

STUDIES IN  
*Income and Wealth*  
VOLUME SIX

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*Income and Wealth*

VOLUME SIX

BY THE CONFERENCE ON RESEARCH

IN INCOME AND WEALTH

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*(Resolution adopted October 25, 1926,  
and revised February 6, 1933, and February 24, 1941)*

## P R E F A C E

THIS volume, the sixth of a series of studies by the Conference on Research in Income and Wealth, includes the reports presented at the annual meeting of the Conference in May 1942. Two of these four reports bear on problems of Income Measurement in War-time: John Lindeman's report on Government and National Income and Raymond W. Goldsmith's report on the Impact of Armament Expenditures. Of the other two papers, one, Ernest Grove's Income Parity for Agriculture, examines a normative use of income measurements; the other, by F. L. Thomsen and P. H. Bollinger, deals with the possibilities and techniques of Forecasting National Income.

In addition to these four reports, Volume Six includes two reports submitted to the Conference and circulated after the annual meeting in May 1942; one on Capital Formation and Capital Consumption by Wendell D. Hance, and one on Income Differences among Communities by H. E. Klarman. It also includes one paper presented at the 1941 meeting of the Conference: a consideration by Rollin Bennett of International Transactions and National Income. In connection with several of the reports, discussion by Conference members is presented.

The views expressed in these papers are the personal views of the authors and do not necessarily represent in any way the views of the agencies or institutions with which they are affiliated.

The Committee in charge of Volume Six consists of Milton Gilbert, Clark Warburton, and Simon Kuznets. A major part of the burden of editorial work fell upon members of the staff of the National Income Unit of the Bureau of Foreign and Domestic Commerce: Robert Bangs, Edward Dennison, W. D. Hance, George Jaszi, Charles Merwin, Tynan Smith, and Dwight Yntema.

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*Part One*

INCOME MEASUREMENT  
AS AFFECTED BY  
GOVERNMENT OPERATIONS

JOHN LINDEMAN

OFFICE OF PRICE ADMINISTRATION

*Discussion*

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JOHN LINDEMAN

Acknowledgment and thanks are due for the very helpful criticisms and suggestions made by the staff members of the National Income Unit during the preparation of this paper, particularly to Burton H. Klein, whose cooperation was invaluable. It will be obvious to members of the Conference that discussions of this problem in other Conference Volumes have been drawn upon liberally.



# Income Measurement as Affected by Government Operations

JOHN LINDEMAN

THE ISSUES RAISED for the national income estimator by the activities of government have their basis in the fact that the vast bulk of government services is not sold in the market. In the private sector of the economy transactions are characterized, by and large, by a *quid pro quo* exchange; in the government sector this is seldom true. The financing of government on the one hand, and the nature of government activities and the distribution of benefits on the other, are determined according to different sets of principles. The result is that the incidence and amount of taxation and of benefit are identical, as a rule, only by accident.

The problems with which this paper deals all arise from this circumstance. Indeed, many of the following conclusions and recommendations depend on the acceptance of the proposition that neither in the aggregate nor in specific instances do taxes provide a measure of the value of government output. The consequences are serious indeed to the neat market-value rationale which is the foundation of national income concepts. It destroys, or any rate greatly modifies, the internal structure of that rationale. A solution does not lie simply in the determination of the value of the output of government itself. On the contrary, the two aspects of government activity—taxation and the distribution of benefits—impinge upon the private sector of the economy in such a way that market prices (which are the basic data) cannot always be relied upon to reflect accurately the values to be measured.

Two distinct sets of problems emerge: those connected with valuing the output and activity of private enterprise and those connected with valuing the output and activity of government units. Both arise from the non-exchange nature of government activity; otherwise, they have little in common. Consequently, the discussion of one set of problems can proceed on the assumption that the other set has been disposed of satisfactorily.

It must be recognized that there is no 'correct' measurement of national income, and hence of the government's contribution to it, independent of the purposes for which the measure is devised. In this paper we are concerned with the national income first as a measure of the volume of total output, and second as a measure of total economic activity. These are the purposes that have been

associated historically with the measurement of national income.

Our objective with respect to government is to devise a procedure comparable to that used in the private sector of the economy for these two purposes.

### *Summary*

1) A distinction should be made between *earned national income* and the *value of the national product*. Earned national income is an aggregate of the returns to the labor and property factors participating in production, and thus is a measure of current productive activity in value terms. The value of the national product, on the other hand, is the sum of (1) the value of the final products of private enterprise that are also final products of the system (i.e., excluding intermediate consumption, by government, of the output of private enterprise) taken at their market prices, and (2) the value of the final products of government that are also final products of the system (i.e., excluding intermediate consumption, by private enterprise, of the output of government) taken at cost. It thus corresponds conceptually to the usual meaning of national income.<sup>1</sup> The differences in meaning between the two measures are independent of the operations of government. In a world without government, earned national income as we propose to measure it<sup>2</sup> would be identical numerically with the value of the national product, but this numerical identity would not alter the fact that in one use the measure refers to costs, and in the other use to the prices of finished goods.

However, since government activities are not conducted on an exchange basis there is a numerical disparity between these measures unless a special assumption or demonstration is made concerning an equivalence between the value of government services to business and payments of certain taxes. An assumption of this nature is involved in the present American estimates; it has tended to obscure an inherent difference in content by assuming a numerical equivalence. One recommendation of this paper is that this assumption should be dispensed with.

2) In order to bring out clearly the issues involved the problems of valuation are considered first for the private sector of the econ-

<sup>1</sup> A somewhat similar distinction has been made by J. R. Hicks; see 'The Valuation of the Social Income', *Economica*, May 1940.

<sup>2</sup> That this measurement is defective because of extra-governmental factors is well recognized. See below and Mr. Hicks' article.

omy (Sec. I), and second for the government sector (Sec. II). Consolidation of these valuations is then discussed in Section III.

It is argued that the sum of factor earnings in private enterprise as a component of earned national income (ignoring internal changes in capital accounts) <sup>3</sup> is equal to the market value of goods sold, plus subsidies received from government, and minus payments of those taxes we call 'non-income business taxes'. The essential characteristic of these taxes is that they are collected not *from* but *through* business. As a statistical expedient it is suggested that they be approximated by all taxes formally paid by business enterprises except direct profits taxes.

For the government sector we are faced with the problem of valuing the earnings of government factors and the whole output of government. Wages can be taken as a measure of the earnings of government labor factors; <sup>4</sup> for the property factors a return must be imputed in order to make the valuation of government comparable with that of private enterprise. The sum of government factor earnings and government purchases from private enterprise is taken to be the value of government output.

The private and government measures of factor earnings are consolidated by simply adding the components; the total thus derived is earned national income. However, consolidation of the product values into a non-duplicating total requires the elimination of private output intermediately consumed by government and of government output intermediately consumed by private enterprise. The practical impossibility of segregating free government services to business leads to the conclusion that the latter elimination cannot be satisfactorily made and that it would be better to leave some duplication in the product total rather than to resort to the present expedient of equating these services to business taxes by assumption. The double counting of certain government services inflates the measure of the value of the national product beyond its proper level.

Finally, in Section IV some comments are made concerning the significance and limitations of the suggested measurements.

#### *Limitations of scope*

1) Questions of differentiating between net and gross income are not touched upon, nor are internal changes in capital account con-

<sup>3</sup> Such as force account construction and production for inventory.

<sup>4</sup> Except the pay of the armed forces in wartime.

sidered. To avoid verbal complications we proceed throughout on the assumption that, for private enterprise, production and sale are concurrent.

2) Questions relating to the most appropriate breakdowns in which national income estimates should be presented are avoided also, except for the recommendation that government components be shown as separate categories at all times.

3) Related to the avoidance of questions of presentation is what at first may appear to be a major omission: the recording of money flows is not discussed. Not all the categories included in our estimates have corresponding money flows. For instance, the earnings of government factors are valued at wage payments, plus an imputed return on government property. There is no money flow corresponding to this imputed value. It is certainly desirable to show as much detail as possible concerning money flows of all types; but whether this is to be done by subdividing aggregates into money and non-money components, or by showing separate aggregates for money and non-money items is clearly a question of presentation, outside the scope of this paper.

4) Finally, except in passing, the question of deflation is ignored. We are concerned here with the current dollar valuation of government activity and output, and with the current dollar valuation of two aspects of aggregate national income as this valuation is affected by government operations.

## I Earned Income and Value of Product in the Private Economy

Assume an economy in which all transactions are on a strict *quid pro quo* basis. There is no government; or if there is, it finances its activities and distributes its output in exactly the same manner as any other economic unit. In such an economy it is fairly simple to define and to measure earned income in a meaningful way.

An act of production consists usually of combining, adding to, or transforming certain goods (or services) so that another good is created. For the sake of simplicity let us take as an example the valuation of the productive activity within a single enterprise, enterprise X. We can refer, rather inexactly, to the goods and services added to, transformed, or combined by this enterprise as 'raw materials'; and to the good created as the 'output' of the enterprise.

Both the output of the enterprise and the raw materials are priced

in the market. We accept these market prices as the basis for determining the value of the productive activity of enterprise X. Under our assumptions we can take no better measure than the excess of the value of the output over the value of the raw materials.

Market value is valid for our purposes irrespective of the level of production. A given price for a certain group of raw materials in their 'raw' state must be interpreted as a measurement of the market valuation of the materials in that state; i.e., *before* being combined, added to, or transformed by enterprise X. A given price for X's output must be interpreted as the market valuation of these same raw materials in their new state; i.e., *after* being combined, added to, or transformed. Consequently, the valuation of X's activity is measured by the difference between the price of the output and the price of the raw materials embodied in that output.

This quantity can be called the income earned<sup>6</sup> by an enterprise, or the earnings of all the factors—labor (broadly conceived so as to include management) and property—attached to an enterprise. Several characteristics of this measure are worth pointing out:

- 1) It is appropriate for the economic environment in which the enterprise happens to find itself. If this environment permits more or less temporary monopoly returns, then these returns are properly a part of the earned income. Similarly, any change in the environment might lead to a value higher or lower than the equilibrium value; but it is the actual recorded income, not the equilibrium earned income, that is appropriate in the market conditions prevailing.
- 2) It applies to an act of producing goods and services at all stages. There is no distinction between the production of consumers' goods, producers' goods, and intermediate goods. All that is required is that economic activity take place. The market then sets a value on that activity. Earned national income is the sum of these values for a given period and for all the enterprises within the economy.
- 3) Related to the above is this characteristic, which is dependent upon the assumptions of a pure exchange economy: Any output's price is a summation of a part of the valuation placed by the market

<sup>6</sup> The use of this term implies no ethical judgment. As Gerhard Colm has put it, we are measuring the value of something that is socially desired whether or not it is socially desirable. We accept the market as the mechanism through which the magnitude and intensity of social desire, in the existing institutional environment, is expressed.

on the activities of each enterprise contributing to that output at any stage of production. For example, suppose that enterprise X buys 'raw materials' only from enterprises Y and Z, the raw materials being the 'output' of Y and Z. Then the price of a unit of X's output consists of the following items:

- a) the income earned by X per unit of output, plus
- b) the price of Y's output per unit of X's output, plus
- c) the price of Z's output per unit of X's output.

The price of Y's output embodied in X's output can be expressed similarly,<sup>6</sup> and so can the price of Z's. Thus, the price of any output, and hence the prices of all, can be divided into components representing a part of the income earned by all enterprises that have contributed to that output.

In over-all terms, this means that, under our assumptions, the sum of all factor earnings for the whole economy for a certain period is equal to the sum of the prices of all goods and services (without duplication) produced within the economy during that period. But there is not this equality in the real world unless some highly artificial meaning is attached to the terms 'income earned' and 'value of product'. One purpose of this paper is to suggest a method of measuring earned income so as to preserve its general meaning as set forth above, namely, the sum of factor costs as a measure of the (market determined) value of their productive activity.

#### *Taxes and subsidies*

It is obvious that the disposition of a particular income is irrelevant to the measurement of that income at the point of production. Suppose that the market value of X's output is 100, and that raw materials used in production are valued at 80. Then income earned by X is 20, regardless of the manner the 20 are subsequently disposed of.

Consequently, a relaxation of the present assumptions can be made without affecting the validity of the method of measurement. Suppose the government, which had previously conducted all its activities on an exchange basis, embarks upon an unemployment

<sup>6</sup> When Y buys raw materials from y and z, the price of Y's output per unit of X's output consists of:

- a) the income earned by Y per unit of X's output, plus
- b) the price of y's output per unit of Y's output per unit of X's output, plus
- c) the price of z's output per unit of Y's output per unit of X's output.

relief program which it finances by a direct levy on incomes. The effect will be simply to change the distribution of the money claims arising from the production of income. Under these conditions, a deduction of taxes from any income share would result in an understatement of enterprise income earned (and consequently in an understatement of national income), for such taxes are as much a component of the value of earned income as any other outpayment from that income.

However, the transfer of income from private individuals or enterprises to the government is not always made by a direct levy on incomes. Let us set up here a special category of taxes and designate it as 'non-income business taxes', without at this point considering how one might determine which actual taxes fall in this category. These taxes have their incidence not upon the income shares arising from the creation of an output, but upon the price of the output itself. In effect, a business enterprise is pressed into service as a collection agent for the government; the transfer of income is made *through* the enterprise, which 'pays' the tax in a formal sense only. The actual payment is made by those who buy the output.

The imposition of such taxes introduces a new element into price. Under the original assumptions the price of a unit of output was divided only among the factors associated with the creation of that output. These taxes are, however, a share of the price against which no factor activity can be set. The sole governmental activity is an unemployment relief program, without factor activity. Clearly then, the first step in obtaining from market price data a value for the income earned by an enterprise (or the sum of the earnings of the factors attached to the enterprise) is to deduct from the price of output the amount of non-income taxes paid by the enterprise per unit of output.

Consider the reverse situation, in which, instead of introducing a new element into price, government operations remove an element of price that might otherwise be included. Assume that enterprise X, in the above example, had been buying a transportation service from enterprise Y. Assume further that our measurement of the value of government activity is such that no change should take place in the value assigned either to the transportation service or to the value of the activity of the factors producing that service simply because it is now offered free under government auspices whereas formerly it was marketed by a private enterprise.

If we ignore time lags, the price of X's output under these circumstances will decline by the full amount of the reduction in costs, or more precisely by an amount that will make factor earnings in the enterprise consistent with their market valuation at the scale of output permitted by the new cost conditions. The price thus will fall short of the sum of the earnings of the factors contributing to the output.

The same result would follow if the government, for example, bears the cost of the transportation service by providing enterprise X with a cash subsidy. The price of output will be less than factor earnings.

Ideally, then, earned income, as a sum of the costs of factors attached to an enterprise, can be obtained from market price data as follows:

- Price per unit of output of each enterprise, plus
- a) cash subsidies per unit of output, minus
  - b) non-income taxes per unit of output, minus
  - c) value of goods purchased from other private enterprises per unit of output.

Or, for all private enterprise, with the appropriate offsets against double counting, earned private income equals the market value of private output, plus subsidies and minus non-income business taxes.

The summation of income earned by all private enterprises, measured in this way, gives the total earnings of factors engaged in the private sector of the economy and thus is a market determined measure of the value of their productive activity, with subsidies and non-income business taxes being considered as government imposed modifications of the market.

As a practical matter the derivation of this measure requires knowledge of the incidence of all business taxes, so that taxes that act to reduce the money incomes of factors can be separated from those which have heretofore been called non-income business taxes.

In the absence of the required knowledge a reasonable expedient would be to treat all taxes paid by an enterprise as a condition of doing business, regardless of profitability, as non-income taxes, and to treat those taxes which are paid only in the event of profitable operation as direct taxes. This means, broadly, that income and excess profits taxes should be considered a part of the income earned by an enterprise, while all other taxes—excise, licenses, sales taxes, etc.—should not be. This expedient leaves something to be desired, since income taxes are undoubtedly in-



stitutionalized as costs to some extent, and excises and licenses are often borne either by the enterprise itself or are passed backward to factors. However, we can hope that these opposite tendencies cancel.

Adoption of this expedient would require a change in the current Department of Commerce method of treating payroll taxes. At present the part of these taxes that is deducted from wages is included in total wage payments (as a distributive share), and the part that is paid by employers is counted as a supplement to labor income. But for the employers' share to be included in our suggested total of earned income<sup>7</sup> it would be necessary to make a clear-cut assumption that these taxes directly reduce labor income below what it would otherwise be without affecting the income of other factors; i.e., that they are, in effect, direct net income taxes. It may be that this assumption can be defended. However, in the absence of special treatment for each single category of taxes—as opposed to an assumption concerning the two broad categories of income and non-income taxes—it would seem better to leave the employers' share of payroll taxes out of our computation of factor earnings, while including the employees' share on the grounds that it is in actuality a direct tax.

Another problem of incidence is raised by property taxes. A portion of property taxes falls on economic rent and reduces the net return to property. Since in the case of other factors we measure returns before those taxes that act to reduce net income, it would be proper to measure the return to property before the part of the property taxes that is paid out of pure rent. But, on the basis of the knowledge and data now available, such a procedure is not practicable statistically.

#### *Comparison with Department of Commerce estimates*

The measure here suggested for earned private income corresponds very closely to the present Department of Commerce estimates of income originating in private enterprise. Corporation income and excess profits taxes (and, if statistically feasible, a part of property taxes) would be added to the present Commerce figures; payroll taxes paid by employers, at present carried in the estimates as a supplement to labor income, would be deducted. Thus the resultant measure would be the net recorded income of all factors before

<sup>7</sup> It would, of course, be included in our total value of the national product, along with all other taxes that are paid in the first instance by business enterprise.

the payment of direct taxes. Within the limitations imposed by the nature of our data, the measure will provide us with a fairly reliable estimate of the factor costs which, under existing market conditions, measure the value of economic activity in private enterprise.

## II Valuation of Government Activity and Output

The problem of valuation in the field of government is complicated by the fact that there is no market for government output. In the case of private output valuation is made by the market. In the case of government output an arbitrary valuation procedure has to be decided upon. It is suggested that we value government in such a way that our figures are comparable with those for private industry. We want the government component of our aggregates to approximate the measure we would obtain if there *did* happen to be a market for government output.

Let us for the moment set up a hypothetical situation. Suppose that all commodities sell at the sum of the factor costs involved in their production. In such a case we would not require market data in order to deduce the value of output. We could simply summate factor costs in a given sector of the economy, add in the value of goods originating in other sectors and embodied in the output, and the result would be the market value of that output. In the more complex situation actually facing us we can achieve the same synthetic market value if we know both the factor earnings as defined in the preceding section and the subsidy and tax items that make factor earnings plus intermediate consumption in the particular enterprise (or sector) under examination different from the market value of output.

This may sound like nonsense, since factor earnings are derived from, and are dependent on, the value of output in the first place. But it opens up a fruitful line of attack on the government problem. We do not have a market value for government output for the simple reason that government output is not sold in a market. But we can build up such a value by summing government factor costs and the value of the output of private enterprise embodied in government output.

The first problem, then, is to determine the returns of factors attached to government. We can logically and reasonably eliminate one type of return at once: pure enterprise return, corresponding to

profits (or losses) and monopoly returns in the private sector of the economy. The elimination of this return requires only that we adopt the reasonable assumption that a collective decision to employ resources in a certain manner is also a collective decision that the product of that employment is worth just what it costs. Of course, we may question the implication that the tastes of government authorities are the same as the tastes of society; but since we require a collective expression of preferences, we must accept the expression of the government authorities.

The factor costs that interest us, then, are those of labor and property attached to government. How shall we determine these costs? For the most part we can value labor factors at the current money costs incurred for their activity. This valuation is justified on the basis that most government labor comes to its employment through market forces, and hence the money wage cost is just as good a measure of the value of labor activity in government employment as it is in private employment.

But there is no money flow by which we can measure the contribution of the other government factor, property. Obviously, interest payments cannot be taken as the proper measure. Interest is a function of debt, not of the volume and nature of property. Income is created not by debt, but by factors capable of implementing the production of goods and services, although debt establishes a contractual relationship that requires the payment of a share in the claims against income.

Here we reach the first important statistical difficulty connected with estimating the value of government activity and output according to the model we have set up. If the apparently significant contribution of government property is to be included in the estimates, it must be done on an imputed basis. Morris Copeland feels that this can be done satisfactorily by applying a constant rate of return to the value of tangible assets owned by government if the government sets up a "business-like system of accounts".<sup>8</sup>

Mr. Copeland may be a bit optimistic. We do not have a business-like system of accounts, nor are we apt to get one in the near future. Furthermore, there is danger of circularity in an imputation of this type; we cannot always estimate the value of government property without first knowing the return. It may reasonably be argued that

<sup>8</sup> *Studies in Income and Wealth*, Vol. One, Part I. Mr. Copeland's general position on this point is about the same as that taken here.

this particular estimate is inherently so uncertain that it would be better to omit it entirely; we could treat income from government property as we now treat housewives' services: simply citing it as a source of income outside the scope of our estimates.

The objection to disposing of the problem in this way is that the omission of government property return will leave an important gap in our statistics which will preclude a meaningful comparison of government and private output, either on the whole or for specific items. We include the entire area of private enterprise, but we would stop short in the field of government. Not only would the procedure be inconsistent, but also it would be misleading, as can clearly be seen if we should try to compare the value of, say, a privately built ship with the value of one produced in a government shipyard. If no account were taken of the value added by the navy yard capital equipment, then we would understate the value of the government ship or, depending on the point of view, overstate the cost of the private ship. On the whole, the return on government property seems an important enough category to warrant an attempt at imputation in spite of the practical limitations.

According to the present suggestions income earned in government would be measured by government wages plus the imputed return on government property. Adding the value of the output of private enterprise used by government, we get a figure for the value of government output comparable to the market price figure by which we value private output. The essential difference is that the government figure is derived by working backwards, but in the absence of a market mechanism this seems to be the best we can do. As previously noted, the use of this measure implies the acceptance of a collective valuation of government output according to the decisions of public authorities. There can be neither profits nor losses. Were a different value assigned to government output it would be necessary to conceive of an entrepreneurial aspect of government to absorb the difference between the assigned value and the factor and other costs incurred.

The chief alternative to costs (in some form) as a basis for valuation is that used by Simon Kuznets, who takes tax payments to represent the value of current government output, exclusive of government capital formation.<sup>9</sup> Mr. Kuznets' treatment maintains a certain symmetry in his whole rationale of income measurement

<sup>9</sup> See his discussion in *Studies in Income and Wealth*, Vol. Two, Part V.

and is based, of course, on an analogy between tax payments and prices. It overlooks the fact that fiscal policy today specifically dissociates taxes from considerations of the worth of government output. Borrowing is a conscious and deliberate policy designed to influence the level of employment. It is not in any realistic sense forced upon a government which is unable to 'sell' its product to its 'customers' at a 'profit'.

Furthermore, there is an implicit assumption in the tax payments valuation that the debt will not be repaid. Presumably, collective assent to an appropriation is also collective assent to taxation at some time. Mr. Kuznets apparently has not distinguished between willingness to pay and the convenience of paying later instead of now.

The rather unrealistic implications of the tax approach, combined with the consequent necessity of including a government savings category of doubtful analytic value, makes the cost approach preferable. But it cannot be too strongly emphasized that the choice must rest upon the analytic purpose in view rather than any clear-cut distinction between right and wrong.

It should be clear that we are using the word 'cost' so that it is not the same as 'expenditures'. Our purpose is to include in the value of government output (a) the value of all privately produced goods used by government and (b) an amount to represent the value of the contribution of government factors. Only when market transactions are involved can we use expenditures as a measure of these values. Most government expenditures and most of the value of government output involve such market transactions: when government buys the output of private enterprise and when it employs its regular labor force it bids in the market. In these cases 'costs' and 'expenditures' are practically equivalent.

But there are significant exceptions requiring special treatment. We cannot escape asking these questions: When government makes an expenditure does it acquire either part of private industry's output or the activity of a factor of production? Conversely, when government acquires either a certain part of the output of private industry or the activity of a certain factor, does it make an expenditure that measures the value of that acquisition? We have already seen that, in the case of valuing the contribution of government property, there was a negative answer to the second question.

Expenditures that do not result in adding to the value of government output are simply transfer expenditures: subsidies, direct

relief, pensions, etc. All except subsidies are easily recognizable and present no particular problem. We are on firm ground when we treat direct relief, for instance, as simply a collective transfer analogous to private transfers involved when an employed member of a family group shares his earnings with needy relatives.

With subsidies, however, we have a peculiar problem. We have maintained that pure subsidies are a part of the factor return in the enterprise that receives them; however, since government acquires none of the enterprise's output in return, the subsidy cannot be counted as a part of the value of government output. That much seems clear.

However, subsidies are often concealed in intentional overpayments made for the precise purpose for which pure subsidies are granted. They make possible a type of activity that would be unprofitable in a free market. For instance, the development of commercial aviation was facilitated by the payment of an excessive price to air lines for carrying mail. But here the government acquired a service, a part of the output of private enterprise; it should be included in the value of government output. Must we determine how much of the payment was for a current service and how much was a pure subsidy? For perfect consistency we should. But the impossibility of separating the subsidy from the payment-for-output aspect of such expenditures requires that we be rather arbitrary and accept whatever the government pays for private output as the value of that output. Pure subsidies, for which the government receives no marketable goods or services, would be treated as transfers from the government's point of view.

The problem is particularly difficult in agriculture. Payments made under the agricultural programs are of two types, parity payments and soil conservation payments. There is no output corresponding to the first type. The second type is usually made only on condition that the farmer practice erosion-control and land-use methods definitely making a useful addition to agricultural capital. Both types represent factor earnings in agriculture. But for the second there is also a product that should be counted as output somewhere. It does not seem logical to count it in government, however. It appears to be properly a part of the output of agriculture which, although it is formally paid for by government, remains in the agricultural sector of the economy as capital formation.

Another special problem arises in connection with valuing the services of a draft army. Actual pay and subsistence is a reasonable

measure of the factor activity of the armed forces in peacetime, but when men are drafted from higher paid civilian employment and put into a calling which is, by social fiat, worth more than the calling they have left, we create an anomalous situation if we accept a measurement that will record a decline in the value of factor activity.

We have here an analogy to the problem of valuing the contribution of government property. The expenditure does not reflect accurately the value of the factor employment. An appropriate figure must be derived by imputation, preferably by assigning to the men in the draft army a factor earning equivalent to the weighted average earnings of comparable labor in private enterprise. This adjustment is required if we recognize that government is fully able to commandeer resources without making a *quid pro quo* payment, and without altering the productive value of these resources.<sup>10</sup>

To recapitulate: the government components of the two national aggregates would be as follows:

- a) Earned government income as a component of *earned national income* is measured as the sum of wage payments and an imputed return on government property;
- b) The value of government output as a part of the *value of the national product* is measured as the sum of earned government income and the value of private output used by government.

The Department of Commerce at present values government output at expenditures exclusive of transfers (direct relief, loans, benefits, etc.); 'income originating' in government is this figure less intermediate consumption of privately produced goods, or government wages plus interest payments.

### III Consolidating the Measures For Private Enterprise and Government

Adding the value of earned private income as measured in Section I to the value of earned government income as measured in Section II, we obtain a total of earned national income. Subject to the limitations imposed by the statistical necessity of using broad expedients to measure certain items, namely, non-income business taxes, the

<sup>10</sup> The problems of maintaining consistency in the measures of both factor costs and value of output in wartime are, of course, much more extensive than would be indicated by this mention of the draftee problem. They are treated by Raymond Goldsmith in Part Two.

imputed return on government property, and the adjustment of military pay in wartime, this total provides a non-duplicating measure of the value of the current productive activity of all the factors contributing to the national output.

Consolidation of the value-of-output measures is not so simple. We have taken market prices to be the proper measures of the value of private output, and costs to be the measure of the value of government output. These two figures, however, cannot simply be added to provide a total for the value of the national product, or the value of the final products of the whole system. It is necessary to eliminate (1) the intermediate consumption, by government, of private output, and (2) the intermediate consumption, by private enterprise, of government output. Then the value of the national product would be the sum of the market prices of the final products of the whole system emerging from private enterprise and the costs of the final products of the whole system emerging from government.

Intermediate consumption of private output by government can easily be eliminated. But the elimination of government services to business is obviously a very different task.

Mr. Kuznets assumes that the properly deductible value of intermediate government services is measured by the taxes paid by business enterprises: non-income business taxes as defined in this paper plus corporate profits taxes. No one recognizes better than he the rather arbitrary nature of the expedient he adopts.<sup>11</sup> His discussions of the subject emphasize clearly the inherent impossibility of separating government services to individuals and to society at large from government services to business, or, better, the impossibility of sub-classifying the *social* services government performs into services directly benefiting individuals and services that 'disappear' in private enterprise only to reappear as a part of the output of business. The observation that a definite answer "usually results from the application of some clear-cut position in social philosophy but one that does not necessarily have general validity" is especially relevant.

