to sell; specialisation is limited by the extent of the market.

The increase in the skill of the worker is the primary advantage of specialisation of labour; secondary advantages are the time saved by labour not having to pass from one kind of work to another, the possibility of employing people solely upon the work which they can do best, and the likelihood of improved methods of working suggesting themselves to people who concentrate their attention upon one particular operation.

We are not concerned here with the social aspects of specialisation, but we may notice that even from the point of view of efficiency, too much specialisation may have its drawbacks, especially in the

higher grades of work, as it tends to prevent a man taking a wide view of things. This may be particularly serious in the case of the persons who control businesses. In the control of industrial undertakings, a judicious combination of men of general business capacity and of specialists appears to be the ideal arrangement.

*Use of machinery and specialisation of machinery.*

The second economy of large-scale production is the use of machinery and the specialisation of machinery, *i.e.* the adaptation of machinery to one particular purpose, which it renders possible. Amongst the advantages of the use of machinery, so far as output is concerned, three may be mentioned. Firstly, work can be done which would otherwise be impossible, either on account of the power required, *e.g.* rolling armour plate, or on account of the delicacy of the operations to be performed, *e.g.* spinning very fine cotton yarns. Secondly, work can be done with sufficient accuracy to render possible the system of interchangeable parts or the standardisation of work, *e.g.* watches are now commonly manufactured in large quantities by machinery, instead of being made individually by hand. Thirdly, work can be done more speedily by machinery than by hand, *e.g.* printing. In each case the use of machinery tends to diminish the cost of production, but the more machinery that is to be used, and the more specialised the machinery is to be, the greater must be the

output of which it is possible to dispose. It is not worth while to employ a special machine to sew on the tags of boots, if the output is only a few dozen per week.

*Better utilisation of plant and establishment.* The third economy of large-scale production is concerned with the possibility of utilising the plant and establishment more fully. The expenses of a business may be classed as running, primary or variable, on the one hand, and establishment, supplementary or fixed, on the other. The former vary directly with the output, *e.g.* the wages of many workmen, the cost of raw materials, most of the provision for depreciation, the cost of coal used for obtaining power; the latter do not vary directly with the output, *e.g.* interest on debentures and loans, rent of buildings and land, salaries paid to management and to office and works staffs, and some of the provision for depreciation. As the output is increased, some increases in the establishment or "fixed" expenses will probably occur, but these should not increase in the same proportion as the output, and consequently, the larger the output, the lower the average cost of production will tend to be.

A striking case of the advantage to be derived from distributing fixed expenses over a larger output arises in connection with the production of a book; the chief expense is the setting up of the type; the average cost of a copy falls as the number printed increases.

As an illustration, some figures supplied a few years ago by a leading publisher are given in the following table :

TABLE showing the cost of production of a crown 8vo book of 320 pages, including printing and binding.<sup>a</sup>

Number of copies issued.	Price per copy in pence.
1,000	18.62
2,000	14.06
3,000	12.56
4,000	11.78
5,000	11.74 <sup>b</sup>
10,000	10.29
20,000	9.71
30,000	9.56 <sup>b</sup>
40,000	9.47
1,000,000	9.31

*Specialisation of businesses.* The fourth economy of large-scale production is associated with the specialisation of businesses. A firm, as it expands, may either restrict itself to one process of some industry, *e.g.* the spinning of cotton, or it may concentrate its attention upon one particular industry or branch of an industry, and carry out all or most of the processes from the production of the raw material to the sale of the finished product; *e.g.* a

<sup>a</sup> Cunynghame, *A Geometrical Political Economy*, p. 55.

<sup>b</sup> Here stereotype plates are introduced.

<sup>c</sup> Here duplicate blocks are introduced.

firm may mine iron ore and coal, produce coke from the latter, and use it for smelting the ore, convert the iron into steel, and manufacture that into armour-plate. Where a division by processes, or a horizontal division of industry occurs, there is often specialisation within a process: one firm spins fine yarns, another coarse yarns; one firm weaves plain goods, another fancy goods. Each further step in the specialisation of businesses, by permitting greater specialisation of labour, the use of more machinery and the greater specialisation of machinery, implies reduced cost of production.

Division by processes is not always feasible, *e.g.* where one process must follow another immediately, where the makers of the finished products have to exercise very close control over the quality of their raw materials and half-finished products, where they are afraid that the supply of raw materials or half-finished products may be withheld, or where producers are geographically isolated. In all these cases a vertical division of industry is likely to occur; the tendency will be for one firm to carry out all the processes involved in the making of a particular finished product. The soap and the iron and steel industries illustrate this tendency.

Sometimes an appearance of non-specialisation is given by the fact that one firm manufactures two or more products, *e.g.* motor cars and gas engines, preserves and sweets. Provided each department is



equipped on a big enough scale to avail itself of all the best plant and machinery, the mere fact that the different branches of a particular industry, or that different industries, are carried on under the same management, is not contrary to the principle of specialisation. A composite undertaking of this type may enjoy special advantages, *e.g.* a steadier demand for its products, and a reduction in the selling expenses per unit of output.

*Development of subsidiary industries.* The fifth economy of large-scale production arises from the development of subsidiary industries. Subsidiary work may be either (a) preliminary or incidental to the principal industry, *e.g.* the making of lasts and cardboard boxes in connection with boot manufacturing, or (b) concerned with the utilisation of by-products, *e.g.* the manufacture of oil from cotton seed, a by-product of the cotton-growing industry. Whatever the scale of the principal industry, the preliminary and incidental work must be done, but the bigger the scale of the principal industry, the more economical the basis on which this type of subsidiary industry can be conducted. In Lancashire, the manufacture of textile machinery is itself a highly specialised industry conducted on a large scale. In their turn, industries subsidiary to the textile machinery industry and sub-subsidiary to the cotton industry have developed, *e.g.* the making of cards for the carding machinery.

Though considerable economies may be effected by the development of preliminary or incidental subsidiary and sub-subsidiary industries, it is by utilising by-products, formerly regarded as waste products, that the greatest economies can be secured. When coal-gas is made, coke, tar and ammonia are necessarily produced at the same time. Formerly the tar and ammonia were often thrown away; now the former is used for the manufacture of aniline dyes, etc., the latter for making sulphate of ammonia, a valuable manure, or for some other purpose. The higher the revenue which can be obtained from the sale of the by-products, the lower the price at which the principal product can be sold. In Sheffield, the receipts from the sale of coke, tar and ammonia, represent about one-third of the total receipts of the gas company. The principal product of a slaughter-house is fresh meat, but where such undertakings are conducted on a large scale, as in the case of a big Chicago "packer," there are many by-products, e.g. the hides can be used for making leather, the bristles for brushes, the bones for manure, the fats for soap, the gristle for glue. Under this system, the revenue from the sale of the by-products can be made to exceed that from the sale of meat. The larger the scale of an industry, the greater the opportunity of utilising the by-products.

*Increased opportunities for buying and selling on favourable terms.* The sixth economy of large-scale

production is the increased opportunity for buying and selling on favourable terms. That a big buyer, whose custom many people are anxious to have, can buy on good terms is self-evident. Selling on a big scale is economical, because once a firm has established a selling organisation, it will probably be able to dispose of an increased output without a proportionate increase in its selling costs, thereby reducing the commercial charges per unit of output sold. If the article is used by manufacturers, the producer may seek to get into direct touch with them, or if the article is one consumed by the general public, the producer may seek to deal with retailers, instead of, or in addition to, wholesale houses. This will probably be possible only where the output is considerable; the cost of marketing will be increased, but this will be compensated for by the better prices obtained.

In some cases, where the article is suitable, the producer may even seek to reach the general public directly; he may establish retail shops with this object, or undertake to supply consumers by post. Most readers are probably acquainted with the tobacco shops of Salmon and Gluckstein, which are controlled by the Imperial Tobacco Company, and with various shops in which sewing machines and typewriters are sold, each belonging to the manufacturer concerned. Where a firm markets its product without the assistance of a middleman, it may

hope, firstly, to sell its product rather more cheaply and thereby be more successful in meeting competition ; secondly, to secure a better hold on the market by becoming less dependent on a few large customers ; and thirdly, to gain the maximum advantage from any money spent on advertising, by being in a position to push the sale of its own products.

*Limitations to the law of increasing returns.* Various reasons have been advanced why the cost of production should diminish as the scale on which production is carried on increases ; theoretically, this tendency to decreasing costs or increasing returns should continue indefinitely in manufacturing, but practically it is not likely to do so. As production grows, the land, labour and capital employed can probably all be increased, but the fourth agent, the organising and undertaking power, cannot be increased in the same proportion ; the number of managers and directors may be increased, but not the one or two men who really organise and guide the policy of the business ; sooner or later they will tend to be overworked, and the cost of production will cease falling, if it does not actually rise.

It must also not be forgotten that the law of decreasing returns or increasing costs is probably operating to some extent in all productive undertakings, as far as particular divisions of the work are concerned. The production of the raw materials of an industry may easily be subject to this law. It

often pays to employ agents of production beyond the point where diminishing returns have begun to operate, as it may be more economical to overwork than to increase the supply of costly agents. For a time the increasing economies associated with a growth of output may outweigh the increasing costliness of securing a supply of raw materials or of performing particular operations, but this is not likely to continue to be the case indefinitely.

*Joint products.* We have discussed at some length the conditions under which production is carried on, with a view to ascertaining how the cost of an article tends to be determined. The cost of an article consists of the sum of the rewards claimed by the several agents—land, labour, capital and entrepreneur—who have co-operated to produce it, and it varies according to the scale of production and according to the proportions in which the various agents have been combined.

Cases not uncommonly occur where the manufacturer is not in a position to say exactly what the cost of a particular commodity is; this will happen wherever commodities instead of being produced separately are produced jointly, *e.g.* wheat and straw; mutton, hides and wool; coal-gas, coke, tar and ammonia. Any special expenditure on behalf of one of the joint products can be ascertained, *e.g.* the expenses connected with manufacturing sulphate of ammonia from ammoniacal liquor,

but much of the expenditure cannot be allocated, and consequently, it is impossible to say what a particular commodity has cost.

Very often one joint product is regarded as the principal product and the other or others as a by-product or by-products, and the whole of the expenses which cannot be allocated are regarded as belonging to the principal product. The by-products will not be sold below their out-of-pocket expenses of production (if any), as it would pay the producer better not to incur these out-of-pocket expenses in preparing them for sale, but to throw them away; apart from this restriction, the by-products will be sold for what they will fetch, and the rest of the costs of production will be recovered from the sale of the principal product. This attitude can hardly be adopted where the joint products are of fairly equal importance, *e.g.* wool and mutton, in the case of a sheep farmer. Each product will then have to bear its share of the expenses, though they cannot be allocated scientifically. In most cases, the quantity and quality of joint products can be varied within limits, *e.g.* more mutton and less wool, or better wool and poorer mutton, can be secured by the sheep farmer. It is the object of the producer to obtain for a given expenditure that particular combination of products which will sell for the largest amount; he has continually to readjust his production to changes in market conditions. At

one time one product, and at another time another, will bear a larger proportion of the joint costs; the producer has to be satisfied so long as the total receipts from the sale of the joint products suffice to cover all the costs incurred, including a normal remuneration for himself.

## CHAPTER VI.

### INDUSTRIAL COMBINATIONS

*Causes of industrial combinations.* Many firms, anxious to avail themselves of the economies of large-scale production, and at the same time desirous of minimising the wastes due to excessive competition, seek to combine or to form agreements or associations relating to particular matters. By combining, firms can secure the economies of large-scale production much more quickly than by a slow process of gradual development; the specialisation of businesses becomes immediately possible; the men occupying the higher positions can be more readily employed in the particular work for which they are best suited; the opportunities for properly utilising by-products are greatly increased; the cost of marketing the products will probably be reduced.

There are many wastes of competition which combination can remove: commercial travellers from competing firms make the same rounds, and not uncommonly visit their customers more frequently



than they would do but for unduly sharp competition; much money spent on advertising is wasted from the point of view of society, *e.g.* this being the case where it only diverts consumption from the X brand to the Y brand of any commodity; unwise extensions of credits may be given to obtain new business; many works are almost continually run at less than their full capacity. It is generally the consumer who pays for all these wastes; each of the competing firms may quite well succeed in covering all its expenses—however wasteful they may be—and in making a profit besides. If these wastes of competition could be removed, the cost of production would be reduced, and the commodities could be sold more cheaply, though it does not necessarily follow that they would be.

The tendency to combination is strongest where very large amounts of fixed capital are employed. Under these circumstances, competition can become particularly severe and enduring, and the cutting of prices reckless, because the loss from even a temporary stoppage is great, and the chances of a firm going out of business entirely are small, as this would involve the almost complete sacrifice of the capital invested. An iron and steel works is a case in point; very large sums of money are spent in providing blast-furnaces, converters, rolling-mills and other equipment. The large capital once invested in plant is irrevocably sunk. It is of

no use for any purpose other than iron and steel making ;' the only way to secure a return on the capital is to continue to produce. If an ironmaster cannot dispose of his output at remunerative prices, it frequently pays him better to dispose of his output on unremunerative terms, rather than to close down temporarily or permanently. Where firms are prepared to continue running at a loss almost indefinitely, the need for some kind of understanding must become obvious to all the producers concerned.

*Types of permanent combinations.* Combinations of a more or less permanent character may take different forms. In the first place, there may be complete absorption of a smaller firm by a large firm, both of which may be engaged in exactly the same business ; *e.g.* some years ago J. and P. Coats of Paisley, the sewing cotton manufacturers, absorbed Clarke and Co., of Paisley. It sometimes happens that the two firms carry on the same type of business in different districts, and in consequence of the amalgamation the larger firm is able to extend its area of operations, *e.g.* where a London bank takes over a provincial bank. In other cases, two firms may be engaged in different processes of the same industry, and the number of processes under the same management may be increased by the amalgamation ; *e.g.* Vickers absorbed the Naval Construction and Armaments Company at Barrow in 1897, and became

shipbuilders as well as makers of ordnance, armour plate, etc.

In the second place, a new firm may be established to carry on undertakings previously conducted under separate management; *e.g.* the Calico Printers' Association, the Bleachers' Association and the Fine Cotton Spinners' Association were formed in each case to take over numerous independent concerns which had arranged to combine. In these cases the constituent businesses were formerly competitors. Sometimes the amalgamating firms may have been engaged in different kinds of work; *e.g.* Sir W. G. Armstrong, Whitworth and Co. was formed to take over the businesses of Sir W. G. Armstrong and Co., shipbuilders and ordnance makers, and of Sir Joseph Whitworth and Co., engineers.

In the third place, a new firm may be established to hold the shares of a number of individual businesses, instead of actually managing them. Under these circumstances, the holding company will appoint the directors of the dependent companies. This arrangement may be more flexible than the previous one, but there is more danger of friction. The English Sewing Cotton Company is an illustration of this type of organisation. The holding company is much commoner in the United States than in this country, as it is, or was, the form of organisation adopted by many of the big trusts. The International Mercantile Marine Company, the Shipping Trust

organised by the late Mr. J. P. Morgan, which absorbed the White Star Line and various other concerns, are of this type.

In the fourth place, one firm may acquire a controlling interest in another by purchasing the majority of, or all, the ordinary shares; *e.g.* Dorman, Long and Co., iron-masters, hold all the ordinary shares of Bell Bros. and of the North-Eastern Steel Company, who have very similar businesses; John Brown and Co. own most of the ordinary shares of T. Firth and Sons, who are also ordnance makers, etc.; Brunner, Mond and Co., the chemical manufacturers, recently purchased the majority of the ordinary shares of two large soap manufacturing firms, Crossfield's and Gossage's, presumably to make sure of retaining the custom of these firms.

In the fifth place, two competing firms may become jointly interested in some third firm, partly at least with the object of reducing competition; *e.g.* at the conclusion of the "tobacco war" in this country in 1901-2, the British-American Tobacco Company was established jointly by the Imperial Tobacco Company and the American Tobacco Company to sell tobacco outside the United Kingdom, India and the United States. Quite recently the Union-Castle Line has become the joint property of the Royal Mail Steam Packet Company and Elder, Dempster and Company.

*Types of temporary combinations.* To be contrasted

with the more or less permanent combinations are terminable or temporary associations, and agreements to regulate the sale of goods or services. Under this type of agreement, which may be based on a verbal or a written contract, the combining firms remain quite distinct and independent ; the object is not to secure certain economies of large-scale production, but to check the effects of a too vigorous competition. There are several varieties of terminable association, each of which seeks to modify competition in a different way. In the first place, there are price associations which seek to fix selling prices. These associations are generally local in character ; in many districts milk dealers or farmers have agreements about the price of milk, and the local coal dealers have often similar understandings. The weakness of these associations or agreements is, that no attempt is made to regulate output, in consequence of which it may prove very difficult to maintain prices.

In the second place, there are output associations or agreements. These are of two kinds. First, the interested undertakings allot the output amongst themselves in certain agreed proportions, in the way in which the members of a shipping conference may divide up certain emigrant traffic or arrange for a division of sailings on a particular route, *e.g.* the alternate weekly sailings of the Peninsular and Oriental Steam Navigation Company, and the Orient Line to Australia. Second, the interested under-

takings pool the profits, *i.e.* the difference between a mutually arranged base price and the selling price, and these profits are paid into a common fund and divided in agreed proportions. The North of Ireland Cornmillers' Association have an arrangement of this kind.

In the third place, there are sales associations which sell the members' products and, if there is production for stock, allot the output amongst the members or divide the orders, in the proportion agreed upon at the formation of the association. Organisations of this type are to be found in this country, *e.g.* the Central Agency, Limited, markets the products of J. and P. Coats, the English Sewing Cotton Company and Lister and Co., but they are much commoner in Germany, where, under the name of "Kartell," they flourish in various industries, including coal, iron and steel.

In the fourth place, there are associations or agreements for the division of territory, such as that which exists between the Imperial Tobacco Company and the American Tobacco Company, by which the former undertakes not to sell in the United States, and the latter not to sell in the United Kingdom or India. Agreements of this kind are not uncommon among shipping companies.

*Associations to further common interests.* There are other kinds of associations or agreements among producers, which are not connected with selling or

competition, but which are established to further common interests, *e.g.* employers' associations, which exist in many industries to conduct negotiations with trade unions concerning rates of wages, and so forth; and bankers' clearing houses, which have been set up in the more important towns to facilitate trade and commerce.

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## CHAPTER VII.

### THE APPLICATION OF THE LAW OF INCREASING RETURNS TO RAILWAYS

*Economies of large-scale production in the railway industry.* We are now in a position to consider how the uniformities or laws relating to production in general apply to railways in particular. We have ascertained that the larger the scale on which production is conducted, the greater the economies which can be effected, and consequently, the lower the cost at which each unit of output can be produced. This same tendency can be observed in connection with railway services. The larger a railway undertaking, the more specialised the labour employed can be. This applies particularly to the higher kinds of work ; each can be placed in charge of a specialist, which is not possible on a small undertaking, where one man may be both engineer and locomotive superintendent, or both general manager and engineer. The larger a railway undertaking, the more specialised the machinery and plant which can be introduced ; *e.g.* electric and hydraulic power for transshipping goods,



and special devices for coaling engines, which would not be remunerative on a small undertaking, can be used. The larger a railway undertaking, the greater the development of subsidiary industries thereby rendered possible; *e.g.* the shops established for the building and repairing of locomotives can be conducted on a more economical basis. The larger a railway undertaking, the greater the opportunities for buying and selling on favourable terms; *e.g.* it should be possible to buy all requisite supplies, including coal, at lower prices; it should be possible to reduce the cost of selling railway services per unit of traffic, as the expense of maintaining agencies, offices, canvassing and office staffs, should increase less rapidly than the amount of railway services sold.

The greatest economy of large-scale production so far as railways are concerned is the possibility of utilising more fully the plant and establishment as the traffic increases; or, in other words, of reducing the fixed charges per unit of output. Observation of the various expenses of a railway shows that many of these do not increase in direct proportion to an increase in traffic. We may consider the different expenses of railway undertakings separately, with a view to demonstrating this fact.

*Capital charges.* The capital charges of a railway undertaking do not constitute a working expense or primary claim on revenue, but it is not illogical to

consider them before the working expenses, as much capital expenditure had to be incurred before any revenue could be earned. The total paid-up capital of the railway companies in the United Kingdom, after deducting nominal additions, is £1,125,000,000 ; of this sum, some 80 per cent., or £900,000,000, has been invested in the road and buildings, some 15 per cent., or £170,000,000, in the rolling stock, and some 5 per cent., or £55,000,000, in miscellaneous property. The £900,000,000, spent on some 23,500 miles of line, includes, amongst other things, the outlay on preliminary expenses, on land, on the construction of the road, on the laying of the track, on the equipping of the line with signals, and on the erection of station buildings and platforms.

Even the most modestly constructed line costs a large sum of money, and is capable of dealing with a not inconsiderable amount of traffic ; if the traffic is light, the capital charges per unit of traffic will necessarily be heavy, and every increase in the traffic up to the normal carrying capacity of the line will be accompanied by a decrease in the capital charges per unit of traffic. Many miles of line in this country, whether they consist of a modest single track or of a double or even quadruple track, must be in the position that they could carry an increased traffic with little or no additional capital expenditure, and in these cases a growth in the traffic should

prove remunerative, provided the working expenses were not seriously increased owing to congestion of the lines, a contingency which will be discussed in the next chapter.

The £170,000,000 of capital spent on rolling stock has provided some 840,000 vehicles and 23,000 locomotives. This expenditure differs from that on the road and buildings in so far as it can be more accurately adjusted to traffic requirements. There must, however, be sufficient stock to meet maximum current requirements, which at ordinary times will leave a surplus. If the capital charges in respect of rolling stock are to be kept at a minimum, it must be the object of the management to secure well-filled vehicles to minimise the number of vehicles required, long trains to minimise the number of engines required, and quick transit so that the same vehicles and engines may be available for use as frequently as possible within a given period, thus also minimising the number of vehicles and engines required. The revision by the English and Welsh railway companies of their demurrage regulations on railway companies' wagons and sheets, which came into force on January 1, 1913, has resulted in a large number of wagons being freed from their loads more promptly than was formerly the case. As a result of this new policy, the need for building additional wagons has been obviated for the time being, and a better utilisation of the

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existing rolling stock has been secured.<sup>2</sup> The "control system," to which further reference is made in the next chapter,<sup>1</sup> is, incidentally, another means of securing a better utilisation of rolling stock.

*Working expenses.* The working expenses of railway companies in this country, as revealed in the statutory returns made to the Board of Trade, are divided under fourteen headings. The figures for 1911, the last year for which the returns are available, were as follows :

Maintenance of way, works, etc.,	-	£11,750,000
Locomotive power, - - -	-	21,000,000
Repairs and renewals of carriages and wagons, - - -	-	6,960,000
Traffic expenses, - - -	-	22,500,000
General charges, - - -	-	3,160,000
Rates and taxes, - - -	-	5,080,000
Government duty, - - -	-	320,000
Subscriptions or donations, - -	-	20,000
Compensation—		
To employees, - - -	-	290,000
For personal injury to passengers,		140,000
For damage to, or loss of, goods,		440,000
Legal and parliamentary expenses, -		290,000
Miscellaneous, - - -	-	2,300,000
Expenditure not allocated, - -	-	80,000
		£74,330,000

<sup>1</sup> See page 90.

<sup>2</sup> The actual charges per day for the detention of ordinary wagons and sheets have been reduced from 3s. and 1s. to 1s. 6d. and 3d. respectively. The time allowed for releasing a wagon after conveyance, before demurrage is charged, continues to be two days. In the case of the detention of a wagon before con-

Before attempting to analyse the figures, it is necessary to rearrange them, so as to get them grouped into a few principal classes which correspond fairly closely with the work done by the railways. The items "Compensation for personal injury to passengers" and "Compensation for damage to, or loss of, goods" clearly form part of the traffic expenses. "Compensation to employees," if paid to platelayers, belongs to maintenance of way, if paid to men engaged in shunting, belongs to traffic expenses, and so forth; it cannot be allocated accurately. It is probably fairly safe to assume that the bulk of the "Legal and Parliamentary expenses" and the whole of the "Subscriptions or donations"<sup>1</sup> are incurred in connection with the undertakings as complete systems, and not in respect of particular divisions of the work; consequently the items may be regarded as part of the general charges. There does not seem to be any exact method of allocating the two items, "Miscellaneous" and "Expenditure not allocated." As far as "Rates and taxes" and "Government duty" are conveyance, the number of free days has been reduced from two to one. The most important difference between the new and the old regulations appears to be that, whereas now the companies strictly enforce the payment of demurrage charges, formerly they did not do so, very often on policy grounds, owing to indirect competition between different companies.

<sup>1</sup> In future returns, commencing with those for 1913, this item will be incorporated in the "general charges."—Railway Companies (Accounts and Returns) Act, 1911.

cerned, these may be regarded as charges on income, similar to capital charges, rather than as working expenses. It may be noted in passing that these two items do not vary directly as the traffic, so that the burden of them per unit of traffic should diminish as the traffic increases.

There remain five principal classes, "Maintenance of way, works, etc.," "Locomotive power," "Repairs and renewals of carriages and wagons," "Traffic expenses" and "General charges." One of these, viz., "Locomotive power," can be split into two: repairs and renewals of engines, and cost of working engines. It can be ascertained from the Appendix to the Board of Trade returns for 1911 that the expenditure of fifteen large companies for wages in working locomotive engines, and for coal and coke for locomotive engines was some £11,333,000, and for wages in the repair and renewal of engines, and for materials for the repair and renewal of engines was some £5,000,000. By assuming that the expenditure of all companies on running and repairing locomotives was roughly in the same proportion as for these fifteen companies, we are able to divide the expenditure of all companies on locomotive power, viz. some £21,000,000, into two parts, and to say that, roughly, £14,500,000 represents the cost of working engines, and that £6,500,000 represents the cost of repairs and renewals of engines. The former sum can be allocated to "Traffic expenses," and the

latter sum can be grouped with the cost of repairs and renewals of carriages and wagons to form one item, "Maintenance of rolling stock."<sup>1</sup>

After what is necessarily a fairly rough and ready re-classification of the various items, the working expenses of the railway companies in the United Kingdom in 1911 may be given as follows :

	£ millions.
General charges, - . . . . .	3.5
Maintenance of way, works, etc., - . . . .	12.0
Maintenance of rolling stock—	
Carriages and wagons, - . . . .	£7
Locomotives, - . . . .	6.5
	13.5
Traffic expenses, - . . . .	40.0
	69.0

*General charges.* The general charges of any company, which are incurred in connection with the work of the undertaking as a whole, include the fees paid to directors and auditors, the salaries of the general manager, secretary and accountant, their office expenses, and various law charges. As returned at present, they also include Railway Clearing House expenses, which ought to be included amongst the traffic expenses.<sup>2</sup> The characteristic of these general

<sup>1</sup> Under the Railway Companies (Accounts and Returns) Act, 1911, which came into force on Jan. 1, 1913, there will in future be an item "Maintenance and renewal of rolling stock," which will include locomotives, as well as carriages and wagons.

<sup>2</sup> This will be the case in the 1913 and subsequent returns. —Railway Companies (Accounts and Returns) Act, 1911.

charges is that they depend only indirectly upon the amount of traffic carried ; they should grow less rapidly than the traffic expands ; consequently, the heavier the traffic, the lighter the general charges per unit of traffic.

*Maintenance of way and works.* The expenditure on maintenance of way and works slightly exceeds £500 per mile of line. There are two ways in which we can examine this item with a view to showing that it does not increase in direct proportion to the traffic. We can compare the expenditure of two companies, one with comparatively heavy expenses and heavy traffic, and the other with comparatively light expenses and light traffic, with the object of showing that the burden of maintenance per unit of traffic is less in the former than in the latter case. Let us compare the expenditure of the Midland Railway Company and of the Northern Counties Committee in 1911. The former spent £1,220,000 in maintaining 1,532 miles of line, or, roughly, £800 per mile ; the latter spent £65,000 in maintaining 263 miles of line, or approximately £250 per mile. In other words, the Midland Railway Company spent more than three times as much in maintenance per mile of line as the Northern Counties Committee.