The problem being what it is, it seems to be a better expedient to include as a separate category in the aggregate value of the national product *all* government services that are financed gen-

<sup>11</sup> See *Studies in Income and Wealth*, Vol. One, Part V, and *National Income and Its Composition*, Vol. I, pp. 43 ff. Clearly, the same assumption underlies the Department of Commerce estimates, although it is not explicitly stated in any of its publications.



erally, and to treat the output of public service enterprises exactly as we treat the output of private enterprise.<sup>12</sup> Fortunately, at present, most government output which it is clearly desirable to allocate to businesses and to individuals (such as gas, light, water, postal, and transportation services) is routed through public service enterprises that charge *quid pro quo* fees resembling prices in many respects. For the balance, we can simply admit duplication. The extent of the duplication cannot be measured; its nature can best be decided by the individual user of the estimate.

Until such time as the government begins to offer services of a less generalized character than at present, while financing them without regard to specific benefit, this expedient probably does no particular violence to our estimates. At least it does not do as much violence as the present expedient of assuming a wholly arbitrary equivalence and referring to the derived figure as a net value aggregate, particularly when—as is the case with the Commerce Department estimates—the necessary assumption is nowhere made explicit.<sup>13</sup>

#### *Disparity between earned income and value of product*

Even if government services to business were measurable, there would still be a difference between the earned national income total and the value of the national product.

1) Earned national income has been defined as the sum of the private component (EPI) and the government component (EGI):

$$\text{ENI} = \text{EPI} + \text{EGI}$$

2) The unduplicated value of the national product is equal to (a) the value of private output at market prices (PO) less the value

<sup>12</sup> I do not mean that a functional distribution of government services should never be made. Indeed, for some purposes failure to make a minute allocation can be quite serious. For instance, a distribution of real income among income classes would be deficient if the income redistribution governments commonly effect by creating an inverse relationship between the incidence of taxation and the incidence of benefit were not taken into account. Public health services, parks, beaches, and schooling are more significant additions to the real income of the lower than of the higher income groups.

<sup>13</sup> Since the first draft of this paper was written, there have been several objections to the rather extreme position I take. The usual objection is that I seem to have closed the door to any attempt to make an objective distribution of government services to individuals and to business enterprise. If there is any hope of doing this objectively, I should certainly like to see the allocation made; it would be desirable theoretically (although some doubt has been expressed on this score also). However, I must reiterate my skepticism as to both the possibility that the results would be satisfactory and the practical necessity of making such estimates.

of private output used by government ( $PO_g$ ), plus (b) the value of government output at cost (GO) less the value of government output used by private enterprise ( $GO_p$ ):

$$VNP = PO - PO_g + GO - GO_p$$

3) But the value of private output at market prices was defined (Sec. I) as equal to earned private income plus non-income business taxes ( $t$ ) minus subsidies ( $s$ ):

$$PO = EPI + (t - s)$$

and the value of government output was defined (Sec. II) as equal to the value of private output used by government plus the income earned by government factors:

$$GO = PO_g + EGI$$

4) Substituting these values in equation 2 we have

$$VNP = (EPI + t - s) - PO_g + (PO_g + EGI) - GO_p$$

or

$$VNP = EPI + EGI + (t - s) - GO_p$$

and since  $EPI + EGI$  is the earned national income, it is equal to the value of the national product only if  $t - s$  (non-income business taxes less subsidies) is equivalent to  $GO_p$  (the value of government services used by private enterprise). This is essentially the assumption which is at present made by both Mr. Kuznets and the Department of Commerce. Of course, other definitions would yield other relationships.<sup>14</sup> Indeed, the quantities can easily be defined so that they are equal, but only by highly artificial means such as substituting the sum of factor costs of production for market prices as the 'real' value of output in the private sector of the economy, or by referring to the quantity  $[(t - s) - GO_p]$  as a special type of factor. It is hard to see that anything significant would be gained by such a procedure. On the other hand, the definitions suggested here, or some like them, make a useful distinction between two different, though related, aspects of income measurement.

#### IV Meaning and Limitations of the Measures

We have proposed the measurement of two aspects of economic activity. The first, earned national income, is a money measure of factor activity; the second, the value of the national product, is a money

<sup>14</sup> However, the general nature of the relationship shown here is not dependent upon this particular method of measuring government factor returns.

measure of the output resulting from that activity. It is because of the operations of government that the aggregates of these two aspects of the economic process are different. We cannot escape the feeling that the broad assumption heretofore used concerning the equivalence of government services to business and taxes paid by business has tended to obscure the essential difference between these two meanings of income measures. The numerical equivalence created by the assumption has made it appear that we have shown different distributions of the same measurement, whereas actually we have been measuring two different things which happen, because of a convenient hypothesis, to come to the same total.<sup>15</sup>

Consider the Commerce Department's distribution of income by industrial source, or Mr. Kuznets' similar but more detailed distribution. This distribution shows, for each industry group, a figure very much like the figure suggested in this paper for the sum of the factor earnings in each group.

Actually it shows the sum of the distributive shares flowing to the factors engaged in each industry, with profits being taken after income taxes.

Now suppose that there are no 'government services to business', but that the tax structure remains the same. The necessity for making the presently used broad assumption would not arise, and all business taxes would be included in the national income as it is now conceived. But where would these taxes be shown in an industrial distribution? Would they be included in each industry group as part of the 'income originating' in that group, or would they be shown at the bottom of the tables as a reconciliation?

This is an important question. The sum of wages and profits has a different meaning than the sum of wages, profits, *and* indirect taxes. (Consider the difference in the cigarette industry!) If the taxes are added to the 'income originating' in each tax-paying industry group, then 'income originating' would clearly refer to some-

<sup>15</sup> Cf. Hicks' article (p. 122): "How did we come to embrace this delusion? . . . If competition were perfect and if state activities were so designed as not to disturb the *optimum* organization of production, marginal utilities and prices and marginal costs would all be proportional so that the same valuation which gave us the social income as a measure of economic welfare [our value of the national product] would also give us the social income as a measure of productivity [our earned national income]. . . . It is the departure of the system from the optimum, whether as a result of indirect taxation or as a result of imperfect competition, which upsets the equivalence and makes the measurement of economic welfare a different thing from the measurement of productivity."

thing like 'selling price added'; if, however, the taxes were shown as a reconciliation—i.e., as an extra item in an otherwise homogeneous classification—then 'income originating' would refer to something like our suggested measure of factor costs.

The present estimates have been used with both meanings. Mr. Kuznets, for example, states: "Net income originating in various industries may be interpreted as the contribution of each to the common pool of goods we call national income; or it may be considered a measure of the cost to society of the activities carried on by each. Both interpretations are applicable to income originating in any single industry. . . ." <sup>16</sup>

The purpose of the earned national income measure suggested in this paper is to provide estimates subject to the second interpretation alone. Measures of the value of factor activity are not only useful and desirable, but also are absolutely essential for certain applications of income statistics. Whenever the emphasis is on productive processes, it is factor activity that is relevant. If we want to make inter-industry comparisons of factor activity, we must use earned national income and its components as data. Certainly an appraisal of war potential must be made with reference to factors, and the valuation of the factors must be made in terms of cost.<sup>17</sup>

On the other hand, an analysis of the volume and composition of the end-products of the system requires a valuation in terms of actual market prices. This particular concept of national income, frequently used as an approximation of economic welfare, is so well established that it requires no further discussion here. The whole analysis of final products flow must run in terms of market prices.

In making our recommendations concerning the measurement of the value of government activity and output, we were guided by the desire to devise valuations comparable to those used in the private sector of the economy. The problems being what they are, it would not be surprising that our 'solution' may be considered

<sup>16</sup> *National Income and Its Composition*, p. 72.

<sup>17</sup> Clearly, since only the part of "the departure from the optimum" that is due to government operation has been removed in the measure we suggest, it is still imperfect by strict theoretical standards. The remaining imperfections arise because our economic system itself does not even begin to approach the competitive ideal. In some cases these defects may constitute a serious bar to the effective use of the statistics. However, the practical impossibility of removing the effects of most market imperfections should not stop us from making whatever corrections we can and qualifying the results by saying that they are no more significant than the very imperfect market mechanism permits them to be.

somewhat less than wholly satisfactory. But we do believe that if our recommendations are followed, the government and private components of the estimates will be a great deal more comparable than they are at present.

Nonetheless, since perfect comparability is impossible, we feel that the government and private components should be shown separately in the presentation of national income estimates. Indeed, except for the special use of year-to-year comparisons of aggregates in index number form, the components of each estimate are more meaningful than the totals. (The theoretical and practical defects of index numbers are so formidable that the defects of our government measures cannot be considered any more significant than many other necessary qualifications in this connection. This is particularly true of the duplication involved.)

In an industrial distribution of factor returns the government component would be shown separately in any case. Our suggestion refers principally to a type-of-final-output distribution of the product aggregate. We suggest, as a minimum, three distinct categories for final output: privately produced consumers' goods, private capital formation, and government output. While we can, if necessary, establish sub-categories of government output corresponding to the conventional categories of consumption and capital formation<sup>18</sup> the analytic value of our figures would be seriously depreciated if we integrated these categories with their counterparts in the private sector of the economy.

The fact is that the forces governing the volume and nature of the consumption of privately produced goods and the private formation of capital are entirely different from those governing the production of government output. One of the most important uses of income statistics today is in the study of determinants of output in these three classifications.

<sup>18</sup> These categories must be set up if we want to distinguish between net and gross output of government.

## Discussion

CLARK WARBURTON

### *Differences between government operations and other parts of the economy*

Mr. Lindeman opens his discussion of national income measurements as affected by government operations by the statement: "The issues raised for the national income estimator by the activities of government have their basis in the fact that the vast bulk of government services is not sold in the market." Although in a way true, this opening sentence is misleading because it places a wrong emphasis on the difference between the operations of government and those of other sectors of the economy. In several other sectors, economic goods are not sold in the market, and for them resort must be had to some method of evaluation other than market price; e.g., food produced and consumed without sale in the market, occupancy value of owner-occupied houses, force account additions to business buildings and equipment, services of endowed institutions, and services of religious and other social organizations supported by voluntary contributions. The goods flowing from these sectors of the economy may be evaluated and brought into the estimates of national income either by: (1) imputing to them a unit price taken from market quotations for similar goods sold in the economy; or (2) estimating the cost of providing such goods. To most government services the former method is inapplicable as it is also to the services of endowed institutions and religious organizations.

The chief difficulties encountered by national income estimators in handling governmental operations are due to characteristics of governmental operations other than the absence of sales in the market: (1) the difficulty of separating final products from intermediate products, and (2) the methods governments use in obtaining income to meet the cost of the services they provide.

#### *Segregation of final from intermediate products of government*

With Mr. Lindeman's position that, in theory, services furnished by government that are final products should be segregated from intermediate products, and only the former included in estimates of national income, there is no disagreement. However, a question may be raised about Mr. Lindeman's argument that such a separa-

tion is, in practice, impossible. Mr. Lindeman rests his case not on the lack of adequate records for proper cost allocation, but on the arbitrariness of any line of demarcation even though adequate records were available. In stating his position on this point he refers to Kuznets' comments on the same problem, and sums up the situation as follows:

"His [Kuznets] discussions of the subject emphasize clearly the inherent impossibility of separating government services to individuals and to society at large from government services to business, or better, the impossibility of sub-classifying the *social* services government performs into services directly benefiting individuals and services that 'disappear' in private enterprise only to reappear as a part of the output of business. The observation that a definite answer 'usually results from the application of some clear-cut position in social philosophy but one that does not necessarily have general validity' is especially relevant."

This statement sounds plausible. Nevertheless, I cannot see that a deliberate line of demarcation between final and intermediate products of government, based on careful consideration of their character, is a whit more arbitrary than (a) the line of demarcation, known to be incorrect because of the governmental policy of indirect taxation, drawn by Kuznets on the basis of taxes collected directly from individuals versus taxes paid by business enterprises; or (b) the inclusion of all governmental services that are financed generally, as Lindeman proposes. Both lines of demarcation rest on "some position . . . in social philosophy . . . that does not necessarily have general validity". Lindeman's proposal, it is clear, rests on the assumption that, on the whole, governmental activities are those of an agent of consumers rather than of business concerns.

Nor is a deliberate line of demarcation between final and intermediate products of government, based on careful consideration of their character, more arbitrary than the line all national income estimators customarily draw in the output of the nongovernmental sector of the economy. Surely the classification of medical services provided by a business concern in one industrial center among intermediate products, and the classification of the same services in another industrial center (where medical service is paid for by individuals) among final products, is as arbitrary as a separation of some kinds of governmental services from other kinds. In the nongovernmental sector the social or business arrangements in force automatically provide a line of demarcation we are willing to accept

so long as we refuse to observe closely where that line is placed by those arrangements.<sup>1</sup>

I believe that a committee of economists drawn from various government departments could review government expenditures, even in the present unsatisfactory state of government accounting, and draw a line between final and intermediate products that would be a closer analogy to the line drawn in practice for the nongovernmental sector of the economy than is done by Kuznets' practice or by Lindeman's proposal.<sup>2</sup> However, I agree with Mr. Lindeman's implicit assumption that, on the whole, governmental activities are those of an agent of consumers, and that inclusion of all governmental activities is better than a line of demarcation based on direct taxation.

*The cost approach to the valuation of final products of government*

In recommending the cost approach to the valuation of final products of government as preferable to Kuznets' tax approach, Mr. Lindeman is in agreement with numerous other economists who have given careful attention to this problem.<sup>3</sup> Most of them have come to the conclusion that the method used by national income estimators in evaluating the services of endowed institutions, religious organizations, and other nonprofit associations is more suitable for evaluating the services of government than the method of evaluating governmental services developed by Kuznets on the basis of an analogy between government and profit-making business enterprise.

In the preparation of national income estimates the services of endowed institutions, religious organizations, and other nonprofit associations are evaluated at cost. This cost is met in part by transfers of individual income to the institutions and in part by income of the institutions from property. Thus, in a balanced statement of national income summing the value of final products on one

<sup>1</sup> For previous recognition and discussion of the "twilight zone" between intermediate and final products in the nongovernmental sector of the economy, see *Studies in Income and Wealth*, Vol. Three, pp. 381 and 396.

<sup>2</sup> The National Income Unit of the Department of Commerce might, with good reason, feel hesitant about assuming such a responsibility, since this would amount to one segment of the government making an administrative decision regarding the character of each activity of the whole government.

<sup>3</sup> This problem is discussed in *Studies in Income and Wealth*, Volume One (papers by Gerhard Colm and Clark Warburton and comments thereon), and Volume Two (paper by G. C. Means, Lauchlin Currie, and R. R. Nathan and comments thereon).



side and summing income payments or income shares on the other side, the cost of the 'free' services of endowed and other nonprofit-making institutions on the value of products side is matched on the income payments side in part by a portion of the income paid to individuals and in part by rents, interest, and dividends received by institutions from their endowments.

The evaluation of the 'free' services of government at cost on the value of products side of the balanced statement of national income is also matched in part by a portion of the income received by individuals, the portion paid to the government in direct taxes. If the government collects royalties or other income from property, these amounts will also be included on the income payments side. The remainder of the cost of providing 'free' services (omitting the problem of government deficits from the discussion) is met from the proceeds of indirect taxes, but where do such taxes appear in a summation of income payments?

#### *Indirect taxes*

The simplest method of handling indirect taxes is to include them in income payments or income shares. Another method is to treat that part of the value (cost) of final products met by indirect taxes as a deduction from the aggregate value of final products of business concerns sold in the market, similar to lump sum valuation adjustments deducted from the aggregate value of fixed assets in a business firm's statement of assets and liabilities. Either method provides a balanced statement conforming to the requirements of double entry bookkeeping. A third method, which has the most substantial support in price theory and which also meets the bookkeeping test, but which meets the greatest obstacles in practice because of inadequate data, is to divide indirect taxation on the basis of its incidence.

Mr. Lindeman wavers between the first and second method, recommending the first for some purposes and the second for others. His arguments in favor of this dual solution rest in part on assumptions concerning the character of taxation and in part on the purposes of national income estimates.

#### *Relative importance of various types of taxes*

Mr. Lindeman's recommendations depend upon the theoretical separation of government tax revenues into five parts, and upon assumptions regarding the relative magnitude of certain of those parts. The five types of taxation are:

Direct taxes paid by:

Individuals

Business concerns: i.e., taxes paid out of profits

Indirect taxes, i.e., taxes paid by business concerns, other than those paid out of profits, which are used by the government in providing final products:

Which reduce the income shares of individuals

Which raise the prices of the output of the concerns taxed

Business benefit taxes, i.e., taxes used in providing services to business concerns as such.

The indirect taxes that raise the prices of output are the taxes Lindeman designates 'non-income business taxes' and this term will be retained throughout these comments. The term 'indirect taxes' is used when those which reduce the income shares of individuals are also covered by the discussion.

Mr. Lindeman makes two fundamental assumptions regarding the relative magnitude of these types of tax: (1) that indirect taxes are larger than business benefit taxes; and (2) that the indirect taxes that raise the prices of output of business concerns are larger than those which reduce the income shares of individuals.

The first assumption follows from the decision to treat all governmental services as final products; in fact, that decision carries with it the decision to treat business benefit taxes as nonexistent. Obviously, if it is considered impossible to separate the value of business benefits from final products of government, and business benefits are therefore to be treated as zero in national income estimates, then business benefit taxes must also be treated as zero.

Once the first assumption is made, the second assumption is that taxes collected from business concerns (other than those paid from profits) affect prices more than income shares. This assumption may be correct, but I do not think it should be made before the incidence of taxation has been studied. Certain characteristics of our economy are such that a considerable, though admittedly unknown, proportion of indirect taxes affect income shares rather than prices of output. A very large portion of indirect taxes consists of property taxes, and since most property taxes are locally imposed, the relation between them and the value of output of the business enterprises that pay the tax varies greatly from place to place. However, most of the output is sold in national markets. Consequently, we would expect a considerable portion of property taxes to rest on income

shares rather than on prices. In the case of excise or selective sales taxes, which account for another very large portion of indirect taxes, if there is imperfect competition among producers of the items taxed or more competition in the sale of the product than in the hiring of labor (that is, better mobility of output than of labor), and the demand for the articles is elastic, a considerable portion of the tax is likely to be shifted to income shares. That these conditions are prevalent is known.

There is, therefore, a large degree of doubt about the validity of Mr. Lindeman's statement: "In the absence of the required knowledge a reasonable expedient would be to treat all taxes paid by an enterprise as a condition of doing business, regardless of profitability, as non-income taxes." It is, in fact, quite possible that taxes, other than income and excess profits taxes, paid by business concerns (treating farmers and home-owners as business concerns with respect to farm operations and home ownership) have more influence on income shares than on prices paid by consumers. If this is the case, the aggregate Mr. Lindeman terms 'value of the national product' is a closer approach, using his own line of reasoning, than the aggregate he terms 'earned national income' for the purposes for which he recommends the latter aggregate.

### *Subsidies*

Subsidies, like indirect taxes, may be treated as a positive item on one side or as a negative item on the other side of a balanced national income statement. Choice of method of treating subsidies is independent of choice of method of treating indirect taxes.

If indirect taxes are excluded from the sum of income shares on the ground that they (on the whole) raise prices to consumers, then subsidies can be treated as either: (a) negative indirect taxes on the ground that they reduce prices to consumers and provide income to producers in lieu of income resulting from competitive prices; or (b) income to certain persons in addition to that resulting from competitive prices, and therefore, like pensions, transferred from some other persons via governmental action.

If indirect taxes are included in the sum of income shares as part of the value of the product of industry drawn by government as an agent of the population, then subsidies may be treated as either: (a) negative income of government, so that the amount tabulated as income derived by government as the agent of the population is the amount of indirect taxes minus subsidies; or (b) income of the

recipients drawn from government, just like the salaries of direct government employees.

In strict theory, choice between the two methods, at least in the case of a national income estimate designed to serve the purposes of Mr. Lindeman's 'earned national income', depends upon the incidence of subsidies, and this problem is as complex as that of the incidence of taxation. The assumption implicit in Mr. Lindeman's treatment, that the incidence of subsidies is such that as a whole they have an effect upon prices or income shares opposite to that of indirect taxes as a whole, needs further examination.

### *The uniqueness of indirect taxation*

The foregoing discussion of the treatment of indirect taxes and subsidies has been based on Mr. Lindeman's premise that national income should be so estimated, for certain purposes at least, as to approach as closely as possible income shares and values of final products produced by competitive forces. Mr. Lindeman regards the effect of indirect taxation as different from that of other forces having an influence on market prices:

"The imposition of such taxes [non-income business taxes used to finance an unemployment relief program] introduces a new element into price . . . These taxes are . . . a share of the price against which no factor activity can be set."

This 'new' element in price, against which no factor activity, in the traditional sense, can be set is not as unique as Mr. Lindeman implies. An essentially similar element in price occurs whenever the social arrangements under which some goods are produced, distributed to users, and evaluated interfere with the social arrangements in other sectors of the economy for the evaluation of other goods. Such interference by one sector of the economy with the evaluation of the output of another sector is not limited to interference by government with the prices of the output of business concerns. Changes in the character of the market or in the procedures of business enterprises may also change the values of the output of other business concerns without changing the 'productivity' of the factors attached to the latter enterprises. The effects of a decision of a group of people in a community or nation, through their representatives, to purchase certain final products, such as education or military protection, and the collateral decision to obtain the income to meet the cost by interfering with the prices and values of other products of the economic system, are similar to

•the effects of many decisions made by individuals throughout the economic system. Consideration should be given to the extent and character of such interferences in order to avoid a hasty decision to treat nongovernmental interferences in one way and similar interferences resulting from governmental action in another.

In imposing indirect taxes having their incidence on prices of final products, the government is acting as a monopolist. It is as logical and realistic to call the government a factor attached to the enterprise (in that the government may withhold permission to conduct the enterprise if its demand is not met) as it is to call the owner of a necessary ingredient, resource, or process a factor attached to the enterprise because the owner may withhold permission to conduct the enterprise if his demand is not met. In both cases an income is drawn from the enterprise by virtue of economic power lying outside the competitive sphere.<sup>4</sup> To say that the imposition of indirect taxes introduces, in the social arrangements under which economic goods are produced, an element radically different from those prevalent in the nongovernmental sector of the economy is far less accurate than to say that such taxes introduce an element similar in substance to a practice indulged in by business men when they have the opportunity.

In view of the multitude of interferences, nongovernmental as well as governmental, with the competitive prices of final products and with the competitive prices for labor and use of property that constitute income shares, it is at least open to question whether an attempt should be made to adjust for certain aspects of governmental interference (those which raise the prices of final products) without attempting to adjust for other aspects of governmental interference (those which reduce income shares received by individuals) or for nongovernmental interference. Mr. Lindeman recognizes the difficulties of attempting to adjust for governmental interferences with the price of final products in the preparation of national income estimates in current dollars, used for certain purposes—those for which he recommends the aggregate he terms the 'value of the national product'. But for other purposes—those for which he recommends the aggregate he terms 'earned national in-

<sup>4</sup>The similarity between indirect taxes and profits due to imperfect competition is mentioned by J. R. Hicks, in an article upon which Lindeman leans heavily for many of his arguments ('The Valuation of the Social Income', *Economica*, May 1940, pp. 105-24). The similarity between indirect taxation and monopolistic influence is also discussed by Colin Clark in *National Income and Outlay* (London, 1937), pp. 11-2.

come'—he advocates this adjustment, on the assumption that the effects of governmental interference, through indirect taxes, with the prices of final products can be approximated by total indirect taxation.

*The concept of 'earned national income'*

Mr. Lindeman's treatment of what he calls 'earned national income' is subject to criticism from various points of view: terminology, the meaning of the term as a total and with respect to its components.

Mr. Lindeman points out that no ethical judgment is implied in 'earned income'. However, regardless of ethical judgment, 'earnings' and 'earned income' commonly connote a certain part of income. Usage varies considerably as to what part, but the contrast between it and the other part of income exists in the language of the man in the street, in business accounting, and in income tax legislation. It is a badly chosen term to designate what Mr. Lindeman wishes to include in the sum it purports to describe.

Mr. Lindeman uses several phrases to describe the character of the total he designates 'earned national income':

An aggregate of the returns to the labor and property factors participating in production;

A measure of current productive activity in value terms;

Sum of factor earnings;

The sum of factor costs as a measure of the (market determined) value of their productive activity;

A money measure of factor activity.

This variety of explanatory phrases reflects, I think, a real confusion concerning the meaning of the aggregate they purport to describe. Some of the descriptions are inaccurate or misleading. The most inaccurate is that it is a measure of the value of current productive activity. The sum Mr. Lindeman designates 'earned national income' is not such a measure for two reasons. One is that the sum includes the present use-value of past (not current) productive activity. The current output, or product, resulting from the entire economic process is in part a direct result of past economic activity. The value of current economic activity can be much more closely approached by the sum of wages, salaries, and other payments for personal services, including the part of entrepreneurial profits that may reasonably be allocated to labor income. The other reason, and this applies also to the other definitions in terms of activity, is that

an unknown, but undoubtedly substantial, share of the value included in the sum is a value that results from deliberate inactivity.

In defining 'earned national income' as the sum of factor costs as a measure of the (market determined) value of their productive activity, there is confusion between the market determined value of production factors as such and the market determined value of the final product emerging from the combination of production factors. The sum of income shares derived from the economic system equals the latter rather than the former because whenever the market determined value of the product differs from the market value of production factors, the residual, plus or minus, is assigned, in the accounting process, to certain persons who have a legal claim to it. This residual is so assigned because it is income to those persons, not because it represents part of the 'market-determined value' or 'productivity' of a production factor.

In pure competitive theory, to be sure, such residuals between the market determined value of the product and the market determined value of production factors are assumed to approach zero in the long run. However, in fact there are three important influences—indirect taxation, monopolistic influence, and imperfect competition other than monopolistic tactics—that produce a difference between the market value of final products and the competitive value of production factors. All three elements in the value of final products must be eliminated to obtain an aggregate that is a reasonable approach to Mr. Lindeman's desire to provide a "method of measuring income . . . to preserve its general meaning as . . . the sum of factor costs as a measure of the (market determined) value of their productive activity". Of the three elements, Lindeman eliminates only the first, though Mr. Hicks recognizes the inherent similarity, in economic theory, between indirect taxation and imperfect competition.

Mr. Lindeman argues that in practice it is possible to deduct indirect taxes (as represented by all taxes paid by business concerns except income and profits taxes), but not to make deductions for monopolistic influence or other aspects of imperfect competition. He recognizes that the results are no more significant than the imperfect market mechanism permits them to be. However, he indicates his belief that estimates of the value of the national product adjusted for indirect taxation, and components thereof, are usable—in fact, good enough so that they are "absolutely essential"—for comparisons of economic activity by factors and industries, and also

for measuring the war potential of the economic system. The usefulness of 'earned national income' and its components for these purposes, it seems to me, is exceedingly slight. Imperfect competition is so rampant in modern economy that the components of the aggregate Mr. Lindeman designates 'earned national income' are worthless for an analysis of factor costs along the lines of competitive price theory. We should recognize that it is impossible to divide the value of final products into factor costs, except by adding to the traditional factors of production two specific factors of interference (indirect taxation and monopolistic influence) and a residual reflecting other factors of interference with competitive price adjustments. The parts of the value of final products resulting from the factors of interference may, perhaps, be called 'factor costs'—whether they are market determined or set by governmental order—but these costs cannot properly be described as 'value of productive activity'.

If it is impossible to adjust national income estimates for these important elements in the value of final products attributable to factors of interference rather than to the true factors of production, Mr. Lindeman should not claim that what he calls 'earned national income' represents the value of productive activity, or that its components represent the value of the activity of the traditional factors of production.

The least inaccurate of the explanatory phrases Mr. Lindeman uses to describe the meaning of 'earned national income' is the first: an aggregate of the returns to the labor and property factors participating in production. Even this is not wholly unobjectionable. A more accurate description would be: an aggregate of the income derived by labor and property-owners from the productive process, by type of income.

*Contrast between 'earned national income' and 'value of the national product'*

The foregoing comments on the character of the sum Mr. Lindeman inappropriately calls 'earned national income' and improperly says represents the value of productive activity lead to a consideration of his contrast between it and the sum he calls the 'value of the national product'. In discussing the difference between these two aggregates, Mr. Lindeman insists that they measure two different things that happen (except for the influence of indirect taxation) to come to the same total, that 'earned national income' is in



terms of costs and the 'value of the national product' in terms of the prices of finished goods.

In truth, the components of the two totals are different. The components of 'earned national income' are factor costs (in the traditional competitive sense) plus other payments that become income to the individuals who receive them. They are income shares. The components of the 'value of the national product', on the other hand, are the market values of end-products or final output, including appropriate equivalents in the case of certain products not actually sold in the market.

Moreover, the two totals do not just happen to be equal. They are necessarily equal, except for errors of estimate and inconsistency in methods of evaluation, for a very simple reason: the sum of factor costs and other income shares includes a residual item, plus or minus, defined as the difference between the sum of all other income shares and the value of output. As totals the two concepts become identical, like the assets and liabilities (including capital account) of a business firm, and for the same reason, namely, that one component of one total is a residual derived by subtracting the sum of the other items from the other total. The national income estimator, to be sure, does not in practice perform the subtraction, just as the bookkeeper does not do so in drawing up a balance sheet from the books of the business concern. In the national income estimation it has been performed by business concerns in computing their profits, just as in the preparation of a business firm's balance sheet it has been performed in keeping the books.

As a total figure, therefore, 'earned national income' is the value of the final output or national product. The difference between it and the total Mr. Lindeman designates the value of the national product results from inconsistency in the method of evaluation. Mr. Lindeman fails to obtain the same figure in estimating national income by the two methods simply because he omits, in his summation of income shares, an important element of income. This missing item is the part of the proceeds of sales of final products that is paid to the government, as an agent of the population, instead of being paid to individuals in their capacities as employees, stockholders, etc. The taxes Mr. Lindeman describes as 'non-income business taxes' are indirect personal income, that is, income routed through the government and received in kind. They may also be regarded as a kind of property return paid to the government because the government, by virtue of its economic power and pre-

rogatives, has placed itself in the position of a holder of a prior lien on the value of the product.

This discussion of Mr. Lindeman's concepts from the viewpoint of terminology, double entry bookkeeping, and consistency in method of evaluation does not, of course, touch the heart of his arguments. If the two totals balance, there may be good and sufficient reasons for adjusting them, not on one side, but on both sides of the balanced statement, for certain uses to be made of the aggregates; and this adjustment may be assumed to equal indirect taxation.

*Appropriate aggregates for various purposes*

Mr. Lindeman recognizes that "there is no 'correct' measurement of national income, and hence of the government's contribution to it, independent of the purposes for which the measure is devised". He says he is concerned with national income as a measure of both total economic activity and total output, and that his objective with respect to government is to devise a procedure comparable with the valuations in the private sector of the economy for these two purposes. Toward the end of his paper he states: "Measures of the value of factor activity are not only useful and desirable but also are absolutely essential for certain applications of income statistics. Whenever the emphasis is on productive processes, it is factor activity that is relevant. If we want to make inter-industry comparisons of factor activity, we must use earned national income and its components as data. Certainly an appraisal of war potential must be made with reference to factors, and the valuation of the factors must be made in terms of cost."

As general theoretical statements, these sentences sound very good, but when the components of Mr. Lindeman's 'earned national income' are applied to a particular case, their absolute essentiality turns into absolute worthlessness. Take the case of 'inter-industry comparisons of factor activity', in dealing with productive processes or in appraising the war potential, of the aluminum industry. Does Mr. Lindeman really think that the relation of wages to profits in the aluminum industry or the relation of profits in the aluminum industry to those in the machine tool industry has any significance in these connections?

The fact is that modern economy differs so greatly from a fully competitive economy that the components of 'earned national income' are of very little, if any, use in analyses of factor activity or

productive processes. They are useful measures of income shares, that is, for such purposes as comparing the income derived by labor and property owners in various industries, or analyzing the division of the total national product among types of income. For these purposes income turned over to the government and used to provide 'free' services should be recognized, and the difference between 'earned national income' and 'value of the national product' disappears.

### *Valuation of income from government property*

Mr. Lindeman points out that for certain comparisons of the components of the national product, an imputed income from government property should be included, and concludes: "On the whole, the return on government property seems an important enough category to warrant an attempt at imputation despite the practical limitations." However, this recommendation is not accompanied by any suggestion of how to impute the value of the use of government property.

Is the use of government property not more analogous to that of consumers' durable goods than to that of business property, especially when governmental activities are considered final products of the economy together with consumers' durable goods? In the case of consumers' durable goods inclusion of imputed rent on owner-occupied dwellings is necessary in order to provide a reasonable degree of comparability with actual rent payments, and a reasonable degree of comparability of incomes of home owners with those of tenants. However, no allowance is usually made for the use-value of other consumers' durable goods, including such large items as automobiles and refrigerators, and these goods enter into the calculations as direct purchases of consumers' goods without going through capital accounts. An analogous procedure would be to include the rental value of government buildings (presumably on the basis of rents paid by the government), and perhaps also of such structures as shipyards. But armaments, including aircraft and naval ships, would be treated like consumer purchases of automobiles.

### *Classification of final products*

Mr. Lindeman suggests three categories of final output: privately produced consumers' goods, private capital formation, and government output. This is not a satisfactory solution of the problem of

fitting governmental activities into the customary division of final products between consumers' goods and capital formation, especially acute in wartime. Any solution proposed should reflect the decisive deflection of the economic system from consumers' goods, as ordinarily defined, and also from capital formation designed to enlarge the capacity to produce consumers' goods. This change in the orientation of the economy is not adequately reflected by complete separation of the value of final products of government from those of the nongovernmental section of the economy because some important governmental products, such as education and educational buildings, are likely to be curtailed along with other consumers' goods.

I therefore suggest that the traditional twofold classification of final products into consumers' goods and capital formation should be expanded into a threefold classification, the additional category to include the cost of governmental activities usually thought of as the basic functions of government, namely legislative bodies, courts, general administrative departments, defense, and war. These are the types of government activity most difficult to treat as services to either individuals or business. Under this proposal, some final products of government would be classified as consumers' goods and some with nongovernmental capital formation, but the major portion of government activities, in terms of cost under present conditions, would be placed in the new category.<sup>5</sup> The application of this threefold classification of the final products of the economy should be carried back through World War I.

Such a classification of final products by type would be separate from a classification by industry. In classification by industry the products of government are, of course, segregated from the products of the nongovernmental sector of the economy.

#### M. A. COPELAND

Mr. Lindeman is addressing himself to improvements in income estimates in an area in which established methods of measurement, though admittedly unsatisfactory, had been tolerated before the war partly because the difficulties then involved were relatively small and partly because of conceptual disagreements. The war effort has greatly increased the magnitude of the items in this area

<sup>5</sup> This suggestion is given in more detail in my comments on Mr. Goldsmith's paper.

for which estimates have been unsatisfactory and revised methods have become imperative.

As a remedy Lindeman proposes two concepts and hence two estimates which he would substitute for the single concept 'national income'. Two aspects of his proposal should command general agreement.

1) In both his proposed measures Lindeman would use an imputed income estimate based on a valuation of government tangible property instead of using government cash interest payments. The difficulty with the cash interest computation was recognized during and immediately after World War I, and then neglected by most income estimators. Current changes in government debts have again made the difficulty with the cash interest computations a matter of current importance.

Although Lindeman and I agree on proposing an imputed measure for government property income, Lindeman misstates the reasoning that originally led me to make such a proposal<sup>1</sup> when he implies that I am optimistic that the government will set up a "business-like system of accounts . . . in the near future". I am not optimistic about that. I would only urge that (a) the problems involved in an estimate of imputed income on government property are similar to those involved in estimating imputed income for owner-occupied houses and (b) an imputed income estimate can be made with sufficient accuracy to be an improvement over the established type of cash interest payment estimate.<sup>2</sup> It would be difficult to quarrel with either proposition.

2) Another and even more serious defect in our pre-1940 procedures of income measurement has been disclosed by attempts to measure the war and nonwar constituents of the net value product separately. These attempts indicate a substantial understatement in the measurement of the increase in total national income following 1939. Lindeman's proposal of two income concepts provides a correction for this error in measurement of recent year-to-year movements of total national income.

The two concepts Lindeman proposes correspond in a sense to two generally recognized methods of estimating national income, both of which use accounting data covering the operations of busi-

<sup>1</sup> *Journal of Political Economy*, Feb. 1932, pp. 29 ff.

<sup>2</sup> "The possibility of making accurate estimates of a theoretically untenable item is not an argument for substituting it for a tenable item that can be estimated only roughly" (*Studies in Income and Wealth*, Vol. One, p. 29).

nesses, governments, and other enterprises. These two methods have sometimes been referred to as the debit or distributive-shares method of estimating the net value product and the credit or revenues method. If consistently defined and evaluated, the debit concept and the credit concept will necessarily be theoretically equal, and the differences between the two estimates will necessarily reflect errors in measurement.

In effect Lindeman would take the debit estimate as his concept of 'earned national income' and would define his 'value of the national product' as the credit estimate plus business taxes. In other words, 'earned national income' is a new name for an old concept, and 'value of the national product' is a new concept created by summing two existing concepts: (a) the net value product of the economy and (b) business taxes. Lindeman's 'value of the national product', if computed by adding business taxes to a net value product estimate made on the old pattern (and substituting an imputed property income estimate for government interest payments), will give a year-to-year movement that is more nearly accurate than that of 'earned national income'.

Lindeman's argument for his two concepts constitutes a theoretical justification for moving further in a direction sometimes referred to as 'providing different meanings of the term national income for different purposes'. But if there is a special purpose served by an income series that displays reasonable year-to-year movements but operates on too high a level (that is, what Lindeman calls the 'value of the national product' the level of which is too high by an amount measured roughly by business taxes) Lindeman does not state this purpose. Nor does he state the purpose to be served by a series that, while avoiding the double counting of government charges for services to business, shows a year-to-year movement known to understate the recent growth of national income. What would seem to be needed, both theoretically and practically, is a single measure of national income that has a year-to-year movement similar to Lindeman's 'value of the national product' and a level like that of his 'earned national income'.

By way of recapitulation, I suggest that there are two points on which there should be general agreement: (1) despite deficiencies in existing data, income estimates can be improved by substituting an imputed property income estimate for the estimate of cash interest payments on government debt, and (2) methods of measure-

ment should be revised to correct the understatement of the income increase since 1939.

The theoretical justification Lindeman offers for his proposal of two income concepts greatly oversimplifies the actuality of our economy in two important respects. In each he follows the traditional paths of neo-classical economic theory: (1) He conceives our economy as consisting of two spheres that differ in kind rather than in degree—on the one hand business enterprises and on the other government. (2) He assumes that in one sphere, business, it is easy, in general, to identify a *quid pro quo*, while in the other, government, such identification is, in general, impossible.

Let us consider the second point first. Lindeman's disinclination to treat business taxes in the same way as the cost of goods and services purchased by one private enterprise from another derives from the sharp distinction he draws between government and business. Because he assumes that a *quid pro quo* can be identified in each private business transaction, he feels that the allocation of business charges as between (a) ultimate consumers and (b) customers that are producing enterprises may be accepted at face value for purposes of computing an unduplicated total of net value products. On the other hand he holds that the corresponding allocation in the case of charges for government operations cannot be given any credence whatsoever for this purpose.

In making this sharp contrast he seems to have in mind a small scale business enterprise producing only one homogeneous product rather than a large scale highly integrated corporation. Consideration of the latter type of enterprise raises questions concerning the allocation of charges by business enterprises as between (a) ultimate consumers and (b) customers that are themselves producing enterprises. Can we be sure of the *quid pro quo* basis for allocating indirect costs as between charges to enterprises and to consumers in the allocation of charges as between freight and passenger traffic on the railroads? between domestic and commercial rates for telephones? between domestic and commercial rates for electric power? and the allocation of charges for commercial banking services as between individuals and business enterprises?

Lindeman seems to hold that the greater difficulties in identifying a *quid pro quo* in the case of government services than in the case of business products and services are responsible for the fact that on the whole, business financial records are better than government financial records. Hence, his disinclination to try to eliminate the

admitted double counting involved in the series 'Value of the National Product' by estimating what better government records might have shown, if available. If his position were entirely correct in this respect, we should expect to find that accounting records of small scale enterprises are on the whole better than those of large scale enterprises. Actually the contrary is the case.

It is proposed that an attempt be made to estimate what government records might show if they were better. In proposing this I do not wish to suggest that we should force government into a business mold; nor do I suggest that the task of estimating proposed is easy. I merely urge that the ground of Lindeman's pessimism is not firm, and that we should be optimistic enough not to give up the task until we have tried. I am convinced that a genuine effort of this sort promises worth while results.

Not only are the two spheres of our economy just considered less sharply distinguished than Lindeman suggests, but also we must reckon with other types of entity, with farms which are to some extent self-sufficient and with churches and other nonprofit institutions. If two spheres call for two concepts of national income and there are actually more than two spheres, where does this line of argument stop? <sup>8</sup> If the difficulty of allocating the charges for government service as between business enterprises and consumers is, as Lindeman alleges, ground for having two concepts of income instead of one, shall we not in theory at least need to double our income concepts again, because of the difficulty of distinguishing between the cost of farm products the farmer eats and the cost of farm products fed to his livestock? Or shall we continue to ignore this difficulty in practice as of small consequence?

The moral I suggest we draw from these considerations is this: "The need for different meanings of the term national income for different purposes" has sometimes been an excuse for tolerating a general confusion of terminology.

No one will question the propriety of a multiplicity of special purpose indexes or other estimates of income employed in the many special purpose studies. But neither this propriety nor technical statistical difficulties can justify an agency such as the National Bureau of Economic Research or the Bureau of Foreign and Domestic Commerce in maintaining two, three, or four standard time

<sup>8</sup> If difficulty of allocation justifies a duality of concepts, the field of government surely justifies another conceptual doubling because of the difficulty of distinguishing government payrolls from relief payments.



series, which are certain to be confused with one another and each of which is certain widely to be thought of as an estimate of *the national income*.

### REPLY BY THE AUTHOR

There is no disagreement in principle between Mr. Warburton and myself on at least one point. We are agreed that it would be desirable to devise a satisfactory method of eliminating the intermediate output of government in order to remove the duplication in the value of the national product total which comes from treating all government output as final. Where we disagree is over the question whether a satisfactory and generally acceptable method of defining and measuring the intermediate output of government can be devised. Mr. Warburton's proposal that the problem might be put up to a committee of economists in no way reduces my skepticism. While undoubtedly immediate agreement could be reached with respect to extreme items, I am still convinced that the very wide 'twilight zone' would present a formidable obstacle. At any rate, while we are waiting for the committee to be set up and reach a decision, I think it would be better *immediately* to do away with the present assumption concerning the equality between business taxes and the value of governmental services to business, and to admit that our total includes some undetermined duplication.

For most of Mr. Warburton's other points I am inclined to refer the reader to my paper for rebuttal. They are anticipated and answered to my satisfaction there. I have only one further comment.

Aside from the question of duplication, it is proposed in my paper that we strike a total for the value of the national product by summing (1) the value of the final output of government taken at cost, and (2) the value of the final output of private enterprise at the prices it actually sold for in the market. I assume that Mr. Warburton does not quarrel with this method.

If we divide this total into the shares received by members of the community we have, in addition to the income shares that accrue to individuals and business enterprises, a residual item, indirect taxes. The method of disposing of this residual item is at the center of the controversy.

Suggesting three ways of treating indirect taxes, Mr. Warburton says I waver between the first and the second:

a) To count them as one of the income shares;

- b) To treat them as a deduction from the aggregate sales value of final products of business concerns; or
- c) To divide indirect taxation on the basis of its incidence.

Actually, I 'waver' between the first and the third methods in principle. However, with respect to earned national income I suggest that (because of the statistical impossibility of separating the taxes according to incidence) we should assume that the conventional categories of indirect taxes have their incidence on prices, and we should hope that the error involved in the assumption is substantially canceled by the ability of many business organizations to institutionalize their 'income' taxes as costs.

Mr. Warburton's comment that this third method has the most substantial support in price theory indicates that he also would like to divide indirect taxes according to incidence whenever a distributive share breakdown is shown. Now, Mr. Warburton disagrees with me concerning the probable preponderance of the incidence of indirect taxes. I am willing to leave the question open, merely reiterating my belief that the appraisal of incidence suggested in my paper is not too far from the truth. The question of incidence is not, after all, the point at issue; but the decision to recognize it is. For that reason Mr. Warburton's concern with incidence, and his desire to correct the reported income shares in order to account for it, is of the utmost interest.

Let us go back for a moment to the value of the national product. Its components are economic goods and services reduced to the common denominator of market price (or, in the case of government, an acceptable substitute for market price). They constitute a homogeneous group; their economic content is identical with that of the aggregate. If, however, we strike a balance on the income side by summing the shares in the price *as reported*, we have components that, while useful in many ways, are not altogether meaningful as payments for the factors of production of competitive price theory. Mr. Warburton and I both recognize this; that is why we see the theoretical desirability of correcting the reported shares and also the total value of the national product for the incidence of indirect taxes (among other things), if the reported shares are to be thought of or used as measures of the value of factor activity. Once this correction is made, a residual consisting of the indirect taxes that have the effect of raising the price of output rather than of reducing the income shares still remains.

The difference between us is very clear. If national income esti-

mates are used to approximate the value of factor activity, I would throw out this residual as an element so patently unique that it cannot sensibly be included with the income shares. Mr. Warburton does not consider it so unique, and suggests that it may be kept in and called a monopoly return to government. I cannot see that much can be gained from this procedure. If it is desired to relate shares in the price of output to factor activity, I still think it can be done better by the method I suggest than by stretching the idea of monopoly to cover government.

Of course, another procedure can be followed: we can abandon the attempt to relate income shares and 'value added' to factor activity, and simply report the shares in the price of output without any correction. This would eliminate the necessity of rationalizing the inclusion of indirect taxes. It would also eliminate the question of incidence, which arises only if we are not satisfied with the reported shares as a measure of the return accruing to factors of production. I think this should be Mr. Warburton's position; furthermore, I think it is a reasonable and defensible position. But it does not answer the need for national income statistics that can be used in an analysis of (for example) the economic activity of the various industry groups.

*Part Two*

MEASURING THE ECONOMIC IMPACT  
OF ARMAMENT EXPENDITURES

R. W. GOLDSMITH

WAR PRODUCTION BOARD

*Discussion*

CLARK WARBURTON

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WAR PRODUCTION BOARD

The first draft of this paper was prepared early in 1942. It was revised in September utilizing comments made at the meeting of the Conference as well as suggestions received from friends who were good enough to struggle through various forms of the manuscript. Pressure of other duties unfortunately has prevented me from taking as much advantage of these suggestions and of some of the recent literature on the subject as I should have liked. A few changes in the statistical material were made in March 1943.

# Measuring the Economic Impact of Armament Expenditures

R. W. GOLDSMITH

THE HUMAN MIND, it seems, longs for neat and simple measures of complicated sets of facts and tends to use them as shorthand symbols. In economics examples of this tendency are quantitative concepts such as the national income, the volume of production, the level of prices, the balance of trade, and in more technical spheres, the Pareto coefficient of inequality of income distribution and the net reproduction rate of a population. It is, therefore, only natural that attempts have been made to find one figure that would in itself provide an indication of the economic impact, or, if a more colorful word is preferred, the economic burden of a rearmament or war effort on an economic system.

During the first World War there seems to have been an inclination to summarize the economic aspects of the war effort by the crude dollar figures of Treasury expenditures for military purposes. This time another figure seems to have caught public attention, the ratio of reported military expenditures to national income. Whether or not popular thinking about the subject has brought about this change in emphasis, it certainly constitutes a step in the right direction. Economists are still under the obligation, nevertheless, to determine whether this new shorthand symbol answers the questions it is supposed to answer. Moreover, if this figure is found wanting as a tool of economic analysis, we are left with the duty to find a more suitable figure. To conclude that matters are too difficult and complicated to be reduced to a relatively simple over-all measurement may salve our conscience, but does not discharge our obligation to the public.

Throughout the analysis we are interested not only or even primarily in the influence of defense and war on the government's accounts but in the influence on the nation's accounts. In other words, we want to see how preparation for war or the conduct of war affects the balance sheet and the income account of the nation regarding these as a combination of the accounts (kept by or reduced to methods as comparable as possible) of all the individuals, business enterprises, governmental, and nonprofit units within its boundaries. We must be aware that the economic impact of armament expenditures is not the same thing as the 'cost of war', which in the sense usually employed represents a broader concept. The

difference rests mainly in confining this discussion to the economic aspects which, by definition, exclude the human cost of war.

But we go even further. Three problems of great importance in any evaluation of the total economic cost of war are regarded as falling outside the scope of this paper: (a) The effect of the defense or war effort on the total resources used (see Sec. III H); (b) The reduction in consumers' satisfaction due to shifts within civilian disposable income, shifts due to curtailment of production through allocation, to consumers' rationing, to price fixing or to other regulations made on account of the defense or war emergency; (c) The reduction in productivity likely to follow from a large scale shift from civilian to armament production.<sup>1</sup>

## I Definitions

'Measuring', as already explained, is interpreted as finding one quantitative expression for the impact on a country's economic system of the activities subsumed under armament expenditures.

The meaning of 'expenditures' is discussed in considerable detail in Section III. Suffice it to say here that the term is used in something like its accounting sense and that it is not identical with cash outlay.

The term 'armaments' is intended to cover every activity directly connected in peacetime with the military establishment or in wartime with the conduct of hostilities. There is always some question where such a direct connection ends, especially in modern 'total war'. Some will argue that under present conditions all economic activities except the small and quantitatively unimportant sphere of luxury production and services must be regarded as related to armaments. I prefer to continue interpreting the term more narrowly and to include under it only those commodities and services whose use is directly connected with or traceable to the defense or war effort, i.e., all expenditures on the armed forces and their auxiliaries, on materiel<sup>2</sup> and on the facilities that produce materiel. It seems preferable, particularly in the interest of comparability over time and between countries, to exclude indirect armament expenditures such as for the care of civilians (except quasi-military

<sup>1</sup> J. K. Horsefield, who has been bold enough to estimate this factor for Great Britain, calling it the 'invertible output', puts it at £600 million, or about 11 per cent of total output (*The Real Cost of War*, Penguin Books, 1940, pp. 28, 33, 34).

<sup>2</sup> For the difficult problem of civilian disinvestment see Sec. III C below.

items such as provision of air raid shelters), for subsidizing civilian consumption, or to expand facilities for the production of civilian commodities.

The difficulties of separating economic from other activities are familiar, but I feel justified in taking refuge in regarding as economic effects those usually so treated in economic theory, i.e., those which "can be brought directly or indirectly into relation with the measuring rod of money".<sup>3</sup> The effects of defense and war on human values, physical or moral, are thus excluded.

'Impact' is used in an over-all sense as the sum total of the effects of defense or war on the entire economic system so far as they are taken into account in the calculation. No consideration is given to differences in impact on classes, industries, or localities within the country.

## II Purposes of Measurement

To say that any measurement depends on and must be shaped in accordance with the purposes it is intended to serve and the questions it is expected to answer is a truism. Foregoing detailed discussion I shall simply list what seem to be the major possible purposes of a measure of the economic impact of armament expenditures.

- 1) To ascertain whether the economic impact of a country's defense or war effort, as represented by its armament expenditures, is becoming heavier or lighter.
- 2) To compare the impact in different countries, in order to find out whether armament expenditures during a period impinge more heavily on the economic system of one country than on that of another.
- 3) To measure the degree to which the defense or war effort has brought about a change in the country's peacetime economic activities, i.e., the extent of the switch-over from civilian to military production.
- 4) To measure the degree of economic sacrifice the armament effort has involved, i.e., to determine the extent to which a country's economic welfare has been affected temporarily or permanently.
- 5) To measure the margin above the subsistence minimum that armament expenditures leave to a country, thus indicating how

<sup>3</sup> A. C. Pigou, *The Economics of Welfare* (London, 4th ed., 1932), p. 11.

much room there is for further intensification of the defense or war effort.

6) To compare the economic cost of armament with its economic results, attempting thereby to see whether defense and war satisfy the economist's basic criterion of yielding a margin of revenue over cost, or more popularly speaking, whether war and preparation for it 'pay'.

The discussion in the next three sections will not be focused on the questions raised by this diversity of possible purposes of impact measurements. An attempt will be made, however, in Section VI to evaluate the extent to which the measurements developed in this paper answer each purpose.

### III Basic Problems of Measurement

#### *A The meaning of 'expenditure'*

The interpretation of the term 'expenditure' is the central and at the same time the most difficult problem encountered in devising a measurement of the economic impact of defense and war that will be theoretically satisfactory and at the same time practicable.

Obviously, it is not possible to accept the reported figure of government payments for armaments as representing, without further adjustment, the measure of the economic impact of the defense or war effort. The types of economic effort paid for by the government and those which are not, as well as the principles governing the prices paid, are too much the result of custom and accident and vary too greatly from time to time and place to place to be usable as more than a starting point.

Any interpretation of the term 'expenditure' is bound to lead to serious difficulties unless the analysis is kept strictly within the field of economic concepts. If that is done, however, it seems possible to interpret 'expenditure' as the use of economic resources and to measure it by the value of their alternative products. This is merely an application of the customary opportunity cost concept to the problem.

This definition immediately eliminates from the sphere of armament expenditures in the economic sense all governmental outlay connected with the defense or war effort so far as it does not involve the use of resources (labor, entrepreneurship, capital equipment, natural resources). These non-exhaustive expenditures, as they are often called, include payments for existing assets (such as land and



buildings) that are to be used for military purposes; transfer payments (such as war pensions); and allowances for taxes and bad debts covered in the prices of armaments paid by the government.

The economic impact of armament expenditures (i.e., the economic cost of armaments), then, is equivalent to the value of the civilian goods and services that would otherwise have been produced by the resources actually used to provide armaments.<sup>4</sup> This formulation does not help matters unless two questions are answered: What resources are used in providing armaments? How can the value of their alternative civilian products be determined?

The first question is of interest and importance only so far as it is needed to answer the second; we cannot determine the alternative products or their value before we identify the resources from which they flow. This identification presents no problem, at least not in principle, though considerable difficulty will be encountered in any given case, depending on how detailed the factual information is. It must be noted, however, that not only the resources for which the government pays are to be included among armament expenditures, but also those used in the defense or war effort without compensation by the government. The extent of the uncompensated use of resources depends, of course, on the legal arrangements in force and on the fiscal policy followed by the government and therefore varies from period to period and country to country.<sup>5</sup>

The real difficulties begin with the determination of the alternative products and their value. If rigorous standards are applied, the problem is insoluble because we can never know with certainty or even a high degree of probability which civilian products would have been produced in the absence of the defense or war effort, in what quantities and by what combination of production factors, or to what extent absolute and relative prices would have been different had the armament expenditures not been made.

Lack of knowledge about the exact form and value of the alternative civilian products would not be too serious if we could assume the validity of the usual rule that the marginal value of a unit of resources is the same in each of its alternative uses so far as competition prevails. We could then use the prices these resources or

<sup>4</sup> The somewhat vague term 'provide' is used in order to indicate that armament expenditures include not only the resources used in producing new armaments and operating old and new armaments but also any other form of consumption of resources directly connected with the war or defense effort.

<sup>5</sup> The problems raised here are similar to the differences between social and private net product treated, e.g., by Pigou in Part II of his *Economics of Welfare*.

their services fetch in providing armaments as the expression of their value in alternative civilian occupations, i.e., as their opportunity cost. Such an assumption is justified in an economic system where competitive free enterprise predominates, so long as armament expenditures are so small that they use merely a minor proportion of total resources and that the process of shifting from civilian to armament production can reasonably be regarded as taking place at the margin of resource use. This condition is met, e.g., by the small wars of the *saeculum mirabile* between 1815 and 1914. However, when armament expenditures are as large as they have become in modern wars, we cannot blandly assume that the price paid for resources used in the defense or war effort is the equivalent of their value in civilian use. The point is reached here where a difference in quantity means a difference in kind. Marginal analysis is not strictly applicable to the macroscopic shifts from civilian to armament production that modern war involves.

Another reason why the customary type of analysis ceases to be valid unless considerably modified is the abandonment in wide fields of the determination of prices by the unfettered interplay of supply and demand and its replacement by price control, conscription, commandeering, priorities, allocations, and other methods that amount to an authoritative fixing of prices for commodities and services, including service in the armed forces and labor conscription.

We must reconcile ourselves, I think, to the fact that a theoretically satisfactory answer cannot be found, and we shall have to be content to devise a practicable solution that is not too different from what we would theoretically wish for and that is at least better, particularly for comparative purposes, than the crude figures given in the government's accounts. The only way I see to such a practicable compromise solution is to start from the assumption, admittedly not strictly valid, that actual armament expenditures represent the opportunity cost of the resources used in providing armaments, but to drop that assumption wherever the divergence between actual payment by the government and armament expenditures in the economic sense is obvious and amenable to quantitative adjustment. The practical problem then becomes one of locating significant instances of such divergency and of devising adjustments for them. Such an approach appears preferable to and more in keeping with economic theory than, the unquestioning acceptance of all the haphazard valuations and compensations deter-

mined by a market place and a governmental bureaucracy acting under the stress of war.<sup>6</sup>

### *B The standard of measurement*

Problems arise also in connection with the unit in which armament expenditures are expressed. To conform as closely as possible to theoretical concepts, we would wish to have the figures expressed in physical units which would vary according to the type of resource employed and of goods produced. This approach, however, can be applied to a measurement of the total impact of a defense or war effort only if the different resources and goods are in terms of a common denominator.