These figures are deceptive, as the Midland Railway Company had much double and a good deal of quadruple track to maintain, whereas the Northern Counties Committee had chiefly single track to main-



tain. If we take running track instead of line as the basis of comparison, the Midland Railway Company spent £392 per mile in maintaining 3,116 miles of running track and the Northern Counties Committee spent £203 per mile in maintaining 320 miles of running track. If sidings are taken into account, the Midland Railway Company spent £252 per mile in maintaining 4,843 miles of single track, as compared with £179 per mile spent by the Northern Counties Committee in maintaining 364 miles of single track. This assumes that sidings cost as much to maintain as running track, which is not the case, and consequently, these figures can hardly be accepted as a fair comparison. Not to ignore sidings, and at the same time not to attach too much weight to them, we may regard 3 miles of siding as being equivalent to 1 mile of running track in what concerns maintenance. The Midland Railway Company maintained 3,116 miles of running track and 1,727 miles of sidings, equivalent to 3,692 "unit miles,"<sup>1</sup> and spent £331 per unit mile; the Northern Counties Committee maintained 320 miles of running track and 54 miles of sidings, equivalent to 338 "unit miles,"<sup>2</sup> and spent £193 per unit mile.

The Midland Railway Company's expenditure on maintenance per unit mile was, roughly, seventenths as much again as that of the Northern Counties Committee. The amount of traffic carried per mile

<sup>1</sup>  $3,692 = 3,116 + \frac{1}{3} \cdot 1,727$ .

<sup>2</sup>  $338 = 320 + \frac{1}{3} \cdot 54$ .

of track was much greater on the Midland Railway than on the Northern Counties Committee. No ton-mile or passenger-mile statistics are available to measure accurately the amount of work done by the two undertakings; we can only ascertain that the Midland Railway Company earned £3,477 and the Northern Counties Committee £1,130 per unit mile, or that the former earned three times as much per mile as the latter. Is it safe to assume that the Midland Railway did at least three times as much work per unit mile as the Northern Counties Committee? It seems fairly safe to do so, as its earnings per mile, per passenger, and per ton carried, with its large mineral traffic at low rates, were almost certainly as low as, if not lower than, those of the Northern Counties Committee. We may, therefore, conclude that the cost of maintenance per unit of traffic on the Midland Railway was probably about three-fifths of what it was on the Northern Counties Committee.<sup>1</sup> These figures, and others which could be

<sup>1</sup> Our calculations show that the M.R. earned three times as much per unit mile as the N.C.C.

If, on the average, the charges on the M.R. were three times as high as on the N.C.C., the M.R. would be dealing with as much traffic only, per unit mile, as the N.C.C. It would follow that the expenditure on maintenance *per unit of traffic* on the two companies would be in the same ratio as their expenditure on maintenance *per unit mile*, viz. 331:193, which is equivalent to 171:100. In other words, the M.R. would spend on maintenance per unit of traffic roughly seven-tenths as much again as the N.C.C. did.

If, on the average, the charges on the M.R. were equal to those

produced concerning other railways, clearly suggest that the cost of maintenance of way does not increase as rapidly as the traffic increases, and that, consequently, the heavier the traffic, the lower the cost of maintenance per unit of traffic.

The second way of reaching the same conclusion, viz., the heavier the traffic the lower the cost of maintenance per unit of traffic, is by analysing the expenditure on maintenance of way and works with a view to ascertaining how much of it does, and how much of it does not, vary directly with the traffic. If we take the Midland Railway figures for the first half of 1912, we find that the expenditure on maintenance of way, works, etc., consisted of four items (omitting expenditure on docks, harbours and canals). One is "Salaries, office expenses and general superintendence," £29,500; this is evidently fairly independent of the traffic. A second is on the N.C.C., the M.R. would be dealing with three times as much traffic per unit mile as the N.C.C. It would follow that the ratio of expenditure on maintenance *per unit of traffic* on the two companies would be one-third of the ratio of their expenditure on maintenance *per unit mile*, viz.  $\frac{221}{3} : 193$ , which is equivalent to 57 : 100. In other words, the M.R. would spend on maintenance per unit of track roughly three-fifths of what the N.C.C. did.

If, on the average, the charges on the M.R. were less than those on the N.C.C., the M.R. would be dealing with more than three times as much traffic per unit mile as the N.C.C. It would follow that the ratio of expenditure on maintenance per unit of traffic on the two companies would be less than  $\frac{221}{3} : 193$ . In other words, the M.R. would spend on maintenance per unit of traffic less than  $\frac{57}{100}$  of what the N.C.C. did.

“Repairs of roads, bridges, signals and works,” £101,000; and a third is “Repairs of stations and buildings,” £73,500. Both these items must depend mainly on the wind and weather, and may be regarded, therefore, as being fairly independent of the traffic. The fourth is “Maintenance and renewal of permanent way,” £309,000; this must vary to a considerable extent with the traffic, as rails wear out and joints are loosened by the passing of trains; on the other hand, the weather will largely account for such things as the rotting of sleepers and the washing away of ballast. In the returns of American railways more details are given, and we can ascertain for a busy line like the Pennsylvania Railroad that, roughly, one-third of the expenditure on maintenance of permanent way is due to the weather and two-thirds to wear and tear. If we divide the £309,000 in this proportion, we should say that £206,000 was due to wear and tear and £103,000 to weather. Of the total expenditure of £513,000 on maintenance of way and works, only some £206,000, or two-fifths, appears to depend directly on the traffic passing over the line; the remaining expenditure will tend to increase at a lower rate than that at which the traffic increases. Thus again it follows that the heavier the traffic, the lower will be the cost of maintenance per unit of traffic.

*Maintenance of rolling stock.* The expenditure on maintenance of rolling stock really consists of two

separate things : (1) provision for wear and tear and (2) provision for obsolescence. Repairs and renewals due to wear and tear depend largely upon the number of miles the rolling stock has run,<sup>1</sup> whereas replacements due to stock having become antiquated do not depend upon the use which has been made of the stock; consequently, the more the stock is used before it becomes obsolete, the lower the charge for obsolescence per unit of traffic will be. If all the stock could be worn out before it had a chance of becoming antiquated, there would be no charge for obsolescence at all.

With a view to reducing the comparative cost of maintaining rolling stock, the object of a railway company will be to secure heavier loads per wagon and per locomotive. It must not be overlooked that heavier loads per wagon or per carriage will increase the cost of repairs and renewals, especially of tyres, and that heavier loads per locomotive will also involve increased repairs, especially to boilers, which are the delicate part of a locomotive and suffer severely if hard-pressed on a heavy trip. Nevertheless, it is improbable that the repair bill will increase in the same proportion as the loads, and it is certain that a heavy load involves no more obsolescence than a light load. Consequently, well-filled wagons and long trains imply a lower charge for maintenance in respect of wagons and locomotives per unit of traffic than partially-filled wagons and short trains.

<sup>1</sup> The springs suffer when the rolling stock is standing idle.

*Traffic expenses.* The traffic expenses consist chiefly of cost of labour and cost of coal.<sup>1</sup> The information available does not allow the expenditure on wages to be analysed sufficiently to throw much light on the question as to how far it depends directly upon the amount of traffic.<sup>2</sup> There are at least two ways in which it may be possible for traffic to grow without involving a proportionate increase in traffic expenses. (1) The cost of the station service—salaries, wages, materials—and the cost of watching and signalling on the open line should not increase proportionately as the number of trains run is increased. (2) The cost of running locomotives and other train expenses should increase at a lower rate than the traffic carried, if the additional traffic is conveyed in better filled wagons and longer trains; the better filled wagons imply less deadweight to be hauled in proportion to paying load; the longer trains imply that a saving will be effected in coal and in the wages of locomotive and train staffs, as

<sup>1</sup> Until now, this item has included the expenses of collection and delivery. After Jan. 1, 1913, it will no longer do so. These expenses will appear on the credit side of the Revenue Account as deductions from the total receipts from passenger train and merchandise traffic.—Railway Companies (Accounts and Returns) Act, 1911.

<sup>2</sup> This will be more feasible in the future, when what is at present a single item, "Salaries and Wages," will be subdivided under five headings: (1) superintendence, (2) station-masters and clerks, (3) signalmen and gatemen, (4) ticket collectors, policemen, porters, etc., (5) guards.—Railway Companies (Accounts and Returns) Act, 1911.

up to a certain point these should not increase at the same rate as the length of the train.

*Heavier loads per wagon and per locomotive.* Well-filled wagons and long trains render possible economies in capital charges, economies in maintenance and economies in working; and when we learn that a company has increased its earnings whilst decreasing its train miles, we can be almost certain that it has been running longer trains and probably better filled wagons. That there has been an increase in earnings and a decrease in train miles of recent years in this country can be clearly demonstrated from the Board of Trade returns. The figures for a period of ten years are embodied in the table below.

TABLE showing for English and Welsh railway companies the receipts from goods traffic, the miles travelled by goods trains, and the receipts per train mile from goods traffic, in each year from 1902 to 1911.

Year.	Receipts from goods traffic.	Miles travelled by goods train.	Receipts per train mile from goods traffic.
	£	Miles	d.
1902	46,300,000	142,900,000	77.62
1903	46,700,000	133,800,000	83.54
1904	46,900,000	129,700,000	86.59
1905	47,800,000	129,600,000	88.41
1906	49,600,000	133,100,000	89.31
1907	52,200,000	138,100,000	90.82
1908	50,200,000	131,800,000	91.52
1909	50,600,000	128,500,000	94.65
1910	52,300,000	129,100,000	97.31
1911	53,900,000	130,900,000	98.94

Between 1902 and 1911 the receipts from goods traffic on English and Welsh railways increased by 16.4 per cent., whilst the miles travelled by goods trains decreased by 8.4 per cent. In other words, the receipts per train mile from goods traffic were 27.5 per cent. greater in 1911 than in 1902. A possible, though highly improbable, explanation of these figures would be that the quantity of traffic had diminished but that such traffic as remained was, on the average, of a higher class, and consequently subject to higher charges, than the former traffic, and that this accounted for the increased receipts per train mile. To prove that this is not the case and that the increased receipts per train mile are due to heavier train loads, it would be necessary to have the ton-mile as well as the train-mile figures, so that the average train load could be calculated.<sup>1</sup>

Generally speaking, ton-mile figures are not available in this country; in the case of the North-Eastern Railway Company, however, certain ton-mile statistics are calculated, and it is possible to

<sup>1</sup> The ton-mile figures are obtained by multiplying the tonnage of goods and minerals conveyed in a given period by the average distance for which each ton is conveyed. The train-mile figures relating to goods trains indicate the number of miles travelled by goods trains in a given period. *E.g.* if 7,000,000 tons of goods were conveyed for an average distance of 35 miles, the number of ton-miles would be  $35 \times 7,000,000 = 245,000,000$ . Further, if it were ascertained that the number of miles travelled by goods trains was 4,000,000, the average train load would be  $245,000,000 \div 4,000,000 = 61.25$  tons.



ascertain the train loads for a succession of years. Some recent figures, which are doubtless typical of what is happening on the systems of other English railway companies, are quoted in the table below. The figures show that during the ten years 1902 to 1912, the average goods and mineral train loads have increased by approximately 60 per cent.

TABLE showing the freight train loads on the North-Eastern Railway for the December half-years, 1902-1912.<sup>1</sup>

Year.	Goods train loads.	Mineral train loads.	Total freight train loads.
	tons.	tons.	tons.
1902	59.76	113.81	84.23
1903	67.63	129.59	94.97
1904	73.01	134.19	100.68
1905	80.00	141.22	108.56
1906	78.90	144.61	109.73
1907	83.37	152.75	115.83
1908	80.08	161.65	116.79
1909	84.78	172.77	124.98
1910	87.20	176.71	127.12
1911	90.09	179.34	128.46
1912	95.40	183.96	133.84

It must not be overlooked that to secure well-filled wagons involves the accumulation of consignments at intermediate tranship stations, and consequently delay in their delivery, which may easily lead to

<sup>1</sup> Supplied by Mr. A. Kaye Butterworth, general manager of the N.E.R., and quoted from *The Railway News*, Feb. 15, 1913, p. 387.

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claims for compensation or to loss of traffic to competitors ; nor must it be forgotten that long and well-loaded trains, drawn by heavy locomotives, may involve the strengthening of many bridges, and in that and other ways occasion a serious increase in capital and working expenses. These points will be dealt with more fully in the next chapter.

## CHAPTER VIII.

### THE APPLICATION OF THE LAW OF DECREASING RETURNS TO RAILWAYS

*Similarity of agricultural and railway conditions in old countries.* We have examined the capital charges and working expenses of the railway undertakings with the object of showing that up to a certain point these may be expected to grow less rapidly than the traffic increases, and consequently, the larger the traffic, the lower the capital charges and working expenses per unit of traffic ; in other words, it should be possible to handle increasing traffic at diminishing costs. We must now consider the limits to this tendency, as there are undoubtedly cases where additional traffic can only be dealt with at increasing costs. This refers, not to the growth of working expenses, which may be brought about in course of time by such things as a rise in the rate of wages or a rise in the price of coal, but to the operation of the law of decreasing returns. That law, or general tendency, states that where one of the necessary agents of production is fixed in quantity, and more

of the other agents are employed with a view to obtaining a larger output, the output will be increased, but sooner or later at a diminishing rate or increasing cost. We have seen that this law generally operates in the case of agricultural production in old countries on account of the limitation in the quantity of land available at suitable prices ; in these cases the most that can be done is to spend large sums on improved methods of working, costly manures, elaborate systems of drainage, and so forth, with the object of postponing the operation of the law and of making it act less severely when it does operate.

The position with regard to railways does not appear to be at all dissimilar to that of agriculture. Land plays a most important part in the railway industry. As considerable expenditure must be incurred in making land of use for railway purposes and on maintaining it, the management of a railway will think twice before employing more land, even if it costs nothing, or if that required for laying a second track is already owned. Where, as in this country, land is often exceedingly expensive, railway companies will be prepared to incur a large outlay in increasing the capacity of their existing lines and buildings before they will undertake costly widening and enlargement schemes. It is a mistake to think of a goods yard, or of any particular section of a line, as having a definite capacity, just as it is a

mistake to think of a particular field as having a definite output. The output of a field depends entirely upon the efforts expended in cultivating it; the capacity of a goods yard, or line, depends upon the efforts expended in enabling traffic to be dealt with. Just as it may pay to spend more money in cultivating land more intensively in an old country, in order to produce an additional output, even though each additional unit of output is obtained at increasing cost, or subject to decreasing returns; so it may pay to spend more and more money in an old country on improving and on working a given section of line, in order to deal with more traffic, even though each additional unit of traffic is dealt with at increasing cost, or subject to decreasing returns.

*Alterations in the normal carrying capacity of a railway.* After a railway undertaking has secured that amount of traffic which is best adapted to the normal carrying capacity of the line, if the traffic continues to grow, increasing costs can be postponed up to a certain point, by successive increases in the normal carrying capacity of the line. Every increase in the normal carrying capacity of the line corresponds to the introduction of a new system of production, in which the various agents are combined in new proportions: the quantity of land remains constant, the amount of labour is probably slightly increased, the amount of capital is considerably augmented. Each addition to the

normal carrying capacity of a line involves new expenses, but, provided the additions are made gradually, the growth of the traffic may not merely prevent the expenses per unit of traffic from increasing, but actually cause them to diminish. It is not always easy to ascertain how soon any particular improvement has justified itself; when one is first made it may temporarily cause a slight increase in the cost of dealing with each unit of traffic, but this increase may be more than set off by the decrease in the cost caused by the development of traffic on sections which have not yet reached their full carrying capacity and by the better utilisation of previous improvements. The usual practice of railway companies is to make improvements only when they are convinced that the cost of dealing with traffic, per unit, will be less, or at any rate no greater, than previously.

There are various ways in which the normal carrying capacity of a line can be increased, each involving a more or less large expenditure on capital or current account. Heavier trains may be run; this will involve the use of extra locomotives, which will generally not be fully utilised, or the building of larger and more powerful engines. Experience shows that the cost of the increased capacity of engines increases out of all proportion to speed; increased power of engines will also involve greater wear and tear of the permanent way, and very possibly the

relaying of the line with heavier material, the increasing of the size of turn-tables and the strengthening of bridges. Heavier, and consequently slower, trains involve the construction of larger and more lie-by sidings to allow quick trains to pass. The signalling arrangements may be improved; additional signal-boxes may be constructed and manned (if placed too close together, however, trains cannot get up speed), or pneumatic and electric operation of signals, which is effective in their quicker manipulation, but involves high cost of installation and working, may be introduced. In all cases, as the traffic grows level crossings will have to be replaced by bridges, and footbridges or subways will have to be constructed at stations where previously they did not exist.

Improved methods of train working may be introduced. A "control system" may be established by which the arrangement of the loading of goods and mineral trains is taken out of the hands of goods guards and placed into those of the special officials or controllers in charge of various control areas. The controller is in telephonic communication with every signal-box and goods yard in his area, and is kept informed both of train movements and of the traffic to be moved in his area. It is almost inevitable that a time-table for the working of goods and mineral traffic cannot be kept; trains are unpunctual and the time-table has to be modified. Whereas under

the old system the daily changes and alterations were left largely to the discretion of the individual signalmen, under a control system they are arranged and adapted to the particular conditions by the controller, who is in the best position to manipulate the traffic, as he has complete information as to the whereabouts of each train in his area. In addition to directing train movements, a controller also gives instructions about the loads to be conveyed by each train.

As part of the control system, or under a separate scheme, arrangements may be made by which goods and mineral traffic is collected in selected depots, whence heavy trains are made up and dispatched on long through journeys, thus reducing the number of trains and relieving the pressure on the main lines.

The control system is of American origin. The first company to adopt the system in this country was the Midland Railway at the beginning of 1909. Since that time it has been introduced on busy areas of the systems of various companies, including the Lancashire and Yorkshire, the London and North-Western, the North-Eastern and the Great Western. The introduction of the system entails considerable expense, as amongst other things it involves the installation of an entirely independent telephone system to connect each control office with all points in its area.

Up to the present we have discussed how a railway



undertaking may evade the operation of the law of decreasing returns by successive increases in the normal carrying capacity of its line, which enable it to deal with a growing traffic at constant or decreasing costs. The carrying capacity of a line, however, cannot be extended indefinitely, nor, generally speaking, can it be done at quite short notice. Each of these points must be considered separately; the latter may be taken first.

*Overcrowding and congestion.* Whatever the normal carrying capacity of a line may be, that line is liable to become temporarily overcrowded or congested through a boom in trade, fog, snow, or some other cause. This will occasion great inconvenience and delay, as well as much extra expense, and the cost of dealing with each unit of traffic will be increased. On overcrowded lines the time-table breaks down, and goods and mineral trains are longer on the way. This involves the working of extra hours by the engine and train staffs, and therefore entails a larger wages bill; the consumption of coal is increased, engines being longer under steam; claims for the delay of goods are likely to occur; demurrage will have to be paid on any foreign wagons unduly detained. Owing to some wagons being delayed in transit, or being held up for other reasons, other wagons may have to be unloaded in goods yards in overtime so as to provide a supply. Import traffic, instead of being loaded

straight into wagons, may, owing to the delay, have to be unloaded on to the dock and later into wagons, thereby necessitating two handlings of the traffic instead of one.

At times of pressure, during holiday seasons, assisting engines may be necessary for heavy passenger trains; these engines will probably not be fully utilised, and it may easily occur that they have to work home light. In some cases duplicate trains will have to be provided; even if these are fully utilised, they tend to disorganise the goods and mineral traffic, and thus indirectly occasion additional expense.

Where goods yards or sidings are overcrowded or congested, more shunting charges have to be incurred to get wagons into position; men, horses and drays are kept waiting in connection with loading and unloading; the staff have to work overtime and on Sundays to get through the work—both costly expedients; extra men are engaged, who are inexperienced, in consequence of which bad loads are made, and more goods are damaged and go astray. Two men may be employed as “loaders” to load a wagon instead of one; the work is done more quickly, but not in proportion to the increased cost, yet such an arrangement may be necessary where the accommodation of the loading platform is limited. The cartage department may not be able to clear the goods as they arrive, and this will

involve double handling. When sidings are congested, an inordinate amount of shunting has to be done to marshal and dispatch different trains; wagons are delayed and prevented from earning. The tendency for firms to keep goods under load is probably greater during a boom of trade than at ordinary times; it is certainly more serious, as rolling stock is held up when most needed. Traffic comes in faster than firms can clear or choose to clear wagons; firms' sidings and railway companies' sidings become congested; it is difficult to get traffic out of these works; the railway's workings may be disorganised by the blocking of the running tracks during shunting operations. Experience has shown, however, that the tendency for sidings to become congested is considerably diminished since the new demurrage regulations came into force in January, 1913, as wagons are now released much more promptly than formerly.

*Limits to the increase of the carrying capacity of a railway.* Sooner or later, a situation must arise in which the normal carrying capacity of a line cannot be increased, either at all, or without incurring such a large expenditure as will raise the cost per unit of traffic. As an illustration of this latter contingency, the electrification of a suburban line may be given. This expedient will enable a much larger passenger traffic to be dealt with, but it is very doubtful if the increase in the traffic will suffice to compensate for

the increase in the expenses. The cost of dealing with each unit of traffic will be higher than it was previously, but as the traffic grows and the improvement is more fully utilised, it will diminish again, though probably not to its old level. Whether a railway undertaking will be prepared to increase the normal carrying capacity of its lines under these circumstances will depend, to a considerable extent at least, upon the cost of land for widening purposes, as this will determine whether electrification or a widening scheme is the more economical method of dealing with additional traffic; but special considerations may influence the decision. For example, if it is essential to expedite the handling of passenger traffic, electrification will probably be adopted; or if there are good prospects of large developments of traffic in the future, a policy of widening will very likely be preferred.

Where a line with a high normal carrying capacity becomes overcrowded, and a company is faced with a costly and unremunerative improvement scheme, or perhaps with an even more costly and unremunerative widening scheme, it is possible that a solution of the difficulty may be found in working agreements or amalgamations between different companies.<sup>1</sup> If one company's lines are much more crowded than a competitor's, an arrangement may be made for a

<sup>1</sup> The general question of railway agreements and amalgamations is discussed in the next chapter.

redistribution of traffic to relieve the one line, and to utilise the other more fully. An illustration of the adoption of such a policy is provided by the mineral traffic of the South Leicestershire line (Midland Railway). Since the recent pooling agreement between the London and North-Western and the Midland Railway Companies, the London and North-Western Railway works the mineral traffic of the South Leicestershire line to London, via Nuneaton, and so relieves the Midland line between Wigston and London. Even if both competitors are crowded with traffic, a redistribution of traffic with a view to running, as far as possible, express traffic over one company's lines and slow traffic over the other company's lines, should considerably increase the carrying capacity of both companies' lines. This follows from the fact that the maximum amount of traffic can be moved on a line when all the trains are travelling at the same speed, as is the case on the Underground railways in London and on the Overhead railway in Liverpool. The closer the train movements on a line approximate to this condition, the greater the carrying capacity of the line will be. Where one company has four tracks between two points, it naturally reserves two for fast and two for slow traffic, but where one company has two different routes between two points, or two allied companies have each a route between two points, a definite allocation of all fast traffic to one route and all slow

traffic to the other is hardly possible. Nevertheless, under these circumstances it is feasible to distribute the fast and slow traffic in a manner which is more favourable to economical operation, than if the two routes were quite independent. The Prussian State Railways, for example, have two routes between Cologne and Mainz, and they run the great bulk of the express passenger traffic, together with a considerable amount of goods and slow passenger traffic, on the line on the left bank of the Rhine, through Bonn and Coblenz, and reserve the route on the right bank of the Rhine almost exclusively for goods and slow passenger traffic.

Sooner or later a policy of extension may have to be adopted : larger stations, larger goods yards, more running tracks will have to be constructed. In other words, the attempt to deal with more traffic without increasing the quantity of land will be given up. A very large expenditure of capital will be involved ; it will have to be incurred, at the outset, to deal with some small increase in traffic ; the capital and maintenance charges will be greatly increased, and the addition to the revenue on account of the extensions will for many years be absolutely inadequate to compensate for the expenditure incurred. In some cases, where the land for extension has been particularly costly, it may never prove adequate.

## CHAPTER IX.

### COMBINATIONS AMONG RAILWAY COMPANIES

*Causes leading to combinations among railway companies.* Railway undertakings, like other industrial concerns, find that excessive competition may prove exceedingly wasteful, and are therefore anxious to restrict it as far as possible. As no railway can be established without the approval of Parliament, all direct competition between railways owes its origin to the fact that Parliament has frequently sanctioned competitive schemes, with the object of securing that there shall be at least two railways capable of carrying traffic between most of the principal towns. Experience has shown, however, that the mere existence of two routes between any two points is not sufficient to insure active competition, the number of parties concerned being so small and the inducement to avoid competition in many matters being particularly strong. As a consequence, understandings, agreements and combination among railway companies are very numerous, and not infrequently these efforts to restrict competition have actually received the approval of Parliament.

Probably the strongest motive which leads railway companies to establish understandings amongst themselves is connected with the financial organisation of railway undertakings. Owing to the fact that so much of the expenditure of a railway company is more or less fixed in character, and that so little of it can be attributed to the cost of carrying any particular traffic, the management will often prefer to carry traffic for a very small sum rather than not carry it at all. Consequently, if one company began underbidding another in the matter of rates, competition would be likely to become extremely reckless, and the results would probably be very unsatisfactory, if not disastrous, to both companies. Railway companies are practically compelled, in self-defence, to enter into arrangements to secure equal rates between competitive points. An agreement to charge equal rates between competitive points is not in itself sufficient to do away with competition in the matter of charges; the understanding must extend to the charges made for subsidiary services arising out of the actual conveyance of traffic, *e.g.* collection and delivery, demurrage, siding rents, warehousing. If two companies charge the same rates, but one affords certain subsidiary services free of charge, which the other does not, the one company is really under-bidding the other. Competition in rates and fares and in subsidiary charges practically no longer exists in this country.



During recent years various causes have operated to raise the cost of railway working. The very considerable rise in the general level of prices, which has made itself felt since 1896, has increased the cost of the coal and the materials purchased by railway companies. The same rise in prices, by causing an increase in the cost of living, has considerably strengthened the movement in favour of higher wages, which in many cases have been accorded by the companies voluntarily, or as the result of arbitration awards. This also has helped to swell the working expenses. The sums which the companies have to pay in rates to the local authorities have also increased very considerably, and in a greater proportion than the gross revenues of the railways have increased.

To meet their growing expenses, railway companies cannot easily do what ordinary producers under similar circumstances are free to do, viz. charge higher prices. Railway companies are confronted with two difficulties. On the one hand, there are legal restrictions on their powers to raise their rates for the conveyance of goods and minerals.<sup>1</sup> On the other hand, where they have power to raise their charges, it can only be brought about in practice, as has been indicated above, by the adoption of a common policy on the part of the competing companies concerned. In other words, understandings or agree-

<sup>1</sup> This point is dealt with in Chapter XX.

ments are necessary before an increase in the price of tickets, such as was introduced on the English and Welsh railways on January 1, 1912,<sup>1</sup> can be established. Similarly, an understanding or agreement among various companies is practically necessary before a revision of the conditions and charges for storage and wharfage of traffic and handling services incidental thereto, can be introduced, such as came into operation on English and Welsh railways on March 25, 1913.<sup>2</sup>

Instead of, or in addition to, attempting to increase their revenues by raising their charges, railway companies may seek to reduce their expenditure in various directions. In this case, again, it is probably necessary to establish some form of combination among different companies in order to restrict competition in the matter of services and facilities, the provision of which may prove very costly to the companies and of little real advantage to the general public. Competition leads to a large expenditure on advertising; some of this may be needed owing to the existence of other methods of conveyance, or in order to draw the attention of the public to the

<sup>1</sup> The price of ordinary tickets was not affected, but the charges for tourist, week-end, Saturday to Monday, excursion, season and trader's tickets were raised.