Either one uniform set of prices must be applied to all quantities, or the crude monetary figures must be reduced to a common denominator with the help of price indexes. The first method is hardly practicable because we lack sufficient data on the types of armament produced or on the materials and other cost elements that go into making them. We are, therefore, restricted to the second method, making the unadjusted monetary figures as comparable as possible with the help of appropriate price indexes. The difficulties involved in the calculation and use of such indexes are too well known to need restatement. While no entirely satisfactory solution has yet been found, it should be possible to develop price indexes that would make the figures for any one country comparable, especially since the period of comparison is usually short. Separate indexes must be used for the prices of armaments and of civilian goods since it cannot be assumed that the two will move closely together. A reduction of armament expenditures of different countries to a common denominator, on the other hand, encounters extraordinary difficulties. A satisfactory comparison presupposes, among other things, knowledge of the prices of specific armaments and of wages and productivity in the armament industries, all of which, of course, are regarded as military secrets.

Many of the difficulties involved in reducing armament expenditures to a common denominator, or at least in making them more comparable than the crude data, can be overcome by the use of ratios (such as the ratio of armament expenditures to national income) instead of the absolute figures expressed in their respective monetary units. Resort to ratios, however, does not avoid all the

<sup>6</sup>Needless to say, many of the adjustments made in armament expenditures must be applied also to national income if the comparison between the two is to be valid.

difficulties because the relation between the prices of armaments and of civilian goods is likely to change and almost certainly differs from country to country, although generally much less than the levels of absolute prices.

### *C Uncompensated use of resources*

Almost invariably armament expenditures in the economic sense include certain uses of resources in the defense or war effort for which the government does not pay at all.

a) One category of such uncompensated use of resources is represented by the donation of goods and services by citizens to their government (including contributions to relief organizations), or by one ally to another. Here both sides are aware of the nature of the transaction and agree on the omission of any compensation. Donations of this type must be regarded as forming part of armament expenditures so far as the goods or services donated flow from domestic resources (or foreign investments) that would otherwise have produced civilian goods. The donation of services by persons who are not regularly part of the economic system as usually defined in discussions of national income (such as housewives and debutantes), however, does not have to be counted as a hidden armament expenditure; nor do the activities of civilian defense workers so far as they do not impinge on their input of services into the economic system.

b) In other types of transaction the lack of compensation for the use of resources is due to arrangements made by the government on the basis of its legislative or police powers (either for the emergency only or as a part of the prewar scheme of things) not to a voluntary act of the resource owner. Uncompensated use of resources of this type is present to the extent that the government declines to reimburse property owners for damage through air raid or other enemy action. Other examples of this type of uncompensated resource uses are extraordinary wear and tear on equipment, provided the government does not pay for it in the form of higher prices for supplies. To the extent that compensation is paid not by the government but out of an extra-budgetary insurance fund to which all property owners are forced to contribute, as is the case in Great Britain, expenditures reflecting payments made by the fund should also be added to budgetary armament expenditures to approximate armament expenditures in the economic sense.

c) A special case of uncompensated use of resources, one that is at

the same time of considerable theoretical difficulty and of great quantitative importance, is disinvestment in civilian industries that is attributable to the defense or war effort.

Failure to make good the wear and tear on civilian plant and equipment constitutes a use of resources as it impairs the capacity to produce civilian goods in the future. The use of civilian resources is clearer still in the reduction of non-armament inventories. Nevertheless, two difficulties arise from the viewpoint of the definition of armament expenditures used in this paper. First, the business enterprises owning the deteriorating plant and equipment or the shrinking inventories generally have received payments for this resource-use as part of the sale price of their products. Second, the resources have been used to produce civilian goods, not armaments. Thus disinvestment in civilian industries would at first sight seem not to constitute an expenditure on armaments under the definition adopted and, even if it did, would seem to have been paid for.<sup>7</sup> These difficulties can be overcome, I believe, if we look realistically at the situation as it presents itself in most actual instances.

The owners of the resources in which disinvestment takes place have been paid for their use, but the economy has not, and that is what matters. We are here confronted with another instance of divergence between private and social net product. For the individual private enterprise all that has happened is a change in the form of its assets, the replacement of fixed assets or inventories by cash, bank deposits, securities, or other liquid assets. For the economic system, however, a net disappearance of assets may have occurred since capital has been transformed into goods that have been used up.

Whether civilian disinvestment is an armament expenditure in the economic sense then depends on the specific situation. A strong case can be made for regarding civilian disinvestment as part of armament expenditures when the part of civilian consumption that represents disinvestment is essential to providing the practical minimum of civilian consumption, i.e., when the production of armaments would have to be reduced if the extra consumption made possible by civilian disinvestment were unavailable so that civilian disinvestment may be said to be a source, though indirect, of arma-

<sup>7</sup> Disinvestment in civilian industries representing wear and tear on equipment producing goods purchased by the armed services is, of course, already included in reported armament expenditures. What is under discussion here is the disinvestment in types of equipment that continue to produce goods sold to civilian consumers.

ments. Thus civilian disinvestment may be regarded as part of armament expenditures when civilian consumption (including the part representing disinvestment) is near the minimum, as is now probably the case in most European belligerent countries. The case is doubtful when a wide margin between actual consumption and practicable minimum consumption still exists, as in the United States in 1942 or in Great Britain before 1941. Since it is inadvisable, especially for comparative purposes, sometimes to include civilian disinvestment in armament expenditures and sometimes to omit it, and since civilian consumption tends to approach the practicable minimum as a total war effort gets into full swing, civilian disinvestment has been included under armament expenditures in the sample calculations presented in Section V. This decision, admittedly, is to a certain extent arbitrary, but it seems to constitute the most practicable solution of the difficulties raised.

#### *D Valuation problems*

A second type of divergence between opportunity cost and cost to the government is represented by the under- or overvaluation of resources used in the defense or war effort, in the sense that the price paid by the government is below or above the opportunity cost. The real difficulty here is to find a criterion for the existence and a measure of the extent of under- or overvaluation. Undervaluation will probably be admitted in cases such as the employment of (most though not all) men at a salary of \$1 a year who have been highly paid in their former business positions. But how are we to determine the degree of the undervaluation?

Of larger quantitative importance is the problem of evaluating the services of the armed forces.<sup>8</sup> Any quantitative adjustment will always entail great difficulties and will remain in large degree arbitrary. But so long as the majority of all men are engaged in civilian employment we may take their earnings (particularly if they do not differ much from their prewar level) as an adequate measure of their opportunity cost. In that case the opportunity cost of the services of the armed personnel can be taken as roughly equal to the product of their number and the corresponding average earnings of adult males.

Another instance of undervaluation is presented by the acquisi-

<sup>8</sup> This problem would not arise in the case of mercenaries' armies, at least not so far as their members as well as the professional soldiers of modern armies can be assumed to be guided by economic motives in choosing their occupation.

tion of goods and services by the government through seizure or at prices fixed below those of a free market. Such measures lead to understatement of armament expenditures in the government's accounts since the opportunity cost of the resources used is higher than the price actually paid by the government.<sup>9</sup>

Usually it is not too difficult to identify the instances in which the government obtains the use of resources below their opportunity cost, but there are considerable difficulties in estimating the amount of the underpayment. Quantitatively speaking, however, this understatement of armament expenditures is probably small compared either with total armament expenditure or with the understatement involved in the uncompensated use of resources or in the payment of the armed forces.

Over against these undervaluations there is at least one important cause of overvaluation customarily associated with the war or defense effort: the increase in the remuneration of the factors engaged in war production relative to the remuneration of comparable factors actually engaged in civilian production.<sup>10</sup> In calculations of the impact of armament expenditures this overvaluation should be eliminated by subtracting from actual armament expenditures a fraction corresponding to the difference between the remuneration of the same skills or productive services in civilian and armament production. Any calculation of this sort will give rise to serious difficulties, of both a conceptual and a practical nature, once armament production accounts for the majority of total employment in a given industry or occupation. This instance of overvaluation is, nevertheless, of practical importance because it tends to offset more or less completely, or sometimes even overbalances, the effect of the aforementioned instances of undervaluation that cannot be expressed quantitatively.<sup>11</sup>

<sup>9</sup> In some cases, however, government interference of this nature will not result in an understatement of armament expenditures but rather bring the government's outlay nearer to the opportunity cost of the resources used; for instance, when the government reduces the price it would otherwise have paid to monopolists and moves the price nearer the competitive level.

<sup>10</sup> See Milton Gilbert and Robert Bangs, 'National Income and the War Effort—First Half of 1942', in *Survey of Current Business*, Aug. 1942, p. 11.

<sup>11</sup> To illustrate the possible overvaluation, assume a gross national product of 100 and armament expenditures of 50, both at the prewar rates of factor remuneration; further, assume a 10 per cent increase in the relative remuneration of factors engaged in war production. Then the actual remuneration of factors engaged in armament production would be  $52\frac{1}{2}$  and that of the factors remaining in civilian production  $47\frac{1}{2}$  provided total gross national product remained unchanged.

*E Privately financed armament facilities*

Private investment in armament facilities, including investment for the account of foreign governments and their agents, involves the use for military purposes of resources that would otherwise be currently available for civilian consumption or capital formation. Economically equivalent to armament expenditures by the government, it should be added to reported armament expenditures. Since the facilities remain the property of the private owners and the prices of their products presumably include adequate allowances for depreciation, obsolescence, and profit, the problem of uncompensated or undercompensated use of resources does not arise. If private investment in armament facilities is treated in this way any amortization payments for them (such as are provided under the Emergency Plant Facility Contracts) included in reported armament expenditures, as well as any payment for supplies that actually represent depreciation allowances on armament facilities built since the beginning of the war (or defense) effort, should be deducted in order to avoid double counting.<sup>12</sup>

There is some question, however, about the compass of privately financed armament facilities. In accordance with the tendency not to extend the scope of armaments more than necessary (see Sec. I) only private investment in plant and equipment producing finished armaments or material definitely going into armaments and in inventories destined to be incorporated in armaments should be included with armament expenditures made by the government.

*F The treatment of foreign transactions*

For the sake of completeness the treatment of armament expenditures involving transactions abroad or transactions with foreigners will be discussed briefly, although the general principles apply without change and no new problems are raised. There are four important types of such foreign transactions: the importation of

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In the more likely case, that the shift is brought about by a rise in the actual price of factors engaged in war production to the full extent of the relative shift, total armament expenditure would rise to 55, while the remuneration of factors engaged in civilian production would remain at 50 and gross national product would rise to 105. The overvaluation under discussion, therefore, would amount to  $2\frac{1}{2}$  units or 5 per cent of armament expenditures in the first case and to 5 units or 10 per cent in the second.

<sup>12</sup> The payment of depreciation allowances on all facilities built before the war will, of course, continue to be included in armament expenditures.



armaments (including materials that go into armaments); military expenditures abroad (except on domestically produced armaments); export by the government of armaments for the use of its own forces and of its allies; and export of armaments on a commercial basis.

The cost of imported armaments is, of course, included in armament expenditures as usually reported. There is no reason to exclude it from the economic concept of armament expenditures, since we may regard as the opportunity cost of imported armaments the equivalent amount of civilian goods exported or, if such are wanting, the reduction in net foreign assets. Armaments imported without immediate payment or obligation of future payment obviously are not counted as armament expenditures in the receiving country.

Expenditures (other than on domestically produced armaments) made in other countries in connection with the defense or war effort are treated exactly like those on imported armaments. Their opportunity cost is represented either by the domestically produced civilian goods that must be exported to pay for them or by the net reduction in foreign assets that provides the means of payment. No adjustment, however, is necessary for uncompensated or under-compensated use of resources in foreign countries.

Armaments exported for the use of a country's own or its allies' forces similarly form part of reported and adjusted expenditures.<sup>13</sup> Their economic cost is represented by the civilian goods that could have been produced with the resources employed in manufacturing the exported armaments. However, if the armaments supplied to allies are not regarded as outright gifts or subsidies, the discounted value of the expected future repayments must be regarded as an offset. This will always be a very doubtful item. Experience suggests that it may be wiser to forego an attempt at a rough guess at its size and to forget about the offset.

A more difficult problem is raised by the export of armaments on a commercial basis, which, of course, does not appear among reported armament expenditures. From an economic point of view, however, such exports are similar to other armament expenditures in that they reduce the supply of civilian goods to the extent that they are not offset by a simultaneous net increase in the import of civilian commodities. The problem, therefore, arises only when

<sup>13</sup> It is assumed that such exports are not offset by additional imports of civilian commodities.

payment for armaments so exported is received in forms that constitute an addition to net foreign assets. In that case commercial exports of armaments may be regarded as an additional current armament expenditure offset on capital account by the value of the deferred payments of interest and capital. (The one case of practical importance is presented by the export of armaments by the United States, both from 1914 to 1916 and from 1939 to 1941 before the adoption of the lend-lease arrangement.)

### *G The timing of debit entries*

Determination of armament expenditures for any given period requires a decision about the point at which resources used for armaments shall be debited, i.e., about the time at which their services shall be regarded as having left the civilian sector. There are four ways of handling the matter, two of which have superior theoretical merit while the other two possess the essential advantage of being simpler and more practicable.

One method, to enter the debit at the time of the 'production' of a given piece of armament, encounters theoretical difficulties due to the well known problems involved in determining the period or time of production of any commodity and practical difficulties due to the lack of many of the basic data. Any satisfactory calculation by this method would require data on the input of labor and materials of different types and on the use of existing equipment in the production of armaments. These data, if available at all, are largely independent of the figures reported as budgetary expenditures and great difficulties will arise in reconciling the two sets of figures, neither of which is ordinarily to be obtained in sufficient detail.

A second method, to enter the debit item at the time of actual use, requires the introduction of accounting for the stock of armaments existing at any one time and of depreciation for types of armament that last longer than the interval for which the calculation is made. The practical difficulties involved in this approach clearly outweigh its theoretical attractiveness.

A third method makes the debit entry at the time of the delivery of a finished piece of armament (or of rendering services not embodied in tangible armaments), and a fourth at the time of payment by the government. Both methods are practicable and the choice depends on which seems to approximate more closely the time at which the resources are taken from their alternative civilian use.

From this point of view the 'armaments delivered' base seems preferable. Its use implies exclusion from any period's armament expenditures of prepayments for armaments to be delivered after the close of the period and of payments for armaments delivered during preceding periods, and requires inclusion of any arrears of payments behind deliveries.

### *H Idle resources*

Probably the most controversial and at the same time quantitatively the most important problem in measuring the economic impact of armament expenditures is raised by the fact that total resources used generally increase under the influence of the defense or war effort, reflecting the reduction or elimination of the under-utilization of productive factors before the start of large scale armament expenditures. In this situation, it has been argued, the economic cost of armaments is equal only to armament expenditures minus the value of product of the resources that were idle before the defense or war effort started and that would have remained idle except for it. (Armament expenditures thus could even be a negative quantity.) But if such an expansion of total resource-use is regarded as an offset to armament expenditures, consistency demands that the reduction of national income during the depression that usually follows the conclusion of hostilities—and by some students is attributed directly to the war—should be debited and treated as an additional impact of armament expenditures to the extent that such reduction is attributable to the war. Further, the disemployment of civilian resources due to the defense or war effort would have to be regarded as part of armament expenditures. Finally, allowance might have to be made for the reduction in valued leisure involved in the longer hours of war production. All this gets us too deeply into the quicksands of speculation. It would seem, therefore, that it is not advisable to allow for changes in the total utilization of resources in calculating armament expenditures, mainly because it is not possible to determine the increase or decrease in total production due to armament expenditures and to the aftermath of war.<sup>14</sup> Even if the increase in total utilization of resources during the defense or war effort is thus excluded from the measurement of armament expenditures, it should be taken into account, to-

<sup>14</sup> For an opposite conclusion see e.g., Gerhard Colm, 'The Cost of Arming America', *The Annals*, March 1941, pp. 10-11.

gether with other factors not reflected in armament expenditures, in any final evaluation of the economic cost of war or defense.

### *I The treatment of human resources*

The last of the basic problems of measurement concerns the treatment of the use of human resources that constitutes part of armament expenditures. In a slave economy it might be appropriate to treat human resources in their economic aspects exactly like physical resources. Our system, however, lacks most of the market valuations of human resources that would be necessary for such a treatment and ingenious devices, such as capitalizing a man's earning power, are but unsatisfactory substitutes. The other theoretical extreme, to eliminate from the calculation the direct use of human resources in the defense or war effort, is even worse. We are, therefore, driven to the not too satisfactory compromise of valuing the use of the services of the armed forces at the prevailing average rates of civilians' earnings but of disregarding the compensation paid for death and disability that can be traced to military service. Consistent adherence to this stand would require elimination from armament expenditures of the outlay for the medical sections of the armed services as well as of governmental payments to private hospitals, physicians, etc., for the same purposes. The wisdom of such consistency is, however, doubtful.

### *J Summary*

From a practical point of view the result of these considerations is that to approximate armament expenditures in the economic sense most closely, one should start from the reported figures of government outlay for armaments and try to make the following adjustments:

- a) Shift to the basis of 'armaments delivered', if the accounts are kept on a different basis.
- b) Add private investments in armament facilities.
- c) Add the value of resources used for which the government has paid no compensation whatever, including disinvestment in equipment used for the production of civilian goods.
- d) Deduct payments included in armament expenditures that do not represent the use of resources or that represent overpayments.
- e) Eliminate compensation paid for losses of human resources.
- f) Correct for the undervaluation involved in the compensation of the personnel of the armed forces.

Fortunately the adjustments listed, as well as corrections not specifically enumerated and other controversial adjustments that deserve serious consideration, are of very different practical importance. If the major adjustments are made inability to provide for the minor ones will usually not detract too seriously from the results. While exact data are lacking for almost all these adjustments the material is usually sufficient to present at least rough estimates of the more important items listed.

#### IV The Current and the Capital Impact

##### *A Current versus capital armament expenditures*

The resources producing armaments (or, more correctly, the resources giving off the services that produce armaments) are of two types: (1) Resources whose services become currently available and can be used without reducing the stock of resources and thereby the future supply of commodities and services; e.g., labor and the use of plant and equipment made good through maintenance, repair, and replacement.<sup>15</sup> (2) Resources that form part of the nation's wealth; e.g., irreplaceable natural resources and the use of plant and equipment and of foreign investments without simultaneous replacement.

The distinction is essential from the economic point of view because we must keep apart the impact of armament expenditures on current production and on national wealth. The two types depend on different factors, the current impact on the flow of net national income, the capital impact on the stock of accumulated domestic and foreign resources. Corresponding to the two types of resources a distinction must be made between two categories of armament expenditures. Current expenditures comprise all those reflecting the use of current resources; capital expenditures are those that lead to a change in the nation's capital. Together current and capital expenditures account for all armament expenditures as they have been defined for the purposes of this paper, and there is no overlapping between them.

The distinction between the two categories of armament expenditures leads to the calculation of two impact ratios, the current and

<sup>15</sup> If labor were treated on a par with other resources its use in such a way as to diminish the workman's productive or reproductive capacity would have to be included with the second type of resources as impairing a form of national wealth.

the capital. Since, as the following section shows, each requires its own denominator they are non-additive and cannot be combined into one over-all ratio measuring the total economic impact of armament expenditures. For that purpose both ratios are needed. In general, however, the current impact ratio may be regarded as the primary measure, showing the proportion of current resources diverted to the production of armaments. That the capital impact ratio is usually treated merely as a subsidiary measure is due largely to difficulties involved in its determination and to the omission from the calculation of the effect of war on human capital.

*B The content of current and capital armament expenditures*

In terms of the concept of opportunity cost, current armament expenditures are represented by the additional domestic production<sup>16</sup> that would be available for civilian use without impairing the nation's capital if the war expenditures had not been made. The current armament expenditure account, therefore, is to be debited with the following items of expenditure:

- a) The value in civilian employment of the services of the men in the armed forces.
- b) The expenditure (adjusted for over- or underpayments) on domestically produced armaments delivered to the country's own forces or exported, except so far as the exports are covered by additional imports of civilian goods.
- c) The value of the additions to plant, equipment, and inventories of armament producers (partly offset by item k).
- d) The cost of imported armaments so far as they are paid for by the export of home produced civilian goods.
- e) The net export of commodities representing tribute and current interest on war loans paid to foreign countries. (In the receiving country the respective amounts are, of course, treated as credit on current account.)<sup>17</sup>

Non-current armament expenditures (or armament expenditures on capital account<sup>18</sup>) consist of the part of total armament expendi-

<sup>16</sup> Imports are treated as equivalent to domestic production so far as they are balanced by exports; to the extent that they are not so balanced they are regarded as net capital imports and therefore excluded from current account.

<sup>17</sup> This item may include in the case of tribute the consumption within the country of the foreign army of occupation and its train.

<sup>18</sup> This is a magnitude quite distinct from gross investment in the armament industries which, of course, is a part of current armament expenditures and is offset to some extent by item (k).

tures that impinges on the nation's civilian capital in the sense that it is a source of future services. They are measured strictly speaking by the (appropriately discounted) value of the alternative future civilian products of the source of services that is destroyed or impaired in providing armaments. In practice, however, the valuation is usually based on the depreciated cost or the market value of the assets representing these sources of future services. Debits to the armament capital account include:

- f) Depreciation and depletion on plant and equipment in the civilian sector so far as they are not made good by simultaneous investment in civilian facilities.
- g) Net reduction in inventories of civilian goods so far as attributable to the defense or war effort. Since it is extremely difficult to decide exactly which reductions in inventory are due to the defense or war effort, it is usually advisable to regard the aggregate net reduction in civilian inventories as part of armament expenditures.
- h) Capital assets destroyed by enemy action. They should be entered at their full value, not at the price paid by the government.
- i) Net reduction of foreign assets, so far as attributable to the defense or war effort.<sup>19</sup> (An increase in foreign indebtedness is a form of such reduction.) The same difficulties regarding imputation to the defense or war effort arise as under items (f) and (g). However, in actual calculation there is a possibility here of using a short cut, viz., to attribute to the defense or war effort, as indirectly reflecting armament expenditures, the difference between the net reduction in foreign assets during the period of defense or war and the corresponding magnitude during an appropriate preceding average period.
- j) Assets (domestic tangible assets or foreign investments) appropriated directly or indirectly by the enemy.

It is quite possible that entries corresponding to items (g) and (i) and (j) will have to be made on the credit rather than on the debit side, reflecting, e.g., a net increase in foreign assets or in stocks. In fact, one additional item that will usually be on the credit side, constituting an offset to these debit entries, is:

- k) Gross investment in armament industries (paid for by the gov-

<sup>19</sup> Armaments or other commodities and services received from abroad without the obligation of repayment are, of course, not regarded as a reduction in foreign assets. They do not appear at all among the armament expenditures of the receiving country but must be included among the current or capital armament expenditures, as the case may be, of the country providing the commodities and services.

ernment or by private interests) so far as the resulting plant, equipment, and inventories are usable for civilian production.<sup>20</sup>

Since human capital is not treated like physical capital, no debit to capital account should be made for loss of life or for disability.<sup>21</sup> Consequently it will be impossible to distinguish, through the measure of armament expenditures, between relatively bloody and bloodless wars; hence the expenditures of the less strongly armed and less industrialized combatants generally will seem smaller than they would from a broader point of view.

### C *The choice of denominators*

a) Armament expenditures on current account, as defined here, constitute part of the nation's current supply of services of human and physical resources. The appropriate denominator, therefore, is national income. Obviously, if this ratio is to be unambiguous, the valuation of resources used, the treatment of the uncompensated use of resources, and the handling of certain deductions from gross income (such as depreciation allowances and business taxes) must be identical in the calculations of armament expenditures and of national income.

Both national income and current armament expenditures can be calculated on two bases, factor cost or market prices. If they are based on market prices, all commodities and services that form part of national income or of armament expenditures are entered at the prices for which they were actually sold or that were implied in actual sales. These sales prices cover, in addition to wages and salaries, interest and rent expenditures and total net profits (including profits arising in effect from inventory revaluation) of business enterprises, the taxes paid by them, their regular depreciation allowances, and their other charges to earned surplus such as special reserves and bad debt allowances. All these items, therefore, are included in national income and in total current armament expenditures respectively. On the other hand, if both national income and armament expenditures are based on factor cost, several of the items just enumerated are excluded since they do not constitute compensation for the use of current production factors: business

<sup>20</sup> See E. M. Hoover, Jr. and G. E. McLaughlin, 'Strategic Factors in Plant Location', *Harvard Business Review*, Winter 1942, p. 133.

<sup>21</sup> However, the actual cost of treating the wounded and disabled should be included among armament expenditures and debited to current account.

See also J. M. Clark, *The Costs of the World War to the American People* (Yale University Press, 1931), pp. 180-204.



taxes, bad debt allowances, deductions for extraordinary depreciation and depletion, special reserve allocations, and profits or losses from inventory revaluations.<sup>22</sup> National income and armament expenditures can be compared directly only if both are reduced to the same basis.

Practical considerations usually decide which basis to adopt. Since in the available statistical material national income is almost always calculated at factor cost, and armament expenditures are necessarily reported on the basis of market prices, we must either increase national income to a market price basis or reduce reported armament expenditures to factor cost. With our present information we can make neither adjustment in an altogether satisfactory fashion, chiefly because of the absence of current estimates of national income on a final product basis. However, we can step up national income more easily, and probably with a smaller margin of error, than reduce armament expenditures.

The two methods will not yield the same ratio since the items included in the calculation based on market prices but excluded from that based on factor cost differ relative to total armament expenditures and to national income. There is little doubt that certain items in the difference, such as allocations to special reserves and allowances for extraordinary wear and tear, are larger constituents of armament expenditures while others, such as bad debt allowances and excise taxes, bulk larger in national income. It is difficult to say, however, in which direction the net difference will lie and how large it is likely to be.

b) As armament expenditures on capital account reflect the inroads on the stock of civilian physical capital (the use of human capital being disregarded in the calculation) they must be compared either with the cost (depreciated original cost or cost of reproduction) or with the discounted future income from depreciable capital assets, depending upon the method followed in estimating armament expenditures on capital account. The value of unimproved land is thus excluded from the denominator, but net foreign assets are included.<sup>23</sup>

<sup>22</sup> Most of these were classified above (Sec. III A) as non-exhaustive expenditures.

<sup>23</sup> Armament expenditures on capital account may be compared also with the average gross and net investment under peacetime conditions for a period of equal length. Such a comparison is illuminating but is not strictly parallel in its construction to the capital impact ratio.

The shortcomings of even the best national wealth estimates are too well known by this time to require restatement. Any ratio that uses wealth as the denominator obviously must be handled with great care and cannot purport to yield exact results. Both reservations, moreover, apply with equal force to the numerator, armament expenditure on capital account. The ratio is, therefore, doubly problematical. Nevertheless, its limitations seem not serious enough to render it useless. If handled with sufficient caution, it should at least give an idea of the magnitudes involved. For example, the higher the capital impact ratio the shorter the time, other things being equal, it can be maintained. Any more significant statement requires knowledge of capital impact ratios for specific types of assets, notably those employed in the production of armaments and civilian necessities. But even a rough over-all ratio is better than none, since the inroad on the stock of resources is often too large to be neglected in calculations of the economic impact of armament expenditures or to be lumped with expenditures basically different in that they were on resources that become currently available.

c) The current impact ratio and the capital impact ratio cannot be combined unless we are ready to perform several statistical *tours de force* which do not recommend themselves. Theoretically, of course, it would be possible to capitalize current armament expenditures that are not for human resources, add them to armament expenditures on capital account, and compare the sum with national wealth. Alternatively one might express non-current armament expenditure in terms of the expected reduction in future income and discount this reduction to the present day, add it to current expenditures, and compare the sum with national income. However, the difficulties are such as to render either procedure impracticable. We are thus left with two measures of the economic impact of armament expenditures that cannot be added, but we may get an idea of their approximate relative importance since the quantitative relation between national income and national wealth is known, if only in a very rough way.

## V Illustrations

During recent years the economic impact of armament expenditures has been calculated frequently by different methods, yielding

widely divergent results. Instead of making another set of calculations, five outstanding 'cases'—the United States, Great Britain, Canada, Germany, and Japan during the calendar or the fiscal year 1941—are used to illustrate some of the basic problems encountered in measuring the economic burden of armament expenditures. Because this material is presented for illustrative purposes, no attempt has been made to put the figures on as comparable a basis as might be possible with more research, or even to strive for the most accurate figures the material might yield. All too often no material is available to make the adjustments theoretical considerations demand. When, as here, interest lies in the problem of measurement, not in the precise figures, this deficiency is not too serious.<sup>24</sup>

### A United States

Since the available data are more plentiful and reliable for the United States than for any other country (except possibly Great Britain) we are in a better position to observe here the effects of various alternative calculations, particularly the use of the gross or the net basis in calculating the impact ratios.

Total defense and war expenditures by the United States Government during the calendar year 1941 (including expenditures on armaments shipped abroad under lend-lease arrangements) amounted to slightly over \$13 billion.<sup>25</sup> This includes payments made outside the United States, probably in relatively small amounts, which should be deducted. Expenditures on existing assets in the United States apparently were small. Prepayments on war contracts seem to have been substantial but were offset to an unknown extent by lags of payments behind deliveries on other contracts.<sup>26</sup> Private investment in armament facilities, including increases in war plant inventories, was considerable while the off-

<sup>24</sup> The manuscript of this paper was completed early in 1942; it has been impossible to take into account all the data since published that might have been utilized in improving the rough estimates presented in the following pages. All quantitative estimates given are based on or derived from public figures.

<sup>25</sup> The figures for national income, gross national product, and unadjusted war expenditures are taken from Milton Gilbert and George Jaszi, 'National Income and National Product in 1942', *Survey of Current Business*, March 1943.

<sup>26</sup> 'Net Prepayments, Purchase of Existing Assets, Off-Shore Expenditures, etc.' are estimated (*op. cit.*) at \$0.8 billion; this figure does not allow for the payments implicit in lags of payments behind deliveries.

setting amortization payments by the government remained small.<sup>27</sup> Armament expenditures (not covered by lend-lease arrangements) made in the United States by foreign governments totaled about one and a half billion dollars.<sup>28</sup> Uncompensated use of current resources in war production seems to have been small. Corrections for the undervaluation of resources used by the government apparently were quantitatively minor.

After these adjustments are made, often very tentatively, current armament expenditures are increased to about \$17 billion. If this figure is compared, as it often is, with net national income of \$96 billion a current impact ratio of nearly 18 per cent is obtained. Since, however, armament expenditures are on a gross basis the appropriate denominator is not national income but gross national product at market prices which has been calculated by the Department of Commerce at \$123 billion. The correct current impact ratio is thus nearly 14 per cent.

Armament expenditures on capital account during 1941 are a negative rather than a positive quantity, i.e., they have resulted in a net addition to the nation's stock of capital. Lend-lease production and services (which may be regarded either as a loan, repayment of which is expected, or as a gift) amounted to slightly over \$1 billion.<sup>29</sup> The reduction of British assets in the United States used to pay for armaments and materials and the conversion value of war plants built during 1941<sup>30</sup> constitute two important credit items. Debits to capital armament account seem to be lacking, except air raid damage and shipping losses in December, both of which certainly have been very small relative to total armament expenditures. A very tentative evaluation of these items indicates that the increase in the armament capital account during 1941 may have

<sup>27</sup> Value of construction of privately financed industrial facilities, most of which were war plants, was estimated at \$0.7 billion (*Survey of Current Business*, Feb. 1942, p. 11). Machinery and equipment installed in these plants was probably considerably in excess of construction costs. The increase in durable goods inventories, only part of which can be regarded as connected with war production, is estimated at about \$2 billion (*ibid.*, p. 43).

<sup>28</sup> Milton Gilbert, 'Measuring National Income as Affected by the War', *Journal of the American Statistical Association*, June 1942, p. 194.

<sup>29</sup> Report to the 78th Congress on Lend-Lease Operations, January 25, 1943, p. 24.

<sup>30</sup> Military construction amounted to about \$2 billion (*Survey of Current Business*, Jan. 1943, p. 11). Construction of industrial plants was valued at slightly over \$2 billion (*loc. cit.*) plant and equipment probably adding considerably more than this total. If it is assumed that as little as 1/10 of military construction and 1/3 of war plants have potential civilian uses, total conversion value would amount to about \$2 billion.

been in the order of \$4 billion, even if the credits on lend-lease account are disregarded.

The situation was, of course, quite different in 1942. Total war expenditures reached \$52 billion. Prepayments, payments for existing assets, and off-shore expenditures are estimated to have reduced the total by nearly \$3 billion.<sup>31</sup> Refunds following renegotiation may reduce it by a further as yet unknown but certainly relatively minor amount. Private investment in armament facilities was small and partly offset by amortization payments made by the government.<sup>32</sup> The increase in armament manufacturers' inventories, however, may have been considerable. It is impossible to estimate the extent to which uncompensated use of resources was made by the government. The extent of undercompensation certainly increased in 1942 but remained a minor item quantitatively. Adjusted current armament expenditures in 1942 then should not have been much lower than the reported crude total, aggregating about \$50 billion. With a national income of nearly \$120 billion and gross national product at market prices of slightly in excess of \$150 billion, the current impact ratio for 1942 may be estimated at about 33 per cent, more than double the 1941 ratio.<sup>33, 34</sup>

The capital impact ratio for 1942 depends largely on the treatment of lend-lease aid which aggregated \$7 billion. Outlay on civilian construction and equipment and on consumer durable goods together seems to have been below \$10 billion.<sup>35</sup> Since the usual depreciation allowances run to about \$14 billion a consider-

<sup>31</sup> Gilbert and Jaszi, *op. cit.*

<sup>32</sup> Value of construction of privately financed industrial facilities amounted to only \$0.3 billion (*Survey of Current Business*, Jan. 1943, p. 11).

<sup>33</sup> No strictly comparable figures are available for World War I. Clark (*op. cit.*, pp. 33-4) estimates "war expenses representing actual economic effort" for 1918 at somewhat over 25 per cent of national income. Calculated on the basis of gross national product at market prices, to make the figure comparable with those in the text, the ratio should not have exceeded 20 per cent. It certainly remained far below the ratios of 1942 and 1943.

<sup>34</sup> Chiefly because of the extraordinary rise of gross business profits and of the direct taxes levied on them it makes a considerable difference whether the calculation of the current impact ratio is done on the market price or the factor cost basis (Cf. IV A above). While the calculation in the text that proceeds on the market price basis yields a 1942 ratio of 33 per cent the factor cost method would lead to a slightly smaller figure, probably not over 30 per cent.

<sup>35</sup> Outlay on consumer durable goods is estimated at \$6.4 billion and that on private residential construction at \$1.5 billion (Gilbert and Jaszi, *op. cit.*, p. 21). The value of civilian construction and equipment not connected with the war effort and not included in these figures was small.

able civilian disinvestment is indicated.<sup>36</sup> This was partly offset by the conversion value of armament plants.<sup>37</sup> If lend-lease production is treated as a gift the capital impact ratio for 1942 thus was probably slightly positive.<sup>38</sup>

### B Great Britain

The case of Great Britain is of particular interest because it illustrates very clearly the importance of the distinction between current impact and capital impact, and the necessity for a correct treatment of the draft on foreign resources.<sup>39</sup>

The national income of the United Kingdom in the fiscal year ending March 31, 1942 may be estimated at £6,800 million; <sup>40</sup> gross national product at market prices may be put at about £8,500 million.<sup>41</sup> Total reported armament expenditures (represented by the expenditures of the Supplies Service less Civil Votes) have amounted to slightly over £4,000 million. This figure seems to include the payments for all munitions imported from the United States and Canada except those received under lend-lease arrangements. Private investment in munitions facilities appears to have been very small. Civilian disinvestment, on the other hand, was undoubtedly of considerable proportions although its size is very difficult to estimate; the official estimate is £200 million.<sup>42</sup> Adding these items to the expenditures of the Supplies Service gives total armament expenditures of about £4,200 million, about 62 per

<sup>36</sup> Business depreciation and depletion charges are estimated at \$7.8 billion (Gilbert and Jaszi, *op. cit.*, p. 19). Very rough allowances for depreciation on homes and other consumer durable goods account for the rest.

<sup>37</sup> Military construction amounted to about \$5 billion; construction and equipment of war factories to nearly \$6 billion (*War Production in 1942*, issued by the War Production Board, Division of Information, p. 15). Again assuming 1/10 of direct military construction and 1/3 of war plant expenditures to represent conversion value, a total of about \$2½ billion is obtained.

<sup>38</sup> Should lend-lease exports and services be regarded as full valued claims the capital account would show a considerable net increase (i.e., a negative capital impact ratio) possibly of as much as 2 per cent of national wealth (excluding value of unimproved land).

<sup>39</sup> Most of the figures used to illustrate the British situation are taken from the Treasury White Paper of April 1942 (An Analysis of the Sources of War Finance and an Estimate of the National Income and Expenditures in 1938, 1940 and 1941) and from the summary of the White Paper (*The Economist*, April 17, 1943).

<sup>40</sup> The official estimate for the calendar year 1941 is £6,619 million (*The Economist*, p. 499).

<sup>41</sup> The sum of estimates for business taxes, war risk insurance premiums, ordinary depreciation allowance, and net national income.

<sup>42</sup> *The Economist*, *loc. cit.*

cent of net national income and 50 per cent of gross national product.

These figures do not yet allow for losses from enemy action of British owned assets in the Far East, which would raise the ratio another few points. Allowance for the relatively low pay of the armed forces and for the savings to the government through certain types of price fixing would further increase armament expenditures in the economic sense, though probably only by a small amount. On the other hand the total contains certain relatively small sums paid as compensation for loss of human resources that should be deducted to conform to the economic concept of armament expenditures.

The riddle of this high percentage of armament expenditures, which contradicts what is otherwise known about the trends of production and consumption in the United Kingdom, is solved by a look at the capital account. Funds accumulated by the British Government for the payment of existing orders in the United States are estimated to have provided about £300 million, advances by the Canadian Government over £150 million, and other overseas sources about £350 million,<sup>43</sup> while domestic disinvestment is estimated at about £200 million. Destruction and confiscation of property by enemy action would add another considerable though unspecified amount to the draft on capital. Taking all these items in account (but without allowance for destruction and confiscation or for American lend-lease aid) the armament capital account seems to show a debit of nearly £1,000 million for 1941-42 if Canadian aid is treated as a debt.

After deducting this sum from the aggregate armament expenditures in the economic sense, there remains to be debited to the current account only about £3,200 million. The current impact ratio, therefore, is somewhat under 40 per cent, a figure so far from the 60 per cent ratio resulting from the usual method of calculation<sup>44</sup>

<sup>43</sup> Expenditures in the United States, estimated at £300 million (*The Economist*, Dec. 1941, p. 746), probably do not include munitions received under lend-lease arrangements. Canadian advances during the fiscal year 1941-42 were given as nearly \$700 million (Budget Speech of the Canadian Minister of Finance, June 23, 1942, p. 60). The total reduction in overseas assets, estimated at £800 million for the calendar year 1941 (*An Analysis* . . . p. 9), probably includes assets used to pay for munitions imported from the United States and Canada except those received under lend-lease arrangements.

<sup>44</sup> £4,000 million reported armament expenditures: £6,800 million net national income. The ratio rises to about 70 per cent if armaments received from North America are regarded as a capital obligation.

as to show quite a different situation.<sup>45</sup> Obviously the higher figure may give an incorrect impression of the scale of the British war effort, the possibility of its undiminished continuation or further increase, and the extent of the switch-over from civilian to armament production.<sup>46</sup>

### C Canada

Calculations of the impact ratio for Canada are interesting mainly because of the importance of inter-allied transactions and the problems involved in their treatment. Reported armament expenditures during the fiscal year ending March 31, 1942 amounted to about \$1.4 billion.<sup>47</sup> Expenditures on armaments and other material for the account of the United Kingdom added about \$0.9 billion. Private investment in armament facilities seems to have been minor but the reduction in civilian inventories has been considerable.<sup>48</sup> Adjustments for uncompensated or undercompensated use of resources are apparently small. Total current armament expenditures in the economic sense seem to have amounted to fully \$2.5 billion. With a net national income of about \$6.5 billion<sup>49</sup> and a gross national product at market prices of about \$8 billion, the current impact ratio somewhat exceeded 30 per cent.<sup>50</sup>

Debits to capital account seem to have been very small. On the other hand, the repatriation of Canadian securities, aggregating about \$0.4 billion for the fiscal year 1941-42,<sup>51</sup> gives rise to a con-

<sup>45</sup> Income, gross national product, and total reported armament expenditures in 1942 were only slightly above the preceding year, all three probably about 10 per cent. In 1942, however, reported armament expenditures included only a relatively small amount for munitions produced abroad and paid out of British assets. Current armament expenditures therefore rose to well over £3,500 million, reflecting the considerable increase in domestic armament production in Great Britain. The current impact ratio consequently increased slightly to fully 40 per cent. The capital impact ratio appears to have been fairly substantial again and may not have been lower than in 1941 if account is taken of losses of British assets in the Far East.

<sup>46</sup> Again no strictly comparable figures exist for World War I. A. J. Brown estimated that "consumption fell in the worst year of the war . . . probably . . . to 65-70 per cent" of its immediate prewar level ('Resources Available for War: A Comparison', *Oxford Economic Papers*, Feb. 1940, p. 19).

<sup>47</sup> See Budget Speech of the Canadian Minister of Finance, June 23, 1942, pp. 51 and 60. This figure includes about \$120 million of 'recoverable advances' to allies.

<sup>48</sup> It is estimated roughly by A. F. W. Plumptre at about \$150 million (*Mobilizing Canada's Resources for War*, Toronto, 1941, p. 289).

<sup>49</sup> *Ibid.*, p. 289.

<sup>50</sup> Gross national product seems to have risen about 10 per cent in 1942, i.e., to about \$9 billion. With reported armament expenditures exceeding \$3.5 billion, the current impact ratio appears to have increased to about 40 per cent.

<sup>51</sup> See Budget Speech, p. 60.



siderable credit on capital account. There is doubt, however, about the treatment of the sterling balance of \$0.7 billion accumulated in London by the Canadian Government during the fiscal year and funded into a loan not to bear interest until after the war. If this loan were regarded as an asset, total net credits to capital account would aggregate over \$1.0 billion or something like 4 per cent of national wealth (excluding land).<sup>52</sup> If it is treated as the equivalent of a gift, the net increase in capital attributable to war expenditures amounts to only \$0.4 billion.

#### *D Germany*

Measurement of the economic impact of Germany's armament expenditures illustrates especially well two major points: (a) the difficulties of obtaining for the numerator and denominator of the impact ratio data covering the same territory, and (b) the importance of booty and tribute.

The net national income of Germany (including Austria and the incorporated parts of Czechoslovakia, Poland, and France) has been estimated at about RM115 billion for the fiscal year ending March 31, 1942.<sup>53</sup> Gross national product at market prices has been put at around RM155 billion.<sup>54</sup> Military expenditures (which must be approximated very roughly by combining figures on tax receipts, increases in the government's indebtedness, and non-military governmental expenditures) seem to have amounted to about RM90 billion.<sup>55</sup> They contain the contributions of occupied territories which have been estimated at about RM15 billion including the protectorate of Bohemia and Moravia but probably excluding contributions exacted from the occupied part of the U.S.S.R.<sup>56</sup> No allowance is made in either set of figures for the contribution to

<sup>52</sup> If the excess of the increase in foreign assets over the prewar balance is alone regarded as attributable to the war effort, as suggested above, total net credits are reduced to about \$0.8 billion.

<sup>53</sup> An estimate by the German Minister of Finance in an address before the Berlin Academy for the Administration of War Finances runs to RM110-115 billion; another estimate cited by H. W. Singer, 'The German War Economy', VI, *Economic Journal*, June-Sept. 1942, p. 202, gives RM120 billion.

<sup>54</sup> See Guenter Keiser, *Bankarchiv*, 1942, pp. 78-9; the figure given in the text is exclusive of contributions from occupied countries.

<sup>55</sup> Keiser, *op. cit.*, puts total public expenditures at RM100 billion. O. Schwarz (*Bankarchiv*, 1942, p. 258) estimates extraordinary military expenditures at RM75 billion, possibly excluding contributions from occupied countries.

<sup>56</sup> Singer, *op. cit.*, p. 201; Keiser, *op. cit.*, p. 78 gives RM15-17 billion.

armament expenditures in the form of the labor of war prisoners and of workmen imported from occupied and allied countries, and certainly none has been made for materials bought at artificially low prices or without immediate payment from these countries.<sup>57</sup> To these items must be added estimates of net civilian disinvestment which undoubtedly has been of considerable proportions, possibly reaching RM10 billion in 1941,<sup>58</sup> and of private investment in armament plants which may be assumed to have been small. Total armament expenditures in 1941, then, seem to have been around RM85 billion<sup>59</sup> for Germany proper and about RM105 billion for the entire German occupied area.

The current impact ratio can be calculated in two ways.<sup>60</sup> One is to treat the contributions made by occupied countries as gifts, paralleling the treatment of British receipts under lend-lease arrangements. The current armament expenditures provided by German resources, amounting to about RM75 billion, would then have to be compared with a gross national product at market prices of Germany proper of about RM155 billion, yielding a current impact ratio of about 50 per cent. The alternative, to equalize the territorial coverage of armament expenditures and of national income, requires a comparison of Germany's total current armament expenditures (including those borne by the occupied countries) of about RM90 billion<sup>61</sup> and the gross national product of the entire area under German control (excluding occupied parts of the

<sup>57</sup> Singer (*op. cit.*, p. 202) estimates them as at least RM6 billion.

<sup>58</sup> Disinvestment in plant and equipment has been estimated for 1940 at RM3-4 billion (K. M. Hettlage, *Wer Beahlt den Krieg?*, *Deutscher Volkswirt*, Dec. 20, 1940, p. 476), the reduction in civilian inventories adding another RM5-6 billion. Keiser (*op. cit.*, p. 79) puts disinvestment for 1941 at RM5 to RM10 billion. An official estimate of 'capital consumption' in 1941 cited by Singer (*op. cit.*, p. 201) of RM30 billion seems to be based on a broader definition, but even then it is difficult to accept since it would put disinvestment at about one quarter of national income.

<sup>59</sup> This figure makes no adjustment for the undervaluation involved in the low pay of the armed forces and the limitation on prices paid by the government to domestic suppliers. It is doubted, however, that either adjustment could be of great quantitative importance.

<sup>60</sup> For purposes of this calculation we assume RM75 billion of current armament expenditures by Germany (RM85 billion total expenditures minus RM10 billion disinvestment) and RM15 billion by occupied countries (RM15 billion total contribution plus RM5 billion underpayments for labor and commodities minus RM5 billion estimated to come out of capital).

<sup>61</sup> No allowance is made for the contributions from the occupied countries that came out of accumulated resources, and not from current income, and therefore constituted a capital impact.

U.S.S.R.) of about RM250 billion.<sup>62</sup> This comparison gives a current impact ratio of fully 35 per cent.<sup>63</sup>

The method used should depend largely on the purpose to which the ratio is to be put. If one is interested primarily in the impact on the current income of the German people, the first ratio, about 50 per cent, is applicable. If, however, the purpose is to determine the impact of armament expenditures on the total area under German occupation, the second ratio, about 35 per cent, is appropriate. In any comparison of the enduring burden of armament expenditures and the margin available for further expansion of total German military expenditures, the lower of the two should form the basis of the argument.<sup>64</sup>

In calculating a capital impact ratio for Germany, it must probably be assumed that the booty in the form of inventories of raw materials and finished commodities and confiscated machinery and equipment constitute a valid credit on capital armament account, fully or partly offsetting disinvestment in Germany. On the other hand, it may be better to disregard the booty in the form of confiscated precious metals, stocks, and other titles to wealth in the occupied and neutral countries as well as the confiscation of real estate outside Germany since it is doubtful that capital gains of this type will be more than temporary. On these assumptions, the capital impact ratio was probably negative in 1940 as a result of large scale plundering in western Europe. In 1941, however, dis-

<sup>62</sup> The gross national product of the countries occupied by Germany has been approximated on the basis of the national income estimates presented by Colin Clark, *The Conditions of Economic Progress* (London, 1940), p. 40, for the decade 1925-34. It has been assumed, however, that the relation between the national product of Germany and that of the occupied countries (not including 'allies' such as Rumania and Hungary or unoccupied France because they had separate armament expenditures, and omitting occupied parts of the U.S.S.R.) was in 1941 considerably (25 per cent) more favorable to Germany than the corresponding national income relation was in the base period.

<sup>63</sup> Additional data for 1942 are not available. Indications, however, point to another increase in armament expenditures, particularly the part financed by the occupied countries. Since gross national product seems to have risen only very slightly, if at all, the current impact ratio must have increased, possibly to about 55 per cent for Germany proper and to over 40 per cent for the entire German occupied territory (excluding occupied parts of the U.S.S.R.).

<sup>64</sup> For World War I the average ratio of unadjusted armament expenditures to prewar national income seems to have been about 40 per cent (see Leo Grebler, *The Cost of the World War to Germany*, Yale University Press, 1940, pp. 96-7), indicating a ratio to gross national product of not over 35 per cent. The current impact ratio was probably somewhat lower. All the ratios, of course, were higher than the average during the later years of the conflict and lower in 1914 and 1915.

investment in Germany is likely to have exceeded additional loot, although probably not by much. Material is lacking for calculating the capital impact ratio in the occupied countries. There is, however, little doubt that on account of physical destruction and of abduction as well as deterioration of the remaining stock of capital it would be considerably higher than for any of the countries for which figures have been given here.

### *E Japan*

Calculation of the impact ratio for Japan is especially difficult. Not only are most of the problems encountered in the other countries present, but the basic figures of armament expenditures and national income and product are still more uncertain. Estimates using the most reliable material available, but nevertheless representing not much more than rough guesses,<sup>65</sup> place military expenditures at about 25 per cent of national income for both 1938-39 and 1939-40, and at about 20 per cent of gross national product at market prices. From the few scraps of evidence available for the more recent period we may infer that the proportion had not risen much until the war with the United States started and for the year 1941 probably did not exceed 25 per cent of gross national product.<sup>66</sup> The ratio would be lowered if the national income estimates included not only Japan proper, but also dependencies such as Korea and occupied territories such as Manchukuo and sections of China proper which without compensation provide part of the economic resources for the military expenditures. However, information about the national income of these territories is much too uncertain,<sup>67</sup> and the methods by which contributions not appearing in Japan's military budget are extracted from them are not well enough known to permit adjustment of the crude ratio between the national income of Japan and the total reported or inferred military expenditures.

<sup>65</sup> Taken from an unpublished report by Kurt Bloch for the Office of Price Administration; see also Leon Henderson's testimony in Hearings on Revenue Revision of 1941 (House), p. 641.

<sup>66</sup> The current impact ratio certainly was considerably higher in 1942. It may have amounted to 40 per cent of gross national product. This estimate, however, is subject to a wide margin of error as the available information on total armament expenditures is very scanty and unreliable and it is not clear to what extent colonies and occupied territories may have contributed to them.

<sup>67</sup> The national income of both the dependencies (Korea, Formosa, Southern Sakhalin, Kwantung, and South Sea Islands) and Manchukuo seems to be about 15 to 20 per cent of that of Japan proper.

## VI Conclusions

The search for a summary expression of the economic impact of armament expenditures has led to the conclusion that two separate, non-additive measures are required: (1) the current impact ratio, calculated by dividing adjusted armament expenditures on current account by gross national product at market prices, and (2) the capital impact ratio, obtained by dividing armament expenditures on capital account by the value of the nation's stock of depreciable physical assets. The conceptual, analytical, and practical difficulties of measurement are so serious that no entirely satisfactory solution is in sight. The best that can be claimed for any actual attempt at measurement, and all that is claimed for the one presented in this paper, is that the figures are somewhat more satisfactory and illuminating than the still cruder measures now in use.

Both the current and the capital impact ratios are well adapted for comparison of the impact of armament expenditures over time. In that respect they are superior to unadjusted figures for armament expenditures which are unsuitable in the presence of large changes in price level or national product. The use of the ratios entirely obviates the necessity of an adjustment for price changes so long as we may assume that the price levels of armaments and of civilian goods move along parallel lines. If the facts depart too violently from these assumptions, an adjustment of the original data underlying the ratios by the use of appropriate price indexes may still be necessary.<sup>68</sup>

The current impact ratio does not provide an adequate measure of the degree of switch-over from civilian to military production unless full employment of resources existed when the defense or war effort started.<sup>69</sup> In that case the ratio of armament expenditures

<sup>68</sup> Unfortunately there is no statistical material on the actual relations. Some important factors will generally make for a sharper rise in the prices of armaments; for instance, the small regard for prices in government contracts; the predominance of cost plus or similar arrangements; the necessity of bidding factors away from civilian occupation. On the other hand, the increase in armament output may decrease its unit cost while the accompanying restriction of civilian production will raise it. It is difficult to say in which direction the balance will lie. It would seem, however, that the factors raising the prices of armaments relatively to those of civilian goods will generally overbalance them, working in the opposite direction. If so, the ratio unadjusted for these price shifts will tend to overstate the impact of armament expenditures, other things being equal. (This overstatement appears to be particularly pronounced for the United States.)

<sup>69</sup> The capital impact ratio is not relevant to this problem.

to national income will with fair accuracy measure the proportion of resources shifted from the production of civilian goods to that of armaments provided allowance is made for the higher level of factor remuneration in the field of armament production. Otherwise, a special investigation is necessary to determine what proportion of armament expenditures represents a switch-over from civilian production and what proportion is due to the reemployment of formerly idle resources without involving a lowering of the previous level of civilian activity.<sup>70</sup>

The two impact ratios together give a better idea of the degree of economic sacrifice involved in a defense or war effort than the absolute figures of armament expenditures. They should, however, be supplemented by a figure indicating the change in real civilian consumption per head.<sup>71</sup> Their usefulness as measures of economic sacrifice is limited by the factors that have prevented any satisfactory quantitative measurement of economic welfare. As in the broader problem, the main difficulty arises from the difference in the degree of sacrifice of economic welfare according to the income level that is lowered. The same impact ratio may, therefore, be obtained although the degree of economic sacrifice differs. Thus, economic sacrifices may be assumed to be larger, yet have the same current impact ratio, the smaller a country's income per head and the more unequal the distribution of income. Similarly, a given capital impact ratio will imply increasingly smaller economic sacrifices the higher the real wealth per head.

Neither impact ratio by itself measures the margin available for a further expansion of armament expenditures. When resources are utilized to the full, this margin is given by the difference between the portion of total national product that constitutes the subsistence minimum of the population (in the sense that the defense or war effort would suffer if current consumption fell below it)<sup>72</sup> and total

<sup>70</sup> How great the difference between the current impact ratio and the reduction of civilian consumption and investment can be is illustrated by the case of the United States. In the third quarter of 1942, e.g., the current ratio was as high as 40 per cent, but civilian consumption (roughly adjusted for price changes) was only slightly below the level of the first half of 1940, just before the real start of the defense program (cf. *Survey of Current Business*, Feb. 1943, pp. 11 and 21).

<sup>71</sup> This figure is not simply a complement to the current impact ratio, as it includes the effects of numerous factors other than armament expenditures.

<sup>72</sup> The subsistence minimum can be estimated on the basis of technological and nutritional considerations or on that of historical evidence, i.e., as the minimum of a not too distant period in the past (as A. J. Brown, *op. cit.*, has done for Great Britain on the basis of the situation in World War I).

actual armament expenditures. It depends, apart from the size of the subsistence minimum, on the real income and wealth per head of the population and the technical possibilities of transforming the stock of resources into currently consumable goods and services. The ratios provide information on the subtrahend of the difference alone.

Nor can the ratios serve as the basis for the comparison between the cost and the revenue of the war, even if both terms are limited strictly to the economic aspects. They do not even provide the one side needed for the comparison, viz., a summary of the economic cost of the war. Such a calculation, as has been said repeatedly, would have to go considerably beyond the sphere of armament expenditures in the sense used here. This shortcoming need not distress us too much as it seems utterly impossible anyhow to arrive at any quantitative expression for the other side of the comparison, the economic yield of a defense or war effort.

The worth of the ratios is probably greatest for the purpose of international comparison and that is the purpose for which they have usually been employed. There is no doubt that they are much better suited to that purpose than absolute figures on armament expenditures.<sup>73</sup> But they should be used for that purpose only with great caution and it may be worth while to restate the precautions which must be taken before such a comparison can validly be made:

- a) The scope of armament expenditures must be the same in all countries included in the comparison.
- b) The original data should be adjusted throughout to the 'armament delivered' basis.
- c) The figures must be corrected for any differences in the original data regarding armament expenditures made by persons and organizations other than the central government and not paid for by the Treasury.

<sup>73</sup> There is one obvious exception: when we want to know something about the absolute size of the defense or war effort in different countries, none of the ratios will give us the answer, but neither will the unadjusted expenditure figures. It is then necessary to go back to a common denominator of military significance. If this is not feasible there are two other measures which, while less satisfactory and not easy to calculate or estimate, are preferable to unadjusted absolute armament expenditures: (a) the hours of labor engaged in defense or war work after rough adjustment for differences in the level of productivity, and (b) the absolute armament expenditures roughly adjusted for differences in the price level (for an example of this type of comparison see *The Economist*, Jan. 17, 1942, pp. 66 and 77).