<sup>2</sup> The new regulations make provision for (1) a curtailment in the period allowed for warehousing without charge, and (2) an increase in the charges made for rent in warehouses and on wharfs.

attractions of particular places, but much of it could be avoided by agreement. Unnecessary outlay on canvassing for traffic is incurred in towns where two or more companies compete. Duplication of town offices, receiving houses and agencies is another consequence of competition. So, too, is an uneconomical cartage system ; vans are sent out light to secure early delivery ; goods are carted long distances by companies with inconveniently situated stations to secure traffic from competitors ; the same districts are served by vans from different companies where one set of vans would suffice to collect and deliver goods. In some cases, owing to competition, an unnecessary number of trains is run ; this hardly applies to passenger traffic between competing points, as different intermediate districts are tapped by the different lines ; it is in connection with the freight traffic that a curtailment of the service can probably be effected, as competition is responsible for much light loading of wagons, short trains, and circuitous and inconvenient routes.

There are other reasons besides those of desiring to restrict competition which may cause railway companies to combine or to form agreements. On the one hand, by combination it may be possible to secure certain economies of large scale production : a saving can be effected in administrative expenses, workshops and repairing shops can be conducted on a bigger footing, a smaller surplus of rolling stock

will be required. On the other hand, agreements may be entered into to facilitate the working of through traffic.

Combinations and agreements among railway companies may take different forms. They fall into two classes: (I) those which cause the parties to the agreement to have one management, and (II) those which leave each party to the agreement under independent management.

*Combinations which cause the contracting parties to have one management.* We can distinguish four types of combination in class I.

(1) *Amalgamation.* The systems of most of our railway companies comprise what were formerly the undertakings of a large number of independent companies; e.g. the Great Western Railway is composed of what were formerly 107 separate undertakings. One kind of amalgamation is that which unites railways to form one continuous line of communication between two centres, or, in other words, which unites railways which are supplementary to each other; e.g. the Great Western route from Paddington to Birkenhead, via Birmingham, is made up of eight component railways. Another kind of amalgamation is that which unites competing companies; e.g. amongst the railways which constitute the North-Eastern Railway Company are the Leeds Northern, and the York, Newcastle and Berwick Railway Companies, which were formerly strong

competitors. Amalgamation may be brought about by a new company being formed to take over the separate undertakings; *e.g.* the Midland Railway Company was established in 1844 to take over the North Midland, the Midland Counties, and the Birmingham and Derby Railway Companies; or amalgamations may be brought about by one company absorbing another; *e.g.* the Great Central Railway Company absorbed the Lancashire, Derbyshire and East Coast Railway Company in 1906; the Midland Railway Company absorbed the London, Tilbury, and Southend Railway Company in 1912.

(2) Working union. In this case the existence of each company is maintained; there is a common administration, but the capital accounts are kept separate. In 1899 a working union, known as the South-Eastern and Chatham Railway Companies Managing Committee, was formed by the South-Eastern and the London, Chatham and Dover Railway Companies.

(3) Lease. The owning company, in return for a fixed rent or guaranteed dividend, leases its line for a definite period, or in perpetuity, to a working company, which undertakes to work it and keep it in repair; *e.g.* the London and Blackwall Railway is leased to the Great Eastern Railway Company.

(4) Working agreement. One company secures powers to maintain and manage the lines of another company, and in return pays over an agreed pro-

portion of the gross receipts to the owning company, and generally undertakes to use its best endeavours to develop the traffic of the line ; *e.g.* the Sheffield District Railway is worked by the Great Central Railway Company.

*Agreements which leave the contracting parties under independent management.* We can distinguish various types of agreement or combination in class II.

(1) Agreements or arrangements to restrict active competition. (a) Conferences of railway officials who meet at the Railway Clearing House to discuss and deal with various matters, *e.g.* the fixing of competitive rates and fares, general regulations affecting particular classes of traffic, charges or rebates allowed for services outside railway conveyance, claims for damage or delay to goods. The decisions reached are not legally binding, but in practice are nearly always carried out. (b) Pooling arrangements under which specified traffic receipts are divided between companies without reference to which company's lines the traffic has passed over. Under these conditions there is no object in competing for traffic. For example, the London and South-Western Railway Company has an arrangement with the Great Western Railway Company to pool receipts on traffic with the Channel Islands ; the beer traffic between Burton and London is pooled in self-defence, as the big brewers could almost dictate their own terms, when three railway

companies vied with each other for the traffic. Several of the more recent pooling arrangements are much more comprehensive in character. They relate not merely to traffic between certain competitive points, but to competitive traffic of all descriptions arising on the systems. They also provide that "arrangements shall be made with a view to securing the most economical methods of working, combined with the best facilities to the public." In practically every case a deduction is allowed from gross receipts to cover working expenses, and only the residues are pooled.<sup>1</sup> The usual basis for dividing pooled receipts, after deductions for working expenses, is the actual carryings of the pooled traffic by each company party to the pool for an agreed period prior to the formation of the pool.<sup>2</sup> A comprehensive pooling arrangement is that which was formed in 1909 between the London and North-Western, the Midland and the Lancashire and Yorkshire Railway Companies. The agreement is to continue until determined by ten years' notice, such notice not to be given before 31st December, 1998.

(2) Agreements concerning divisions of territory and the construction of new lines may be established.

<sup>1</sup> In the case of the L. & N.W.R., M.R. and L. & Y.R. agreement the deduction allowed for working expenses is 20 per cent.

<sup>2</sup> In the case of the L. & N.W.R., M.R. and L. & Y.R. agreement, the traffic carried in 1907 is the basis of the division.

For example, the London and South-Western and the Great Western Railway Companies have an agreement not to promote lines in each other's territory ; the Caledonian and the North British Railway Companies have an agreement with regard to the promotion of competing lines. In some cases a difficulty about a division of territory may be overcome by the promotion of a joint line ; *e.g.* the development of the South Yorkshire coalfield made various companies anxious to secure access to that district. Ultimately the South Yorkshire Joint Line Railway was established, belonging to the Great Central, Great Northern, Lancashire and Yorkshire, Midland, and North-Eastern Railway Companies, and managed by a Joint Committee.

(3) Agreements or combinations to facilitate the working of through traffic. (a) Running powers may be secured, enabling one company to run engines, carriages and wagons over the lines of another company ; *e.g.* the London and North-Western Railway Company has running powers over the Midland lines from Burton to Derby. Running powers are usually obtained by common agreement, but they are sometimes accorded to one or more companies by Parliament against the wish of the owning company. (b) Joint lines may be established to give through connections ; *e.g.* the Midland and North-Eastern Joint Line between Swinton and Knottingley appears to be of this character. (c) The Railway Clearing



House has been instituted to further the common interests of railway companies. The need for some kind of Joint Committee of railway companies to make arrangements for through traffic had long been recognised. The Railway Clearing House was first established in 1842, and eight years later, by the Railway Clearing Act, 1850, secured the right to sue (or to be sued) as an entity. Every railway of importance in Great Britain is a party to the Clearing House. It deals, amongst other things, with the division of receipts, conditions as to packing, and regulations as to the construction of wagons.

*Effects of combinations on companies not parties to agreements.* Whilst it may be clearly in the interests of two or more companies to amalgamate, other companies which are not parties to the combination may be prejudicially affected, and will probably oppose any scheme brought forward. What they fear is a diversion of traffic; traffic may be lost through becoming "local" to one company or through being transferred from one route to another. Traffic between a place where there is only one company and any other place on that company's system is described as "local." It may be that there is only one company at both places; e.g. this is the case at Millers Dale and Ambergate, and traffic between these stations is "local" to the Midland Railway Company; but it may be that there are two or more companies at one of the places, e.g. in Manchester,

but this does not prevent traffic between Millers Dale and Manchester being "local" to the Midland Railway Company. As a matter of fact, it is physically possible for the London and North-Western Railway Company to carry the traffic from Manchester as far as Buxton and there hand it over to the Midland Railway Company, but it is an accepted principle of railway working that where traffic is "local" to one company, no other company shall carry the traffic part of its way at the local rates.

Outside companies may secure some, if not complete, protection from the diversion of traffic through the amalgamation of two companies, by the insertion of a clause or clauses in the Act sanctioning the amalgamation. An illustration may be given. Under an Act of 1876, the Great Western Railway Company acquired the Bristol and Exeter Railway. Traffic between such places as Cheltenham, Gloucester and Birmingham, where the Midland Railway Company competed with the Great Western Railway Company, and local stations on the Bristol and Exeter Railway would, in the absence of facilities, have become local traffic to the Great Western Railway Company. As a matter of fact, by Section 32 of the Act of 1876, the Midland Railway Company secured facilities for through booking, etc., via Bristol, with the stations on the Bristol and Exeter Railway, thus retaining the use of the route by which

they had carried traffic with that railway before it was taken over by the Great Western Railway Company. In this way the Midland Railway Company's rights in connection with the Bristol and Exeter Railway have been preserved, though traffic originating on the old Bristol and Exeter Railway, for stations where the Midland and Great Western Railway Companies compete, is more likely to be carried by the Great Western Railway Company than was formerly the case.

*Powers required to form railway combinations.*

When two or more railway companies are desirous of effecting a combination, the way in which it is carried out will be influenced, in some cases at least, by the fact that certain forms of combination require the sanction of Parliament, or the approval of the Railway and Canal Commissioners, whilst others do not. An amalgamation, working union, or lease, requires an Act of Parliament; a working agreement may be sanctioned by a special act in which the terms are specified, or it may be made pursuant to powers of a special act incorporating the Railway Clauses Act, 1863, in which case the agreement has to be submitted to the Railway and Canal Commissioners for approval. On the other hand, an agreement which does not appear to differ from a working agreement, but which requires no special sanction or approval, may be made under Section 87 of the Railway Clauses Consolidation Act,

1845.<sup>1</sup> Arrangements to secure uniformity in rates, charges and services, and pooling agreements also require no sanction or approval.

A pooling agreement, although much more easily established, is not as satisfactory, from the point of view of the parties to it, as a closer combination sanctioned by Parliament. The reader may be reminded that the Great Northern, Great Central and Great Eastern Railway Companies did not enter into a comprehensive pooling agreement until after they had promoted a bill in Parliament in 1909 to authorise a closer combination, and had withdrawn it on account of the great opposition. It is obvious that under a pooling agreement where the contracting parties retain their independent managements, the economies cannot be as great as under some form of combination where the managements are merged. There is also a special drawback to pooling arrangements, arising from the fact that if one member receives an unexpectedly large proportion of the pooled traffic, it does not obtain the whole of the increased receipts; it is involved in extra expense without adequate compensation.

*The effects of combinations on the general public.* Where non-competing companies combine to form a continuous route, the question of disadvantages

<sup>1</sup> *Report of the Departmental Committee on Railway Agreements and Amalgamations*, § 60.

to the general public hardly arises ; and this type of combination is viewed by the public with more or less indifference. It is when competing railways combine that traders and travellers become alarmed, but even in these cases the public will derive certain benefits, although there are also undoubted drawbacks from their point of view.

Some of the advantages which the general public are likely to derive from railway combinations will occur only when the combination causes the contracting parties to have one management ; others will occur not only in these cases, but also in connection with comprehensive pooling agreements. Amongst the former advantages a few may be noticed. (a) As a result of larger concerns being established, better rolling stock and equipment can be provided. (b) When two companies amalgamate, their lines are treated as one, for the purpose of calculating the maximum rates for merchandise. The maximum rates fall as the distance increases ;<sup>1</sup> when the lines are counted separately, the maximum rate on traffic passing from the line of one company to the line of the other is calculated afresh from the point of transfer, and the higher powers come into operation a second time. When the lines are counted as one, the calculation proceeds continuously, with the result that the maximum powers of charge on traffic passing from one line to the other are

<sup>1</sup> See page 202, below.

reduced. That the reduction arising in this manner may be by no means inconsiderable can be gauged from the fact that the Great Northern, Great Central and Great Eastern Railway Companies estimated in 1909, at the time of their proposed combination, that such an obligation with regard to maximum charges would cost them £100,000 per annum.<sup>2</sup> (c) When two companies amalgamate and it happens that the maximum charges are higher in the case of one line than of the other, the higher rates are reduced and the various schedules of maxima are placed on the lower basis.

Amongst the advantages to the public afforded by pools, as well as by closer combinations, several are deserving of attention. (a) More through facilities will be provided, both in respect of passengers and of goods. With regard to the former, two cases arising out of the pooling arrangement between the London and North-Western and the Midland Railway Companies may be mentioned: the through Midland carriage from Manchester to Bournemouth is hauled over the London and North-Western line between Manchester and Birmingham, as by this means the time required for the journey is three-quarters of an hour less than if passengers were conveyed the whole way over the Midland route;

<sup>2</sup> Cf. *Departmental Committee on Railway Agreements and Amalgamations*, Appendix II., p. 839.

<sup>3</sup> *Ibid.* Q. 294.

in the summer a very convenient through train is now run between Sheffield and North Wales, the train passing from the Midland to the London and North-Western line at Buxton. With regard to goods, they will be forwarded by the quickest route ; less transshipment will be necessary, and consequently there will be less delay and less chance of damage. (b) All stations, goods yards and receiving offices of the combining companies will be available for the public without extra charge ; e.g. to-day a trader may send goods from Leeds (M.R.) to Birmingham (L. & N.W.R.) at the Midland local rate, whereas formerly an addition of 10d. or 1s. 8d. per ton was made for the extra service entailed in the interchange of such traffic. (c) It will be easier to obtain a concession in rates. On the one hand, there will be fewer parties to be consulted. On the other hand, a company with a longer route is loath to approve of an exceptional rate suggested by a competitor with a shorter route, as where the difference in distance is considerable, the class rate may be barely remunerative to the company with the longer route ; but if the companies combine and the traffic is pooled, the company with the longer route will agree to the special rate, as the traffic can then all be carried over the shorter route. (d) Certain tickets issued by one company become available on the routes of the other company or companies party to the combination ; in the case of the trader's

ticket, it is only necessary to influence £300 of traffic on the combined systems in order to qualify for a ticket available on one or more of the systems.

Where competing companies combine by means of an amalgamation, working union or pool agreement, the general public, and in particular the traders, are liable to suffer in several ways. It will no longer be possible to play off one company against another with a view to securing concessions. The companies will be able to pay greater attention to securing good wagon-loads, and this may lead to merchandise being delayed. In some cases goods will not be delivered as promptly as previously, as there will be a tendency to keep back lorries and vans which are only partially filled. The bulk of the traders' complaints, however, appear to be directed not against pools or amalgamations, but against the Joint Claims Committee, set up by the railway companies in 1902 to enforce the conditions of owner's risk notes in a stricter and more uniform manner,<sup>1</sup> and against Railway Clearing House Conferences, which decide upon the conditions that shall govern a variety of services on the undertakings of all the companies party to the conferences. The recent revision of demurrage and of warehousing regulations are cases in point.

There does not appear to be any doubt that the railway companies have effected numerous

<sup>1</sup> *Ibid.* Q. 488.



economies as the result of the various forms of combined action upon which they have entered during the last few years. Had it been possible to give some of the savings to the public in the form of reduced charges, the movement would probably have met with less opposition. As it is, the economies have not even sufficed to meet the growth of railway expenditure in other directions; it has been necessary to raise fares and to increase rates.<sup>1</sup> However justifiable it may be that charges are being increased at the same time as economies are being effected by combination, it is hardly astonishing that the coincidence of the two policies should render the movement in favour of combination unpopular.

<sup>1</sup>The railway companies of the United Kingdom issued notices in May, 1913, that on and after July 1, 1913, the rates for merchandise traffic by goods and passenger trains would, with certain exceptions, be increased on a 4 per cent. basis, subject to the statutory maximum. The notices did not apply to coal and coke.

## CHAPTER X.

### THE DETERMINATION OF PRICES UNDER COMPETITIVE CONDITIONS

*Definition of value.* We now approach what may be described as the central problem of economics, the determination of the value or price of a commodity or service. Value means power in exchange, and value expressed in terms of money is price. In common parlance "value" is not used exclusively in the sense in which it is defined here. A man may speak of a valuable picture, and mean either that the possession of it gives him great satisfaction, as it happens to be the portrait of an ancestor, or that it is worth a lot of money. In the one case, he contemplates the picture alone and expresses a personal opinion about it; in the other, he compares it with a second article—money. Formerly, economists used the expressions "value in use" or "intrinsic value," and "value in exchange" to distinguish between two kinds of "value"; to-day, they speak of "utility" where "value in use" is implied, and restrict the word "value" to one meaning—power in exchange. The picture

would be described, in one case, as possessing utility for the owner, *i.e.* as giving him satisfaction, and in the other, as possessing value, *i.e.* as being worth money if offered for sale.

Utility and value are different, but intimately related; an article may have great utility but no value; *e.g.* air, because it is unlimited in quantity and not appropriated by any individual or group of individuals, has no value in exchange. On the other hand, if an article is to have value, it must have utility; otherwise nobody will be prepared to offer anything for it, and consequently it can have no power in exchange. Utility is an important factor in determining value, as will be shown in what follows. Value is a relative term; it implies a comparison, and consequently there must be at least two things under consideration before it is possible to speak of value. In nearly every case money is taken as the second thing, so that the price and the value of an article may be treated as identical. Our task is to consider what governs the price of a commodity or service.

*Market price.* If we seek to ascertain the price of some common article of consumption, *e.g.* Danish butter, it is easily done. Generally there is no question of an individual bargain. Grocer A and Grocer B probably quote the same price, say, 1s. 3d. per lb. This would be the retail market price of butter. By a market, we understand a group of

buyers and sellers in direct competition, who are dealing in some commodity. In some markets the quantities dealt in are large, in others small. In the case of some articles a whole country, or even the world, must be regarded as constituting a single market; in the case of other articles the market is purely local. Where competition is keen, there is a tendency for there to be one price for one commodity at one time in one place. The more localised a market is, and the smaller the scale of the transactions, the less effective is competition likely to be. Variations in retail prices in any one town are quite common. We shall first discuss prices on the assumption that there is more or less effective competition among buyers, on the one hand, and sellers, on the other. The case where competition is eliminated, *i.e.* where monopoly conditions prevail, will be considered in the next chapter.

*Long-period prices.* The price at which an article exchanges hands depends upon two things: upon the offers of would-be buyers, *i.e.* upon the demand prices, and upon the sums which would-be sellers are prepared to accept, *i.e.* upon the supply prices. We discussed in Chapter II. the demand for an article, *i.e.* the different prices which would-be purchasers are prepared to offer for varying quantities. In discussing supply prices, or the different prices at which various quantities of an article will be forthcoming, we shall assume for the moment that

production is carried on under so-called *long-period or normal conditions*, i.e. with all the suitable buildings, specialised machines and skilled workers that are required. The state of affairs where these conditions are not fulfilled will call for attention shortly. Sellers are organised to produce a certain quantity in a given time, each contributing his quota towards the market supply. Each will tend to produce at different costs, owing to differences in situation, skill of management, efficiency of labour, and so forth. The least successful producer, the one with the highest costs, whose product, however, is necessary in order to complete the market supply, is the *marginal producer*, and his cost of production is the *marginal cost of production* (which includes the normal remuneration of the entrepreneur). The marginal cost of production is the supply price for the particular quantity placed upon the market.

The quantity of an article actually bought and sold will be that for which the demand price and the supply price coincide. Let us suppose the demand prices and the supply prices for butter in some particular market are as follows :

Quantity of butter per week.	Demand prices.		Supply prices.	
	s.	d.	s.	d.
10,000    -    -	1	6	1	1½
11,000    -    -	1	5	1	2
13,000    -    -	1	4	1	2½
16,000    -    -	1	3	1	3
20,000    -    -	1	2	1	3½
25,000    -    -	1	1	1	4

The demand prices are, of course, subject to the law of diminishing utility, and decrease as the quantities increase. Butter, it is assumed, is produced subject to decreasing returns or increasing costs, and the supply prices consequently rise as the quantities supplied increase. The demand price and the supply price coincide when the quantity bought and sold is 16,000 lbs. per week; that will be the quantity which tends to change hands, and the price will tend to be 1s. 3d. per lb. If more than 16,000 lbs. are offered, the demand price will be beneath the supply price, in consequence of which producers will curtail their output, and the price will tend to rise. If fewer than 16,000 lbs. are offered, the demand price will be above the supply price, in consequence of which producers will increase their output and the price will tend to fall.

It may be urged that many would-be sellers could afford to sell for less than the supply price, i.e. marginal cost of production. Competition, however, among would-be buyers prevents this from happening. Similarly, many would-be buyers would be willing to pay more than the [marginal] demand price. Competition of would-be sellers, however, prevents this from happening. An illustration may make this point clearer. Let us suppose that there are five would-be purchasers of battleships, A, B, C, D and E,

and that the sums which they are willing to pay are as follows :

A	is willing to pay	£2,500,000	for a battleship.
B	"	"	2,250,000
C	"	"	2,000,000
D	"	"	1,750,000
E	"	"	1,500,000

From this information we can ascertain the demand prices for battleships. At a price of £2,500,000 one ship only will be bought ; if the price drops to £2,250,000, two ships will be purchased, as B will buy a ship in addition to A ; when the price is £2,000,000, three ships will be purchased, as C will buy a ship as well as A and B ; similarly, four ships will be bought if the price is £1,750,000, and five if it is £1,500,000.

Further, let us suppose that there are five would-be sellers of battleships, V, W, X, Y, Z, none of whom is able to produce more than one battleship at a time, and that the terms they quote are as follows :

V	is prepared to build a battleship for	£1,500,000.
W	"	"
X	"	"
Y	"	"
Z	"	"

From this information we can ascertain the supply prices for battleships. At a price of £1,500,000, one ship only will be built ; if £1,750,000 is offered for each ship, two will be forthcoming, as W, as well as V, will build a ship ; when the price is

x      **PRICES UNDER COMPETITION**      123

£2,000,000, three ships will be produced, as X, W and V will each be prepared to supply a ship on those terms; similarly, four ships will be quoted for if the price offered is £2,250,000, and five ships if the price is £2,500,000.

The demand and the supply prices for battle-ships could be tabulated as follows :

Number of battleships.	Demand prices.	Supply prices.
	£	£
1	2,500,000	1,500,000
2	2,250,000	1,750,000
3	2,000,000	2,000,000
4	1,750,000	2,250,000
5	1,500,000	2,500,000

The demand and the supply prices coincide when the number of ships is three, so three will be the number purchased and the price of each will be £2,000,000. D and E will have to do without ships, and Y and Z will not build any. Why, it may be asked, should not

Z sell a ship to A for £2,500,000,  
 Y   "   "    B   "   2,250,000,  
 X   "   "    C   "   2,000,000,  
 W   "   "    D   "   1,750,000,  
 and V   "   "   E   "   1,500,000,

and thus enable all the would-be buyers to secure ships, and all the would-be sellers to build ships? The answer is, that the competition of the would-be sellers V, W and X would prevent Y and Z from



obtaining orders at £2,250,000 and £2,500,000 respectively, and that the competition of the would-be buyers A, B and C would prevent D and E from securing ships for £1,750,000 and £1,500,000 respectively.

*Short-period prices.* From considering how price is determined in the long period, we may proceed to examine how it is determined when the balance between demand and supply is disturbed, and the industry affected has not had time to settle down to the new conditions, *i.e.* has not had time exactly to adjust the factors of production to the output required. Whilst producers are seeking to satisfy a new demand with buildings, equipment and labour, which are really organised for the satisfaction of a smaller or a larger demand, *short-period conditions* are said to prevail, and the price at which the commodity concerned changes hands is a *short-period price*. It is necessary to distinguish two kinds of "short period," the one in which the demand for some commodity has increased, the other in which it has diminished. We will consider each kind of "short period" separately.

*The short period in which demand has increased.* When there is a sudden increased demand for a commodity, due perhaps to improved trade or to a change in fashion, the immediate effect will be a rise in price, which temporarily will be determined by the existing stocks in conjunction with the new

demand prices. Owing to the rise in price, producers will seek to increase their outputs, as the demand price now exceeds the supply price. The first device will probably be to work overtime, which is always costly, as also are night shifts and Sunday work, which it may be necessary to introduce. A second expedient will be to engage more workers, but as the supply of specialised labour will probably prove insufficient, inadequately skilled workers will have to be employed. As a third resort, it may even become desirable temporarily to bring back into use antiquated machines and appliances which have previously been discarded.

By working overtime, by employing labour which is not properly skilled, by using machinery which is antiquated or not specialised, the output can be increased, but the more it is increased the greater the cost of each additional unit will become: the additional output is obtained subject to increasing costs. When the short-period marginal cost of production and the new demand price are equal, the output will cease to increase. The short-period price thus established will be lower than the price established immediately after the increase in the demand, but higher than the original long-period price. Gradually, if the new demand continues at the higher level, labour will become more skilled, the necessary specialised machinery, appliances and buildings will be secured, the need for working over-

time will grow less and less ; the short-period price will continue to drop, until ultimately a new long-period price is reached. This will be higher than the original long-period price, if the industry is subject to decreasing returns, and lower than the original long-period price, if the industry is subject to increasing returns.

*The short period in which demand has diminished.*

When there is a sudden decrease in the demand for a commodity, there will immediately tend to be a drop in price, as the existing stock will be too great to be disposed of at the old price. The severity of the drop in price will be moderated, if some of the stock is withheld from the market, which is likely to occur if it can be stored without deteriorating. Producers are now equipped to produce an output in excess of that which can be disposed of at remunerative prices. Much of the capital invested in any particular industry is of little or no use in any other industry ; consequently, immediate withdrawal from an industry in which prices have become unremunerative is hardly to be entertained, the loss of capital involved being too great. In the short period, after a drop in demand, supply prices, i.e. the prices at which producers are prepared to sell, will be fixed at rates which are less remunerative than the normal charges, or which are unremunerative.

A more or less considerable contraction of output

would, of course, enable the price to be fairly well maintained, but there are several considerations which make the adoption of the policy of contraction unlikely. Firstly, the future efficiency of a works is impaired by partially closing down; it is bad for the machinery, labour becomes demoralised by idleness, new labour engaged after a stoppage takes time to adapt itself to the fresh surroundings. If short-time is adopted, instead of partially closing down, these difficulties can be obviated.

Secondly, fixed or establishment expenses<sup>1</sup> will continue whether output is reduced or not; consequently, to close down will mean a heavy loss. This loss will be heavier, the larger the proportion of fixed to running expenses.<sup>2</sup> If goods can be sold at something above the running expenses, that something will be available towards the fixed expenses. The object of the employer will be so to curtail output that the excess of total receipts over total running expenses is at a maximum, and thus to secure the largest contribution towards fixed expenses that is possible under the circumstances.

Thirdly, a producer may lose customers permanently, if on some occasion he refuses to supply them at current, though unremunerative, prices, as they will thereby be driven into the arms of some

<sup>1</sup> These terms are explained on page 49, above.

<sup>2</sup> This term is explained on page 49, above.

competitor. It often pays a producer to make sacrifices in the present for the sake of preserving the market for the future.

Fourthly, it is frequently the case that if goods are not sold in the present, the demand in the future will be no greater on that account. If, for example, a person refrains from smoking because the price of tobacco is temporarily too high, his demand will probably be no greater than formerly when the price returns to the usual level. Under such circumstances the producer generally prefers to sell at a loss, rather than not sell at all. On the other hand, if the desire of people who refrain from buying because prices are too high, becomes greater the longer they refrain, producers will prefer to withhold goods from the market and keep up prices. For example, the longer people refrain from buying new clothing, the more urgent their desire for it becomes. The producer knows that the demand is merely postponed and consequently tends to maintain prices, until people decide that they can delay their purchases no longer and are prepared to pay the price that is quoted. The difference between the two kinds of demand may be illustrated from railway experience. During March and April, 1912, owing to the coal strike, little traffic could be carried. The subsequent experience of the railway companies showed that the demand for their services for the conveyance of

pleasure traffic was largely lost, but that the demand for their services for the conveyance of goods and mineral traffic was, on the whole, merely postponed.