- d) Identical principles must be followed for all countries in evaluating the services of the armed forces.
- e) Care must be taken that contributions by allied and occupied countries are treated in the same manner in each country.
- f) The same principles must be followed in all countries in evaluating the use of accumulated past resources, particularly uncompensated depreciation and depletion.
- g) The denominators of the fractions, gross national product or national wealth, must be calculated by uniform methods.
- h) The comparison must take into account both the current and the capital impact ratio.

Even if these precautions are observed, the ratios, as we have just seen, do not answer two of the most important questions, the relative degree of economic sacrifice involved and the margin available for a further increase in the defense or war effort.

The same ratio, of course, does not necessarily involve the same degree of economic sacrifice. Even if we abstract from possible differences in the importance of non-economic sacrifices and satisfactions, the same ratio may mean different things depending on the average real income per head. Obviously an impact ratio of, say, 30 per cent involves a greater sacrifice, other things being equal, in a country with an average real income per occupied person of not much over \$100 (China) or \$350 (Japan), than in one with nearly \$1,100 (Great Britain) or nearly \$1,400 (the United States).<sup>74</sup> Similarly, the margin for an increase in defense or war expenditures is wider the higher the real income and wealth per head of population, assuming an equal willingness for economic sacrifice<sup>75</sup> and absence of physical difference in subsistence level (on account of climate, physique of population, etc.), and abstracting from the possibility of covering war expenditures by booty.

These considerations should be kept in mind in comparing the situation in the United States with that of our allies and enemies. In 1941 the difference between the current impact ratio in this country (about 14 per cent) and in the main other belligerent countries (Great Britain about 40 per cent; Canada 30 per cent;

<sup>74</sup> Colin Clark, *The Conditions of Economic Progress*, pp. 40-2. The figures are in so-called international units (dollars of 1925-34 purchasing power) and reflect the situation for the average of 1925-34.

<sup>75</sup> This is a very important point. The same relative level of armament expenditures as expressed in the impact ratio may lead to an impairment (through non-cooperation or passive resistance) of war production in one country but not in another.



Germany about 35 per cent; Japan 25 per cent) was so large that there is no doubt about the degree of economic sacrifice having been much smaller and the margin for a further increase in armament expenditures much wider in the United States than abroad.

In 1942 the current impact ratio for the United States rose to about 35 per cent, reaching the range observed abroad in countries engaged in total war. The ratio also rose in all foreign countries, although more slowly than in the United States, and reached around 40 per cent in Great Britain and Canada as well as in Germany (including occupied countries) and Japan. This does not mean, however, that we had achieved equality of sacrifice or that our margin for further intensification of the war effort was as limited as that of other countries. On the contrary, there is little doubt that in 1942 we were making less of an economic sacrifice than any of the major belligerents because the reduction of civilian consumption was small and hit non-essentials to a much larger degree. Any comparison of per capita consumption of staple foods, clothing, and basic services will show that clearly. More important, there is every reason to assume that the margin available for an increase in armament expenditures after 1942 will be far wider for this country than for any of the other major belligerents.

If present plans are carried out, the current impact ratio for 1943 should be around 50 per cent; in addition we should expect for the first time a not inconsiderable capital impact. We shall then be near the upper limit of the ratio hitherto observed abroad,<sup>76</sup> but will still be left with a sizable margin because of our higher real income and real wealth per head. Where the upper limit lies is difficult to estimate with any degree of accuracy for the United States or for the other major belligerents. The guess may, however, be ventured that a current impact ratio of between 50 and 60 per cent represents the maximum that can be sustained for long and that for most countries the maximum will be lower than this.<sup>77</sup> The United States should be able to support such a load, corre-

<sup>76</sup> By 1943 the impact ratio for most of the other belligerents will, of course, also have risen above the 1942 figures discussed in the text. However, it is unlikely that the current impact ratio will exceed 50 per cent in 1943 in any foreign country except Germany proper. By that time, as a matter of fact, the differences between the current impact ratios in the five countries discussed should have become relatively small.

<sup>77</sup> The armament effort can, of course, be supplemented for some time by a draft on capital and by booty. The scope of such a supplementation is relatively limited for the United States because of the practical impossibility of either drawing on foreign assets or of borrowing abroad on a substantial scale.

sponding at present prices to current armament expenditures of between \$100 and \$120 billion a year, longer and with less serious sacrifice of economic welfare than any of the other major beligerents.

## Discussion

CLARK WARBURTON

My comments on Mr. Goldsmith's paper relate to the following aspects of measuring the impact of the defense and war programs upon the economy: (a) Mr. Goldsmith's starting point in the concept of opportunity cost; b) an ambiguous characteristic of Mr. Goldsmith's 'current impact ratio' and his discussion; (c) adequacy of data to compute the 'current impact ratio'; and (d) devices not discussed by Mr. Goldsmith that are needed to measure the economic impact of the defense and war programs.

*a Opportunity cost vs. the de facto price system as a point of departure*

Mr. Goldsmith's reverent treatment of opportunity cost is like the procedure of the mythical supply engineer who was assigned the task of estimating the number of trucks necessary to carry supplies from Cairo and Suez to the North African battlefield. Standing on the west bank of the Nile, he saw a great city far to the west, through which apparently all supplies must pass on their route to the place of battle. In that city, he said, will be our zero milestone from which we will measure all distances forward to the armies in action and backward to the docks and warehouses where the trucks are loaded. After traveling three days in a jeep without getting any nearer the city, the engineer returned with his zero milestone to the bank of the Nile and set it up at the end of the bridge leading to Cairo. He estimated his mileages from that point, labeling them in his official record: 'Distance from the nearest point to the mirage'.

The set of prices used in actual transactions is necessarily the point of departure in estimating national income and in dealing with related problems such as the value of government output and the impact of armament expenditures. Existing prices form a system in the sense that they are related and are continually being

adjusted to one another and to various economic forces such as changes in the character of the demand for goods, in supplies, and in production techniques. Some price adjustments are made through a competitive market, some by administrative decisions of officials of business enterprise, some by administrative decisions of government, and some by legislative enactment. All price adjustments, regardless of the method by which they are brought about, are designed to modify the amount or direction of the flow of commodities and services through the economy, either (a) directly or (b) indirectly by affecting the incomes of some people.

The current dollar evaluations of commodities and services that result from the *de facto* price system have a reality that is absent from the theoretical notions derived from price theory, competitive or otherwise. They have reality not only because they are compilations of values embodied in transactions, but also because they represent the composite of the decisions of all the people in the nation in providing themselves with economic goods as well as the relative values upon which future choices, plans, and decisions are based. This would still be true though competitive price procedures were abolished and all prices were set by a central committee and its staff.

Since market prices, rather than factor costs in the traditional sense, represent the composite of the decisions of people with respect to the relative values of various kinds of economic goods, the most direct and simplest method of measuring the economic impact of armament expenditures is to compare their amount with the total expenditures on all types of final products. Since the ratio of armament expenditures to total expenditures for all final products has validity as representing the result of the decisions of people in their individual and collective capacities, it is not necessary to justify the use of this ratio, as Mr. Goldsmith does, as a substitute for a ratio based on factor costs. Under our price system it is the selection of evaluations based on factor costs that requires justification.

The chief difference between the ratio of armament expenditures to total expenditures on final products and the ratio proposed by Mr. Goldsmith is that the former uses actual outlays on the pay and subsistence of the men in the armed forces and does not assume that they should be raised to the level of the civilian earnings of the enlisted or drafted personnel.<sup>1</sup> If the current impact ratio is to be

<sup>1</sup> See Mr. Goldsmith's paper, Sec. III B. In illustrating the computation of the current impact ratio (Sec. V A) Goldsmith omits this adjustment because of paucity of data and an assumption that it would be small.

calculated by some method that allows for changes in the valuation of human services, such as the difference between civilian earnings and pay in the armed forces, allowance should be made also for other important changes in relative values induced by the defense or war effort. The adjustments proposed by Mr. Goldsmith are not enough if we desire a current impact ratio that reflects changes in the methods of evaluation resulting from the shift from a peace to a war economy. Differences between the methods of establishing prices for armaments and for consumers' goods probably affect the values of commodities as much as the difference between the methods of establishing army and civilian pay affects the valuation of human services.

The best procedure is to take the actual prices paid as the basis for computing the current value of final products, both for armaments and for other commodities and services, and to handle all valuation adjustments together in transforming current values into series representing constant prices, or some theoretical set of prices.

In international comparisons it may be desirable also to allow for substantial differences among countries in the relative levels of pay in the armed forces and in civilian employment. This kind of adjustment is similar to the problem encountered in attempts to compare the cost of living in countries with wide variations in relative prices of the various kinds of consumers' goods. To make any adjustment of this kind is so difficult that it will usually not be attempted in comparisons of armament expenditures in various countries, but may be essential for some uses of the figures.

#### *b The nature of the economic impact*

The character of the current impact ratio recommended by Mr. Goldsmith is ambiguous, partly because the data are not clearly defined, but primarily because he does not state precisely what kind of impact he is discussing. To illustrate the most important ambiguity in the current impact ratio, as calculated by Mr. Goldsmith, take the case of food consumed by the American army. Its cost is included in armament expenditures, as used in the numerator of Mr. Goldsmith's ratio. Most of this cost represents a shift from individual to governmental purchasing rather than a shift in the character or volume of production. In view of the importance of purchases for war purposes of the same kinds of products as were formerly purchased by civilians, we must be clear about what kind of impact we are considering, i.e., the impact on the

character of production and the use of resources or the impact on the division of payments for final products between those made by individuals and those made by government. Distinctly separate concepts, both are important.

Another differentiation in the character of the economic impact of armament expenditures, which Mr. Goldsmith recognizes but tends to underemphasize, is the difference between the impact upon the value and upon the physical quantity of production. As Mr. Goldsmith points out (Sec. VI), the use of the current impact ratio he recommends eliminates the necessity of adjusting for changes in the general price level, but involves the assumption that the price levels of armaments and of civilian goods move along parallel lines. We should examine the facts very carefully to see whether they do, because powerful forces tend to create divergences between the price levels of armaments and those of civilian goods. One of these forces is the greater degree of centralized purchasing for war supplies than for civilian; another is that a large part of both military and civilian production is carried out under conditions of diminishing cost, and as the war proceeds the output for war purposes mounts while that for civilian purposes declines.

Another factor that may cause a difference between the impact of armament expenditures upon the value of production and their impact upon the physical quantity of production is a difference in the wage rates in armament and civilian industries. If, for example, mechanics and other workmen are induced to shift from the production of civilian goods to production of ordnance by a higher rate of wages, and if this differential is maintained, the impact upon the value of the production of armaments and of civilian goods respectively will be greater than the impact upon the physical quantity of the two types of goods, regardless whether the price levels of armaments and civilian goods are constant or shifting.

This problem of adjusting the values in current dollars for divergent price trends and differing wage levels may turn out to be of great importance if the figures are designed to indicate reasonably well the change in the proportion of the national product devoted to defense or war.

### *c Adequacy of data*

For the data used in calculating the current impact ratio in the United States, Mr. Goldsmith depends upon estimates prepared by the National Income Unit of the Department of Commerce.

My comments on the adequacy of data for the computation of the current impact ratio are therefore directed in part to the procedures followed by the National Income Unit.<sup>2</sup>

A reasonably accurate current impact ratio of the type Mr. Goldsmith recommends requires reasonably reliable estimates of the aggregate value, at current market prices or their most appropriate substitute, of the final products of the economy. The total value of all final products is the denominator of the current impact ratio, and the subtotal of the items that constitute armament expenditures is the numerator. The classification of final products used in preparing the estimates must be twofold in order that the two major aspects of economic impact, changes in type of product and changes in purchaser, may be determined.

The estimates now published by the National Income Unit of the Department of Commerce under the title, 'gross national expenditures' or 'gross national product', are, as Mr. Goldsmith points out, far better figures than have hitherto been available for the denominator of the current impact ratio. They are superior to the figures previously published under the title 'national income', because they are designed to represent market prices rather than factor costs, they include armament and other governmental expenditures, and they are computed on a gross rather than on a net basis with respect to depreciation.<sup>3</sup> The figures of the National Income Unit for armament expenditures are also better than any other now available for the numerator of the current impact ratio.

However, neither set of figures is derived by the procedure best adapted to the calculation of the current impact ratio. The denominator is obtained by making various adjustments to the old series of 'national income' estimates. The numerator is a Treasury figure for defense expenditures adjusted for certain items, but not prepared as part of a general classification of government expenditures for final products. Further, it does not differentiate between expenditures that reflect changes in the character of production and

<sup>2</sup> Milton Gilbert, 'Measuring National Income as Affected by the War', *Journal of the American Statistical Association*, June 1942; 'War Expenditures and National Production', *Survey of Current Business*, March 1942; and Milton Gilbert and R. B. Bangs, 'Preliminary Estimates of Gross National Product, 1929-41', *ibid.*, May 1942.

<sup>3</sup> The problem of depreciation, not treated in Mr. Lindeman's paper or in my comments, will be ignored also in these comments, except to register my agreement with Messrs. Goldsmith and Gilbert that the gross figure should be used for the computation of ratios designed to indicate the impact of defense and war expenditures.

those that reflect purchases by government in lieu of purchases by individuals.

The new estimates of values of final products the National Income Unit is preparing, of which preliminary figures have been in part released, may meet these objections. However, the estimates published to date or announced for future publication will not provide the best numerators for computing the current impact ratios of armament expenditures, because the major groups, by which the final products of the economy are being classified, are not well adapted to this purpose. (1) The traditional twofold classification of all final products between consumers' goods, on the one hand, and capital formation, on the other hand, is not appropriate for the classification of war goods and in fact of certain other products of government. Modification of this classification, by segregating the final product of government as a third category, is not sufficient, since the final product of government consists in part of consumers' services, and armaments are in part the product of nongovernment enterprise.<sup>4</sup> (2) Categories based on the principle of durability are less significant than categories of the type used in surveys of family expenditures; and in fact, break down when applied to armaments. Tanks, planes, and ordnance produced for use in this war do not have a life expectancy of more than three years. Though made of steel and other durable materials, they are more akin to consumers' perishable commodities or to such industrial supplies as sandpaper, files, and shipping containers than to consumers' or producers' durable commodities. (3) Classification must be made by both purchaser and type of product.

The proposed classification of final products is designed to provide the figures needed to compute the two ratios for measuring the current economic impact of armaments expenditures and to be useful in other analyses of economic data for which a classification of final products is desirable.

*d Other measures of the economic impact of defense or war*

Mr. Goldsmith's paper is devoted to the attempt to find the most appropriate and practicable single measure for the economic impact of armament expenditures, but concludes that at least two ratios, a current impact ratio and a capital impact ratio, are necessary. His suggestion of the ratio of armament expenditures to

<sup>4</sup> See Section 'Classification of final products' in my comments on Mr. Lindeman's paper.

total expenditures on final products is undoubtedly a leading candidate for the most appropriate and practicable single measure of the current economic impact of the war effort. However, the fact that this ratio, as discussed by Mr. Goldsmith, is ambiguous and

Proposed Classification of Final Products

TYPE OF PRODUCT <sup>1</sup>	CLASS OF PURCHASER <sup>2</sup>			
	Individuals Pur- chased items	Im- puted items	Nonprofit social organi- zations <sup>3</sup>	Business Gov- enter- prises ern- ment
<i>Consumer goods</i> <sup>4</sup>				
Food				
Household maintenance				
Attire				
Transportation				
Education				
Medical services & supplies				
Etc.				
<i>Capital goods</i>				
Residences				
Other buildings <sup>5</sup>				
Other construction <sup>5</sup>				
Machinery & equipment <sup>5</sup>				
Inventories (net change)				
<i>Government services &amp; related products not classified as consumer or capital goods</i> <sup>6</sup>				
Courts & legislative establishments				
Government administration				
Services of armed forces				
Equipment of armed forces				
<i>Foreign claims (net change)</i>				

<sup>1</sup> The items listed here are designed to indicate the character of categories to be developed; they are not a definite suggestion for categories.

<sup>2</sup> In the case of items not actually purchased in final form (e.g., education in public schools), the classification is based on the purchaser of the materials and services used in providing the item.

<sup>3</sup> Includes universities, foundations, and other endowed institutions; community chests and other philanthropic organizations; religious societies; trade unions; fraternal organizations; etc.

<sup>4</sup> Classification of consumer goods to be such that national estimates can be correlated with estimates based on data from surveys of family and individual expenditures.

<sup>5</sup> With subcategories (a) for purposes other than armament production, and (b) for armament production.

<sup>6</sup> Excluding government services identified as services to business enterprises and therefore excluded from final products of the economy (see Section 'Segregation of final products of government from intermediate products' in my comments on Mr. Lindeman's paper). In the procedure of the National Income Unit, no such exclusions are made.



must be separated into two ratios, and the difficult valuation adjustments encountered in comparing the ratios for various periods and various countries make the question acute whether some measure in physical terms might be preferable to a ratio computed from monetary evaluations.

As another candidate for a single measure of the current impact of the armaments program or of war upon the economy, may I suggest an employment ratio based upon an analysis of labor usage prepared in accordance with a classification of final products similar to that suggested above. The estimates of labor usage should be prepared in terms of person-years (or person-weeks or person-days) employed in the production and sale of the various types of final products, and of the idle portion of the labor force. Fewer data are available for such estimates than for estimates of the values of final products, and they could be classified in less detail. However, if as much effort were devoted to an analysis of the use of the labor force, in terms of direct and indirect employment associated with various categories of final products, as has been devoted during the last few years to estimates of expenditures on final products, results of comparable reliability might be obtained. Furthermore, sufficient data are available at present to make possible an estimate of the number in the armed forces and the number employed in enterprises producing armaments or directly associated therewith (including a suitable proportion of the personnel of transportation and communication agencies), and to relate this figure to total employment, or to the total labor force. These estimates might provide a measure of the impact of the armaments program on the economy that would be as reliable as the ratio Mr. Goldsmith computes from the expenditures estimates now available.

Estimates of armament expenditures, civilian expenditures, and labor usage that could be related, with respect to both the whole economy and its major segments, would be far more useful than such estimates prepared independently, as is the case with the estimates now available. If the former, together with price indexes, production indexes, and estimates of use of the principal resources and basic materials—all calculated on the basis of a uniform classification of the final products into which data from surveys of family expenditures as well as data for the nation as a whole could be fitted—had been available at the beginning of the defense program, they would have been of enormous value in planning the transition to a war economy. If developed now, they would provide us with

several valuable measures of the impact of defense and war operations upon the economy, and would be extremely helpful in the development of policy for the transition to a peacetime economy and for the postwar era.

#### M. A. COPELAND

Mr. Goldsmith's distinction between the current ratio and the capital ratio is an important contribution. I suggest that the two ratios are not to be thought of as resulting from a split of the common sense concept; rather the capital ratio is an additional concept, the current ratio is a refinement of the common sense concept. It would seem desirable to provide a current ratio along the lines proposed by Mr. Goldsmith as a standard basic measurement, then to offer as supplementary information data on existing plant and equipment that may be converted to war purposes along the lines suggested by Mr. Kuznets.

Mr. Goldsmith apparently did not use the 'opportunity cost' concept in defining his ratio. To do so would call for inclusion rather than exclusion of sites and of convertible plant and equipment since the opportunity for alternative uses exists. For statistical purposes the 'opportunity cost' doctrine in actual application has the disadvantage of being subjective, that is, the measurement becomes dependent upon the alternative opportunity one may have in mind. When Mr. Goldsmith speaks of excluding from our war effort exported munitions that are offset by civilian imports and including imported munitions paid for by civilian exports, he introduces two such types of subjectivity. One must decide what imports and exports are to be so matched. Apparently he does not take account of such offsets in computing his ratio.

Mr. Goldsmith, like some others, implies that government cash payments for the war program have thus far substantially exceeded the value of munitions delivered and war construction work put in place. From the viewpoint of the federal budget, the lead of payments over deliveries and value in place in the cumulative totals has been substantial although it has been narrowing in recent months. This lead of down payments, chiefly in the field of ordnance and planes, is partly offset in ship construction and other construction where value in place has tended to lead cash payments. Moreover, there has been a substantial increase in the inventory of war work in process to which private enterprises have title.

Presumably this increase is a part of our war effort and is at least as large as the cumulative excess of down payments over deliveries in the case of planes and ordnance.

### CHARLES L. MERWIN

To the comparison of war expenditures with national income Mr. Goldsmith's paper provides an important contribution. His breakdown of the impact relationship into that on current and that on capital account, in particular, makes clearer what is implied in the ordinary procedure whereby total war expenditures and national income are compared without any adjustment. Moreover, his insistence on reducing to a comparable basis the numerator and denominator of the impact ratios is a welcome respite from the slipshod manner in which such comparisons are frequently made.

In one important respect, however, I wish to submit that Mr. Goldsmith, although recognizing as an important problem the under- or overvaluation of resources used for war, has suggested an illogical solution in his measurement of armament expenditures as the value of the alternative products of the resources used in producing armaments. He admits that the problem of determining these alternative products and their value is insoluble "if rigorous standards are applied" (Sec. III), and concludes that a practicable solution lies between using without adjustment "the crude figures given in the government's accounts" and applying throughout the principle of alternative costs (Sec. III). As a practical matter, therefore, he applies the principle of opportunity cost only in "significant instances" of "divergence between actual payment by the government and armament expenditures in the economic sense" (Sec. III). Although he shies away from trying to list these instances, he seems to consider the application of this principle necessary, for example, in the valuation of the services of the armed personnel, which he would take "as roughly equal to the product of their number and the corresponding average earnings of adult males" (Sec. III).

I submit that the principle of alternative cost is inapplicable, in the manner proposed, to wartime conditions. Properly applied, this principle requires, among other things, that there be alternatives for which given resources may be used, and that there be at least some mobility in shifting resources from one use to another. The latter condition is usually not present in a wartime economy. In

particular, members of the armed forces are not at liberty to shift their human resources to other uses. Moreover, a large part of the capital equipment is not freely transferable to other uses, and, in some foreign countries, the mobility of even civilian labor is negligible.

Government fiat may of course influence the monetary value put upon these resources, and the monetary cost of the war depends to some extent on whether the government elects, say, to pay privates \$30 or \$50 per month. But the peacetime earnings of the private are no measure of the economic cost of using him in the army. The application of the alternative cost principle in the present comparison runs up against the hard fact that there are, practically speaking, no alternative uses for the resources.

Although, as pointed out above, Mr. Goldsmith stresses limitations in using the alternative cost principle in the present situation, he misses the fundamental difficulty—the lack of alternative uses, once we are in a war—and views the problem almost entirely as an alternative between war and peace. That is to say, he considers the principal difficulty to be that “we can never know with certainty or even a high degree of probability which civilian products would have been produced in the absence of the defense or war effort . . .” (Sec. III). Even if we did know this, we would still not have the alternative costs of the resources devoted to the war. I doubt that Mr. Goldsmith means to imply that we had freedom of choice between getting into and staying out of this war. Yet his application of the alternative costs procedure to the economy as a whole implies just that, and its narrower application to particular resources during wartime completely ignores the institutional structure of wartime economy.

To say that the alternative cost principle is inapplicable to the situation under discussion does not deny the existence of the problem Mr. Goldsmith set out to solve by means of this principle. On the contrary, there is a genuine problem, in computing the impact ratio, of adjusting war expenditures for the under- or overvaluation of those resources devoted to war. Although I am not able to suggest a solution I am sure the alternative cost principle is not the key, and that its application to the present situation necessarily gives fictitious results.

*Part Three*

THE CONCEPT OF  
INCOME PARITY FOR  
AGRICULTURE

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The author is indebted to O. C. Stine of the Bureau of Agricultural Economics for many helpful suggestions, particularly concerning the historical development of parity.

# The Concept of Income Parity for Agriculture

E. W. GROVE

FARMERS IN THE UNITED STATES have not escaped the age-old struggle against periodically declining prices for their products. When, after the middle of the last century, farmers and their families ceased to be a majority of the population, they tended more and more to blame their ills on certain nonfarm groups. The struggle became focused on improving their economic status. But only in the last two decades have the objectives of this struggle been made explicit, officially been recognized, received considerable public support, and taken on at least the appearance of concreteness and reality in terms of the 'parity' concept; and only since the middle of the last decade has the concept of income parity acquired some prominence.

Since 1933 'parity' has played a continuously important role as a guide to agricultural programs. Recently it has been accepted as one of the limiting factors on the administration of price control as it affects agricultural commodities. But in all cases, the working formulas have been based on price parity rather than income parity, the latter being referred to merely as a more comprehensive measure of the relative economic status of farmers and as a more satisfactory measure of the combined effect of the various agricultural programs on the welfare of farm people.

During the last few years the Department of Agriculture has conducted an intensive study of income parity, collecting and analyzing the data necessary for its measurement. Preliminary results on various phases have been published from time to time in a series of reports. A summary of these preliminary results was recently published by the Bureau of Agricultural Economics.<sup>1</sup> Not the least

<sup>1</sup> An early prospectus of the study appears in 'Income Parity for Agriculture' by O. C. Stine, *Studies in Income and Wealth*, Volume One (National Bureau of Economic Research, 1937). The series of preliminary reports, prepared under the direction of a Departmental committee of which O. C. Stine is chairman, have appeared under (1) Farm Income, (2) Expenses of Agricultural Production, (3) Prices Paid by Farmers for Commodities and Services, (4) Income to Farmers from Nonfarm Sources, and (5) Population, Farms, and Farmers.

The income of the nonfarm population has also been estimated annually. A summary appears in 'Material Bearing on Parity Prices' presented by Howard R. Tolley at a hearing on parity prices and income for agriculture before a subcommittee of the Committee on Agriculture and Forestry, U. S. Senate, July 1941 (U. S. Department of Agriculture, Bureau of Agricultural Economics; mimeographed). The same summary material is given in the printed report of the hearings ('Formula for Determining Parity Prices', Part 2, pp. 303-73).

of the difficulties and problems encountered were questions concerning the essential nature and purpose of income parity, the type of estimates best suited to its measurement, and the validity of income comparisons of this type. This paper discusses these questions and indicates some tentative answers.

For a complete understanding of income parity, however, it has seemed desirable first to trace briefly the growth of the general concept of parity, indicating the historical and conceptual setting from which income parity arose.

## I . Origin and Development of the Parity Concept

The present concept of parity for agriculture developed as a result of conditions prevailing during the first World War and the 1921 depression.<sup>2</sup> During the war prices of agricultural products were relatively high, and the idea of price controls or guarantees became widely accepted. When prices of farm products dropped fast and far in 1920-21, it was only natural that there should be much agitation for aid to farmers and that measures designed to raise and guarantee prices should have a dominant place in proposals for such aid. And as the smaller decline of nonagricultural prices relative to farm prices was impressed on the minds of farmers by the squeeze between their production and living costs and the receipts from the sale of their products, it was also natural perhaps that arguments for special assistance to farmers should stress the 'disparity' between farm and nonfarm prices, between prices received and prices paid.

It was possible to advocate 'equality for agriculture' and to make a good case for the existence of 'disparity' between farm and nonfarm prices in 1921, without precisely defining equality, and without having any very definite idea about what price relationships should be considered as constituting 'parity'. As a matter of fact, the term 'parity' was seldom used in these early postwar years, and did not become common usage in the sense applied to agriculture until its legal recognition and definition in 1933. But it was not possible to provide any quantitative measures of the disparity without first establishing a set of relationships between prices, either

<sup>2</sup> Some highlights in the historical development of parity are given in 'Agriculture and the Parity Yardstick', an address by Howard R. Tolley before the National Cooperative Milk Producers Federation, Chicago, Illinois, Nov. 11, 1941 (U. S. Department of Agriculture, Bureau of Agricultural Economics, mimeographed). See also 'Parity: What Is It?' by O. C. Stine, *The Agricultural Situation*, Sept. 1941, pp. 11-15.

historical or based on abstract considerations, that could be considered as parity. The base periods now taken as embodying the parity relationships stem directly from these early attempts to measure postwar price disparity.

During the period of economic maladjustment following the war, the popular rallying cry was 'back to normalcy'. The years immediately preceding the war's outbreak were naturally viewed by many persons as a sort of golden age to be restored as nearly and as soon as possible. It was inevitable, therefore, that some average of price relationships prevailing during the years just before the war should be taken as parity, especially as these years had the additional recommendations of recency, relative stability, and price relationships more favorable to farm products than in most earlier years.