In the short period occasioned by a decreased demand it is very improbable, for the previously mentioned reasons, that supply will be so restricted as to maintain the old level of prices ; the short-period price will be below the previous long-period price, but above that established immediately after the fall in demand. Gradually, if the demand continues at the low level, some of the least successful producers will go out of business ; others, as their machinery and plant wear out, will not renew them. The output will thus be diminished and prices will rise, until a new long-period price is reached, which will be higher than the original long-period price if the industry is subject to increasing returns, and lower than the original long-period price if the industry is subject to decreasing returns.

*Summary of how prices are determined under competitive conditions.* In actual practice, before an industry has had time to adjust itself to any particular set of conditions, a change generally occurs which necessitates a new adjustment ; before one short period has had time to develop into a long period, a new short period has begun. An industry passes through a constant series of short periods, of which several in succession may be of one kind or the other ; price is always tending towards the long-

period level, but seldom reaches it, being either above or below this level. This is only another way of saying that in any industry, owing to the constant fluctuations to which it is subject, producers are probably either striving to secure an output in excess of that for which they are really equipped, or being compelled, by unfavourable conditions, to reduce their output below that for which they are really equipped. In the former case price will be above, in the latter case below, the average level of prices. It is the exception for every firm in an industry to be selling that output which it is really equipped to produce. In the short period, or at any one time, it may be said that that demand is the predominant influence in determining prices, but prices so determined must constantly be tending towards the long-period marginal cost of production (which includes a normal remuneration for the entrepreneur), because, taking good and bad trade together, a producer must earn sufficient on the average to make it worth his while to continue in business. Over any considerable period of time, therefore, it is true to say that supply is the predominant influence in determining prices.

## CHAPTER XI.

### THE DETERMINATION OF PRICES UNDER MONOPOLY CONDITIONS

#### UNIFORM AND DIFFERENTIAL CHARGES

*The fixing of a uniform price by a monopolist.* Whenever competition on the side of supply is largely or entirely absent, monopoly conditions are said to prevail. The absence of competition will make it possible to restrict the output; in this way the demand price can be made to exceed the supply price and the entrepreneur can earn a profit in excess of the normal, in respect of every article sold. This extra profit may be described as a monopoly revenue. The object of the monopolist will be so to restrict the output that the monopoly revenue, *i.e.* the excess of the total receipts over the total expenses, shall be at a maximum. To make this clearer, we will return to our battleship illustration. We will suppose that the supply of battleships is entirely in the hands of one firm, which up to a certain point is able to produce them subject to diminishing costs, and then at constant costs, and



that the demand prices and supply prices are as follows :

Number of battleships.	Demand prices.	Supply prices.
	£	£
1	2,500,000	2,000,000
2	2,250,000	1,875,000
3	2,000,000	1,750,000
4	1,750,000	1,625,000
5	1,500,000	1,500,000
6	1,250,000	1,500,000

In order to learn when the monopoly revenue will be at a maximum, it is necessary to ascertain the total expenditure and the total receipts according as different numbers of ships are produced. The total expenditure involved in building any particular number of ships is obtained by multiplying that number by the corresponding supply price. The total receipts from the sale of any particular number of ships is ascertained by multiplying that number by the corresponding demand price. The information may be tabulated as follows :

Number of battleships.	Total expenditure.	Total receipts.	Monopoly revenue.
	£	£	£
1	2,000,000	2,500,000	500,000
2	3,750,000	4,500,000	750,000
3	5,250,000	6,000,000	750,000
4	6,500,000	7,000,000	500,000
5	7,500,000	7,500,000	..
6	9,000,000	7,500,000	- 1,500,000

This table shows that two ships can be produced for £3,750,000,<sup>1</sup> and that they can be sold for £4,500,000,<sup>2</sup> which will yield a monopoly revenue of £750,000 to the monopolist. This will be the most favourable result the monopolist can obtain ; it is true that his revenue would be the same if three ships were sold, but as this would involve additional trouble without extra reward other than the normal remuneration of an entrepreneur in respect of another ship, he will probably prefer to restrict the output to two ships, which he will produce for £1,875,000 and sell for £2,250,000 each. Had the demand and supply prices related to competitive conditions, five ships would have been produced and sold for £1,500,000 each. If six ships were produced and sold, there would be a loss of £1,500,000, which is indicated by placing a minus sign before that figure in the last column.

*The theory of differential charges.* We have assumed so far that the monopolist sells at a uniform charge ; if differential charges could be made, i.e. if some consumers could be charged more than others, the monopolist could realise a greater monopoly revenue, and incidentally, would sell a larger output. The most advantageous position for the monopolist is where each purchaser is charged the full amount that he is willing to pay. Under these circumstances the total expenses, total receipts

<sup>1</sup>  $2 \times £1,875,000 = £3,750,000.$

<sup>2</sup>  $2 \times £2,250,000 = £4,500,000.$

and monopoly revenue in our battleship illustration would be as follows, assuming the demand prices and the supply prices to be the same as indicated in the table on page 132 :

Number of battleships.	Total expenditure.	Total receipts.	Monopoly revenue.
	£ millions.	£ millions.	£ millions.
1	2	$2\frac{1}{2}$	$\frac{1}{2}$
2	$3\frac{1}{2}$	$4\frac{1}{2} (= 2\frac{1}{2} + 2\frac{1}{2})$	1
3	$5\frac{1}{2}$	$6\frac{1}{2} (= 4\frac{1}{2} + 2)$	$1\frac{1}{2}$
4	$6\frac{1}{2}$	$8\frac{1}{2} (= 6\frac{1}{2} + 1\frac{1}{2})$	2
5	$7\frac{1}{2}$	$10 (= 8\frac{1}{2} + 1\frac{1}{2})$	$2\frac{1}{2}$
6	9	$11\frac{1}{2} (= 10 + 1\frac{1}{2})$	$2\frac{1}{2}$

Five ships would be sold at £ $2\frac{1}{2}$ ,  $2\frac{1}{2}$ , 2,  $1\frac{1}{2}$ , and  $1\frac{1}{2}$  millions respectively, making the total receipts £10,000,000; the five ships could be produced for £1,500,000 each, or £7,500,000 in all, which would leave a monopoly revenue of £2,500,000. This, as the last column of figures shows, is the position most favourable to the monopolist.

If consumers, instead of being charged the full amount each was willing to pay, were grouped into classes, the charge being uniform within any class, but varying from class to class, results could be obtained which would be less favourable to the monopolist than charging every consumer differently, but more favourable than charging a uniform price. For example, if only two prices could be charged for ships, two might be sold at £2,250,000 to the

two consumers willing to pay £2,500,000 and £2,250,000, and three at £1,500,000 to the three consumers willing to pay £2,000,000, £1,750,000, and £1,500,000. In this way, £9,000,000 would be obtained for five ships which had cost £7,500,000, leaving a monopoly revenue of £1,500,000. A similar result could be obtained by producing four ships for £6,500,000, and selling two at £2,250,000 and two at £1,750,000, which would yield £8,000,000 in all.

A very important application of the system of differential charging is seen in cases in which an industry is enabled to pay its way, which, if it were restricted to charging a uniform price, it could never do, on account of the supply prices for all quantities exceeding the corresponding demand prices. Suppose the demand prices and supply prices for battleships were as follows :

Number of battleships.	Demand prices.	Supply prices.
1	£ 2,500,000	£ 2,750,000
2	2,250,000	2,500,000
3	2,000,000	2,250,000
4	1,750,000	2,000,000
5	1,500,000	1,875,000
6.	1,250,000	1,875,000

At a uniform charge, no ships could be produced on remunerative terms. .If, however, each would-be

consumer is charged the full amount that he is willing to pay, five ships can be sold for £10,000,000,<sup>1</sup> whereas the cost of production is only £9,375,000,<sup>2</sup> and consequently, a monopoly revenue of £625,000 is obtained. This is the largest monopoly revenue which can be secured if the facts are as represented in the table.

If consumers were grouped into classes, instead of each being charged a different price, it would also, in some cases, be possible to make an undertaking pay, which would not be remunerative if one price were charged. In our illustration, consumers might be divided into three classes: in the first, two would be charged £2,250,000, in the second, two would be charged £1,750,000, and in the third, one would be charged £1,500,000. In this way the total receipts would be £9,500,000, whereas the cost of five ships is only £9,375,000, so that there would be a monopoly revenue of £125,000.

A point to notice about differential charges under these circumstances is, that part of the output is sold at less than the average cost of production. There will be occasion to refer to this at greater length later; here it may be remarked that it is worth while selling some of the output below the average cost of production, if, by increasing the scale of production to the extent of this particular

<sup>1</sup> £10,000,000 = £2½ + 2½ + 2 + 1½ + 1½ millions.

<sup>2</sup> £9,375,000 = 5 × £1,875,000.

part of the output, the average cost of producing all the units of output is sufficiently reduced. To return to our illustration in the last paragraph but one, in which ships built at an average cost of £1,875,000 are assumed to be sold for £1,750,000 and £1,500,000. If three ships are built, each costs £2,250,000; whereas if four are built, each costs £2,000,000 only; in other words, three ships cost £6,750,000 to build, and four ships £8,000,000. The fourth ship may be regarded as costing £1,250,000, which is the difference between the cost of producing three ships and four ships, and as it is sold for £1,750,000, it cannot be said to be sold for a loss, although it is sold for less than the average cost of production. Similarly, the fifth ship may be regarded as costing £1,375,000, which is the difference between £8,000,000, the cost of producing four ships, and £9,375,000, the cost of producing five ships, and as it is sold for £1,500,000, it, too, cannot be said to be sold at a loss, although it is sold for something less than the average cost of production.

Even in the cases in which a producer enjoys a monopoly, the system of differential charges is not always feasible. If the commodity or service can be easily transferred, a favoured consumer may purchase more than he requires, and re-sell some to a would-be consumer, to whom less favourable terms have been quoted by the producer. This would probably break down the system of differential

charging. On the other hand, it is sometimes possible for producers of commodities or services who do not possess a monopoly to make differential charges, as some of the illustrations given in the next chapter will show.

## CHAPTER XII.

### THE SYSTEM OF DIFFERENTIAL CHARGING IN PRACTICE

THE practical aspects of the system of differential charging must now be considered. To charge each consumer a different price, equal to the maximum amount that he is willing to pay, is not feasible, as it is impossible to ascertain exactly how much everybody is willing to pay. Further, to classify consumers so that all those willing to pay high prices fall into one class, those willing to pay moderately high prices into another, and so forth, is also impossible, as again this would involve knowing how much everybody would be willing to pay. All that can be done is to adopt some rough and ready method of classifying would-be consumers so that, as far as possible, those who are likely to be willing to pay high prices are placed in a class above those who are likely to be willing to pay low prices only.

*Charging buyers roughly in proportion to income.* One device is to take the supposed income of the would-be consumer as a basis of classification ;



*e.g.* a general practitioner charges according to the rental of the houses in which his patients live, the rent being a rough indication of income. Thus, if the rent is £10-£25, the fee for an ordinary visit may be 2s. 6d. to 5s. ; if the rent is £25-£50, the fee may be 3s. 6d. to 7s. ; if the rent is £50-£100, the fee may be 5s. to 10s. 6d. An optician is another person who takes the supposed income of his customers into account in fixing his charges, though he does so in a much less accurate way than the doctor. The optician assumes that a customer who comes with a prescription for glasses from a hospital is not in such a good position to pay as one who comes with a prescription from an eye doctor, and consequently, he charges the latter type of patient far more than the former. Sometimes a producer allows his customers to classify themselves more or less according to income ; he supplies two or more qualities of his article, the difference in the price charged exceeding the difference in cost, and trusts that his rich customers will buy the expensive article ; *e.g.* a soap manufacturer may make one kind of tablet ; some tablets he sells loose at 2d. each, others he wraps up in a little paper and packs three together in a cardboard box, for which he charges 1s. The more well-to-do customers buy the soap at the rate of 4d. per tablet, the less well-to-do at 2d. per tablet.

*Charging different prices in different parts of the*

*same country.* In some cases locality is taken as the basis of differential charges ; in one neighbourhood, where competition is keen, low prices are charged ; in another neighbourhood, where there is little or no competition, prices are kept up. The practice of the Standard Oil Company affords an excellent illustration of this system. The investigations of the United States Bureau of Corporations showed that after deducting the cost of freight, the prices charged by the Company for illuminating oil in certain cities in December, 1904, were as follows : New York, 10.5 cents per gallon ; Philadelphia, 8 cents ; Savannah, 12 cents ; Chicago, 8.4 cents ; New Orleans, 7 cents ; Salt Lake City, 14.9 cents. It may be asked, how was it possible to maintain these differences in prices, seeing that oil can be easily transferred ? Firstly, the Company sold direct to retailers, which limited the supply which any purchaser had at his disposal. Secondly, oil can be transported economically only in tank cars, which involve considerable expenditure for the installation of plant to handle the oil so transported. This consideration would deter many people from attempting to re-sell oil in other districts. Thirdly, the knowledge that the Standard Oil Company would cut prices, if competition became active, would probably be enough to deter customers of the Company from investing capital in the attempt to re-sell oil outside their own district.

Two further examples of the system of differential charging may be given, especially to emphasise the point that it may be a sound financial policy permanently to sell some output at lower prices than the average cost of production.

*Charging different prices at different seasons.* Many hotels have season and out-of-season charges, the former considerably higher than the latter; it must often occur that the one is above, and the other below, the average cost. Suppose that the inclusive charge made by an hotel is 15s. per day in the season and 10s. per day out of the season; in the season the hotel is full and 6,000 days' accommodation are sold; during the rest of the year guests are not very numerous, and only 4,000 days' accommodation are sold. The total receipts would be £6,500,<sup>1</sup> and the average receipt per guest per day 13s.<sup>2</sup> If the hotel just pays its way, 13s. represents the average cost per guest per day (including the remuneration of the proprietor), yet many guests are being taken at 10s. per day. Is the proprietor losing on this account? No, if 10s. more than covers the running expenses of providing for each guest each day.

The proprietor has large fixed expenses to meet, e.g. interest on capital invested, rent on buildings, rates and taxes, wages of the principal members of

<sup>1</sup>  $6,000 \times 15s. + 4,000 \times 10s. = £6,500.$

<sup>2</sup>  $£6,500 \div 10,000 = 13s.$

the staff, say, £2,500 in all, which are quite independent of whether the hotel has visitors or not. He has also running expenses to meet, *e.g.* cost of food, provision for depreciation of furniture and linen, wages of that part of the staff which varies more or less directly with the number of guests; these expenses we will assume amount to 8s. per guest per day. In respect of each of the 6,000 days' accommodation during the season, when the charge is 15s., 7s. will be available towards fixed expenses, or, altogether £2,100; in respect of each of the 4,000 days' accommodation out of the season, when the charge is 10s., 2s. will be available towards fixed expenses, or, altogether, £400. Why not divide the fixed expenses equally among all the guests and charge each 13s. per day (8s. running and 5s. fixed expenses)? As the hotel is already full in the season, no more guests could be taken then as a result of the lower charges; on the other hand, fewer guests would come out of the season if the charge were raised from 10s. to 13s. per day, and consequently, the hotel would not pay.

The season guests have no real grievance, although they contribute so much more per head towards the fixed expenses than the out-of-season guests, as the latter contribute £400 towards the fixed expenses. If there were no out-of-season guests, the whole burden of the fixed expenses would fall on the season guests; 6,000 days' accommodation would

have to be sold at 16s. 4d.<sup>1</sup> each, or some smaller number of days' accommodation at a still higher price, to make the hotel self-supporting.

The season and the off-season of an hotel are joint products in the strict sense that the one is the necessary complement of the other. If an hotel is to cater for the public during successive seasons, it must tide over the intervening off-seasons, just as a ship which makes successive outward journeys from A to B must make an equal number of return journeys from B to A. There is no scientific way of distributing the fixed expenses amongst joint products. As the hotel business is competitive, a proprietor who wishes to remain in the business has to discover the most economical way of financing his hotel. He divides the fixed expenses amongst the season and out-of-season guests not arbitrarily, but in the ratio which he believes will prove most expedient, *i.e.* according to his estimate of the strength of the demand for accommodation in and out of the season. In some cases the only sound policy may be to close the hotel in the off-season on the ground that the takings would not be sufficient to meet the running expenses.

*Charging different prices according to the purpose*

<sup>1</sup> The charge of 16s. 4d. would leave 8s. 4d. available towards fixed expenses, after meeting running expenses and  $6,000 \times 8s. 4d. = \text{£}2,500$ , which we have assumed to be the amount of the fixed expenses.

*for which a product is used.* A more complicated case of differential charging than that of hotels is that of electricity undertakings, which sell current for light and for power purposes at various prices, as in this case the differential charges are due not merely to differences in the amounts which various would-be consumers are willing to pay, but also to differences in the cost of providing the current under varying circumstances. Current for light and current for power are not joint products in the strict sense of the expression, as the production of the one does not necessarily involve the production of the other ; various instances occur of current being produced for one purpose only. Nevertheless, it is universally recognised that it is generally very advantageous for an undertaking to produce current for both light and power purposes, as this usually renders possible a much better utilisation of the plant. Where current for light and current for power are generated at one station, much of the expenditure is for the common benefit of the light consumers and of the power consumers, and the problem of its allocation amongst the different consumers is closely analogous to the division of the general expenses, under a regime of joint production, amongst the consumers of the joint products.

As an illustration of the differential charges made for electricity and their relation to the average cost of production, the explanation of which we are seek-

ing, the figures relating to the Manchester electricity undertaking may be quoted : the charge for light is 3.75d. per unit ; the charge for power is from 1.5d. to 0.7d. per unit, according to circumstances ; the average cost of production during 1911-12 was 1.045d. per unit sold. It will be noted that the price of some current for power, as quoted in the published tariff, is below the average cost of production ; where current is sold in accordance with special arrangements, it is probable that in some cases the prices charged are even lower than those in the published tariff.

An analysis of the expenditure of an electricity undertaking shows that the fixed expenses, which are more or less independent of the output, represent, roughly, three-quarters of the total expenses, and that the running expenses, which vary with the output, represent, roughly, one-quarter of the total expenses. The former include capital charges, rates and taxes, office expenses, salaries, the larger part of the wages bill, some of the provision for depreciation, and all the provision for obsolescence ; the latter include the cost of coal and oil, most of the provision for depreciation, and the smaller part of the wages bill. The fixed expenses depend upon the maximum demand for current, as enough plant must be installed to supply the largest quantity of current required at any one time ; in practice, the consumption of current is likely to be the greatest

in the middle of winter between 4 p.m. and 6 p.m., as lighting consumers and power consumers will then be using current simultaneously. The more current that is consumed at times when the demand for current is not near its maximum, the better the plant will be utilised, and the lower the fixed expenses per unit of current consumed will be. In deciding what share of the general expenses are to be allocated to a consumer, in addition to the out-of-pocket expenses incurred on his behalf, the following points will be taken into account so far as cost of providing the service is concerned :

1. A customer who consumes during long hours, and, in addition, does not take current at times when the maximum demand occurs, deserves most consideration.

2. A customer who consumes during long hours, but takes current at times when the maximum demand for current occurs, deserves less consideration.

3. A customer who consumes during short hours only, but does not do so at times when the maximum demand occurs, deserves some consideration.

4. A customer who consumes current during short hours only, and takes it at times when the maximum demand for current occurs, deserves least consideration.

Generally speaking, power consumers help to



utilise the plant much better than light consumers, and on that account alone they are entitled to a less than average share of the general expenses. It not infrequently happens, however, that they obtain more favourable terms than could be justified on the ground of cost of production ; the competition of other forms of power often makes it necessary to quote very low prices, which, after payment of out-of-pocket expenses, provide only a very small contribution towards the general expenses. If this current cannot be sold on better terms to other would-be consumers, its sale at low prices is justifiable on the ground that the general expenses would have been incurred, whether it was sold or not, and that by its sale at prices above out-of-pocket expenses, the burden of general expenses resting on other consumers has been somewhat reduced. In cases where very low prices are quoted to large power consumers, it is most important that all expenditure specially incurred in connection with the particular supply should be taken into account. The charges in respect of any plant specially installed to enable the particular supply to be afforded should be treated as an out-of-pocket expense ; if caution is not exercised, the receipts from the sale of the particular current may be less than the extra expenditure involved in providing the supply, in which case it will be sold at a loss, and an extra burden will be imposed on the other consumers.

On the whole, it is the light consumers who are able and willing to pay comparatively high prices for their current, and they, consequently, have to bear the larger share of the general expenses. But an electricity undertaking can by no means be sure of its light consumers; if the price charged is too high, a good many would-be consumers will prefer gas or oil. It not uncommonly happens on account of the limitations on what power consumers, and the limitations on what light consumers, are willing to pay, that some electricity undertakings find it very difficult, if not impossible, to conduct their businesses on remunerative lines.

As a result of our analysis, we reach the conclusion that the selling of some current below average cost of production, with a view to utilising the plant better by disposing of current which could otherwise not be sold, is justifiable, provided the price is something in excess of the real out-of-pocket expenses. If *all* the expenses specially incurred to provide the supply at the low price are not covered, current is being sold not merely below the average cost of production, but at a loss, and the undertaking is worse off than if the particular current were not sold at all. It is probable that this sometimes happens; no management would adopt such a policy deliberately, but it may be brought about by the very favourable terms granted to one customer, whose consumption, it was clearly

ascertained, would secure a better utilisation of the *existing* plant, being claimed by other customers in similar positions, for whose benefit *additional* plant may have to be installed.

## CHAPTER XIII.

### CONDITIONS UNDER WHICH THE PRICES OF RAILWAY SERVICES ARE FIXED

HAVING discussed the determination of price in general, under competitive and under monopolistic conditions, we may proceed to examine how the prices of railway services are determined. At the outset, some of the conditions under which rates and fares are fixed will be analysed.

*Direct and indirect competition to which railways are subject.* The extent to which competition influences railway charges calls for consideration. In what concerns direct competition, it has previously been pointed out that direct, or point-to-point, competition between railways has led to equal rates and fares being charged over longer and shorter distances, where two or more railways carry traffic between two towns, the charges being based upon the shorter distance. This type of competition is quite automatic in its character.

In what concerns indirect competition, two kinds

can be distinguished. The first is that among markets, ports or localities. When two or more railways carry the same commodity from different localities to the same market, there is a tendency for the one company to place the locality it serves on an equality with the other locality or localities which compete for the common market, but which are served by the other company or companies; *e.g.* various coalfields, served by different railway companies, compete for the London market; each company seeks to fix rates that will enable coal from the field, or fields, it serves to be carried to London. Where ports served by different railways, or even by the same railway, compete for traffic to and from some inland centre, *e.g.* Liverpool and Bristol in the case of the Midlands, the rates quoted will tend to be equal. Where neighbouring ports, or neighbouring towns, compete for particular traffic, they are very commonly grouped, and a uniform rate is quoted for them; thus there is a uniform coal rate from all collieries in the South Yorkshire coalfield to London; or, again, the Humber ports, including Hull, Goole and Grimsby, are grouped for purposes of rating various kinds of traffic.

With regard to passenger traffic, pleasure resorts and residential districts served by different companies are frequently in competition, and each railway seeks to develop the traffic to its resorts and districts. In some cases this is done by quoting a

relatively lower fare for a longer than for a shorter journey; *e.g.* in a town like Manchester there is keen competition between East and West Coast seaside resorts, and we find the Great Central Railway Company offering day excursion tickets to Cleethorpes (a distance of 206 miles there and back) for 3s. 6d., this specially low fare being doubtless largely due to the fact that a day trip to Blackpool by the Lancashire and Yorkshire Railway (a distance of 98 miles there and back) costs 3s. 3d. In other cases the traffic is encouraged not so much by the adjustment of fares, but by means of the facilities and services provided; *e.g.* the competition between Bournemouth (London and South-Western) and Torquay (Great Western) for high-class pleasure traffic, not merely from London, but also from the North, is of this kind.

The second kind of indirect competition is that which arises from other means of transit. The most important, so far as goods and mineral traffic is concerned, is water competition, which greatly modifies rates in this country, where no town is very far away from the sea or a canal. The competition of motor cars and motor lorries has probably had little or no effect upon rates and fares,<sup>1</sup> but tramway competition has unquestionably influenced the fare

<sup>1</sup> It may be pointed out, however, that a good deal of high-class traffic which formerly passed by rail is now being conveyed by motors.

policy of certain companies which cater for a large suburban traffic.<sup>1</sup>

In so far as there is no active competition among railway companies in the matter of rates and fares, they may be regarded as fixing charges under monopolistic conditions. The large amount of indirect competition with which they have to contend is, however, alone sufficient to modify the monopoly considerably. As a matter of fact, the monopoly in this country is further modified by laws regulating maximum charges, so that the railways may best be described as enjoying a partial or restricted monopoly.

*Steadiness of railway charges.* The steadiness of railway charges is deserving of note. Whilst railways are subject to constant fluctuations in the demand for transportation, depending upon the good and the bad trade enjoyed by the country as a whole, there are no corresponding movements in the prices charged for railway services. The costly efforts made to handle an abnormally large traffic are made without any compensation in the form of higher prices; when business is slack, no attempt is made to encourage it by a temporary drop in rates and fares. Even where there is a permanent change in conditions, a railway has considerable difficulty in

<sup>1</sup> A more detailed discussion of the influence of direct and indirect competition on rates and fares will be found in Chapters XVIII. and XIX.

adjusting its prices to correspond with the changed conditions. Reductions in certain charges may be made to develop future traffic or to meet special circumstances, but general alterations in charges, such as are constantly occurring in most other industries, rarely occur in the railway world. In respect of fluctuation, the problem of prices so far as railways are concerned is simpler than it is in the case of many other industries, as there is no need to distinguish between long-period and short-period prices.

*Non-transferability of railway services.* The fact that railway services are not transferable is of great importance. Transportation supplied to one passenger or one trader is used up at the time it is supplied, and is consequently not available for re-sale by the purchaser to some would-be consumer to whom higher prices have been quoted. A merchant who buys coal, secures a commodity which he can dispose of to whom he pleases and on any terms he chooses. A merchant who buys transportation for his coal, secures a service which is not at his disposal once it has been supplied; he cannot become a carrier with transportation to sell, on the strength of the carriage of his coal by a railway company. As a consequence of the non-transferability of railway services, a railway undertaking is in a favourable position to make differential charges; e.g. it can fix a low rate for carrying coal



and a high rate for carrying furniture, without any fear that the furniture dealer will escape payment by securing his transportation from the coal merchant.

*Other considerations favourable to a system of differential charging.* Another consideration which is likely to assist in bringing about the introduction of a system of differential charging in the case of railways is the partially monopolistic character of the industry. As we have already seen, differential charging is practicable under competitive conditions in some cases, *e.g.* in the cases of doctors, opticians and hotels; but it is undoubtedly encouraged by the existence of a monopoly, as it provides a means of increasing the earnings of the monopolist, who is therefore likely to adopt it when feasible. The fact that the railway industry, as previously pointed out, is commonly subject to increasing returns is another point in favour of a system of differential charging; a large part of the capital and a not inconsiderable part of the working expenses of a railway undertaking do not vary directly with the traffic, and consequently a gradual growth of traffic should reduce the cost of dealing with each unit of traffic, as the share of fixed charges to be allocated to each unit will diminish. To secure a low average cost of production, a large amount of transportation must be sold. If two or more prices can be charged, it will be worth

while selling some of the transportation below the average cost of production, provided the extra sales thereby rendered possible reduce the average cost of production sufficiently to make the total surplus, arising from the excess of the high prices over the new average cost of production, exceed the total deficiency arising from the low prices falling short of the new average cost of production. An illustration may help to make this clear : Suppose on a mountain railway the annual total expenses, including interest charges, were £20,000 (£15,000 fixed + £5,000 variable expenses), and that 50,000 passengers were carried, each being charged 8s., or the average cost of production. If another 25,000 passengers were carried, we will assume that the fixed expenses would remain constant, and that the variable expenses would be increased by 50 per cent., *i.e.* by £2,500. The total expenses would be £22,500, and the average cost would be reduced to 6s. To secure this reduction in the average cost, it would be worth while carrying the extra 25,000 passengers for a very low price. If 3s. were the best price that could be obtained, the total surplus arising from the excess of the high price (8s.) over the new average cost (6s.), *viz.* £5,000 [= 50,000 × (8s. - 6s.)], would exceed the total deficiency arising from the low price (3s.) falling short of the new average cost (6s.), *viz.* £3,750 [= 25,000 × (6s. - 3s.)], and the undertaking would benefit by

the difference, £1,250. Were the price 2s. instead of 3s., the deficiency arising from selling below the average cost would have been £5,000, and the company would reap no benefit from the increased traffic. If the average cost of carrying a passenger remained constant at 8s. whatever the number of passengers, it is evident that it would not pay to charge some 3s. to induce them to travel; still less would it do so if the average cost of carrying passengers increased above 8s. as the number carried became greater. Under either of these circumstances, it would only pay a railway company to make differential charges, provided no charge was less than the average cost of production.

## CHAPTER XIV.

### THE COST OF SUPPLYING RAILWAY SERVICES AS A FACTOR INFLUENCING THEIR PRICES

*Differences in the cost of providing transportation under various conditions.* There is no one uniform cost of providing transportation on any railway undertaking. Transportation is provided under various conditions, some of which involve more expense than others. In many cases subsidiary services are provided, such as collection and delivery, loading and unloading, covering and uncovering, and these are naturally taken into account in fixing inclusive rates. As far as conveyance alone is concerned, experience shows that the cost of dealing with traffic will depend upon many considerations. Among others, it will depend upon whether the traffic is conveyed by express or by slow train ; in what type of carriage or wagon it is carried ; whether it is dispatched in large or small quantities ; the proportion of its bulk to its weight ; whether the shipments are regular or spasmodic ; the distance over which it is hauled ; and whether it is carried

at the railway company's or at the owner's risk. These considerations refer principally to operating expenses; in what concerns capital charges, the mere fact that one line has cost more to build than another is no justification for higher charges, as it may quite well happen that the capital charges per unit of traffic are less on the costly than on the cheap line, owing to the traffic being so much greater. Where, however, the cost of construction of some particular section of a line has been especially great, this may be a ground for making a higher charge than usual. In practice this is brought about, not by specially high rates, but by treating the particular section as being much longer than it really is; e.g. in calculating the distance over which any merchandise is conveyed and for all purposes of rates and charges, the Runcorn Bridge over the Mersey is calculated as 9 miles, the high level bridge over the Tyne at Newcastle as  $3\frac{1}{4}$  miles, and the Tay Viaduct as 12 miles 18 chains. Where a shorter competitive route exists, the public will not be affected by the high nominal mileage of the costly section concerned; it will, however, affect the division of a through rate as between two or more companies that have carried the traffic which has to pass over the costly section.

*Reasons why the exact cost of performing a service cannot be ascertained.* It is easy to ascertain that there are differences in the cost of supplying trans-

portation under different conditions, and to see in this a justification for making differential charges. It is entirely another matter, however, to ascertain what is the exact cost of supplying a certain amount of transportation under particular conditions. There are two practically insuperable difficulties which prevent this from being done. In the first place, certain railway services are joint products in the strict sense of one service being the necessary complement of another. A service of trains in one direction implies a corresponding service in the opposite direction; the two services are joint products, and the expenses arising out of the provision of the particular services have to be shared between them in the manner which proves most expedient. If the demand for accommodation in both directions is fairly equal, the expenses may be divided more or less evenly; but if the demand for accommodation is much smaller in one direction than in the other, the bulk of the expenses will have to be borne by the traffic moving one way. When it is a question of filling wagons which must otherwise be returned empty, any rate which more than covers the difference in expense between running them full and running them empty is better than no rate, provided there is not much delay in securing the freight, and it may pay to quote specially low rates to obtain return traffic. If there is no demand for transportation in one direction, or if the prices that can be obtained are so low

as to be less than the out-of-pocket expenses which would be incurred in dealing with the traffic, trains will have to be returned empty, and the whole of the expenses will have to be borne by the traffic moving in one direction.

In practice there is often inequality in the amount of goods and mineral traffic in opposite directions. Where large quantities of raw produce or coal are being sent to a big market or port, return freights are often difficult to get. If the distances concerned are short, the policy commonly adopted is to return the wagons empty as quickly as possible, so that they shall be available for use again with a minimum loss of time. This is what generally happens with coal wagons in this country, and also with the special wagons used to carry bananas from Bristol to London and other important markets. If the distances concerned are considerable, special efforts are frequently made to obtain back-loads by granting specially favourable terms. Figures relating to a case of this kind may be quoted from Mr. Pratt<sup>1</sup>: Coal was carried into Holland from Westphalia by a Dutch railway in 200-ton lots at a rate of about 1-3d. per ton per mile. To secure a return freight Spanish ore was carried in train loads from Rotterdam to the ironworks in Westphalia, a distance of about 150 miles, at a rate as low as 1-10d. per ton per mile. In the United

<sup>1</sup> *Railways and their Rates*, p. 275.

States the amount of freight moving from West to East considerably exceeds that moving from East to West, and special rates are made to encourage traffic in the latter direction.

In what concerns passenger traffic, its movement is generally much more evenly distributed, as between any two places, than is the case with goods and minerals. Where, however, a country is affected by immigrant or emigrant traffic, the number of passengers moving in one direction may considerably exceed those moving in the opposite direction. In the United States and Canada, for example, the westward movement of passengers exceeds the eastward, and the fares charged are sometimes higher in the former than in the latter direction.

The second difficulty in the way of ascertaining the exact cost of transportation is that in order to supply numerous customers with transportation under varying conditions, a great deal of expenditure is incurred which is common to the whole of the service provided. The services provided under varying conditions are not joint products in the strict sense that one necessarily implies the other; if passenger traffic increases, it does not in the least follow that goods and mineral traffic will increase. As a matter of fact, it is possible to deal with one kind of traffic without the other; there are railways which carry passengers only, *e.g.*



the tube railways, and there are others which carry minerals only. In most cases, however, it is advantageous to carry various descriptions of traffic, as in that way it is often much easier to secure a good utilisation of a railway undertaking, just as the sale of electric current for light and for power purposes generally leads to a good utilisation of a generating station. There are some cases, however, in which a growth of one kind of traffic, instead of being favourable to other kinds of traffic, by reducing the burden of fixed expenses, is prejudicial to them; e.g. an increase in passenger traffic on a crowded line will impede the working of goods traffic and make it more costly to deal with. The question to be considered is, to what extent can the common expenditure, incurred for the benefit of different kinds of traffic, be allocated scientifically amongst the traffic; and in so far as it cannot be allocated scientifically, on what principle is it to be allocated? To anticipate slightly, it is the existence of this large mass of common expenditure which does much to encourage the system of differential charging on railway undertakings.

*The distinction between general and special expenses.*

Up to the present, in discussing railway expenses, we have distinguished between those which vary directly with the amount of the traffic and those which are independent of moderate variations in traffic, and which tend to grow less rapidly than

the traffic expands. The former we have described as variable, the latter as fixed expenses. A somewhat different way of classifying expenses is to divide them into general and special; these expressions are often used as corresponding to fixed and variable respectively, but they do not necessarily so correspond. In the one case, the traffic is regarded as a whole, and the expenses are described as being variable or fixed in respect of the traffic as a whole. In the other case, each unit or each group of traffic is regarded separately, and the object is to ascertain what additional or special expense has been incurred in dealing with a particular unit or group of traffic. Expenses which are fixed may be special to a particular class of traffic; e.g. the capital charges in respect of motor vans for the conveyance of motors are special to the whole traffic in motor cars. Expenses which are variable may be general to particular units of traffic; e.g. the running expenses of a train are general as far as an additional passenger is concerned.

*General Expenses.* The classification of railway expenses as general and special cannot be made in a very definite manner, as what is a general expense in some cases may be a special expense in others. The most that can be done is to indicate which expenses usually fall into one class or the other. In what concerns general expenses, it is possible to distinguish roughly (1) those which are general to the

whole traffic, and (2) those which are general to large divisions of traffic. One expense general to the traffic as a whole is interest on capital spent in the construction and equipment of running lines, as all traffic shares in their use. Amongst the working expenses which are general to the traffic as a whole are the so-called "general charges," that part of the cost of maintenance of the running lines which is due to wind and weather, and that part of the traffic expenses which represents the cost of watching and signalling on the open line.

Some capital charges and some working expenses will be general to certain divisions of the traffic. Amongst the expenses which are general to passenger traffic are capital charges in respect of passenger stations, carriages, and engines used exclusively for passenger traffic, and working expenses in respect of passenger station service, repair of station buildings, and obsolescence of carriages and passenger engines. In a similar manner, capital charges and certain working expenses in respect of goods stations and goods yards, and wagons and locomotives used exclusively for goods traffic, will be general to goods traffic. The capital charges and working expenses in connection with marshalling and sorting depots are in most cases general to the goods and mineral traffic. The capital charges and cost of maintenance in respect of any special rolling stock, *e.g.* refrigerator cars, is general to units of traffic using the stock. It

will be obvious to the reader that the classification of some of the expenses indicated above is somewhat rough and ready ; *e.g.* some goods and mineral traffic is dealt with from passenger stations, but where one division of traffic benefits almost exclusively from some expenditure, it seems simpler to treat it as general to that division of the traffic than to treat it as general to the traffic as a whole.

*Special expenses.* The special cost of carrying any particular traffic is the difference in the total expenses incurred, according as the particular traffic is, or is not, carried. In estimating the special expenses, it is most important to know the exact amount of the traffic concerned, as expenses which are general if small quantities are in question, will become special if large quantities have to be dealt with. Three examples may be given to illustrate this important point.

The special expense of carrying one excursionist from Burton to Blackpool and back must be very small, as accommodation for him can be found on existing trains. Let us suppose the special expense is one penny. If, however, 10,000 excursionists have to be carried from Burton to Blackpool and back in one day, the special expense will be very much greater than 10,000 times one penny. It will be necessary to run a dozen or more special excursion trains, and the special expenses will not even be limited to the mere cost of running those trains ;

ordinary traffic will be to some extent disorganised, goods and mineral traffic will be delayed and will consequently occasion extra expense, which should be regarded as special to the excursion traffic. The special expense of the Burton-Blackpool excursion traffic will therefore depend upon the number of passengers; but there is also another consideration. If the special excursion trains have to be run at a time when the holiday season is at its height, the railway company may have to increase its supply of rolling stock to accommodate the traffic, or refrain from running remunerative services in other directions. In this case, the excursion should be charged with the interest on the capital involved and the provision for obsolescence of the additional rolling stock or with the loss incurred by refraining from running other remunerative services.

Take a second example. Railway companies undertake to carry passengers' luggage in advance. It could be argued, when the system was introduced, that as vans were already in use for collecting and delivering parcels carried by passenger train, the extra trouble of collecting and delivering luggage would not be great; further, that trains with luggage van accommodation would be run in any case, so there would merely be the cost of handling to take into consideration, together with the slight expense incurred in connection with clerical work. A small sum would, it was thought, suffice to

compensate the companies, and the charge was fixed as low as sixpence per article. The charge was very quickly raised to one shilling,<sup>1</sup> on the ground that sixpence was unremunerative. This clearly suggests that the new method of dispatching luggage proved much more popular than was anticipated, and that the quantity of luggage taken as a basis in calculating the special cost per unit was considerably exceeded, with the result that the special cost per unit was much greater than the sum estimated. With the great rush of luggage it was necessary to employ many additional vans in its collection and delivery, and further, in some cases, the accommodation on ordinary trains proved inadequate to carry the luggage in advance, and special luggage trains had to be run. Briefly, what happened was this: certain expenses which had been general—cost of collection and delivery and cost of conveyance by train—became special with the expansion of the particular traffic.

A third example may occur where a company finds that its lines are not fully occupied with its through passenger traffic and its goods and mineral traffic. The company may seek to develop its short-distance or suburban traffic in the neighbourhood of large towns by a system of low fares, the special expenses of the particular traffic being

<sup>1</sup> Assuming the railway company does the carting at both ends.

small, viz. the cost of running the additional trains. In the course of time, the short-distance traffic may develop so greatly as to involve the purchase of new rolling stock, the construction of new sidings, and even the duplication of running lines. A large capital outlay would then have to be incurred, and the interest charges, as well as the maintenance expenses in respect of the new capital outlay, should, strictly speaking, be regarded as special expenses of the short-distance traffic, as they would never have been incurred but for this traffic. As a consequence, low fares, which were once remunerative, in the sense of leaving a margin after covering special expenses, might become entirely unremunerative. Something of this kind has probably happened in connection with the traffic carried by the Great Eastern Railway Company into and out of Liverpool Street (London) at very low workmen's fares.

These illustrations will suffice to show how difficult it is to say definitely what are general and what are special expenses in connection with a railway undertaking. The attempt has been made to indicate some expenses which under ordinary circumstances may be regarded as general. Similarly, where a moderate amount of traffic is under consideration, the whole cost of running trains—wages of train staff, cost of coal, allowance for wear and tear of rolling stock, and allowance for wear and tear of permanent way, in so far as it is due to traffic

passing over it—may be regarded as special expenses. Where small quantities of traffic are under consideration, the special expenses may be very trifling indeed.

*The division of the general expenses amongst the units of traffic.* The amount of railway expenditure common to all kinds of traffic depends very much upon the quantities of traffic taken into consideration for the purpose of ascertaining the special expenses ; the larger the quantities taken, the greater the special and the less the general expenses will be. By this means more of the expenditure is divided scientifically amongst groups of traffic, and less remains to be allocated on what is at best a somewhat rough and ready basis. It must not be overlooked, however, that the division of special expenses amongst the units which constitute a group of traffic may itself be a troublesome problem, analogous to the division of general expenses amongst all the units which make up the traffic as a whole. It is easy to speak about dividing the general expenses “ equally ” amongst the different units of traffic, or of charging each unit “ a full share ” of the general expenses, but the application of this system of allocation is a difficult matter.

At the outset some relationship must be assumed between passengers measured by number and goods and minerals measured by weight. One way is to take the weight of the rolling stock used for the con-



veyance of passengers, and to calculate the average weight hauled in respect of each passenger. Passenger traffic would thus be measured in terms of tons and would be comparable with goods and mineral traffic. Another way is to treat one passenger as being equivalent to a certain weight of goods or minerals, say, one ton. Under these circumstances, each passenger and each ton of goods or minerals might be charged, in addition to its own special expenses, a fixed sum as its share of the general expenses; *e.g.* each passenger might be charged  $\frac{1}{4}$ d. per mile special expenses and one shilling as a fixed contribution towards general expenses. Under such a scheme, short-distance traffic would be heavily penalised as compared with long-distance traffic, and much of the short-distance traffic would probably be altogether lost to the railway company.

To overcome the difficulty involved in charging each unit of traffic a fixed sum as a contribution towards general expenses, it would be necessary to take distance into account in allocating general expenses; so much for each mile that a passenger or a ton of goods or minerals was conveyed might be reckoned in respect of general expenses, to be paid in addition to the special expenses. If the amount reckoned were  $\frac{1}{4}$ d. per mile, the contribution towards general expenses would be 1s. 3d. in the case of a ton of goods conveyed 30 miles, and 4s. 2d. in the case of a passenger who travelled 100 miles.

Such a system of allocating general expenses could not be followed very closely. In the first place, it ignores the various considerations which affect the cost of performing a particular service, so that it would in no sense be a fair distribution of general expenses; long-distance traffic would be penalised. It undoubtedly costs less to carry one consignment of 10 tons 100 miles than to carry 100 consignments of 1 ton 10 miles, as the former would secure a better utilisation of rolling stock, and involve less handling and less clerical work, yet under the system we are considering 10 tons carried 100 miles and 100 consignments of 1 ton carried 10 miles would each contribute the same amount towards the general expenses. In the second place, the system, by tending to equalise the charges on all kinds of traffic, would cause the charges in respect of some traffic to become relatively so high as to be practically prohibitive. If this system were adopted, comparatively little traffic would be carried, and such as was carried would be conveyed at high rates and fares; under these conditions, it might, or it might not, be possible to make the undertaking pay its way.

Theoretically, there is a third manner in which general expenses might be divided "equally" amongst the traffic; they might be allocated to each unit in proportion to the special expenses of the particular unit, i.e. the general expenses would

in all cases constitute a certain fixed percentage of the special expenses. Similar objections can be made to this system as to the previous one ; it would be neither fair nor practicable. As between two groups of traffic in respect of one of which more of the expenses were treated as special than in the case of the other, the former would be charged with a larger share of the general expenses than the latter, which would probably be quite unfair. This would be most evident in the extreme cases ; in one case, practically no special expenses could be attributed to a particular unit of traffic, and under these circumstances it would escape payment of general expenses almost entirely ; in the other case, where a considerable proportion of the expenditure involved in conveying certain traffic was special, a large contribution towards general expenses would have to be made in addition. Such traffic would practically be required to pay twice over, the other kind of traffic hardly at all. Between the extreme cases, various degrees of unfairness would exist. In practice there would arise the same difficulty about increasing the charge for some traffic so much, that would-be purchasers of transportation would not pay the price quoted, as in taking the distance that a passenger or ton was carried as the basis for allocating general expenses. There is a further ground on which this system of distributing general expenses must be rejected ; it is exceedingly

difficult to calculate with even moderate accuracy the special expenses of carrying any particular traffic ; it would be impracticable to take a number of necessarily uncertain and inexact amounts as the basis on which the whole of the expenses of a railway undertaking should be distributed.

There is only one conclusion which can be drawn from the discussion of general and special expenses in this chapter, viz. that there is no ascertainable scientific method of allocating the general expenses amongst the units of traffic.

## CHAPTER XV.

### THE DEMAND FOR RAILWAY SERVICES AS A FACTOR INFLUENCING THEIR PRICES

*Conditions on the side of demand impose a limit on charges.* The fact that it is never possible to sell anything for more than people are able or willing to pay, is as true of railway services as it is of all other services and of commodities. When discussing demand in Chapter II., we considered the probable effects of alterations in the price of railway services on the amount of the traffic. We saw, amongst other things, that where the freight charges account for an appreciable proportion of the selling price of an article, a rise in the railway rate, by raising the price of the commodity, may seriously diminish its consumption, and thereby diminish the demand for transportation. From this we may conclude that a trader's *ability* to pay freight charges depends largely upon the probable sales, at different prices, of the article transported. The consideration which influences a trader's *willingness* to pay is the price, if any, at which he can secure the desired commodity

by some other means. As far as passengers are concerned, travelling for pleasure is but one of many ways in which a surplus of income above that required to maintain the standard of life can be spent; if fares are high, people will restrict their travelling and spend more money on other pleasures. Travelling on business will also be restricted if fares are high, but not to the same extent as in the case of travelling for pleasure. The ability to pay for transportation may be roughly expressed as follows: In the case of goods it depends largely upon their value, in the case of passengers it depends largely upon their incomes. The lower the value of goods, the larger the proportion of their cost which will be represented by some particular charge for transportation, and the more easily the freight will check their sales; the smaller a passenger's income, the less the sum he can afford to pay for conveyance.

If goods of small value and passengers with small incomes are to be carried, low charges must be made, but to charge low rates and fares to all traffic would probably prevent the undertaking from paying its way, though this scheme of charging would be more feasible in the case of passengers than in the case of goods. The solution of the difficulty lies in making differential charges; in ordinary railway parlance this policy is conveyed by one short expression: "Charging what the traffic will bear."

*Charging what the traffic will bear.* This expression implies the division of traffic into classes, as the only practical means of giving effect to the policy it advocates. Further, it implies fixing such a rate, or fare, in each class that the maximum contribution towards general expenses shall be secured, though on the face of it, it does seem to suggest something different, viz. fixing the charge so low that all the traffic will be carried. That it cannot mean this is easily shown. There is no fixed quantity of any particular traffic, the whole of which will be conveyed provided the charge is not more than a certain amount, and none of which will be conveyed if the charge exceeds that amount. The quantity of any particular traffic will vary according to the charge; the higher the charge, the smaller the quantity conveyed. The object of a monopolist is, therefore, so to fix the charges in respect of each kind of traffic that the total excess of receipts over special expenses will in each case be at a maximum. It is very unlikely that this would be achieved by charging a low rate or fare, only very slightly in excess of special expenses; it might be secured in some cases by charging a high rate or fare on a limited amount of traffic, in other cases by charging a moderate rate or fare on a fairly large amount of traffic. Each kind of traffic would have to be considered separately. Suppose the following table contains the estimates of the management concerning some particular traffic :

Rate per ton per mile.	Number of tons conveyed.	Average number of miles over which each ton is conveyed.	Special expenses per ton per mile.	Excess of rate over special expenses per ton per mile.	Total excess of receipts over special expenses.
d.			d.	d.	d.
1½	1,100	50	½	1	55,000
2	1,000	50	½	1½	62,500
2¼	900	50	½	1½	67,500
2½	800	50	½	1½	70,000
2¾	650	50	½	2	65,000
3	500	50	½	2½	56,250

The last column is obtained by multiplying the excess of the rate over the special expenses per ton per mile (column 5) by the corresponding number of tons (column 2), and by the average number of miles over which each ton is conveyed (column 3). According to these figures, the most favourable arrangement for the railway undertaking would be to carry 800 tons at a rate of 2½d. per ton per mile, as this would secure the largest total excess of receipts over special expenses available to meet general expenses, viz. 70,000 pence.

In practice, a railway company does not enjoy an absolute monopoly and cannot, consequently, secure that the rate in respect of each kind of traffic shall be such that the contribution towards general expenses shall be at a maximum. Legal restrictions on the one hand, and competition on the other, considerably limit a company's powers of charging. In the case of an article like cigarettes, which may



easily be worth £1,000 or more per ton, a charge of 4·30d. per ton per mile constitutes such a slight addition to the cost—·000125d. per oz. per mile—that the consumption would not be affected to an appreciable extent by a considerably higher rate, nor, consequently, would the quantity offered for transport. A railway company could secure a far larger contribution towards its general expenses from the cigarette traffic, were it not that 4·30d. per ton per mile is the legal maximum rate for the conveyance of cigarettes, and a similar situation exists in respect of many other high grade articles.

In the case of low grade articles, it is commonly competition which prevents a railway company from charging a rate likely to produce the maximum contribution towards general expenses. We may take an illustration from the coal trade. The distance from a particular colliery to Lynn is 101 miles ; the maximum rate, including one station terminal, would be 6s. 4d. per ton. Actually, the charge is 5s. 5d. per ton, that presumably being regarded as the rate which is likely to prove most remunerative. When, however, the coal is carried for shipment, the rate for the 101 miles is only 2s. 11d., the competition of Hull rendering it necessary to quote such a low rate. It is obvious that it would not pay to carry any coal at that figure unless it exceeded the special expenses, but it probably exceeds them by so little as to provide a very small contribution towards the

general expenses, and the railway concerned could not afford to carry all coal traffic on the same terms.

*Upper and lower limits in the matter of charges.* The charge which would tend to be fixed, in respect of any particular traffic, by a railway company enjoying an absolute monopoly, viz. the rate which would provide the largest contribution towards general expenses, may be regarded as indicating the upper limit in the matter of rates and fares. It does not follow, however, that charges may not exceed the upper limit, owing to a company failing to realise that a reduction of certain charges would be likely to cause such an expansion of the particular traffic as to more than compensate for the lower charges. In practice, the rates fixed for local traffic are most likely to approximate to this upper limit.

The lower limit in the matter of charges is indicated by the special expenses of carrying the traffic concerned. Under ordinary circumstances, a rate would never be fixed quite as low as the special expenses, as nothing would be available to meet general expenses, and the undertaking would be as well off without the traffic. It might, however, be policy to carry some traffic at approximately the special cost, if it were likely to cause a considerable development of more lucrative traffic; e.g. coke carried at very low rates to an iron and steel works might enable a large product to be disposed of, which would provide the railway with remunerative traffic.

In practice, some traffic may be carried at rates which are below the special cost or lower limit ; where this is the case, it has probably been brought about by the special cost having increased with the growth of traffic, so that a rate which was originally above the limit has come to be below it.<sup>1</sup>

*General view of the determination of railway charges.*

We are now in a position to attempt to summarise how railway charges are determined. What we are seeking is the theoretical explanation that underlies the fixing of the vast number of railway rates and fares which, in this country at least, have gradually been established by railway companies acting along the lines which appeared to them to be most expedient. The present complex system of rates and fares has come into being, not as the result of carrying out a definite policy, based on certain general principles, but by a process of continually elaborating the tariffs as they existed at any one time. Each new elaboration has been based upon experience gained on previous occasions, the original tariffs being fixed with a view to securing traffic from the older forms of transit in which the charges were based upon ability to pay. Although railway charges have been fixed by practical men feeling their way step by step, with little or no reference to theoretical

<sup>1</sup> Compare what was said about special expenses of a railway undertaking on pp. 167-170, and also the remarks on the charge for electric current for power purposes (p. 148).

considerations, the system of charging so built up undoubtedly conforms to certain principles, just as a boy who learns to ride a bicycle without any lessons and in ignorance of all physical laws, will by experience come to maintain his balance in accordance with sound principles.

At the root of the system of differential charging on railways, is the impossibility of ascertaining, even approximately, what it has cost to perform any particular service, owing to the very large amount of capital and working expenditure which is incurred for the benefit of all the traffic, or for the benefit of large sections of the traffic. Nevertheless, it is not infrequently possible, as between different shipments, to ascertain that the conveyance of one costs more than the conveyance of the other, though it is not feasible to say exactly how much more it has cost. In other words, whilst the absolute cost of conveying units of traffic is indeterminable, the comparative cost of carrying different units of traffic can be gauged to a considerable extent. On the basis of the comparative cost of conveying traffic under varying conditions, it is possible to establish a system of differential charges. In some cases this appears to be the predominant, if not the sole, explanation of the difference in the charges for performing two services ; in other cases it appears to be the partial explanation ; and in still other cases it does not appear to figure at all in the explanation. As an illustration of

a case where the comparative cost of performing the services seems to be the predominant explanation of differences in charges, we may take the charges for conveying pig iron, according to the quantities in which it is consigned. If 5 tons of pig iron were consigned by the Midland Railway for 20 miles, the maximum charge for conveyance would be 2s. 1d. per ton, if  $2\frac{1}{2}$  tons were consigned, the maximum charge would be 3s. per ton ; if 1 ton were consigned, the maximum charge would be 3s. 8d. per ton. In each case, one truck would have to be devoted exclusively to the conveyance of the pig iron, so that the dead-weight to be hauled would be the same, whether 5 tons,  $2\frac{1}{2}$  tons or 1 ton were conveyed. The larger the shipment, as long as it does not exceed the maximum load which can be carried in one truck, the lower the cost per ton of pig iron of hauling the dead weight. Hence the justification for the reduction in the charge as the consignment increases.

Where the comparative cost of performing services does not account for differential charges, as is very often the case, or where it accounts for them only to some extent, we must seek the explanation of the differential charges in the efforts of the management to take consumers' ability or willingness to pay into consideration in fixing its charges. To do this is clearly to the interest of the railway, as it enables a larger revenue to be secured than if uniform, or

approximately uniform, charges were made. It is to the interest of the poorer passengers and low grade traffic, as these could not afford to pay the same contribution towards general expenses as richer passengers and high grade traffic, and would consequently be carried to a much smaller extent, if at all, were concessions in the matter of charges not granted to them. It is to the interest of the richer passengers and high grade traffic, because the burden of the general expenses resting upon them is reduced in so far as the poorer passengers and low grade traffic are charged more than their special expenses. It is to the interest of the community as a whole for two reasons, (1) in some cases it is the only way of enabling a railway undertaking to be conducted on a self-supporting basis, and but for it, such a railway would not be constructed, and (2) in all cases it permits of far more traffic being carried than would otherwise be possible.