It does not seem possible to give primary credit to any one individual or group of individuals, either within or outside the United States Department of Agriculture, for originating the parity concept. The general idea seems to have occurred at about the same time to many people interested in agricultural problems. But the Department of Agriculture, through the collection of data and the construction of price indexes, probably was primarily responsible for the ultimate form and specific content of parity. In 1921 it published its first indexes of the prices of all farm products.<sup>3</sup> The practical reasons for selection of the base period August 1909-July 1914 were probably threefold: (1) it was the 60 months immediately preceding the outbreak of the war in Europe; (2) August-July approximately represents the annual marketing season for many of the more important farm products; (3) as monthly data on prices paid to farmers were not available before 1908, the range of choice for a prewar base period was rather narrow.

The Bureau of Labor Statistics all-commodity index of wholesale prices was converted to the August 1909-July 1914 base period, and the 'purchasing power of farm products' was determined by dividing the new index of farm prices by it. In stating that "if the purchasing power is 100, it means that the [farm] products can be exchanged for the *usual quantity* of other things", but that "low purchasing power of farm products has made it impossible for farmers to buy the *normal amount* of other things",<sup>4</sup> this early

<sup>3</sup>G. F. Warren, 'Prices of Farm Products in the United States', U. S. Department of Agriculture *Bulletin* 999, Aug. 26, 1921.

<sup>4</sup>*Ibid.*, pp. 25, 56.



publication obviously contained all the essentials of the price parity concept.

The Joint Commission of Agricultural Inquiry, appointed by Congress in June 1921 to investigate and report on the current condition of agriculture, studied 'the relation of prices of commodities other than agricultural products to such products'. Part I of its report, published late in 1921, contained considerable material pointing toward a concept of parity prices, much of which had been prepared in the Department of Agriculture.<sup>5</sup>

By dividing the indexes of wholesale prices of farm products by the indexes of wholesale prices of all commodities, both on a 1913 base, the Commission concluded that the 'purchasing power of the farmer's dollar' was only 77 cents in May 1921. The purchasing power of farm products was also shown in terms of the index for all commodities other than food and farm products. Probably the fact that the Bureau of Labor Statistics indexes of wholesale prices were then based on 1913 as 100 had much to do with the selection of 1913 price relationships as the basis for comparison.

In 1922 a pamphlet advocating 'equality for agriculture' was published in which the 1906-15 average ratios of prices of farm products in major wholesale markets to all wholesale prices were considered as representing the 'fair exchange values' of farm products.<sup>6</sup> A second edition contained a supplementary memorandum and tables prepared in the Department of Agriculture in which calculations of disparity were based on average wholesale price ratios for the decade 1905-14, the period specified in the first McNary-Haugen bill in 1924 for determining 'ratio prices' (i.e., parity prices) for agricultural commodities. The Department memorandum, however, "recognized that farm prices for farm products and retail prices for the things farmers buy would be the appropriate data to use in such a compilation if they were available".

Shortly after the collection of data on prices received was started, the Department of Agriculture began to collect data on prices paid by farmers. In the *Yearbook of Agriculture* for 1918 and 1919 the prices of some 85 commodities purchased by farmers are shown for 1909 and 1914 and for the current and preceding years, together with the number of units of each commodity purchasable by the

<sup>5</sup> *The Agricultural Crisis and Its Causes* (67th Cong., 1st Sess., House of Representatives, No. 408).

<sup>6</sup> George N. Peek, and Hugh S. Johnson, 'Equality for Agriculture' (Moline Plow Company, Moline, Illinois, 1922).

average crop value per acre. In the *Yearbook* for 1920 and 1921 prices paid and purchasing power per acre are converted to percentages of 1914, and rough indexes are given in the form of simple unweighted averages of the price and purchasing power relatives. The germination of the parity concept can be seen in this change in the manner of the presentation of the data on prices paid. And an article in the 1921 *Yearbook* goes a step further in the direction of price parity, comparing prices of wheat for 1910-21 with average prices of articles bought by farmers, using 1913 as the base period.<sup>7</sup>

To provide a satisfactory measure of price parity, however, more accurate indexes of prices paid by farmers were needed. And in 1928 such indexes showing prices paid for 'commodities bought for family maintenance' and for 'commodities bought to be used in production', were first published.<sup>8</sup> Because only annual data were collected before 1923, the five years 1910-14 were used as the base period.

Until the appearance of these new indexes of prices paid, the determination of price parity on the basis of 1913 relationships had been quite common. Although the index of prices received for farm products was published with August 1909-July 1914 as 100, it so happened that the average for 1913 on this basis was practically 100. And as the Bureau of Labor Statistics wholesale price index, constructed on a 1913 base, had to be used as a substitute for prices paid, it was simple and convenient to assume that 1913 average price relationships constituted parity. But with the publication of the prices-paid index on a 5-year base, and the shift of the Bureau of Labor Statistics index to a 1926 base at about the same time, the use of 1913 relationships as parity was abandoned.

As the idea of parity prices was reasonably simple, easily understood or misunderstood by farmers, farm lobbyists, Congressmen, and the general public, and was readily adapted to the support of almost any proposal for farm relief, it is not surprising that it became widely accepted as the correct, or at least the best available

<sup>7</sup> C. R. Ball, C. E. Leighty, O. C. Stine, and O. E. Baker, 'Wheat Production and Marketing' (U. S. Department of Agriculture, 1922), p. 119. On page 148 there is a chart showing 'purchasing power' per bushel and per acre yield of wheat 'in 1913 dollars' for 1866-1921, the decline in purchasing power following World War I being compared with that following the Civil War.

<sup>8</sup> C. M. Purves, 'Index Numbers of Prices Farmers Pay for Commodities Purchased' (U. S. Department of Agriculture, Bureau of Agricultural Economics, Division of Statistical and Historical Research, Aug. 1928; mimeographed).

measure of the relative economic status of agriculture.<sup>9</sup> The collection of data on prices received and prices paid by farmers and the construction of indexes were improved from time to time. The use of the 5-year prewar base period became more or less standardized. Finally, in 1933, parity prices for farm products became a major goal of the agricultural program.

The Agricultural Adjustment Act of 1933 stated that it was the policy of Congress to "reestablish prices to farmers at a level that will give agricultural commodities a purchasing power with respect to articles that farmers buy, equivalent to the purchasing power of agricultural commodities in the base period. The base period in the case of all agricultural commodities except tobacco shall be the prewar period August 1909-July 1914. In the case of tobacco, the base period shall be the postwar period August 1919-July 1929." Although there have been several extensions and modifications since the passage of the original Agricultural Adjustment Act, the essential features of the price parity concept have remained unchanged.<sup>10</sup>

## II Development of the Income Parity Concept

From the very beginnings of the parity idea, there had been some recognition of the fact that satisfactory prices for agricultural commodities did not necessarily mean satisfactory returns to farmers when production was below normal. In some of the earliest publications in which the idea of parity prices was developed, the purchasing power of an average acre's yield was shown as well as the purchasing power per unit of the commodity. But with production of the major farm products fairly large and fairly stable during the later 1920's and early 1930's, major emphasis tended to be put on the price factor. The marked decline in agricultural production, especially of grains, in 1934-36, brought about more by the droughts of 1934 and 1936 than by the adjustment program itself, caused a renewed awareness on the part of farmers that high prices for their products could be of little benefit if they had nothing to sell. It was recognized that, since prices tended to be high when the harvest

<sup>9</sup> There were, of course, some dissenters; see, e.g., Joseph S. Davis, 'An Evaluation of the Present Economic Position of Agriculture by Regions and in General: I. Prices of Farm Products', and the discussion by O. C. Stine, *Journal of Farm Economics*, April 1933, pp. 247-59.

<sup>10</sup> Legislative extracts relating to parity are given in 'Material Bearing on Parity Prices'.

was small and low when the harvest was large, parity prices could be achieved through a program of production curtailment without necessarily bringing the farmer much money. The important thing was price multiplied by quantity, or income. And this was probably the major consideration in the extension of the parity concept to include 'income parity' in 1936.

Farm and nonfarm incomes had been compared in 1921-22 as evidence supplementary to farm price disparities pointing to the unfavorable economic situation of farmers. But the disparity between farm and nonfarm incomes was studied in absolute terms, not in relation to the incomes of some earlier period taken to be equitable or normal. The comparisons were based on income estimates for 1909-19, then just completed by W. I. King and others on the National Bureau of Economic Research staff showing net income from agriculture as a percentage of total national income for each year.<sup>11</sup> The National Bureau pointed out "that while about 30 per cent of the gainfully employed persons in the United States are engaged in agriculture, the industry normally receives only about 17 per cent of the national income", and concluded that "the average farmer can scarcely with justice be considered a pampered child of fortune".

The report of the Joint Commission of Agricultural Inquiry in 1921 reproduced this information.<sup>12</sup> And the 1921 report of the Secretary of Agriculture presented it in the form of a pie chart contrasting the 1909-18 average percentages of national income received by the several industry groups with the corresponding percentages of gainful workers determined by averaging data from the 1910 and 1920 Censuses.<sup>13</sup> It pointed out that the income of persons engaged in agriculture averaged only a little over half that of persons engaged in other industries.

These data and later revisions of the National Bureau's income estimates were frequently used in this way during the 1920's. The National Industrial Conference Board<sup>14</sup> carried the contrast between the percentage of the working population engaged in agriculture and agriculture's share in the national income back to

<sup>11</sup> W. I. King, Oswald W. Knauth, and Frederick R. Macaulay, *Income in the United States, its Amount and Distribution, 1909-19*, Vol. II (National Bureau of Economic Research, 1922), pp. 62-4.

<sup>12</sup> P. 51; see footnote 5, above.

<sup>13</sup> *Yearbook*, 1921 (U. S. Department of Agriculture, 1922), p. 2.

<sup>14</sup> *The Agricultural Problem in the United States* (1926), pp. 45-9.

1850 on the basis of King's earlier work,<sup>15</sup> and concluded, probably incorrectly, that the decline in the relative economic status of agriculture began in 1900, not in 1920.

In 1927 H. C. Taylor and Jacob Perlman presented National Bureau and Department of Agriculture data to show agriculture's share in total national income annually, 1909-25, and contrasted the results with changes in the farm population relative to the total population, instead of with changes in the ratio of persons engaged in agriculture to the total gainfully occupied as had been the practice.<sup>16</sup> Approaching the present concept of income parity, they compared the 1925 relationship between agriculture's share in national income and its proportion of the total population with the same relationship for prewar years, and concluded that farm income would have had to be 15 per cent of total national income, or 50 per cent greater than it actually was, "in order to be on a parity with the prewar period". They used the Bureau of Labor Statistics cost of living index to derive the "purchasing power of the net income from agriculture" for 1909-25.

These contrasts between agriculture's share in national income and its proportion of gainful workers were frequently accompanied by estimates of farmers' labor and property income in comparison with similar data for other industries. The net income of farmers was reduced (1) by an allowance for interest on the value of farm property to yield the estimated return for farmers' labor and management, or (2) by a wage allowance for farmers' labor to yield the estimated return on farm property.

The National Bureau of Economic Research, in its 1922 publication on *Income in the United States* (p. 63), allowed an annual interest rate on the value of farm property of 5 per cent for 1909-18, 5.5 per cent for 1919, and 6.5 per cent for 1920. After deducting these allowances from agriculture's net income excluding wages paid to hired labor, it was concluded that, except in 1918 and 1919, the average farmer's reward for labor and management was less than the average earnings of all employees in the United States. The report of the Joint Commission of Agricultural Inquiry reproduced these data, and made a more detailed comparison with employees' earnings in other industries.<sup>17</sup>

<sup>15</sup> *The Wealth and Income of the People of the United States* (Macmillan, 1915).

<sup>16</sup> 'The Share of Agriculture in the National Income', *Journal of Land and Public Utility Economics*, May 1927, pp. 145-62.

<sup>17</sup> P. 57; see footnote 5, above.

In 1925, L. H. Bean and O. C. Stine, considering "the portion of national wealth represented by agricultural wealth" as one possible criterion for determining whether agriculture was receiving a fair share of the national income, reversed the process.<sup>18</sup> Deducting a wage allowance for farmers and unpaid family labor based on the earnings of hired farm laborers, the return for capital and management was obtained and expressed as a percentage of the total value of farm property. National Bureau data for 1909-20 and new Department of Agriculture estimates for the crop years 1919-20 to 1923-24 were used. Although difficulties in the way of comparing property returns in agriculture with those for other industries were conceded, it was pointed out that earnings for capital and management in agriculture "have generally been below the current commercial rates of interest". But the results thus obtained represented all property returns, including those going to nonfarmers. After deducting interest on farm mortgages and rent paid to nonfarm landlords, the rate earned on 'operators' net capital investment' was found to be even lower, negative in fact for 1920-21 and 1921-22.

The same authors also determined the labor income of farmers in a manner similar to that first used by the National Bureau. The latter's results were shown for 1909-20; additional estimates for 1919-20 to 1923-24 were computed assuming an interest rate of 4.5 per cent on farmers' own capital and 6-7 per cent on borrowed capital. The results were compared with annual wages paid to hired farm labor, with the conclusion that "the average farmer could have obtained a larger income if he had hired himself out as a farm hand". The same data were presented by Henry C. Wallace in 1925.<sup>19</sup>

In *The Agricultural Problem in the United States* the National Industrial Conference Board computed farmers' labor and property income, but included in farmers' income an allowance for the rental value of farm dwellings.<sup>20</sup> Farmers' average annual 'labor earnings' were divided by the cost of living index; and the results, expressed as percentages of 1914, were then contrasted graphically with earnings per worker in other occupations treated in similar fashion. It was concluded that the "real annual labor earnings of

<sup>18</sup> 'Income from Agricultural Production', in 'The Agricultural Situation in the United States', *Annals of the American Academy of Political and Social Science*, Jan. 1925, pp. 27-34.

<sup>19</sup> *Our Debt and Duty to the Farmer* (Century, 1925), pp. 90-6.

<sup>20</sup> Pp. 55-61.

farmers in 1924-25 were 3 per cent below the level of 1914, while those of other workers had risen 22 per cent". This was the closest approach to the present concept of income parity.

In its annual reports on income from agricultural production appearing in *Crops and Markets*, the Department of Agriculture continued to present the type of data developed by Stine and Bean, and made additional comparisons from time to time. In 1926 the purchasing power of the average labor income per farm was contrasted with that of average earnings per factory employee on the basis of 1919-20 as 100;<sup>21</sup> and in 1931 the same comparison was made on the basis of 1924-29 as 100.<sup>22</sup> In 1927 annual rates of earnings on farm operators' net capital investment were contrasted with rates of corporate earnings on capital stock at market values.<sup>23</sup>

In 1929 John D. Black further refined the technique of determining the property income of farmers, allowing a flat \$500 per year as wages of farm management in addition to the usual farm-hand wage allowance for operators, and doubling the farm value of food and fuel consumed on the farm "to bring it roughly to a comparable urban basis".<sup>24</sup>

The type of income comparisons made during the 1920's was determined, in part at least, by the nature of the available data. Estimates of both farm and national income were in the experimental stage, and were less comparable than now. Except for some 1909 estimates based on 1910 Census data<sup>25</sup> and the early estimates of King for Census years back to 1850,<sup>26</sup> the National Bureau's *Income in the United States* included the first serious attempt at annual estimates of net income from agriculture. And they were based on inadequate data, especially as to expenses of production.

The Department of Agriculture did not attempt to estimate farm income on an adequate scale until several years later. Estimates of the total value of farm production for 1919-21 at December 1 prices were published in 1921.<sup>27</sup> But these were unsatisfactory even as measures of gross income because of failure to allow for amounts used for feed and seed. In 1924 crop-year estimates of gross and net

<sup>21</sup> *Crops and Markets*, Monthly Supplement, July 1926, p. 229.

<sup>22</sup> *Crops and Markets*, Sept. 1931, p. 400.

<sup>23</sup> *Ibid.*, July 1927, p. 254.

<sup>24</sup> *Agricultural Reform in the United States* (McGraw-Hill, 1929), pp. 24-7.

<sup>25</sup> E. A. Goldenweiser, 'The Farmer's Income', *American Economic Review*, March 1916, pp. 42-8.

<sup>26</sup> *Wealth and Income of the People of the United States*.

<sup>27</sup> *Monthly Crop Reporter*, Dec. 1921, p. 146.

farm income beginning with 1919-20 were published.<sup>28</sup> These data were kept up to date, revised, improved, and supplemented with new information from time to time, the results appearing in various issues of *Crops and Markets*. In 1925 monthly estimates of cash income from marketings appeared. In 1930 gross and net income were put more nearly on a calendar-year basis beginning with 1924; and state estimates of gross and cash income appeared. In 1932 estimates of gross income and the more important production expenditures were extended back to 1909.

The scope and methods of research relating to agricultural income were surveyed in 1933 under the direction of a Social Science Research Council committee.<sup>29</sup> Work already done and its uses were discussed and new projects proposed. Research on agricultural income was undoubtedly stimulated by the publication of this report. But only in recent years have satisfactory estimates of net farm income back to 1909 become available.

The early comparisons of farm and nonfarm income were not without their critics, both as to the adequacy of the data for the use made of them and as to the general conclusions reached on the relative submergence of agriculture. In 1922 David Friday criticized current statements "that there has been a great disparity in the growth of agricultural income as compared with that of other industries".<sup>30</sup> From Department of Agriculture estimates of the annual gross value of farm products, he concluded that whatever "distress in agriculture" might exist was "not due to any failure of agricultural income to increase during the last twenty-five years, nor to hold the increase which had been attained in 1913".

The chief critics in recent years, however, have been John D. Black and the late George M. Peterson. The latter criticized attempts to compare corporate and agricultural rates of return on invested capital.<sup>31</sup> He also analyzed and recalculated the National Bureau and Department of Agriculture estimates of national and farm income for 1924-29, concluding that farm incomes compared not unfavorably with industrial wages in those years.<sup>32</sup> Black has repeatedly pointed out elements of incomparability in data on farm

<sup>28</sup> *Crops and Markets*, Monthly Supplement, Aug. 1924, pp. 286-7.

<sup>29</sup> 'Research in Agricultural Income; Scope and Method', *Bulletin 6*, June 1933.

<sup>30</sup> 'The Course of Agricultural Income during the Last Twenty-five Years', *American Economic Review*, Supplement, March 1923, pp. 147-58.

<sup>31</sup> 'Corporate Versus Agricultural Rates of Return on Invested Capital', *Journal of Farm Economics*, Jan. 1930, pp. 175-80.

<sup>32</sup> 'Wealth, Income, and Living', *ibid.*, July 1933, pp. 421-48.



and nonfarm incomes, and fallacies in their use, and has stressed the greater validity of comparing changes in terms of indexes over direct comparisons on an absolute basis.<sup>33</sup> The latter consideration, too frequently overlooked in early comparisons of farm and non-farm incomes, was taken into account in 1936 legislation defining income parity.

Several students of the farm problem had recognized the definite superiority of income over prices as a measure of farmers' welfare. Henry C. Wallace wrote: "the prosperity of the farmer is not measured by the prices he gets for what he sells. It is measured by his total income and what that income will buy".<sup>34</sup> And J. S. Davis stated: "prices and indexes of prices are incomparably less useful in evaluating the position of agriculture than national, regional, and group measures of gross, cash, and net income. . . ." <sup>35</sup> But the legislation establishing income parity seems to have constituted a recognition of this viewpoint only to a limited extent.

A declared purpose of the Soil Conservation and Domestic Allotment Act of 1936 was the "reestablishment, at as rapid a rate as the Secretary of Agriculture determines to be practicable and in the general public interest, of the ratio between the purchasing power of the net income per person on farms and the income per person not on farms that prevailed during the 5-year period August 1909-July 1914, inclusive, as determined from statistics available in the United States Department of Agriculture and the maintenance of such ratio". This was a simple extension of the price parity concept to the field of income, parity income being the 5-year prewar ratio of per capita real incomes, just as parity price was the 5-year prewar ratio of average prices. It did not supersede or displace parity prices as a major goal of agricultural policy. It was rather intended as a more accurate over-all measure of the relative economic status of farmers than parity prices, the latter remaining nevertheless the major guides to the farm program as applied to individual agricultural commodities.

Unlike parity prices, parity income as thus defined was not merely legislative crystallization of a concept already fully developed. The form given income parity was undoubtedly conditioned by the com-

<sup>33</sup> Discussion of papers by David Friday and L. C. Gray, *American Economic Review*, Supplement, March 1923, pp. 181-4; 'Agriculture Now', *Journal of Farm Economics*, April 1927, pp. 137-62; 'Agricultural Reform in the United States', pp. 23-31; 'Research in Agricultural Income; Scope and Method', pp. 63-5, 76-8.

<sup>34</sup> *Op. cit.*, p. 82.

<sup>35</sup> *Op. cit.*, p. 248.

parisons of farm and nonfarm income, by the type of estimates that had been made, and by criticisms of the estimates and their use. But income parity itself bore little resemblance to most of its predecessors. Because satisfactory data for prewar years were lacking, income parity as defined in 1936 was conceivable but not measurable until a few years before that date. And the information available in 1936 was hardly adequate for its proper measurement. The base period specified was the same as that for price parity, regardless of the lack of data on nonfarm income for prewar years on anything except a calendar-year basis. The conclusion is inescapable that income parity had its roots more in the existing concept of price parity than in the earlier comparisons between farm and nonfarm income. It was originally intended merely to close up a noticeable gap in the ranks of price parity.

Perhaps because of this fact, the terms of its definition seemed somewhat ambiguous or inconsistent; and there was considerable criticism of its provisions and disagreement over its interpretation.<sup>86</sup> In general, it would seem that the confusion created by the definition arose from an inadequate recognition on the part of its formulators of the questions it raised and of the difficulties involved in providing quantitative answers. More specifically, the distinction between income from agriculture and income of persons on farms was not clear; and the deficiencies of current income estimates as measures of either were ignored.

In the Agricultural Adjustment Act of 1938 the definition of parity income was changed to read as follows: " 'Parity', as applied to income, shall be that per capita net income of individuals on farms from farming operations that bears to the per capita net income of individuals not on farms, the same relation as prevailed during the period from August 1909 to July 1914." A supplementary definition of parity income to be used in apportioning parity payments among individual crops appears in later legislation. But the definition quoted above remains in effect for the general purpose of appraising the economic status of farmers.

The 1938 definition of parity income differs from the 1936 definition in four respects. (1) The term 'net', apparently omitted from the earlier definition by an oversight, is applied to per capita income of persons not on farms as well as to that of persons on farms.

<sup>86</sup> See the discussion of 'Income Parity for Agriculture' by O. C. Stine, M. R. Benedict, and J. D. Black in *Studies in Income and Wealth*, Vol. One (National Bureau of Economic Research, 1937).

(2) The 'purchasing power' provision in the 1936 definition, omitted apparently because it was intended that the comparison should be one of incomes in current dollars instead of real incomes, was presumably excluded because of the lack of suitable price indexes to be used in determining the purchasing power of income going to persons not on farms, and in the belief that the validity of the comparison would not be improved by putting it in terms of purchasing power on the basis of the inadequate data available. (3) Income of persons on farms is to include income from farming operations alone; presumably because of the lack of adequate data on income of persons on farms from nonfarm sources. (4) The phrase "as determined from statistics available in the United States Department of Agriculture" is omitted from the later definition. As this phrase in the earlier definition had the effect of making it legally possible to overlook the inadequacies of the data available, its later omission together with other changes might be interpreted as indicating a growing recognition that parity income could no longer be considered a simple extension of parity prices but must be viewed as a separate concept with important problems of its own.

### III Principles underlying Parity

The foregoing recital of the origins and evolution of the idea of parity for agriculture is intended to show that the concept as we now know it did not spring full-blown from the brain of some economic Jupiter, but rather grew out of the continuous groping for a concrete measure of justice for the farmer, and was steadily modified by the conditions prevailing in the economic life of farmers and the nation. In other words, parity did not develop as the practical application of an economic theory immaculately conceived, free from all taint of original sin in the form of class interest. On the contrary, parity, like Topsy, just grewed; and whatever economic justification can be found for it in its present form may be considered largely a rationalization.

In view of these aspects of the problem, a considerable unreality is evident in any attempt to expound a theory of parity. Parity is a practical economic and political expedient, not a theory.

It cannot be denied, however, that the concept of parity is an important fact of present-day economic life, and as such deserves to be analyzed and placed in its proper theoretical setting. More-

over, and this point provides the main justification for this paper, an economic rationale of parity is essential for the development of satisfactory statistical yardsticks to be used in its measurement. Even persons who may disagree with the fundamental objectives of the parity concept will doubtless agree that, given those objectives, it is imperative that they be understood and their underlying philosophy analyzed if suitable measures of their attainment are to be provided. We therefore discuss the major principles underlying the parity concept in general and the income-parity concept in particular, apply these principles to the selection of appropriate statistical series for the measurement of income parity, and discuss the validity of conclusions drawn from comparisons of the type embodied in the income-parity concept.

Another reason for tracing the development of the idea of parity from its inception was to make clear that the concept of income parity cannot properly be considered in isolation from the rest of the parity concept. Income parity has been a relatively recent offshoot from the parity plant, one that, although growing in practical application and importance, is as yet definitely secondary to parity prices. It can be properly understood only in terms of the whole plant and its growth.

From the very beginnings of the parity concept, it has apparently been based on two more or less separate and distinct ideas: the principles of 'welfare' and of 'balance'. These principles have not been clearly distinguished by most of the advocates of parity for agriculture. But there has been some recognition of the difference from earliest years. Thus, the 1921 report of the Joint Commission of Agricultural Inquiry may have had the two points of view in mind when it stated that "the condition of agriculture as a whole, as distinguished from the condition . . . of individuals in agriculture, may be measured by the prices which the farmer receives . . . in their relation to the prices of other commodities".<sup>37</sup> And even when the different principles are not explicitly recognized, they can usually be seen in the arguments advanced in favor of parity.

Proponents of parity have in general argued that higher prices for farm products and larger incomes to farmers are necessary (1) to give farmers and their families a decent standard of living and a fair share of the national income, and (2) to restore and maintain the economic stability and prosperity of the nation as a whole. It

<sup>37</sup> *Op. cit.*, p. 26.

goes without saying that the improvement of the welfare of farmers has always been the prime motivation in the advancement of the parity idea. But it has also been argued, with evident sincerity, that a better economic status for farmers was the easiest and most obvious, if not necessarily the sole way, to achieve economic salvation for the nation as a whole. And the latter argument has frequently been displayed with such prominence and advanced with such force as almost to obscure the merits of the primary contention.<sup>38</sup> This was especially true in the earlier years of the development of the parity concept, and perhaps for that reason in its earlier stages the idea of parity was based mainly on the principle of balance.

In seeking to interpret the course of development of the parity concept, it seems reasonable to conclude (1) that it has always rested on the dual philosophy of 'balance' and 'welfare', (2) that parity price, although frequently used as though it measured farmers' welfare directly, is chiefly a concept of balance, and (3) that parity income is a welfare concept, although early comparisons of farm and nonfarm incomes sometimes contained implications of balance. Farmers' costs of production are recognized in one way or another in both price and income parity, but neither is a cost of production concept in the sense often advocated for the determination of fair prices of farm products. It may be further concluded (4) that there has been some shift in emphasis from balance to welfare in recent years, coinciding with the development of the income parity concept.

Parity price deals with the relation between two sets of prices, the prices of commodities sold by farmers and the prices of the things bought by farmers. The parity price concept is thus directly analogous to the terms of trade concept in international exchange. It is concerned with the terms of trade between the farm and non-farm sectors of the national economy.

The parity price concept implies a fundamental stability in the price system. Assuming that certain relationships among prices may be considered to represent a balanced or equilibrium condition, it implies that any deviation from these price relationships involves imbalance and maladjustment, and that, if such maladjustment does not disappear of itself in reasonably short order, steps should be taken to correct it.

These ideas of balance and stability in price relationships possess

<sup>38</sup> See Arthur Capper, *The Agricultural Bloc* (Harcourt Brace, 1922), pp. 3-4.

some degree of respectability in economics.<sup>39</sup> Observation of pronounced and rapid changes in price relationships combined with knowledge concerning the actual factors creating inflexibility in parts of the price system can create a strong prima facie case for the existence of price disparities. But it is seldom, if ever, possible to determine objectively what should be considered as constituting parity relationships except on the always dubious basis of relationships actually existing in the past. And it is not always possible to determine whether the observed price disparity is a cause or merely a symptom of the economic maladjustment accompanying it. Some probable validity, therefore, can be conceded to the concept of balance underlying price parity without necessarily accepting as parity the particular price relationships established as such in existing legislation, and without necessarily concluding that a direct attack on the prices themselves constitutes the most appropriate remedy for any observed disparities.