As an illustration of a case where ability to pay appears to govern differential charges very largely, if not entirely, the rates charged on the French railways for conveying gold and silver may be quoted; the charge in either case is 0.00252 frs. *ad valorem* per 1,000 frs. and per kilometer. Consequently, a shipment of gold is charged from 35 to 40 times as much as a shipment of silver of the same weight. As an illustration of the very common case where ability to pay and comparative cost of providing the

services are both taken into consideration in fixing differential charges, first and third class passenger fares may be mentioned.

Railway rates and fares are determined partly by the conditions on the side of supply and partly by the conditions on the side of demand ; the former govern (a) the minimum charge in any particular case, (b) the general level of charges on traffic as a whole, as this must be sufficient to cover all expenses, and (c) to some extent the differences in the charges made for various services ; the latter govern (a) the maximum charge in any particular case, and (b) to a large extent the fixing of differential charges. The conditions operating on the side of demand and on the side of supply act at the same time, and every rate and fare is fixed by the interplay of these conflicting conditions, though it is permissible in particular cases to regard the one set of conditions or the other as exercising the predominant influence.

## CHAPTER XVI.

### THE CLASSIFICATION OF GOODS AND MINERALS

THE carrying into practice by railway undertakings of the system of differential charging generally comprises three steps. We will consider them first in connection with goods and mineral traffic, and then in connection with passenger traffic. The first step consists of grouping the great variety of articles carried by rail into classes, because to establish a separate rate for every separate article would be an almost impossible task. The second step is to fix the rates for each class, and thus produce a regular scale of charges. The third step is to adjust the rates, whenever necessary, to the special conditions of some particular traffic; where this is done to a large extent, it will greatly modify, if not entirely do away with, any regular scale of charges.

*The influence of conditions on the side of demand on the classification of goods.* In grouping the various articles into classes, it has to be remembered that the intention is to charge a different rate in respect of each class; consequently, the conditions which



tend to determine railway rates must be taken into consideration, as far as possible, in drawing up the classification. We have already seen that, on the side of demand, ability to pay, which is roughly measured by the value of the article concerned, is a most important factor. This, then, is generally the primary consideration in allotting an article to any particular class. Its influence can be clearly traced in the classification sanctioned by the Railway Rates and Charges Order Confirmation Acts, 1891 and 1892. Merchandise traffic is arranged in three lettered and five numbered classes, A, B, C, 1, 2, 3, 4 and 5, and, roughly speaking, the higher the value of an article, the higher the class in which it is placed. One way of ascertaining this, is to glance through the list of articles in the different classes, and to notice the tendency for the value to increase as the class rises from A to 5; *e.g.* we find sand and iron ore in class A, rock-salt and zinc ore in class B, grain and copper ore in class C, raw cotton and tin ore in class 1, brass and raw wool in class 2, tea and silver ore in class 3, plated goods and snuff in class 4, and cigars and silk in class 5.

Probably an easier way of showing how value affects classification is to take a few articles in different stages of production, and thus of different values, and to observe how they are classified; *e.g.* iron ore is in class A, pig-iron in class B, axle forgings, in the rough, in class C, axleboxes in class 1;

or, again, wholly undressed stone straight from a quarry is in class A, stone in the rough state, for building and paving, is in class B, sawn or roughly wrought-up stone, such as sinks or troughs, is in class C, stone carved for building purposes is in class 2, whilst decorative stone, carved for decorating the interior of buildings, is in class 4.

*The influence of conditions on the side of supply on the classification of goods.* On the side of supply, there are several considerations which influence the choice of class to which any particular article is to be assigned. In the first place, the bulk of an article in proportion to its weight is taken into account; if it is light and bulky a far less satisfactory load can be obtained than if it is heavy and compact, and it is therefore more costly to carry. As a consequence, there is a tendency for light and bulky articles to be placed in the higher classes regardless of value, e.g. wheelbarrows are in class 3, handcarts and tanks in class 4, birdcages, and in some cases empty crates and casks, in class 5. Instead of quoting a few light and bulky articles which appear in the higher classes, we may take one article and observe how it is classified according as it is more or less bulky. Esparto grass will serve as a good illustration: if it is hydraulic or steam press-packed, it is placed in class C; if it is machine-pressed, in class 1; if it is not hydraulic or steam press-packed or machine pressed, but in full truck

loads or consignments of 20 cwt., in class 3; if it complies with none of these conditions, in class 4.

In the second place, the liability to damage is taken into account in classifying an article, as a railway company is a common carrier, and is responsible, with certain exceptions, for loss or damage of goods entrusted to its care, unless there is an explicit contract with the trader to the contrary. Goods easily liable to damage will require more careful handling, and will cause smaller loads to be obtained than is the case with ordinary goods. These considerations, as well as the actual compensation that is likely to have to be paid in spite of all precautions, lead to articles especially subject to damage being placed in the higher classes. Thus, for example, we find porcelain in class 4 and clay models and glass vases in class 5.

Liability to damage can be modified, in some cases at least, by the method of packing adopted, and this is a third point to be taken into account in determining the class of an article. The method of packing is of importance, not merely because it may reduce the amount of damage, but because it facilitates handling, and enables better loads to be obtained. Further, in some cases it is an indication of the value of the goods, the more expensive qualities being better packed than the cheaper qualities. Under the latter circumstances, the better packed goods will probably be placed in a higher instead of

a lower class than goods which are not packed so well. Two or three illustrations of the influence of packing on classification may be given. Butter, if packed in casks, firkins, baskets or boxes, or in tubs or cools with wooden lids, is in class 2 ; if packed in crocks in wood, or in crocks packed with straw in baskets, it is in class 3 ; if packed in flats or hampers, or in tubs or cools without lids, it is in class 4 ; if packed in crocks, otherwise than in the manner previously mentioned, it is in class 5. Paints in casks, or iron drums, or in tins packed in cases, are placed in class 2 ; paints in boxes, cans, hampers, or iron bottles are placed in class 3 ; paints in jars are placed in class 5. In the case of both butter and paint, the better the packing the lower the class in which the article is placed. The position with regard to an article like china is different ; if it is packed in boxes or cases it is in class 4 ; if in hampers, in class 3 ; if in casks or crates, in class 2. It should be possible to secure a better load and incur less risk of damage if the china is in boxes or cases than if it is in hampers ; but, generally speaking, a better quality of china is packed in boxes and cases than in hampers, and that determines the classification. It often happens, however, that where valuable china is sent out from the works in quantities exceeding a hundred pieces, it is packed in casks, and so is charged at class 2 rates only.

In the fourth place, the size of the consignment may be taken into account in classifying, with a view

to securing good wagon-loads, and thereby a reduction in the amount of tare weight to be hauled in proportion to paying load. This is particularly important if the shipment cannot be loaded in the same wagon as other shipments, as, for instance, if it is loose or has a strong smell ; but it is of importance under all circumstances as facilitating the economical operation of a railway undertaking. There appear to be two ways in which the size of a consignment may affect the classification. (1) Articles may be placed in a particular class only on condition that a minimum weight is shipped ; *e.g.* classes A and B of the statutory classification are applicable to consignments of 4 tons and upwards, and class C to consignments of 2 tons and upwards. Where merchandise in class A is consigned in quantities of less than 4 tons but not less than 2 tons, it may be charged at the conveyance rates applicable to class B, and where it is consigned in quantities of less than 2 tons, it may be charged at the conveyance rates applicable to class C, provided that a company shall not charge more than would be charged for a consignment of 4 tons or 2 tons respectively in the class to which the merchandise properly belongs. There are similar provisions where consignments under classes B and C fall short of 4 or 2 tons.<sup>1</sup>

<sup>1</sup> In practice, where traffic in classes A, B and C is consigned in less than the minimum quantities, the rates charged are below

(2) Articles may be placed in a particular class only on condition that they are shipped in wagon-loads, with a minimum of a certain weight per wagon. There are a few cases of this kind in the statutory classification ; *e.g.* apples, with a minimum of 20 cwt. per wagon are in class 1, otherwise in class 2, and the same applies to gooseberries and pears. Scrap iron, with a minimum load of 4 tons per truck is in class B, with a minimum load of 3 tons per truck in class C, and otherwise in class 1. In the Prussian classification there are six wagon-load classes, four of which relate to minimum loads of 10 tons per truck, and two to minimum loads of 5 tons per truck, and in respect of every article there are, theoretically at least, 5-ton and 10-ton rates, as well as ordinary rates. A consignment of 10 tons does not enjoy its 10-ton wagon-load rate unless it is actually conveyed in one 10-ton truck ; if only 8 tons can be loaded in one wagon, they will have to be paid for at the 5-ton rate, or be treated as 10 tons, and be paid for at the 10-ton rate, if that is

the maximum powers. Thus consignments of articles in class A under 4 tons and not less than 2 tons are charged 6d. per ton less than the class B rates, but not at a lower rate than would be charged for 4-ton consignments, and consignments of articles in class A under 2 tons are charged 1s. 6d. per ton less than the class C rates, but not at a lower rate than would be charged for 2-ton consignments. There are similar provisions for charging below the maximum powers where articles in classes B and C are consigned in less than the minimum quantities.

cheaper ; the remaining 2 tons will have to be conveyed at the ordinary rate. In a similar manner, the 5-ton rate is only applicable where the 5 tons are conveyed in one wagon. In the American classifications—Official, Southern and Western—an article is generally placed in a different class when shipped in “car-load” quantities than when consigned in smaller quantities. In this connection, a “car-load” usually varies between 10 and 15 tons according to circumstances.

In the fifth place, the time within which the traffic is to be conveyed may influence the classification: the longer the traffic can be held up after it has been handed over for conveyance, the better the load that can be obtained and the more economically the service can be conducted. This is brought out very clearly on some of the Continental systems, where a distinction is made between fast and slow goods between “*grande vitesse*” and “*petite vitesse*”. In Prussia, for example, consignments in less than wagon-loads may be dispatched under the fast or the slow goods classes, the rates charged to the fast class being in many cases double those charged to the slow class. The maximum periods allowed for transit in the two classes are as follows: For fast goods, the time allowed for dispatch from the forwarding station is one day, and the time allowed for transport for every 300 kiloms., or part thereof, is one day. For slow goods, the time allowed for di-

patch from the forwarding station is two days, and the time allowed for transport for the first 100 kiloms. is one day, and for each additional 200 kiloms., or part thereof, is one day. Time does not begin to count until midnight following the receipt of the goods, and Sundays and holidays do not form part of the delivery period. If the distance between two towns is 480 kiloms. (approximately that between London and Carlisle), goods consigned on Monday would not need to be ready for delivery under the fast scale until Thursday evening, under the slow scale until Saturday evening.

The closest approach to the distinction between fast and slow goods in this country is the arrangement by which perishable merchandise can be consigned by passenger train under Part V. of the Railway Rates and Charges Order Confirmation Acts, 1891 and 1892. The articles concerned, *e.g.* fish, game, ice and milk, can of course be dispatched by goods train, but on payment of a higher rate a more expeditious conveyance can be secured by dispatching them by passenger train.

There are one or two other considerations on the side of supply which may affect the classification of goods and minerals to some extent. When it is probable that certain commodities will be dispatched with a considerable degree of regularity, there is a tendency to place them in lower classes than articles which are consigned only occasionally, as the former



traffic helps to utilise the undertaking better than the latter. Another, and probably much common way of taking the regularity of traffic into account is to quote reduced or exceptional rates in favour of such traffic as moves with considerable regularity. The type of wagon required to convey the traffic may influence the classification of an article, as a closed wagon represents a larger capital outlay than an open truck, and special rolling stock, such as a refrigerator wagon, is much more costly to supply and maintain than ordinary wagons. Finally, when articles compete or are substitutes for each other there is a tendency to place them in the same class e.g. the various raw materials for paper making, esparto grass, wood pulp and rags, provided they comply with certain conditions, are all placed in class C; butter and margarine, though the former is more valuable than the latter, are placed in the same classes.

*Incompleteness of statutory classification.* The statutory classification is far from being complete, even after allowance has been made for the fact that animals, carriages and certain exceptional articles including abnormally heavy and bulky goods, wild beasts, dangerous goods, specie, bullion and precious stones, are provided for outside the three letter and five numbered classes. The railway companies have extended the statutory classification by incorporating in it a large number of unenumerated

articles, and have in this way produced the much more comprehensive "General Railway Classification of Goods," in which the system of dividing goods into eight classes is followed. The three American classifications, though drawn up by the railway companies themselves, are also incomplete. This, however, is done intentionally, so that class rates may remain unchanged as far as possible; exceptional or so-called "commodity" rates are quoted on the articles excluded from the classification, these articles being treated separately on the ground that they move in very large quantities, or that they deserve special consideration for other reasons. In this country, and also in Germany, classification has nothing to do with the question of special or exceptional rates.

## CHAPTER XVII.

### THE FIXING OF RATES

*Conditions which influence rates as well as classification.* After merchandise has been classified, the next step is to fix the rates to be charged in respect of each class. It goes without saying, that the higher the class the higher the rate will be ; the question is what shall be the rate in the lowest class, and how great shall be the difference in charges between the different classes ? There are two sets of conditions to be considered : (1) those which influence rates as well as the classification of articles ; and (2) those which influence the determination of rate alone. Special considerations which influence the classification of particular articles, *e.g.* bulk in proportion to weight, liability to damage, and method of packing, will hardly be taken into account in fixing class rates, as each class will contain many articles unaffected by these special considerations. It is the general considerations affecting classification, especially ability to pay, but also the size of consignments and regularity of shipments, which are

likely to determine the rates charged in any class. The maximum rates for conveyance—the closest approximation in this country to a scale of charges—are all in terms of one ton; but whereas in the case of articles in classes A and B of the statutory classification, the scale applies only to consignments of 4 tons and upwards, and in class C to 2 tons and upwards, in the case of articles in the numbered classes the rates apply to consignments of less than one ton, and in practice such consignments greatly predominate.<sup>1</sup> It is only where a consignment is 3 cwts. and under that an additional charge can be made under Part VI. of the Railway Rates and Charges Order Confirmation Acts, 1891 and 1892.

*Conditions which influence rates but not classification: provision of trucks.* Two conditions which influence rates but not classification are the provision of trucks and the distance for which the traffic is carried. The first consideration distinguishes class A rates from the remaining class rates, as the provision

<sup>1</sup> Some figures, given by Mr. Pratt (*Railways and their Rates*, p. 94), analysing the weights of consignments forwarded from the Camden and Broad Street (London) goods depots of the London and North-Western Railway Company in the course of a single day, may be quoted. Of the 10,705 consignments, 5,766, or 53·86 per cent., did not exceed 1 cwt.; 2,097, or 19·59 per cent., were between 1 and 2 cwts.; 964, or 9·01 per cent., were between 2 and 3 cwts.; 548, or 5·12 per cent., were between 3 and 4 cwts.; 334, or 3·12 per cent., were between 4 and 5 cwts.; 860, or 8·03 per cent., were between 5 and 20 cwts.; and 136, or 1·27 per cent., exceeded 1 ton.

of trucks is not included in the maximum rates applicable to merchandise specified in class A, but is included in all other maximum rates. Railway companies are not required to provide trucks for the conveyance of merchandise specified in class A, nor for the conveyance of lime or salt in bulk, or of ammoniacal liquor, creosote, coal-tar, gas-tar, gas-water or gravel tarred for paving, when carried in such manner as to injure the trucks of the companies. If a company provides trucks when the provision of trucks is not included in the maximum rates for conveyance, the company may charge for the use of trucks as follows :

Distance.	Charge per ton.	
	s.	d.
Miles.		
Not exceeding 20	0	4½
21-50	0	6
51-75	0	9
76-150	1	0
Over 150	1	3

If a company is unwilling to provide trucks for the conveyance of merchandise other than that specified in class A, a trader is entitled to a reduction in the authorised rate in consideration of providing his own trucks.<sup>1</sup>

<sup>1</sup> It has been decided by the Court of Appeal (*Spillers & Bakers v. Great Western Railway Company* [1910], 1 K.B., 778) that the reduction in the authorised rate when a company does not provide trucks does not apply to a case where, although the

Incidentally it may be mentioned that the question of traders providing their own trucks is one of considerable contention between railway companies and traders. There are a very large number of private wagons in use, especially in the coal trade ; generally speaking, the railway companies regard the use of private trucks with disfavour, whereas the traders regard it with favour.

*Distance for which the traffic is carried.* This second consideration is of great importance in all cases. There are three principal ways in which distance may be taken into account in fixing a scale of rates. One way is to adopt a flat rate or equal mileage rate ; a second way is to introduce a system of tapering rates ; a third way is to establish a zone system of rates. Before the treatment of distance is discussed, each method may be described separately.

When the flat rate or equal mileage rate is employed, the charge made is in exact proportion to distance ; the charge for conveying a ton of a particular commodity 100 miles will be exactly ten times the charge for conveying it 10 miles. As an illustration, certain Prussian rates may be quoted. Under the ordinary scale, the rates per ton per kilometre, applicable to all distances, in five of the wagon-load

company is ready and willing to provide trucks, the trader prefers to, and does, use his own trucks, but only to a case where a trader uses his own trucks in order to supplement a deficiency in the supply of trucks by the company.

classes are as follows : In A 1, 6-7 pf. ; in B, 6 pf. ; in A2, 5 pf. ; in I., 4-5 pf. ; in II., 3-5 pf.

Under a system of tapering rates, the charge per mile decreases as the distance increases. The maximum rates for conveyance in respect of articles in the statutory classification are excellent examples of this system. The maximum charges of different companies vary slightly ; those of the Midland Railway may be quoted :

MAXIMUM RATES FOR CONVEYANCE.

In respect of merchandise comprised in the under-mentioned classes.	For the first 20 miles or any part of such distance.	For the next 30 miles or any part of such distance.	For the next 50 miles or any part of such distance.	For the remainder of the distance.
	Per ton per mile.	Per ton per mile.	Per ton per mile.	Per ton per mile.
A	1-15d.	0-90d.	0-45d.	0-40d.
B	1-25	1-00	0-80	0-50
C	1-80	1-50	1-20	0-70
1	2-20	1-85	1-40	1-00
2	2-65	2-30	1-80	1-50
3	3-10	2-65	2-00	1-80
4	3-60	3-15	2-50	2-20
5	4-30	3-70	3-25	2-50

The zone system of rates is an arrangement by which distance is measured in large units or "zones," instead of in single miles or quarter-miles. The charge for conveyance of a particular shipment is one amount, if the shipment is dispatched to any place within a certain distance ; a second and larger

amount, if it is dispatched to any place beyond the first distance, but within a second stipulated distance, and so forth. Finally, there is some distance beyond which the charge does not increase. In its most extreme form, the zone system disregards distance entirely, and the charge is the same however far the goods are carried; this is the case with parcels dispatched by post between any two points in this country, as the Post Office regards the United Kingdom as forming one zone.<sup>1</sup> Illustrations of the zone system of rates can be given in connection with merchandise carried by passenger train; *e.g.* the maximum rates for conveying milk by passenger train under Division I. of Part V. of the Railway Rates and Charges Order Confirmation Acts, 1891 and 1892, are as follows:

**MAXIMUM RATES FOR CONVEYANCE OF MILK BY  
PASSENGER TRAIN.**

Distance.	Rates for conveyance.
Not exceeding 20 miles, - - - -	Per Imperial gallon. 0·50d.
Above 20 miles and not exceeding 50 miles, -	0·60
" 50           "           "           75           "           -	0·70
" 75           "           "           100          "           -	0·90
" 100          "           "           150          "           -	1·00
" 150 miles, - - - -	1·20

<sup>1</sup> It may be noted that in the United States, where the parcel post system has recently been introduced, there is not one scale of charges as in this country, but four, based upon distance. 8



Other illustrations are afforded by the ordinary rates for parcels by passenger train,<sup>1</sup> the owner's risk rates for parcels by passenger train, and the owner's risk rates for parcels of newspapers and periodicals by passenger train.

The flat rate directly proportioned to distance, under its other name of "equal mileage rate," appeals to the public as being a good system, the word "equal" suggesting fairness. As a matter of fact, the system is neither very fair nor very feasible. It is not fair, because although the cost of conveying traffic does increase with distance, it does not increase in direct proportion to distance. The longer haul, by securing a better utilisation of rolling stock, is comparatively less costly to perform than the shorter haul, and it seems reasonable, therefore, that the rate should fall as the distance increases, or, in other words, that a system of tapering rates should be adopted. With regard to feasibility, equal mileage rates may easily affect adversely low-grade long-distance traffic where the freight charges form a considerable proportion of the cost of an article. Equal mileage rates would inevitably prevent much long-distance traffic from passing at all. In Germany, where such rates exist, the difficulty is met by establishing a very large number of exceptional rates. Even with a system of tapering rates, such as we have in this country, many

• <sup>1</sup> An example of such a rate is quoted below on p. 205.

special rates are quoted to encourage long-distance traffic.

Whereas equal mileage rates penalise long-distance traffic, and the system of tapering rates seeks to adjust rates between long and short-distance traffic on what appears to be a fair and at the same time workable basis, the zone system of rates deliberately aims at favouring long-distance traffic; though, where two or more zones exist, it does so in a very erratic manner, the further part of each zone being favoured as compared with the nearer parts of the same zone and the nearer parts of the next zone. For example, the rates for conveying a parcel of 24 lbs. by passenger train between stations in England are 6d. for a distance of 1 to 30 miles, 1s. for a distance of 31 to 50 miles, 1s. 6d. for a distance of 51 to 100 miles, and 2s. for a distance exceeding 100 miles. This scale favours a distance of 30 miles, as compared with shorter distances, the charge being 6d. whether the parcel is carried 10 miles or 30 miles, but it also favours 30 as compared with 31 miles, as the charge for the latter is 1s. In a similar manner distances of 50 and 100 miles, which happen to be the upper limits of two zones, are placed at an advantage as compared with the immediately shorter and immediately longer distances.

The chief point in favour of the zoné system is its simplicity; it cannot under ordinary circumstances claim to be a very fair arrangement, though

it may be expedient. In the case, however, where the charge made under the system includes the cost of services performed at both ends as well as the actual cost of conveyance, and the latter is very small as compared with the former, the system of a single zone may prove not merely simpler, but more equitable than any other that can be devised. This is probably the case where letters are conveyed between any points in a large area at a uniform rate.

*The charge for services other than conveyance.* So far we have considered the rates as for conveyance only ; in practice the rate quoted by a railway company in respect of any shipment generally includes certain charges on account of services other than conveyance, e.g. station terminals, service terminals and collection and delivery. With regard to the first two, maximum charges have been fixed by Parliament as follows :

**MAXIMUM STATION AND SERVICE TERMINALS.**

In respect of merchandise comprised in the under- mentioned classes.	Station terminals at each end.	Service terminals.			
		Loading.	Unloading.	Covering.	Un- covering.
	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. d.	Per ton. d.
A	0 3	..	..	..	..
B	0 6	..	..	..	..
C	1 0	0 3	0 3	1	1
1	1 6	0 5	0 5	1-5	1-5
2	1 6	0 8	0 8	2	2
3	1 6	1 0	1 0	2	2
4	1 6	1 4	1 4	3	3
5	1 6	1 8	1 8	4	4

It will be noticed that there are no service terminals in respect of articles in classes A and B, as traders do their own loading and unloading, covering and uncovering. Whilst the cost of performing the service appears to be the chief consideration influencing station terminals, ability to pay appears to be an important factor in fixing the charges for loading and unloading, although in the lower classes, at least, the cost of performing the service is taken into account, as goods in class C and class 1 can probably be handled much more quickly than most goods in the higher numbered classes. In what concerns covering and uncovering, at first sight ability to pay might appear to be the chief consideration, but it is doubtful if this really is so. It must be remembered that much better loads can be secured in the lower than in the higher classes, and consequently, that the charge per truck is much more alike in the different classes than the charge per ton suggests; a truck with class C goods may easily be loaded with 5 tons and be charged 5d. for covering, whereas it will often be difficult to obtain a load of more than 1 ton per truck of class 5 goods, for covering which the charge will be only 4d.

It will further be noticed that the terminals are definitely fixed and are independent of distance. This is doubtless quite reasonable, as the cost of performing the services charged for will remain the same whether the goods are hauled for long or short,

distances. Nevertheless, fixed terminals will have the effect of making an inclusive rate for a short journey very high, thus discouraging short-distance traffic, a particularly serious matter in these days of motor lorries. In Prussia, the ability of traders to pay is taken into account, and the terminals vary to some extent with distance; *e.g.* in the case of wagon-load classes I., II. and III., the terminals are 60 pf. per ton for distances from 1 to 50 kilom.; 90 pf. per ton for distances from 51 to 100 kilom.; and 120 pf. per ton for distances exceeding 100 kilom.

In what concerns collection and delivery, a charge for these services is nearly always made in the case of articles in the numbered classes. The rates quoted by the railway companies in these cases include a charge for collection and delivery, which, according to statute, must be reasonable. If he so desires, a trader can ascertain what this charge amounts to, as he is entitled to know how a rate is made up. Where a trader prefers to cart his own goods, he secures a cartage rebate from the company concerned, though very likely the rebate allowed will not be equal to the amount included in the rate for cartage. If it were, the majority of traders with their places of business close to the goods station would probably prefer to do their own carting, and the railway companies would be left with all the long-distance carting to do. This would very likely

make the carting unremunerative and necessitate raising the charges. As a consequence, still more traders would do their own carting; the present uniform charge for cartage within the specified collection and delivery area would become almost impossible; and what is practically a zone system of charging would have to be given up in favour of a much less simple system based more directly on distance. In the case of articles in the lettered classes, traders must make their own arrangements for cartage.

On the Continent the work of collection and delivery is not generally undertaken by the railways, but by private firms of "spéditeurs." The spéditeurs really perform two separate functions: (1) they act as carters, and (2) they act as forwarding agents. The rates quoted by the railways are station to station rates; traders can do their own carting, or can employ a particular spéditeur to do it for them, or can request the railways to arrange for the collection and delivery of goods, in which case the work is generally entrusted to a spéditeur who is officially appointed by the railway. In each town the spéditeurs combine to fix a scale of charges, so that the only competition is in the promptness with which the work is done.

In their capacity as forwarding agents, spéditeurs play a most important part in the organisation of continental railway undertakings. Owing to the

existence of many complicated tariffs, it frequently requires an expert to ascertain the best and cheapest way of dispatching particular goods between any two points, and most traders, in a country like Germany, leave it to the spediteurs to make all arrangements for forwarding traffic. The detailed work of dealing with large numbers of small consignments is performed by the spediteurs, who, wherever possible, make up the individual shipments into five- or ten-ton lots, so as to avail themselves of the reduced rates quoted in favour of wagon-loads. Whilst this must tend to cause delay in the dispatch of goods, it may enable the spediteurs to quote lower terms to their customers, and it is undoubtedly advantageous to the railways as facilitating economical operation.

## CHAPTER XVIII.

### RATES BELOW THE MAXIMUM POWERS

WE may now pass to the third step in the process of rate making, viz. the modification, for various reasons, of rates based directly upon the various maximum charges permitted by statute. Three different arrangements can be distinguished. (1) In some cases, the modifications are quite general in their character, and apply to specified traffic between any points, provided the conditions laid down are complied with. (2) In other cases, rates below maximum powers are quoted on all traffic between particular stations. (3) Very frequently, specified traffic between particular stations is carried at exceptional or special rates, provided certain conditions are complied with.

*Owner's risk rates.* An example of a general modification of rates is that made in favour of traders who sign a special contract relieving railway companies of their ordinary liability as carriers, except upon proof of wilful misconduct on the part of the company, or in serious cases of non-delivery, pilferage, or



misdelivery. There are various articles which railway companies are prepared to carry at owner's risk rates at a 10, 15, or 20 per cent. reduction in the corresponding class rates. These articles are designated by the letters *x*, *y*, *z*, and in classes 1 to 5 of the general railway classification of goods there are 358 of these articles. No special conditions as regards quantity or regularity are attached to owner's risk rates in the case of these articles ; nevertheless, the reductions allowed are frequently greater than can be explained by the difference in the risks taken by railway companies under the two scales of rates.<sup>1</sup> This suggests that some other considerations as well as risk are taken into account. One such consideration is regularity of shipment. A trader who sends goods only occasionally cannot afford to become his own insurer against loss or damage in transit, any more than a person who owns one or two houses can afford to act as his own insurer against fire. In both cases, the risks would not be sufficiently spread to form a reasonable basis for a scheme of insurance ; in other words, it would amount to placing too many eggs in one basket. Consequently, it is really only traders with regular traffic who can afford to avail themselves of owner's risk rates, and these rates, to some extent, favour traders with regular traffic.

<sup>1</sup> In the case of parcels by passenger train, the owner's risk rates are in some cases as much as 50 per cent. below the ordinary rates, although no special conditions of any kind are attached.

Some exceptional or special rates are quoted at owner's risk ; but in these cases other conditions are nearly always attached concerning such things as quantity, packing and regularity of traffic. Under these circumstances, the owner's risk rates may be as much as 30 or 40 per cent. below the class rates.

*Reduced rates on all traffic between particular stations.*

Where rates below maximum powers are quoted by a railway company on all traffic between particular stations, or, in other words, where class rates are not built up to the extreme limit of the full maximum powers, there are two possible explanations. In the first place, a large number of class rates are somewhat below the maximum charges for no very definite reason. In some cases, the fact that exceptional rates were in operation between particular stations before class rates were put into operation between these stations, exercises an influence in keeping class rates below maximum powers, and when once this happens there is a tendency for class rates for adjacent stations, which may be arranged afterwards, to be also below full powers. In other cases, a company may consider that by fixing class rates below the maxima, the charges will be better adjusted to what the traffic can bear.

In the second place, a large number of class rates are below, and often very considerably below, maximum powers on account of railway competition ;

another company possesses a shorter route and its charges govern the rates on the line with the longer route. There are many cases of this kind in Great Britain; *e.g.* the distance between Leeds and Bradford is 9 miles by the Great Northern and 15 miles by the Midland Railway; the distance between Oxford and Birmingham is 68 miles by the Great Western and 97 miles by the London and North-Western Railway; the distance between Sheffield and Lincoln is 43 miles by the Great Central and 64 miles by the Midland Railway. For the company with the longer route to charge class rates based on distance would prevent their securing any of the traffic; if they wish to share in it they must fix their rates at the same level as the company with the shorter route. It will pay them to do so, provided (1) that it does not prevent the conveyance of more remunerative traffic, but merely helps to utilise the undertaking more fully, and (2) that the rates obtained more than cover the special or out-of-pocket expenses of carrying the traffic.

*Exceptional or special rates.* There are various reasons why specified traffic may be carried between particular stations at exceptional or special rates. These rates are explained partly by conditions of supply and partly by conditions of demand. Amongst the former are such considerations as the regularity of the traffic, the quantities in which it is consigned, the ease with which the commodity

can be handled, and whether or not its weight and bulk allow of good wagon-loads being secured, the last two considerations being in some cases a question of packing. The chief cases of home produce moving in large volume in this country are in the mineral classes ; a great deal of the coal traffic, for example, is carried at special rates. Other cases in which traffic moves in considerable volume are very numerous ; *e.g.* according to the season of the year, fish is carried in very large quantities from Grimsby, Yarmouth, or Penzance to London, and in the spring long trains conveying nothing but cauliflowers run between Cornwall and London. In respect of this fish and these cauliflowers, exceptional rates are granted, but it is very doubtful if these are accounted for entirely by the volume and regularity of the traffic ; conditions of demand are also taken into consideration.

With regard to conditions of demand, in some cases exceptional or special rates are quoted with a view to developing and encouraging traffic, but it is competition, in some form or other, which lies at the back of most special rates. It may be competition of different districts or different ports to serve a common market or a particular industrial centre ; it may be the competition of other means of conveyance, especially water transit ; it may be the competition of railways in other countries ; it may be the competition of home and foreign producers

in the home markets or in foreign markets. Wherever competition exists, a restriction will probably be imposed on a trader's willingness to pay for conveyance, and concessions in the matter of rates will have to be granted if a reasonable share of more or less competitive traffic is to be secured. Illustrations of some exceptional or special rates which can be attributed, partially at least, to competition, have been given previously, when the character of the competition with which railway companies have to contend was discussed ;<sup>1</sup> when different coalfields supplying the London market are placed more or less on an equality, it is by means of special rates ; when competing producers in a district, or competing ports, are grouped and distance is ignored in fixing charges, we have more cases of exceptional rates.

For some purposes, we can obtain better examples of special rates in Prussia than in this country, as the element of international competition has to be taken into account there, as well as other forms of competition. In the case of German traffic for shipment abroad, the Dutch port of Rotterdam and the Belgian port of Antwerp often compete with Bremen and Hamburg, and the Prussian Railway Administration seeks to secure as much of the traffic as possible for the German ports and for conveyance over its own lines, by granting special rates ; as an

<sup>1</sup> See page 151, above.

example of these, the local and export rates <sup>1</sup> on steel forgings from Düsseldorf to certain ports may be quoted : <sup>2</sup>

	Distance.	Local rate.	Export rate.
	Kilom.	Marks per ton.	Marks per ton.
Hamburg, . . .	386	9.70	5.40
Rotterdam, . . .	220	6.10	5.90
Antwerp, . . .	194	7.20	5.20

The effects of competition with foreign means of transit are perhaps best seen in the rates which are quoted in respect of traffic which merely passes through German territory on the way between its points of origin and destination ; *e.g.* Russian grain, from the frontier to Königsberg for export, is charged 2.5 pf. per ton per kilom. for conveyance, as compared with 4 pf. for local grain between the same points. But for the special rate, the export traffic would pass over Russian lines via Riga, Reval, or Libau. Again, a special tariff is granted for grain traffic from Hungary to England ; the export rate from the frontier to Hamburg is M.353 per wagon load of 10 tons as compared with a local rate between

<sup>1</sup> The local rate applies when the goods are sent to the port for use there, the export rate when the goods are sent to the port for shipment abroad.

<sup>2</sup> These figures, as well as others which relate to Germany, are taken from the " Report on Railways in Germany " contained in the *Report of the Board of Trade Railway Conference*.

the same points of M.468. It is the competition of other routes, such as via Fiume and Gibraltar, which causes this special rate to be fixed.

So far, the expression "export rate" has been used to denote a special rate arising out of the competition of ports, quoted in favour of traffic sent to a certain port for shipment, as contrasted with that sent for local consumption. In other cases, "export rates" are due to efforts to encourage sales of home produce in foreign countries. Such rates are common in Germany; *e.g.* when iron and steel for building, repairing or fitting out sea and river vessels are sent from German stations to German seaports for export by sea to other than European countries, the rate is 2.2 pf. per ton per kilom., the local rate being 4.5 pf.; in respect of dynamo cases from Upper Silesian and Rhenish Westphalian stations to South German frontier stations, for export to Switzerland and France, the rate is 1.7 pf. per ton per kilom., as compared with a local rate of 3.5 pf.

Corresponding to export rates, there are import rates, established with the object of assisting home industries by providing cheap conveyance of raw materials, or with the object of encouraging particular ports and railways; *e.g.* for minerals and petroleum from certain German harbours on the North Sea and the Baltic to South-West Germany, Bavaria, Switzerland, Austria and Hungary, special rates varying from 4 to 2.2 pf. per ton per kilom.

are quoted as compared with the ordinary rate of 6 pf. These particular import rates are largely accounted for by the competition of Dutch, Belgian and French ports, and by the water competition of the Rhine and the Elbe.

From seaports in this country to other ports and to inland centres, exceptional rates are frequently quoted in respect of certain commodities which are imported at those seaports; the special rates, however, generally apply regardless of the origin of the commodities, provided the consignments comply with the stipulated conditions, *e.g.* regarding weight of load. The fact that the volume of traffic is very considerable is doubtless one strong reason for establishing the special rates, but another consideration is often water competition. There are, for example, special rates to London for meat from Liverpool, for bacon, meat and wool from Southampton, for fruit and vegetables from Folkestone, for bacon and dairy produce from Harwich. In all these cases, the produce would be liable to be sent direct to London by water if reduced rates were not quoted.

That the importance of special rates cannot easily be exaggerated, will be realised when it is mentioned that in this country and in Prussia some two-thirds or more of all the goods and mineral traffic is probably carried at special rates, whilst in the United States the proportion of the total traffic



carried at commodity (*i.e.* special) rates is estimated to exceed 75 per cent.

*Exceptional or special rates and undue preference.* In those countries where railways have been nationalised, special rates are frequently fixed with a view to supporting the tariff policy of the State concerned ; thus amongst the objects of special rates in Prussia we find (*a*) the advancement of industry and agriculture by granting facilities for the supply of raw materials, and (*b*) the assisting of home products to obtain markets in competition with foreign rivals by granting facilities for export. In those countries where railways are privately owned, special rates are established on purely business grounds, and it may happen that the interests of a railway company clash with those of the State, as embodied in its tariff policy ; *e.g.* in the United States it is claimed that the discriminations in favour of import traffic tend to neutralise the protective tariff by giving the foreigner distinctly lower rates than the home producer.<sup>1</sup>

In this country the railways are frequently accused of giving undue preference to foreign produce, the complaints generally being made by people interested in agriculture. As previously mentioned, where exceptional rates in respect of particular traffic are granted from seaports, there is frequently no

<sup>1</sup> Cf. Clark, *Standards of reasonableness in local freight discriminations*, p. 93, *et seq.*

condition restricting the special rates to imported commodities, so that the distinction between the rates at which home and foreign produce are often carried is not that between local rates and import rates, but that between local rates and special rates accorded to all traffic dispatched in the stipulated quantity and manner. If home produce is actually conveyed at higher rates than foreign produce, it is because home consignors fail to comply with the conditions on which the special rates are granted. These conditions are not fixed arbitrarily, or with a view to facilitating the conveyance of foreign as compared with home produce, but in order to differentiate between traffic which is less costly to deal with and traffic which is more costly to deal with. It so happens that the foreigners pay great attention to packing, thereby facilitating handling and enabling good wagon-loads to be obtained, and also dispatch their products regularly and in large consignments, all of which considerations favour economical operation of the traffic. English farmers, generally speaking, neglect these considerations, and have consequently to pay higher rates; by adopting a system of co-operation, they might secure the same favourable terms for their consignments as are enjoyed by foreign producers.

*The charging of higher rates for short than for long hauls over the same line.* Where rates below maximum powers are quoted for competitive reasons

in respect of traffic between two stations A and C, a difficulty not infrequently arises about the treatment of intermediate stations. The class rate between A and an intermediate station B may be greater than the reduced rate between A and C, although the traffic is actually carried through B on the journey from A to C; in other words, the rate for a short distance, included in a long distance, may be higher than for the long distance. Is such an arrangement fair, and if so, is it desirable? With regard to fairness, we are concerned here with differential charges based upon the willingness and ability of traders to pay under varying circumstances. If one company quotes a trader a rate of 15s. per ton for traffic between A and C, he will be unwilling to pay more to another company, quite apart from what he is able to pay; on the other hand, he will be willing to pay the company a rate of 20s. for the [shorter] distance A to B, if he can afford it, and if no competing company offers him better terms. If once the justice and necessity of a system of differential charging on railways is admitted, there does not appear to be anything unreasonable in charging more for a short than for a long haul over the same line, provided more remunerative rates for the long haul cannot be obtained. The policy of charging more for a short haul than for a long haul is frequently adopted in this country, and one or two cases may be indicated by way of illustration.

The rates by the Midland Railway between Peterborough and Cambridge are lower than the rates between Peterborough and Kimbolton, although the Midland traffic from Peterborough to Cambridge actually passes through Kimbolton, the explanation being that the Peterborough-Cambridge rates are based on the distance on the Great Eastern Railway. The rates from London to Hitchin on the Midland Railway are lower than the rates from London to Bedford, although the traffic by the Midland Railway actually passes through Bedford to reach Hitchin. In this case, it is the distance on the Great Northern Railway which governs the London-Hitchin rates.

The policy of charging more for a short haul than for a long haul over the same line is also adopted on certain State railway systems where there is a desire to depart as little as possible from the standard scales of rates ; it is the long haul alone which is affected by competition, and it is the long haul alone which is favoured by reduced rates. Where railways are privately owned, the adoption of this policy, with its extreme disregard of distance in fixing rates, is often disapproved of by the general public and sometimes by the State. In the United States, for example, the adoption of the policy is restricted, to a considerable extent at least, by law.

## CHAPTER XIX.

### PASSENGER FARES

*Differences between passenger and goods traffic.* The problem of dealing with passenger traffic is very different from that of dealing with goods and mineral traffic. Many of the services performed in respect of the latter traffic, *e.g.* loading and unloading, covering and uncovering, collection and delivery, have not to be performed in respect of the former traffic. On the other hand, a compulsory system of classification is hardly possible in the case of passengers; where the element of compulsion is introduced, it is generally done in fixing fares: certain tickets are available only to people complying with certain conditions; *e.g.* workpeople, defined very often as people making an outward journey before a specified hour in the morning and a return journey after a specified hour in the afternoon, can secure tickets to travel third class at reduced fares; a trader can purchase a trader's season ticket, for first or third class, in respect of each £300 of freight that he can influence in favour of a particular

company; it is not necessary that he should pay the freight charges himself; it is sufficient if he causes the traffic to be forwarded over a company's lines.<sup>1</sup> A further distinction between passenger and goods traffic is that the former may be affected by social aims; the issue of cheap tickets to workmen and of season tickets at half price to school children, students and apprentices under eighteen years of age, must be explained, partially at least, on social grounds.

*Policies which may be adopted in classifying passengers and fixing fares.* In classifying passengers and in fixing fares there is more than one arrangement which a railway undertaking may adopt; e.g. it may have few classes but several fares applying to each, or it may have several classes, but only few fares applying to each. The former arrangement is that adopted in England; the latter is that adopted in Prussia. In England, nowadays, there are commonly only two classes, first and third; occasionally there are Pullman cars and second-class carriages. The distinction between first and third class is merely one of comfort; people can get to their destination just as quickly in the one class as in the other, with the slight exception of certain boat trains. In Prussia, there are practically five

<sup>1</sup> Under recent pooling agreements, it is sufficient if a trader influences £300 of traffic on the combined systems, to qualify for a ticket available on one or more of the systems.

classes based on comfort, three of which are subdivided into two sections on the basis of speed, so that there may be said to be eight classes : train de luxe, fast and slow first class, fast and slow second class, fast and slow third class, and fourth class. The difference between second and third class, and again between third and fourth class, in the matter of comfort, is very marked. Some trains carrying first, second and third class passengers make comparatively few stops, but technically they are not "fast," so that slow third-class passengers can travel fairly quickly ; on the other hand, those slow trains which carry fourth class generally stop at every station.

Where classification is quite voluntary—colour in some countries is a bar to the higher class or classes—a passenger in selecting his class will doubtless take into consideration (1) the means at his disposal, i.e. his ability to pay, (2) the degree of comfort he desires and (3) the time within which he wishes to complete his journey, if speed is one of the bases of classification or where fast trains carry no passengers of the lower class or classes.

*The ways in which distance may be taken into account in fixing fares.* In fixing fares, the first point to be considered is the manner in which distance is taken into account. In discussing goods and mineral traffic we distinguished between flat rates, zone systems of rates, and systems of tapering rates, and

in the case of passengers we can observe corresponding methods of treating distance. The first method is to make the fare vary directly with distance; *e.g.* the charge for an ordinary third-class ticket in this country is commonly 1d. per mile, based on the shortest route between the stations in question. The Prussian scale of fares by slow train is 7 pf. per kilom. first class, 4.5 pf. second class, 3 pf. third class, and 2 pf. fourth class. In addition, the Imperial ticket tax has to be paid, which varies from 5 pf. to 8 marks, according to the price of the ticket and the class, fourth class being exempt.

The second method is to divide distance into large units or zones. In the extreme case, the whole of a particular transit system is treated as one zone and a uniform fare is charged, regardless of the distance. This, for example, is the case on the underground and overhead electric railways in New York, where the price of a ticket, available for a journey of any distance, is 5 cents. As an illustration of the more usual type of zone system, the Austrian State Lines may be quoted, where distances are divided into zones of 10 kilometers. On the Hungarian State Railways there are three short-distance and sixteen long-distance zones, the zones tending to increase in size with the increase in distance; all distances exceeding 400 kilometers fall in the last zone. In this country the zone system has been adopted by the Midland Railway Company and the Great Central



Railway Company in connection with weekly tickets in the neighbourhood of certain large urban areas.

The third method is to charge a rate per mile or per kilometre, which diminishes as the distance increases. The charges on the Austrian State Lines are of this character :

**PASSENGER TARIFF ON THE AUSTRIAN STATE LINES.**

Distance.	Slow passenger fares per 10 kiloms.		
	I. class.	II. class.	III. class.
First 15 zones (1-150 km.), -	Hellers. <sup>1</sup> 84	Hellers. 50·4	Hellers. 28·0
Next 15 zones (151-300 km.),	81·76	48·16	25·76
Next 30 zones (301-600 km.),	78·4	44·8	22·4
Remaining zones (over 600 km.),	73·92	40·32	17·92

The scale of charges for trader's season tickets in this country tends to diminish per mile as the distance increases. The annual charge per mile for a first-class trader's season ticket on one English railway works out as follows for different distances :

Distance.	Charge per mile.
Miles.	s.
30	9·53
50	7·92
100	6·71
150	6·09
200	5·50
250	4·84
300	4·40

<sup>1</sup>The heller has the same value as a centime, i.e. 10 h. = 1d.

In some cases, fares are not determined on any one system, but are a combination of two ; e.g. fares for the fast first, second, and third classes in Prussia are obtained by adding a supplementary charge, fixed on the zone system, to the corresponding slow fare established on the flat-rate system. The supplementary charges are as follows :

Distance.	First and second class.	Third class.
Kilometres.	Pfennigs.	Pfennigs.
1-75	50	25
76-150	100	50
Over 150	200	100

The charge for train de luxe is fast first-class fare augmented by 20 per cent.

*Cost of providing the services as a determinant of fares.* After examining how the element of distance may be taken into account in fixing fares, there remains to be considered what determines the scale of charges for passengers. As in the case of the determination of rates, it is possible to distinguish two sets of conditions, those on the side of supply and those on the side of demand. That it is not possible to ascertain the exact cost of providing the whole of the passenger service, and still less the cost of providing any particular part of the passenger service, has been emphasised in Chapter XIV. ; a great deal of railway expenditure is general to all traffic ; a considerable amount is special to the passenger

traffic as a whole, though it is general as far as any particular service is concerned ; some is special to the running of a particular train, though it is probably general as far as any individual passenger is concerned. The total receipts from passenger traffic should not merely cover the whole of the expenses special to that traffic, but should yield a contribution towards the general expenses. As the division of general expenses amongst goods and mineral traffic, on the one hand, and passenger traffic, on the other, is a matter of expediency, and not of scientific principle, the absolute cost of providing the whole of the passenger service is, at best, a very uncertain basis on which to establish the general level of fares. Nevertheless, it is possible to note some considerations appertaining to the cost of the service which tend to influence the general level of fares, *e.g.* whether or not passengers are allowed a certain weight of luggage free, and if so, how much ; whether or not a high standard of comfort and convenience is maintained. Where this is the case, it may be due to the exacting requirements of a wealthy community, and under these circumstances the high level of fares should be attributed primarily to ability to pay and only secondarily to the comfort and convenience provided. Considerations such as these are of particular importance when international comparisons of fares are being made.

In fixing the ordinary fares of different classes,

and in deciding what modifications of ordinary fares are to be made in any one class, the question of the cost of providing the different services is an important factor, though, of course, as in all cases of price determination, conditions on the side of demand, as well as those on the side of supply, have to be taken into account. For purposes of analysis, however, it is simpler to consider, as far as possible, each set of conditions separately, and that is the arrangement adopted here. In establishing the ratio of ordinary fares in the different classes, the cost of providing accommodation in such classes as exist must be borne in mind. In this country, for example, it is not merely the greater expense of building, upholstering and equipping first-class as compared with third-class carriages which has to be considered, but also the fact that fewer first-class than third class compartments are placed in a carriage of a given length, and, further, that a first-class compartment holds fewer passengers than a third-class compartment. The provision of accommodation in the case of a first-class passenger involves not only more capital charges than in the case of a third-class passenger, but also more operating expenses, as a far greater dead weight has to be hauled in respect of a first- than in respect of a third-class passenger. On the ground of the cost of providing the service, a considerable difference between ordinary first-class and third-class fares would be expected, though in

practice, owing to conditions on the side of demand, it may not actually be very considerable.

As regards the fares for any one class, there are various ways in which the cost of providing a service under different circumstances may influence the price of tickets. The better the load that can be obtained for each carriage and each train, and the less the time during which existing rolling stock is standing idle, and the more fully the line and the stations can be utilised—the lower the cost of conveying passengers. If passengers travel regularly, or in considerable numbers at the same time, the cost of dealing with the traffic should be favourably affected, and consequently these considerations may be taken into account in fixing fares. Where a season ticket is purchased and used with moderate frequency, the cost of a journey is less than with an ordinary ticket, and very often a six months' season ticket is comparatively cheaper than a three months' ticket, and a twelve months' ticket than a six months' ticket.<sup>1</sup> Season tickets represent a reduction in charges on account of the regularity of the traffic. Similarly, in the United States, commutation tickets are issued at reduced rates for a definite number of journeys between

<sup>1</sup> This implies that the twelve months' ticket is taken as the basis; sometimes a three months' ticket is taken as a basis, in which case a six months' ticket costs exactly twice, and a twelve months' ticket exactly four times as much as a three months' ticket. In Prussia season tickets appear to be all monthly.

stipulated places within a given period, *e.g.* fifty and sixty-trip monthly tickets and 180-trip quarterly tickets are issued. It must not be overlooked that in fixing the price of all season and commutation tickets, ability to pay is also an important factor. Many people who now travel several miles by rail every day to and from their work, could not afford to do so if they had to pay ordinary fares or anything approaching them.

A case of the quantity of the traffic clearly influencing the fares is that in which cheap return tickets are issued to pleasure parties, at one rate, if the party consists of not less than six first or ten third-class passengers, and at a lower rate, if it consists of not less than fifty first or one hundred third-class passengers. Another illustration of the influence of the quantity of the traffic on the charge is seen in the reduction in the price of season tickets when two or more members of the same family residing in the same house take tickets between the same stations; *e.g.* in Prussia, under these circumstances, one season ticket is charged at the full rate, and all others at a rate reduced practically by half. A somewhat special case of family tickets is that in which a restriction is imposed on the time at which they may be used, with a view to securing a more equal utilisation of trains; *e.g.* the Metropolitan Railway Company issues special "limited" season tickets at reduced rates for ladies who are the wives

or daughters of season ticket-holders. These tickets have all the privileges of the ordinary season tickets except that on weekdays they are not available until after 10.30 a.m., when the business rush is over.

*Ability to pay as a determinant of fares.* Even where there is no question of the regularity or the quantity of the traffic, reduced fares may be quoted, subject to certain restrictions, with a view to securing better-filled trains. This is doubtless one ground on which a variety of excursion fares are granted, but it is conditions on the side of demand which probably exercise the predominant influence in the fixing of these fares. Where there are but two classes, and the ordinary fare in the lower class is comparatively high, a very large number of people who might otherwise travel for pleasure, and, to some extent, for business, will be prevented from doing so, because the fares are more than they are able or willing to pay. On the one hand, people with small incomes are not in a position to spend much on railway tickets; and, on the other hand, travelling for pleasure is only one of many uses to which an excess of income above that required to meet more or less necessary expenditure can be put. In what concerns pleasure traffic, railways are subject to the indirect competition of other purchases which afford enjoyment; e.g. visits to football matches, picture palaces and theatres, as well as to the competition of other means of transit, such as steamers,

motor cars, motor cycles and bicycles. The primary object of excursion fares is to induce people, who would otherwise not do so, to travel by rail, and to encourage such as would travel a little, to travel more. There are many varieties of cheap tickets in this country. Long-date and short-date week-end tickets to pleasure resorts, and Saturday to Monday tickets between practically all stations are generally issued at any season, and are available by any train. Where half and whole day excursion fares are granted on certain days each week between particular stations, restrictions are generally imposed in the matter of trains, in any case on the outward journey. More limitations in the choice of trains are often imposed when excursion tickets are available for two or more days.

Where a great variety of excursion fares is granted, there is a considerable likelihood of discouraging traffic at ordinary fares. Excursion ticket-holders can travel with comforts and facilities little, if at all, inferior to those enjoyed by passengers paying full fares, and such restrictions as exist in the matter of trains available, often occasion no real inconvenience to the excursionists. It is probable that in this country a very large amount of passenger traffic is carried at reduced fares, which, but for cheap tickets, would pay full fares. In practice, an elaborate system of excursion fares is not only a means of inducing certain people to travel, who



would otherwise have stayed at home, but it is an indirect method of reducing the general level of charges. In this country, a penny a mile may be taken as the standard fare for third-class passengers, but the average fare must be considerably lower, probably not more than a halfpenny a mile.<sup>1</sup> In Prussia, excursion tickets are almost unknown—a very limited number of special excursion trains are run to seaside and mountain resorts at holiday times, and cheap second-class and third-class return tickets are issued in certain districts on Sundays for short-distance journeys. People whose means are small travel fourth class, even for distances of very considerable length, although the standard of comfort and speed is very low. About one-third of all the passengers conveyed on the Prussian railways travel fourth class.

In concluding our discussion of the subject of fares, we may note that the Prussian system of several classes, with very marked differences in comfort between the lower and the higher classes, and but few kinds of tickets available for each class, is much more successful in making people pay according to their ability than the English system of practically two classes, both with a high standard of comfort and many scales of fares. Where a well-to-do person in this country would probably

<sup>1</sup> Cf. W. M. Acworth, *Economic Journal*, December, 1912, p. 589.

not hesitate to avail himself of a reduced third-class fare, say, a week-end or half-day ticket, if such were available, a similarly situated person in Prussia would be very unlikely to submit to the real discomforts of travelling fourth class in order to travel cheaply. Again, in what concerns second and third class in Prussia, the fact that the second-class carriages have comfortably upholstered seats, whereas the third-class carriages have only wooden seats, is likely to induce the majority of people who can afford to travel second class, to take second-class tickets; in this country, very many who could afford to travel first class are quite content to travel third class. It is noteworthy that in the United Kingdom only some 4 per cent. of the total number of passengers travel first and second class, as compared with some 24 per cent. in Prussia, although the proportion of well-to-do people is probably far greater here than in Germany.

## CHAPTER XX.

### STATE REGULATION OF RATES AND FARES

IN several chapters in which the determination of rates and fares has been discussed, reference has been made incidentally to certain maximum charges fixed by statute. The fact that railways are subject to some direct and a very considerable amount of indirect competition, and further, that it is in the interest of railway companies to develop and encourage traffic by making their charges moderate, might appear to provide the general public with a sufficient safeguard against being overcharged. This attitude towards rates and fares, however, has certainly never been adopted by the Government of this country. The earliest Acts authorising the construction of railways provided maximum tolls which might be charged for the use of the railways,<sup>1</sup> and Acts of a somewhat later

<sup>1</sup> The policy of fixing schedules of tolls or tonnage rates had been adopted in the case of canals, and it was only natural that when a new method of transit was established, maximum tolls should be laid down in the Acts authorising the construction of the railways.

date provided maximum charges for the carriage of traffic by railway companies,<sup>1</sup> it presumably being considered inexpedient to grant more or less monopolistic powers to private undertakings to conduct services of great public utility, unless some restrictions in the matter of charges were imposed.

*State regulation of fares.* Apart from the Acts of the various companies prescribing maximum fares, there is comparatively little legislation concerning the charges which may be made for the conveyance of passengers. The Railway Regulation Act, 1844, required that at least one train a day in each direction over every line should carry third-class passengers at 1d. per mile, whilst the Cheap Trains Act, 1883, encouraged the reduction of fares by abolishing passenger duty on fares not exceeding 1d. a mile. The same Act requires trains to be provided for workmen at fares which appear reasonable to the Board of Trade. In practice, the fares charged are commonly much below the statutory maxima.

*State regulation of rates.* In what concerns the

<sup>1</sup> The original idea was that railway companies would provide merely the road and receive tolls for the use of it, as canal companies did for the use of their waterways. Private firms would act as carriers, providing motive power and vehicles. When railway companies realised the desirability of becoming carriers over their own roads, and they were authorised to do so by Parliament, maximum rates for the carriage of goods, as well as tolls for the use of the road, were imposed.

Government regulation of rates, a much more elaborate system than that originally imposed has gradually been established. It may be said to fall into three divisions : (1) the fixing of maximum charges by statute ; (2) the enactment of other provisions concerning rates ; and (3) the setting up of special authorities to deal with complaints about rates. The maximum rates and charges now in force are those imposed by the Railway Rates and Charges Order Confirmation Acts, 1891 and 1892. Under the different parts of these Acts, maximum station and service terminals,<sup>1</sup> and maximum charges for conveyance are laid down in respect of all goods and minerals <sup>2</sup>—if unenumerated, class 3 rates apply—animals and carriages, with the exception of especially bulky and heavy articles, wild beasts, dangerous goods, specie, bullion and precious stones, which are placed in the exceptional class, in respect of which a company may charge such reasonable sum as it may think fit in each case. In respect of certain services also, *e.g.* the collection and delivery of merchandise, no maximum charges are fixed by statute, and a company may charge a reasonable sum.

Amongst the statutory provisions concerning rates, other than those fixing maximum charges, two may be mentioned. One provision requires that a railway company shall give no undue preference to any particular person or any particular kind of

<sup>1</sup> See page 206, above.

<sup>2</sup> See page 202, above.

traffic (Railway and Canal Traffic Act, 1854, sec. 2), and that where any question of an undue preference arises, the burden of proving that some reduced charge does not amount to an undue preference shall lie on the railway company (Railway and Canal Traffic Act, 1888, sec. 27). Another provision requires that where any railway company raises any rate or charge, and complaint is made that the rate or charge is unreasonable, it shall lie on the company to prove that the increase is reasonable, and for this purpose it is not sufficient to show that the rate or charge is within the statutory maximum (Railway and Canal Traffic Act, 1894, sec. 1). By a recent Act<sup>1</sup> an increase in the cost of labour due to improvement of conditions for the staff is a valid justification for a reasonable increase of charges within the legal maxima, if challenged under the Act of 1894.

With regard to the special authorities for dealing with complaints about rates or charges, disputes may, in some cases, be settled by an arbitrator appointed by the Board of Trade, *e.g.* disputes about charges for collection and delivery, for detention of trucks, or for private sidings. In other cases, when a trader is of opinion that he is being charged an unfair or unreasonable rate for conveyance, he can complain to the Board of Trade. The Board, if they think that there is in such a case a

<sup>1</sup> Railway and Canal Traffic Act, 1913, sec. 1.

reasonable ground for complaint, may call upon the railway company for an explanation, and endeavour to settle amicably the differences between the complainant and the railway company. During the ten years 1902-1911, the Board of Trade dealt with 1,123 complaints relating to rates unreasonable or excessive in themselves, undue preference, rates unreasonably increased, classification, delay in transit, liability, rebates and through rates. The Board succeeded in settling 388 of the cases more or less to the satisfaction of the complainants. In the case of disputes involving the legality of any rate or charge, it is the Railway and Canal Commissioners who exercise jurisdiction, though in respect of increases within the legal maxima, it is necessary that a complaint shall first be made to, and considered by, the Board of Trade.

*State regulation of rates and fares in the United States.* Brief reference may be made to Government regulation of rates and charges in another country in which the railways are privately owned, viz. the United States. The control is exercised partly by the forty-eight State Governments, and partly by the Federal Government. One of the former is responsible when the points of origin and destination of traffic are within its boundaries; the latter is responsible when interstate commerce is concerned. The State Governments generally adopt one or both of two policies. One policy is to fix

maximum charges by statute ; this is done more commonly in the case of passenger than in the case of goods and mineral traffic. The other policy is to establish a Railway Commission. Such a Commission may either have very considerable powers, in some cases to prescribe rates, and in others to revise existing rates, or it may have only very limited powers, in which case it can investigate rates, but cannot order them to be modified if it finds them excessive or unreasonable. The enforcement of the decisions of such a Commission is left to public opinion, but when that is not effective it is open to the law officers of the State to institute legal proceedings.

Federal regulation of railway charges is based upon the Interstate Commerce Act, 1887, and the subsequent amending Acts. The principles underlying the law are practically an elaboration of the provisions contained in section 2 of the English Railway and Canal Traffic Act, 1854, which provides that it is the duty of railway companies to make arrangements for receiving and forwarding traffic without unreasonable delay, and without partiality. In order to prevent the charging of unreasonable or excessive rates, and to do away with discriminations and undue preferences of all kinds, an Interstate Commerce Commission was set up by the Act. From the first it had large powers of investigation, but according to the interpretation placed upon the Act by the



Courts, it had no power to prescribe rates or fix any tariff. The position, however, has been altered by recent legislation ; by the Hepburn Act of 1906, the Commission has been given power to revise specific rates after an investigation made upon the complaint of an interested trader or public body, and by the Federal Railway Rate Act, 1910, the Commission is authorised to investigate and revise rates on its own initiative.

*Recent tendencies in State regulation.* Both in the United Kingdom and in the United States there has been a marked tendency of recent years to extend Government control over railways. We have seen how, in this country, after Parliament had revised, and, as a matter of fact, in numerous cases reduced, the maximum charges in 1891 and 1892, an Act was passed two years later which places serious difficulties in the way of a railway company raising its charges within its maxima. Two points call for notice in connection with the recent State intervention in the matter of rates. In what concerns the Railway and Canal Traffic Act, 1894, the result has undoubtedly been to make a company very reluctant to reduce a rate experimentally, as it might be impossible to raise it again if it proved unremunerative ; in other words, the Act has tended to prevent rates from being easily adjusted to meet new conditions. In what concerns the decisions of the Railway and Canal Commissioners in the matter of rates, the

Commission seek to ascertain the cost of performing the service, the charge for which is in dispute, and tend to base their decisions largely, if not entirely, upon such cost.<sup>1</sup> When it is remembered that it is practically impossible to ascertain with anything approaching accuracy the cost of providing any particular service, and further, that rates are determined by the conditions on the side of demand, as well as by the conditions on the side of supply, and that very often ability to pay is the predominant influence in determining any particular rate, it will be realised that the results achieved by the method adopted by the Commissioners may easily prove to be unsatisfactory. It could hardly be otherwise, if rates are to be established according to one set of principles and revised according to another.

The control exercised by Government over railways is by no means limited to charges ; the sphere of State supervision has been growing in other directions. The requirements in the matter of construction and equipment have increased from time to time, and there is a danger that costly improvements may be insisted upon which add little or

<sup>1</sup> Attention has been drawn above to the situation in the United States and to the large powers of revising and prescribing rates which have been obtained during the last few years by the Interstate Commerce Commission. It is interesting to note that this Commission has shown a considerable partiality of late for cost of service as a measure of reasonableness in the matter of rates.

nothing to the safety of the railways. Further, as regards labour conditions, the power of fixing wages and hours has, to a considerable extent, been taken out of the hands of the companies as a result of the conciliation schemes, which were introduced, more or less at the suggestion of the Government, in 1907 and 1911. The final settlement of questions of hours and wages rests with the independent chairmen, who may have little or no knowledge of the railway industry.

At the present time, the proprietors of the railway companies find themselves being gradually deprived of the power of conducting their undertakings on business lines. They have to bear the whole of the risks, yet new conditions, involving considerable increases of capital and working expenses, may be imposed on them from outside. That the State should exercise control over privately owned railway undertakings is most desirable, but a position in which the State assumes no financial responsibility of any kind, whilst imposing from time to time new conditions, which restrict the powers of the managements and affect the profits prejudicially, may easily become unfair. It may happen that the State will insist upon companies doing things which it would not do itself if it owned and managed the railways, just as a local authority when negotiating with a tramway company tends to be far more exacting in the matter of costly street

widening schemes than a municipality dealing with its own tramway department.

It seems very doubtful if the system of State control can continue to develop along the present lines. New burdens imposed in recent years have been met by economies in operation and by savings arising from a reduction of wasteful competition, but there are limits to the economies to be effected in both these directions. Sooner or later, one of two things will presumably happen. On the one hand, a modified system of Government control may be devised, such as will not check the initiative and enterprise of railway companies, nor impose unreasonable burdens upon them, but at the same time will afford adequate protection to the general public against exorbitant charges and inefficient service. On the other hand, the State may take over the railways, so that the whole responsibility for the management of the railways will rest with the State, and the problems discussed in this chapter will cease to exist.

## CHAPTER XXI.

### STATE OWNERSHIP AND MANAGEMENT OF RAILWAYS

*Reasons why the question of the nationalisation of the railways is coming to the fore in this country.* When the railway industry first began to develop in England, the country was already comparatively wealthy, as a result of its very considerable manufacturing and commercial activities; there was no lack either of capital seeking investment, or of enterprising business men ready and anxious to conduct new undertakings. If these facts are borne in mind, and if it is remembered that at this time the current of legislative opinion was that of individualism, it follows naturally that railways were constructed and operated as private concerns. Although the new railway industry received absolutely no assistance from the Government, in the form of guaranteed interest or otherwise, it was not allowed complete liberty. Every scheme had to be submitted to Parliament for approval and the Acts sanctioning the construction of the various railways

imposed certain restrictions. Other restrictions were gradually introduced by means of general legislation. At the same time, in conformity with the prevailing ideas, very considerable reliance was placed upon the efficacy of competition as a means of securing for the public an efficient railway service at reasonable charges. The railway industry was subjected to a dual system of control and competition.

With the fairly rapid elimination of competition in recent years,<sup>1</sup> a new situation has arisen. One of the two checks designed to protect the public, where their interests and those of the railway companies happened to clash, is disappearing, and many people feel doubtful, on the one hand, whether the extended system of control which is being established, is, or can be made, adequate, and on the other hand, whether it is, or can be, adapted to existing requirements. In this new situation we have one explanation of the growing interest which has been taken during recent years in the question of the State ownership and management of British railways.

Many people seem favourably disposed towards the idea of the nationalisation of the railways, though for very various reasons. Some who hold socialist views would welcome it as bringing about an important extension of the functions of the State. Many traders appear to believe that it would be the means of securing a considerable reduction in charges for

<sup>1</sup> See Chapter IX.

conveyance and subsidiary services, and that section of the community which travels by rail has visions of lower fares, the hopes of the traders and the travellers being based, to some extent at least, upon a somewhat superficial comparison of English and continental conditions. Some people see in it the possibility of realising a large surplus which would be available to relieve the burden of taxation or to prevent increases of taxation; other people look forward to the railways being used by the State to assist in carrying out social reforms, by certain services being performed at cost price or even at a loss. Those districts, and those sections of the community, which have not enjoyed the same ample services and facilities which are provided where railway competition is keen, trust that they would secure a more generous treatment from the State, quite apart from the question whether the desired services and facilities would prove remunerative or not. Many working-class people, and in particular members of the very numerous body of railway employees, anticipate that nationalisation would be accompanied by better working conditions, shorter hours and higher wages.

That all the different ideals of the various classes of people who are favourably disposed towards nationalisation could be realised, seems highly improbable, as the State Railway Administration would hardly succeed in introducing numerous

reforms, some involving increased expenses, others diminished receipts, and at the same time realise a surplus in relief of taxation. Even if the attempt to secure a surplus were given up, it is very doubtful if the remaining hopes of people advocating nationalisation could be satisfied, without incurring a very serious deficit. Some would probably be disappointed, as the great growth of national expenditure in recent years for financing social reforms and other objects, would make any Government chary of increasing taxation with a view to providing subsidies for the State railway undertaking.

*Grounds on which advocates of nationalisation base their hopes of reforms.* If we seek to ascertain on what grounds those favouring State ownership and management of railways base their hopes of various reforms, we find that they fall into two classes: 'on the one hand, they anticipate numerous economies as the result of the fusion of the different systems into one, and on the other hand, they compare our privately owned railways with certain State railways on the Continent, with a view to showing that their hopes are realised on the latter. Each line of argument may be considered separately.

When we were dealing with the subject of combinations amongst railway companies in Chapter IX. we noted various economies which might be effected as a result of agreements or amalgamations amongst



railway companies. If all railways were amalgamated, as would be the case in the event of nationalisation, the economies of combination enumerated in Chapter IX., could be realised on a more comprehensive scale. Further, the fees paid to Boards of Directors and the salaries of certain highly paid officials could be saved, though it must not be overlooked that the amount of work to be done by officials holding responsible positions could hardly be curtailed, so that any large reduction in the number of higher positions would not be feasible. On the contrary, it is very likely that many new posts, with reasonably good salaries, would be created at headquarters, to prepare elaborate statistical and other information, such as ton-mile and passenger-mile statistics, required by the Minister of Railways, or to provide "returns" called for by Parliament. Legal and parliamentary expenses would be considerably diminished as a result of nationalisation; it would no longer be necessary to incur the expense of maintaining the Clearing House; better utilisation of the rolling stock could be secured, owing to its being common to the railways as a whole; assuming that private owners' wagons were abolished, a large reduction in shunting expenses, wages and engine power might be expected. The unification of construction, both of permanent way and of rolling stock, would tend to reduce the cost of production, by rendering possible greater

specialisation. On the other hand, it would hardly be possible to economise all railway expenditure which can be attributed to competition; to do so would mean a serious curtailment of services and facilities, such as a lowering in the standard of comfort of third-class carriages, and a reduction in the number of dining and luncheon cars, which could not fail to be exceedingly unpopular.

When the attempt is made to compare English railways with some continental State system, the Prussian railway undertaking is very commonly selected. It is unquestionably the most successful example of State ownership and management of railways, and it is the only Government system on the continent of Europe which realises a considerable surplus, a fact that is explained very largely, if not entirely, by its inauguration at a most favourable moment, just before the great industrial and commercial expansion of Prussia began.

Any exact, or even moderately exact, comparison between the rates and fares charged by English railway companies and by State railways in other countries, is rendered impossible by two facts. In the first place, no information concerning average fares and average rates in the United Kingdom is available, and in the second place, the conditions attending the carriage of traffic in this country and on the Continent are so different, that even if the average rates and fares could be ascertained, it is

very doubtful if any reliable deductions could be drawn from the comparison.

With regard to the first point, it is obvious that to compare the normal English third-class fare of a penny a mile with the normal Prussian third-class fare of 3 pfennigs per kilometre,<sup>1</sup> or approximately 0.55d. per mile, is utterly deceptive, as it leaves out of account the very large number of third-class passengers carried at reduced fares in this country. The effect of this can be taken into consideration only by means of rough estimates or guesswork, as the material for calculating an exact average fare does not exist; and if such an estimate were used, no great reliance could be placed upon any conclusions drawn. But there is a further objection to the particular comparison connected with the second point raised above, viz. that the standard of comfort of an English third-class compartment is much superior to that of a Prussian third-class compartment, and that, generally speaking, a traveller in England has a far larger service of trains to choose from than a traveller in Germany. Moreover, in England a third-class passenger may be allowed as much as 100 lbs. of luggage free of charge,<sup>2</sup> whereas in Prussia the charge for 100 lbs. of luggage is approximately one pfennig per kilometre.

<sup>1</sup> This is the charge by slow train, exclusive of the Imperial ticket tax. See pp. 227, 229, above.

<sup>2</sup> This is the allowance on the Midland Railway, for example.

In what concerns comparisons of English and Prussian rates, it is even more important than in the case of fares to remember the different conditions under which traffic is conveyed. One or two such differences have been brought out in this book, *e.g.* the retail character of much of the goods traffic dealt with by the English railway companies,<sup>1</sup> and the very ample time allowance for the conveyance of traffic on the Prussian railways.<sup>2</sup> Thanks to the public having recourse to forwarding agents,<sup>3</sup> the Prussian railways are spared the trouble and expense of handling and conveying large numbers of very small consignments. It is also highly probable that the average distance for which traffic is conveyed is considerably greater in Prussia than in the United Kingdom. With regard to the duration of transit in this country, traders in many instances rely on goods being delivered at their destination the day after they have been dispatched, and there would be great dissatisfaction if the English companies delayed delivery of traffic in the way which is permissible in Prussia. These conditions unquestionably operate in favour of the Prussian railways, and should enable them to make somewhat lower charges. Other points to be taken into consideration are the unloading, demurrage and wharfage regulations, which are much stricter in Prussia

<sup>1</sup> See page 199, above.

<sup>2</sup> See page 194, above.

<sup>3</sup> See page 209, above.

than in this country.<sup>1</sup> It must also be borne in mind that the conditions concerning credit accounts in respect of freight charges are much more onerous in Prussia than in the United Kingdom. In Prussia, a deposit is required in cash, specified securities, or sureties, to the amount of at least one and a half times the average monthly freight payments, and interest is charged on overdue accounts, whereas no similar requirements exist in this country. The fact that traders' claims in respect of damage to, or loss of, goods are more generously met by the

<sup>1</sup> The position in Prussia is briefly as follows. Where the consignee is responsible for unloading and has received advice by 9 a.m. of the wagon being in position, the goods must be removed during the business hours of that day. If the consignee is not notified by 9 a.m., or if he resides more than 3 kilometres from the station, he is entitled to 13 business hours from the time of receiving the advice, within which to unload. Goods, the unloading of which does not involve upon the consignee, must be removed during business hours within 24 hours after notification of arrival. The demurrage charges per wagon after the expiration of the free period are 3 marks for the first 24 hours, or part thereof, 3 marks for the second 24 hours, or part thereof, and 4 marks for each additional 24 hours, or part thereof. The storage fees per ton for each 24 hours, or part thereof, are 1 mark when the goods are stored in covered premises, and 40 pfennigs when the goods are stored in the open air. If the traffic is excessive, the Railway Administration is entitled to raise the wharfrage and demurrage rates, and to shorten the period for unloading and the free wharfrage period.

The demurrage regulations in this country are indicated in a footnote on page 71. Although warehouse rents and wharfrage charges have recently been raised in this country (see page 161), and the free period has been reduced, the conditions still appear to be considerably more generous than in Prussia.

English companies than by the Prussian State Railway Administration, must also not be forgotten in comparing the charges in the two countries.

*Some arguments of the opponents of nationalisation.*

Opponents of nationalisation put forward various reasons why they consider the State ownership and management of railways undesirable. Amongst their objections, which are based partly on theoretical arguments, and partly on the experience of other countries, three may be especially noticed.

In the first place, it is urged that the working of a State railway may easily be inefficient and unprogressive; this is a danger associated with any monopolistic undertaking, but whereas private monopolists have the incentive of profits to cause them to be enterprising and to exert themselves, this incentive will not be present in the same measure, if at all, in the case of State monopolists. The recent experience of the nationalisation of a French railway may be quoted in support of this contention. On January 1, 1909, the Western Railway of France was taken over by the State; the working of the trains under the new management appears to have given anything but satisfaction to the general public; the financial results achieved certainly speak badly for the State Railway Administration; the annual deficit has increased from 27,000,000 frs. in 1908, the last year of company management, to 84,400,000 frs. in 1912, the fourth year of State

management ; the average ratio of working expenses to gross receipts during the last four years of company management was 60·7 per cent., during the first four years of State management 80·5 per cent. During 1912, the ratio of working expenses to gross receipts was actually 91 per cent.

In the second place, where the railways are nationalised, there is considerable danger of political corruption. The Government secures a large amount of patronage with which its followers may be rewarded. In fixing rates and fares, particular trades may be favoured with reduced rates, and certain sections of the community may be granted specially cheap fares, with a view to securing votes for the party in power. Additional services may be put on in districts where the Government is anxious to curry favour. The wages of railway servants may be raised, quite regardless of economic considerations, in order to gain the support of a very numerous body of voters and their friends.

It may well be claimed by believers in nationalisation that the standard of political morality in this country is such as to render the danger of political corruption exceedingly small. The rejoinder which the opponents of nationalisation may make is twofold. In the first place, every increase in the opportunities to indulge in corrupt practices in politics is likely to be followed by more indulgence in such practices ; if there are one hundred more positions

be filled on the nomination of ministers, there are a hundred more opportunities for making purely partisan appointments. The danger is particularly great where the positions are only of secondary importance, as no announcement of the appointments is then made in the newspapers, and public attention is not drawn to them. In the second place there must necessarily be differential charges in connection with any railway undertaking, it would be much easier to mask a preferential treatment than would otherwise be the case; *e.g.* whereas it would be difficult, if not impossible, for a Postmaster-General to find plausible reasons for allowing the letters dispatched by the manufacturers of a commodity *x* to be carried for a half-penny, instead of a penny, it would be comparatively simple for the Minister of Railways to find half a dozen passably good arguments for removing the commodity *x* from class 3 into class 2 of the railway classification, that it might benefit by the lower charges for conveyance.

In the third place, if the railways of the United Kingdom were nationalised, the number of persons in the employment of the State would be increased by some 600,000; to this there would be at least no serious drawbacks. On the one hand, these very numerous State employees might, in their capacity as voters, bring undue pressure to bear upon the Government, with a view to securing improved con-



ditions for themselves at the expense of the people using the railways, or at the expense of the general body of taxpayers. On the other hand, in the event of a railway strike, the situation would be much worse than if the railways were privately owned, as in the latter case the Government could intervene as an independent third party representing the interests of the general public, which would not be possible where State ownership existed. A strike on a State railway system is not unknown, and of late there have been several strikes of municipal employees in this country, so that the danger of a strike on British railways after nationalisation would be one that could not be disregarded.

*The financial aspects of nationalisation.* In connection with any definite proposal to nationalise the railways of this country, there are two points calling for very careful attention to which so far attention has not been drawn; the one refers to the way in which the transfer from private ownership to State ownership would be financed; the other to the relation of Parliament to the new Government undertaking.

It may be assumed that Parliament would act fairly by the present proprietors of the railways, and that they would be adequately compensated for their holdings in the various companies. As matters are organised at present, interest at a fixed rate is paid on debenture, guaranteed and preferential

stock,<sup>1</sup> and a variable dividend is paid on the ordinary capital. The policy of the Government would presumably be to issue securities bearing a fixed rate of interest to all classes of debenture-holders and shareholders. In so far as railway investments are gilt-edged or practically gilt-edged securities, the substitution of the new Government security for the companies' securities would presumably not affect the market in gilt-edged securities. But in so far as railway investments are more or less speculative (and all ordinary stock, with its fluctuating dividends, and certain preferential stock, belong to this class), the substitution of the new Government security for the companies' securities, could hardly fail to have a very depressing effect on the market in gilt-edged securities.

Speaking quite roughly, we may say that there are at present £800,000,000 of more or less gilt-edged railway securities, and £500,000,000 of more or less speculative railway securities. The total supply of gilt-edged investments would not be affected by the conversion of the £800,000,000 into Government securities, but the conversion of the £500,000,000 into Government securities would add hundreds of millions to the supply of gilt-edged securities. It is unlikely that the people who invest or speculate in

<sup>1</sup> We may leave out of consideration for the present purpose the comparatively small amount of preferential stock on which the full rate of interest is not forthcoming.

ordinary railway stock would be prepared permanently to hold a Government stock, yielding a lower rate of interest, and devoid of the fascination which a fluctuating dividend has for many people. As a consequence, many of the holders of the new Government security would sell out, with a view to investing in some more or less speculative security, and the market in gilt-edged securities would be liable to be glutted, with the result that the price of all Government securities would fall considerably. The financial problem in connection with such an enormous operation as the purchase of the British railways calls for much more careful consideration than it appears to have received, up to the present, from the supporters of a policy of nationalisation.

*The relation of Parliament to the State Railway Administration.* The importance of the relation of Parliament to the new State Railway Authority, arises from the fact that the business of conducting a railway undertaking is of such a complex character, that it must be managed by experts. This is unquestionably what happens in Prussia, where the officials have almost unfettered control, and show great conservatism in dealing with the finances of the undertaking, considerable betterments and improvements being frequently paid for out of revenue. The comparative independence of the Railway Administration, and the sober financial policy which it follows, are undoubtedly two very important factors

in the success of the Prussian railways. Would Parliament be prepared to accept a similar position in the event of the nationalisation of British railways? Unfortunately, it does not seem probable. In the past, their attitude towards the railways has been characterised by frequent changes of front, which does not promise well for the carrying out of a uniform railway policy; but what is even more serious, Parliament has on various occasions chosen to ignore the advice of the Railway Department of the Board of Trade, which, under the present system, is the Government department best fitted to express an expert opinion on railway matters.

If Parliament were continually to interfere with the management of the railways, as conducted by the Minister of Railways and his officials, by, for example, insisting upon granting concessions which the minister was unwilling to give, or deciding that funds, which the department wished to employ for renewals or improvements, should be used for the relief of taxation or for some other purpose, the efficiency of the administration of the railways could not fail to be seriously impaired. Where local authorities engage in trading enterprises in this country, it not infrequently happens that Town Councils override decisions reached by Committees and General Managers who are responsible for the undertakings, and that concessions are granted and sums in relief of the rates secured, which, in the opinion of

the people in the best position to know, are contrary to the true interests of the undertakings concerned, and liable to undermine their financial stability. It would certainly be most unfortunate if a similar policy of interference were adopted by Parliament with regard to the State Railway Administration, yet the attitude of Parliament towards railway problems in the past, and the very widespread interests involved in questions of railway management, make it not at all unlikely that this would happen, unless very special efforts were made to place the Ministry of Railways on a comparatively independent footing.

*Conclusion.* In the event of the nationalisation of British railways, it is probable that the immediate results achieved would fall considerably short of the hopes expressed by advocates of the policy, whilst distinctly surpassing in success the pessimistic anticipations of many ardent opponents; for, at the outset, in any case, the railways would be managed by practically the same staff as under the system of private ownership. The ultimate results would depend almost entirely upon the manner in which the new administration was conducted, the changes which were introduced, and the general policy which was adopted. To estimate the probable effects of nationalisation with any degree of accuracy, it would be necessary that the various proposals should be carefully elaborated and worked out in detail. To

nationalise the railways without most careful inquiries and investigation, and far more exact information than appears to be available at present, would be taking a leap in the dark ; it would be a pure speculation ; it might turn out well, but it might turn out exceedingly badly.

In reply to a recent deputation of the Parliamentary Committee of the Trade Union Congress, urging the State purchase of railways, Mr. Asquith stated that " however great may be the advantages in the diminution of competition and the co-ordination of the railway system, I remain of the opinion which I expressed last year, that the burden of proof is upon the shoulders of those who are in favour of the proposal." This attitude of Mr. Asquith towards railway nationalisation appears to be one which can be endorsed by all those students of railway economics, who, whilst realising that the present system of private ownership and its control by Government are not ideal, are unwilling, merely on that account, and on the basis of certain general arguments, to admit immediately and unreservedly the desirability of State ownership and management. Although the present system is by no means perfect, it has undoubtedly contributed very largely to the great development in the prosperity and the welfare of this country which has occurred since the introduction of railways ; it is for those who advocate nationalisation to show conclusively that the new

system which they propose to set up would be more efficient and better adapted to the requirements of the community than the present one, organised as it is to-day or in some modified form.

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## CHAPTER X.

### THE DETERMINATION OF PRICES UNDER COMPETITIVE CONDITIONS

*Definition of value.* We now approach what may be described as the central problem of economics, the determination of the value or price of a commodity or service. Value means power in exchange, and value expressed in terms of money is price. In common parlance "value" is not used exclusively in the sense in which it is defined here. A man may speak of a valuable picture, and mean either that the possession of it gives him great satisfaction, as it happens to be the portrait of an ancestor, or that it is worth a lot of money. In the one case, he contemplates the picture alone and expresses a personal opinion about it; in the other, he compares it with a second article—money. Formerly, economists used the expressions "value in use" or "intrinsic value," and "value in exchange" to distinguish between two kinds of "value"; to-day, they speak of "utility" where "value in use" is implied, and restrict the word "value" to one meaning—power in exchange. The picture