The concept of price parity was first developed and was later incorporated by legislation in official agricultural policy during periods of pronounced economic depression, when farm prices had dropped to very low levels while nonfarm prices had declined much less. In 1921-22 it was argued that the low purchasing power of farm products in terms of their current prices was a main contributing cause of industrial unemployment and depression, and that a return to the prewar price relationships as between farm and nonfarm products was an essential step in the restoration of general prosperity. During the remainder of the 1920's, however, when the country as a whole was prosperous, the idea of parity prices did not make much additional headway even though farmers as a whole were not fully sharing in the nation's prosperity and there was much agitation for some form of farm relief. The disparity between farm prices as measured from prewar relationships and nonfarm prices was frequently referred to; and the parity concept was often implicitly endorsed, even by some nonfarm groups.<sup>40</sup> But in the absence of

<sup>39</sup> See Frederick C. Mills, *Prices in Recession and Recovery* (National Bureau of Economic Research, 1936), particularly pp. 33-7, 'On price disparities'. See also Raymond T. Bye, 'An Appraisal of Frederick C. Mills' *The Behavior of Prices*, Social Science Research Council *Bulletin* 45, 1940, and the panel discussion.

<sup>40</sup> See e.g., 'The Condition of Agriculture in the United States and Measures for its Improvement', report by the Business Men's Commission on Agriculture (published jointly by the National Industrial Conference Board and the Chamber of Commerce of the United States, 1927), p. 45.

general economic distress, pressure was insufficient to put the parity concept into practical effect.

With the coming of the depression in the early 1930's and the intensification of farm price disparities as measured from the pre-war base, interest in the parity concept increased and agitation for the restoration of 'balanced' prices as an aid to farmers and as a recovery measure was renewed. It would be idle to deny that the original Agricultural Adjustment Act in 1933 was intended to improve the economic welfare of farmers; but it was primarily designed as an integral part of the national recovery program which embraced also corrective currency and banking measures, direct stimulation of industrial revival, and governmental and work relief programs. The maintenance and improvement of farmers' standards of living were clearly intended but chiefly because the restoration of farmers' purchasing power in the form of parity prices was considered an essential part of the general recovery program.<sup>41</sup> Had the welfare of farm people been the primary consideration in this early legislation, the fact that curtailing production to raise prices would not necessarily raise farmers' income could not have been so readily blinked. The principle of balance was still the dominant philosophy underlying parity.

This idea of balance in price relationships had its counterpart in other phases of the agricultural program. The 'adjustment' philosophy itself, embodied in the first Agricultural Adjustment Act, implied that such changes should be made in the nation's agriculture as would achieve "as sound a 'balance' as possible in the structure and functioning of agriculture in relation to other parts of our whole economic system".<sup>42</sup> And the idea of balance continues to play an important part in the philosophy of present agricultural programs and policies as illustrated by the frequent use of such expressions as 'balanced abundance' and 'a balanced agriculture'.<sup>43</sup>

#### IV Recent Emphasis on Welfare

About the middle of the last decade, however, a tendency appeared to give the welfare aspects of agricultural programs more attention

<sup>41</sup> See Mordecai Ezekiel and Louis H. Bean, 'The Economic Bases for the Agricultural Adjustment Act' (U. S. Department of Agriculture, Dec. 1933).

<sup>42</sup> Edwin G. Nourse, Joseph S. Davis, and John D. Black, *Three Years of the Agricultural Adjustment Administration* (Brookings Institution, 1937), p. 453.

<sup>43</sup> See 'Achieving a Balanced Agriculture' (U. S. Department of Agriculture, Sept. 1934, revised April 1940).

and emphasis. "Economic adjustment occupied the center of the stage in the first half of the decade; human welfare began to be stressed in the second."<sup>44</sup> The gradual change in policy was a reaction to and a defense against the recurrent charges that the farm program was based on 'scarcity economics', that it tended to promote 'monopolistic prices' for farm products fixed in line with historical price relationships, not in accord with current conditions,<sup>45</sup> and that it was a program designed to aid commercial farmers only. The reorientation of agricultural policy stressed the welfare of farmers and other persons dependent on agriculture. But the perspective was also broadened to give more consideration to the effect of farm programs on the welfare of the nation as a whole, and lengthened to give more consideration to their long run as against their immediate bearing on farm and national welfare.

The beginnings of this emphasis on welfare may be seen in the creation of the Rural Resettlement Administration in 1935 and in the shift of Agricultural Adjustment Administration policy from production limitation to soil conservation in 1936. And the emphasis on welfare has gradually increased, as shown by the greater attention paid to problems of low income farm families and farm laborers, the development of programs for rural rehabilitation and for providing better rural facilities for medical care and hospitalization, promotion of family-size owner-operated farms, the ever-normal granary, the food-stamp plan, etc.<sup>46</sup>

The development of the concept of income parity in 1936 may reasonably be interpreted as a part of the growing emphasis on welfare in agricultural policy. As already indicated, income parity developed from the existing price parity concept and from the latter's inadequacy as an indication of farmers' actual income in times of declining farm production. But a revival of purchasing power per acre's yield, as used in some of the earlier publications on price parity, would have been the simplest and most obvious way of allowing for reduced output of farm products not associated with acreage reduction. The newly defined income parity, on the

<sup>44</sup> Mordecai Ezekiel, 'The Shift in Agricultural Policy Toward Human Welfare', paper delivered before the American Economic and American Farm Economic Associations, New York City, Dec. 29, 1941 (U. S. Department of Agriculture; mimeographed), p. 2.

<sup>45</sup> See 'Statistics Relating to Agriculture', memorandum to the Secretary of Agriculture, Committee on Government Statistics and Information Services, Dec. 1934 (mimeographed), pp. 35-7.

<sup>46</sup> Ezekiel, *op. cit.*, pp. 3-9.



other hand, was a distinct departure from the older parity concept, a departure of which its formulators could not have been entirely unaware. Doubtless they hoped in part to overcome the objections frequently raised to the rigid historical price relationships constituting the goal of price parity. Income parity avoided the question of what constitutes 'balance' in price relationships, though raising the no less difficult question as to what distribution should be made of the nation's income. Possibly the use of income parity along with price parity may be interpreted as indicating a growing recognition that "the problem of the best allocation of income" must be considered separately from "the problem of the best allocation of resources".<sup>47</sup>

Price parity, with its contrast between prices paid and received, had as its goal a constant purchasing power per unit of farmers' output. If parity prices were maintained with no changes in farm production, farmers would presumably enjoy a constant level of material welfare equal to that of the base period regardless of changes in nonfarm production and income. Income parity, on the other hand, tied farmers' welfare to that of the nation as a whole with the apparent intention that they should share proportionately in any general increases in productivity.

Such welfare implications as price parity possessed involved the assumption that farmers were entitled to a standard of living equal to that enjoyed in the base period; whereas income parity would attain for farmers, not a minimum standard of living, but a *fair share* of the total national income. If per capita output of commodities and services in the United States increased, the farmer was to receive a share, even though his own output may not have increased. But if real national income declined materially, parity income for the farmer might represent a standard of living much lower than that which he enjoyed in the 1910-14 base period.

The placement of the comparison on a *per capita* instead of a unit of output basis, the inclusion in the comparison of all persons on farms and not merely those actually engaged in agriculture, and the counting, in the original definition, of all income to persons on farms and not just farm income, were additional features of the new income parity concept with definite implications of greater emphasis on the welfare of farm people.

<sup>47</sup>T. W. Schultz, 'Economic Effects of Agricultural Programs', *American Economic Review*, Feb. 1941, pp. 128-33.

## V Philosophy of Income Parity

In brief and simple terms the underlying philosophy of income parity is apparently about as follows: What the farmer can produce, and what he gets for it, are determined less by his own effort and ingenuity than by physical, technical, and market factors largely beyond his control. Moreover, the farmer is a human being; his labor is as good as any other man's; and he is entitled to receive a decent living and a fair return for that labor, and to share in any material progress made by the nation as a whole. This philosophy is in accord with the recent trend in politico-economic thought toward increased recognition of the responsibility of society as a whole for individual welfare. Whether one accepts the income parity concept may depend, therefore, on one's attitude toward this trend.

It is possible to accept the concept of income parity in principle without necessarily endorsing the prewar standard of comparative welfare established by law for the farm and nonfarm populations. In 1910-14 urban wages were relatively low, whereas agriculture was more prosperous than in previous years.<sup>48</sup> It was conceded in 1909 that "there has never been a time when the American farmer was as well off as he is today, when we consider not only his earning power, but the comforts and advantages he may secure".<sup>49</sup> Therefore, it seems fair to conclude that, broadly speaking, the farm population has never until now been so well off in comparison with the nonfarm population as in 1910-14, with the exception of a few war years immediately thereafter.

On the other hand, even in years of relative prosperity for agriculture, farmers were leaving for industry in large numbers; and it is probable that the well-being of persons on farms averaged considerably below that of persons not on farms. Per capita farm income was about one-fourth as large as per capita nonfarm income in 1910-14; and it is unlikely that elements of incomparability in incomes as measures of relative welfare could fully account for this big difference. Although agriculture's prosperity was admitted in 1909, it was also stated that "notwithstanding all this progress as measured by historical standards—agriculture is not commercially

<sup>48</sup> John D. Black, 'Measures for the Improvement of Agriculture', *ibid.*, pp. 166-7.

<sup>49</sup> 'Report of the Country Life Commission', Senate Document 705, 60th Cong., 2nd Sess., p. 21.

as profitable as it is entitled to be for the labor and energy that the farmer expends and the risks that he assumes", and that "the farming interest is not, as a whole, receiving the full reward to which it is entitled".<sup>50</sup> Certainly the question of what the relative economic rewards of farmers and nonfarmers should be is difficult and ticklish. Fortunately this paper is not concerned with it.

As most recently defined in the 1938 Agricultural Adjustment Act, the essential question involved in income parity is something like the following: Are persons living on farms receiving their fair share of the nation's currently available supply of the good things of life? Or, since what constitutes a fair share has been defined as the share actually received during 1910-14, the question may be reworded as follows: Compared with the nonfarm population, are people on farms as well off, on an average, now as they were in 1910-14? If not, to what extent? Everything there seems to be on a fairly objective basis except for the concept of 'well-being', or what constitutes being well off. The definition itself does not use these terms but defines 'parity as applied to income' on the evident assumption that the relative welfare of the two segments of the nation's population can be determined on the basis of their respective income. The validity of this assumption and the limitations inherent in any welfare comparison will be discussed after consideration of the most appropriate measures of income for use in determining parity.

## VI Content of Income for Measuring Parity

Income estimates could conceivably be constructed with some purpose other than the measurement of economic welfare.<sup>51</sup> But those now in use seem to be based, either explicitly or implicitly, on some concept of welfare. At any rate, all the comprehensive estimates of national income now in use are essentially *appraisals*, necessarily *subjective*, of the contribution of economic activity to the nation's welfare.<sup>52</sup> The implications of this fact are not always fully realized even by the makers of the estimates. And it is certainly true that

<sup>50</sup> *Ibid.*, pp. 14, 22.

<sup>51</sup> See J. R. Hicks, 'The Valuation of the Social Income', *Economica*, May 1940, for a discussion of income as a measure of *productivity* versus income as a measure of *welfare*.

<sup>52</sup> See Simon Kuznets, *National Income and Its Composition, 1919-1938* (National Bureau of Economic Research, 1941), Ch. 1, for the best and most recent discussion of the nature, significance, and limitations of national income estimates.

users of national income estimates are commonly unaware of their nature, treating them as objectively observed facts, and accordingly drawing conclusions that are frequently unwarranted.

As estimates of income on a national scale are essentially measures of economic welfare, and as the income parity analysis requires that the nation's population and income be split into two parts for the purpose of determining the relative well-being of the two groups on the basis of ratios of per capita income, the derivation of appropriate estimates of income for this purpose may seem at first glance to be a very simple problem or no problem at all, aside from possible statistical difficulties arising from inadequacies of data needed in their construction. But there are various types of income estimates on a national scale corresponding to differences in content, differences in method of valuation, the time interval used, and the stage in the process of production, distribution, and consumption to which they apply. And some selection from these types must be made before income estimates can be constructed for the parity analysis. It seems desirable, therefore, to consider briefly the possible variants in the measurement of income in relation to the purpose of income parity and the specific requirements of its legal definition before a final choice is made.

Income is a flow of goods. Like any other continuous flow, it can be measured only in terms of a unit of magnitude in combination with a unit of time. The Agricultural Adjustment Act does not specify the time unit to be used in the parity comparison. So it must be selected on the basis of the purpose of that comparison modified by the possibilities of the available information. As a guide to agricultural policy, frequent and up to date measures of the welfare of people on farms compared with that of nonfarm people are needed. With this in mind, monthly income comparisons would be desirable. But because of the seasonal character of agricultural production, it is doubtful whether monthly estimates of farm income that would be significant for comparative purposes could be developed even if all the necessary data were available on a monthly basis. So the parity analysis must be based on annual estimates of income.

As the 5-year base period runs from August through July, it might be inferred that the annual comparisons should represent the same 12 months. But the base period itself was merely a carry-over from price parity; and it is doubtful that too much significance should be attached to it. Moreover, the lack of satisfactory estimates

of nonagricultural income on other than a calendar-year basis dictates the choice of the calendar year.

The various goods of which income is composed can be combined only on the basis of some system of weights, that is, on the basis of some evaluation of their relative usefulness, desirability, or importance. As the supply and demand evaluations of the market place constitute the one generally accepted system of values, the weights must be prices, and the unit of magnitude, the dollar. But income can be measured in terms of fixed prices as of some particular time, or in terms of fluctuating prices current in each time unit used in the measurement, or in terms of any conceivable combination of or compromise between these two extremes. In the definition of income parity 'income' is apparently used in its popular sense as a flow of money instead of in its more strictly economic sense as a flow of goods. In view of this fact and of the fact that the 'purchasing power' provision of the 1936 Act was eliminated from the 1938 Act, it is evident that the most appropriate unit of magnitude for the purpose is the dollar at current prices.

Ideally, income should include all items possessing utility. But the necessity of measuring it in dollars results in narrowing its content to commodities and services that have either passed through the market place or are similar in kind to goods actually passing through the market place. This means the exclusion of all 'free' goods as well as of economic goods, chiefly services, that are produced and consumed outside the exchange economy.

From this brief consideration of the essential nature of income, the methods that must be used in its measurement, the implications of the legal definition of parity, and some of the limitations in the data available for constructing the estimates, it may be concluded that income of the farm population and income of the nonfarm population as determined for purposes of parity analysis should each represent a flow of economic goods, valued at current prices, and measured for calendar years. But what is the most suitable content of income for the purpose? What particular flow of commodities and services should income represent? And at what point in the stream should the flow be measured?

The requirements that the estimates of income be confined to the flow of economic goods and that their valuation be based on market prices do not of themselves preclude the possibility of selectivity in the choice of goods to be included. Should income represent all commodities and services that command, or could command,

a price in the market? Or should certain moral or legal judgments be superimposed on those of the market place, excluding some items for which people are willing to pay a price on the ground that what they think is good for them and what actually is good for them are not necessarily the same? The question is aptly illustrated by alcoholic beverages. Should they be counted in the income estimates for all years? Or only for those years in which they were legal? Or not at all?

Another similar question relates to charges for human maintenance. Is the relative well-being of farm and nonfarm people affected by all commodities and services, or only by those in excess of minimum subsistence requirements? If, for example, \$400 a year should be fixed upon as necessary for an absolute minimum living standard, is a man receiving \$1,000 a year twice or six times as 'well off' as a man receiving \$500 a year? Or is any real comparison possible without deducting minimum subsistence requirements? If the contribution to an individual's welfare of that part of his income necessary to keep him alive is measurable at all, it must be infinitely large. And what sort of a comparison is possible when infinity is one item in both sides of the comparison?

Because of the far-reaching effect such decisions must have on the conclusions derived from the parity analysis, it is worth while to raise these questions even though there is really no choice as to the answers. There are no objective standards by which it could be decided that certain items should be excluded from income on the ground that they add nothing to human welfare or actually detract from it. And there is no way of determining precisely what charges might be deductible as 'costs of human maintenance'. Moreover, the definition in the Agricultural Adjustment Act does not seem to provide any authority for such arbitrary decisions. By its apparently popular use of the term 'income', the Act seems to assume implicitly that the relative welfare of farm and nonfarm people is affected by all the commodities and services that money can buy; in other words, the welfare of the two groups is to be compared in terms of the respective aggregates of all economic goods at their disposal.

Several borderline items of income such as transfer payments, loans, and capital gains or losses, are usually omitted from estimates of national income as a whole on the ground that they represent mere shifts in purchasing power and have no counterpart in

commodities produced or services rendered. Such shifts in purchasing power, however, may be of considerable significance in their effects on the incomes of individuals or groups of individuals within the nation. And there is a question whether they should not be considered when comparing the welfare of farm and nonfarm people. On the whole it seems likely that, for groups so large, the net effect of such items will usually be insignificant and may be safely ignored. An individual farmer might cash in on an increase in land values, but obviously farmers as a whole could not. Similarly, an individual farmer might increase his purchasing power considerably by going into debt, but the net change in the debt position of farmers or nonfarmers as a whole in most years is not likely to be significant in relation to their total income. Nor, aside from the question of government benefit and direct relief payments, is the net shift in purchasing power between the two population groups resulting from gifts or other transfer payments likely to be significant.

The definition of income parity specifies 'net' income. The several items of difference between 'net' income produced and the various types of 'gross' income are not significant in a measure of economic well-being except for relatively short periods. So, even were net income not specified by law, gross income in all its forms should be ruled out on the ground that the parity analysis must concern itself with *significant* changes in the relative welfare of farm and nonfarm people, not with their transient fluctuations.

The decision concerning the appropriate content of income for the parity comparison has been narrowed to a choice between net income produced, or the current value of commodities and services produced minus the current value of commodities and services consumed in their production, and income consumed, or the current value of commodities and services entering into final consumption. As 'income paid out', interpreted as the current value of commodities and services "transferred to individuals by business enterprise", in a sense lies between net income produced and income consumed, it too must be given some consideration.

Goods are made for men, not men for goods; and consumption, not production for its own sake, is in the last analysis the sole justification for economic activity. Consequently it is difficult to disagree with the often expressed viewpoint that human welfare, so far as it is affected by economic goods, is dependent on consump-

tion rather than on production.<sup>53</sup> Were data separating 'consumers' outlay' of farm and nonfarm people from their total incomes available, much might be said for its use in determining income parity. Consumption is ordinarily more stable than production; and income parity measured in terms of income consumed would probably provide a more accurate *current* indicator of relative well-being than income produced.

But there is something unrealistic and paradoxical about any argument leading to the conclusion that a man earning \$1,000 a year and spending it all is as 'well off' as another man who earns \$2,000 a year but saves half, or that a man living on \$1,000 of savings is as 'well off' as one living on \$1,000 of current income. If a man has a certain 'purchasing power' or quantity of goods at his disposal, it does not seem entirely reasonable to consider him less well off merely because he chooses to save some of that purchasing power or to postpone the consumption of some of those goods. What has been said of national income (net income produced), that it "may be treated . . . as a type of maximum fund for current consumption",<sup>54</sup> is true of the total incomes produced by the farm and nonfarm populations. In a sense, at least, it is all available for current consumption if the individuals involved choose so to use it.

The crucial issue is whether welfare is affected by income saved as well as by income consumed. With this in mind, income paid out, which includes 'individual savings' but not 'business savings', seems a question-begging compromise. The artificial nature of income paid out as applied to individual entrepreneurs is self-evident. Any breakdown of farmers' net income as between 'entrepreneurial withdrawals' and 'business savings' is meaningless except so far as the estimates of farmers' 'withdrawals' from the business may be considered to approximate their outlay for consumption, or income consumed. But what about the savings of corporations? Can it be said that the welfare of a small individual stockholder is enhanced by undistributed profits of a corporation, by goods 'accruing' to him but whose use he does not control as an individual? Perhaps not. While an individual stockholder usually has little or no actual control over the disposition of a corporate surplus, the stockholders

<sup>53</sup> See, e.g., A. C. Pigou, *The Economics of Welfare* (London, 4th ed., 1932), pp. 36 and 89; Oscar L. Altman and Thomas C. Blaisdell, Jr., 'National Income Estimates in Relation to Economic Policy', Conference on Research in Income and Wealth, May 1941 (mimeographed); and Hicks, *op. cit.*, p. 123.

<sup>54</sup> Kuznets, *op. cit.*, p. 154.



as a group do exercise such control, theoretically at least. And for the nation as a whole, that control is obviously more than theoretical. So in comparing the welfare of such large groups as farm and nonfarm, there seems to be no reason to exclude corporate savings from the measures of welfare if individual savings are included. As income of farm people is to be confined to that derived from farming operations, the problem of allocating stockholders' equity in corporate savings between the few stockholders on farms and those not on farms does not have to be faced. If it had to be faced, the best answer would probably be that workers and creditors have as much of an equity in corporate surpluses as stockholders, and that all except a very few are nonfarmers.

Until recently tentative computations of income parity were based on a comparison of net farm income produced and nonagricultural income paid out.<sup>55</sup> Use of the latter to represent the income of the nonfarm population was dictated, in part at least, by limitations in the data readily at hand. But there does not seem any justification for comparing one content of income for farm people with a different content of income for nonfarm. If the income parity analysis is to have any real meaning, the two income series must be constructed on a comparable basis. Whatever the decision as to the inclusion or exclusion of savings, their inclusion in one series and partial exclusion from the other will tend to give misleading results, especially during periods of rapid change in national income. Thus, during some of the depression years of the last decade, both the farm and nonfarm populations consumed more than they produced, living in part on their savings. Estimates of net farm income do not include any of this excess of consumption over production in those years. If they are compared with nonfarm income paid out, which *does* include some of the excess, the disparity between farm and nonfarm income may be considerably exaggerated. Similarly, when national income is expanding rapidly, as in recent years, both individual and business savings may become quite large. And if net farm income, including farmers' entire savings, is compared with nonagricultural income paid out, excluding the savings of nonfarm business enterprise, the per capita farm

<sup>55</sup> See, e.g., L. H. Bean, 'Income Parity for Agriculture', Agricultural Adjustment Administration, U. S. Department of Agriculture, March 1936 (mimeographed). The first published statement concerning the derivation of the estimates of nonagricultural income used in this connection appears in 'Nonagricultural Income as a Measure of Domestic Demand' by L. H. Bean, P. H. Bollinger, and O. V. Wells (Agricultural Adjustment Administration, U. S. Department of Agriculture, 1937).

income necessary to achieve parity may be seriously underestimated.

As a precise measure of the actual *current* well-being of farm people compared with nonfarm people, income consumed would probably be more satisfactory than income produced. But the ability to consume rests ultimately on the ability to produce; and income produced is a more accurate indicator of changes in the underlying conditions affecting welfare in the long run.<sup>68</sup>

The longer the interval under consideration, the less significant is the difference between income consumed and income produced likely to be. As a general guide to agricultural policy, we need *frequent* measures of farmers' relative economic status. Yet the best guide is not necessarily one that reflects accurately their actual current status. Farm people might maintain their standard of living for a while even though net farm income had declined materially. But as net farm income is the barometer of the farmer's well-being, a decline in it, presaging lower living standards to come, should be heeded in shaping agricultural policy.

It is suggested, therefore, that the prime purpose of the income parity analysis should be to provide frequent measures of the underlying long time shifts in the relative well-being of farm and nonfarm groups. Just as a moving average can give a short time indication of the current status of a longer time movement, so our income measures should provide current indications of the basic trend in the welfare of farm people. For this purpose income produced is better than income consumed.

In line with this conclusion, "net income of individuals on farms from farming operations", for purposes of the parity analysis, has been taken to mean the part of the current value of the net output of agricultural commodities that is received by, or accrues to, persons living on farms. And "net income of individuals not on farms" has been interpreted to mean total national income, that is, the current value of the nation's net output of commodities and serv-

<sup>68</sup> Pigou considered whether income produced or income consumed is the more appropriate measure of the 'national dividend' (*op. cit.*, pp. 34-7). He concluded that income consumed was better for the *measurement* of "comparative amounts of economic welfare . . . over a long series of years". But he claimed to be chiefly concerned "not with measurement, but with causation". And, as the total effect of any cause operating through the national dividend in a given year can be shown only in terms of income produced, the latter was the more useful measure for his purpose. The report on 'Research in Agricultural Income' (pp. 6-7) concluded flatly that income produced was "more expressive of the economic welfare of a group", and "for purposes of indicating the changes in economic welfare . . . more usable" than income consumed.

ices, after the deduction of the total income of persons on farms, both from farming operations and from nonfarm sources. It is no part of the purpose of this paper to discuss the statistical difficulties encountered in making the preliminary estimates recently published by the Bureau of Agricultural Economics or the extent to which they may fail to embody the concepts here developed.

## VII Validity of the Income Parity Concept: Income as a Measure of Welfare

Because the chief purpose of this paper is to interpret the concept of income parity in terms of an already established legal definition and goal, it was convenient to discuss the selection of appropriate income estimates to be used in measuring the attainment of that goal before considering the implicit assumption that welfare could be satisfactorily compared on the basis of income. In a sense, this was putting the cart before the horse; and the important question, the validity of any relative welfare evaluation of the type implied in the concept of income parity, is now discussed.

In connection with price parity it was briefly concluded that the principle of balance underlying it possessed some degree of validity though the historical price relationships set up as parity and some of the remedies proposed might be open to serious question. Any attempt to judge what should be the legal base period for income parity has already been disclaimed, and this paper is not now concerned with practicable methods for removing any income disparity that may be found to exist. But given the goal, and disregarding the methods used to achieve it, does the income comparison itself have any real meaning or validity as a measure of relative welfare?

Since the first publication in 1920 of Pigou's *Economics of Welfare*, the role of economics in the solution of problems of human welfare and the statistical difficulties involved in attempting to measure changes or differences in welfare have received considerable attention from economists and statisticians. The issues involved have become entangled with those having to do with the proper scope and purpose of economic science and have not as yet been fully resolved to anyone's complete satisfaction, nor is it likely that they will be in the immediate future.

The extreme divergence of viewpoints actually taken on the question of welfare comparisons can be aptly and simply illustrated by quoting from two well-known economists. A. L. Bowley has con-

cluded that "in the end the concept of real income is as much psychological as it is statistical, and statisticians even who have measured as best they can all that is conceivably measurable will not be able to answer the apparently simple question: How much better or worse off are we than our predecessors or our neighbors?"<sup>57</sup> On the other hand, Colin Clark states that, although "there is a good deal of rather ignorant sophistication on this subject nowadays", some economists going "so far as to say that it is impossible to compare the level of income between two communities or between two individuals, or even between the same individual at different times", nevertheless it has been "clearly shown that economic welfare can be compared between times and places. . . ."<sup>58</sup>

In view of its broad and controversial character, it will not be possible, in this paper, to attempt a complete survey and evaluation of the subject. It must suffice to raise some of the salient issues and to consider their bearing on the measurement of income parity.<sup>59</sup>

Although the definition may seem to imply a direct comparison between the welfare of persons on farms and that of persons not on farms, such a comparison is not *necessarily* involved in income parity. What constitutes parity income for the farm population in any given year can be computed (1) as the product of per capita nonfarm income in the given year and the base-period ratio of per capita farm to per capita nonfarm incomes, or (2) as the product of per capita farm income in the base period and the ratio of per capita nonfarm income in the given year to that of the base period. The measures used, therefore, should reflect accurately either (1) the actual differences in welfare as between farm and nonfarm people for each year, or (2) the annual changes in welfare enjoyed by each group. It is not essential that they should be accurate from both points of view.

In the last analysis, whatever validity may be attached to the

<sup>57</sup> 'The Measurement of Real Income' (Transactions of the Manchester Statistical Society, Session 1939-40), p. 28.

<sup>58</sup> *The Conditions of Economic Progress* (London, 1940), p. 27.

<sup>59</sup> Recent noteworthy discussions of the question include 'The Valuation of the Social Income' by J. R. Hicks, *Economica*, May 1940; 'Wealth and Welfare' by Edmund Whittaker, *American Economic Review*, Sept. 1940; and the following articles or notes in *The Economic Journal*: 'Scope and Method of Economics' by R. F. Harrod, Sept. 1938; 'Interpersonal Comparisons of Utility: A Comment' by Lionel Robbins, Dec. 1938; 'Welfare Propositions of Economics and Interpersonal Comparisons of Utility' by Nicholas Kaldor, Sept. 1939; 'Economic Welfare' by L. G. Melville, Sept. 1939; 'The Foundations of Welfare Economics' by J. R. Hicks, Dec. 1939; and 'Economic Welfare: A Comment' by Roy W. Jastram, March 1940.

concept of income parity will rest on the assumption of identical or unchanged wants and tastes. That is to say, it will have to be assumed (1) that consumption patterns and general mode of life have been substantially the same for farm people as for nonfarm, or (2) that there have been no significant changes since the base period in the wants and mode of life of either group. It is hard to say which assumption is less inaccurate. Since 1910-14 tremendous changes have occurred in the way of life of both farm and nonfarm people; and the trend toward the urbanization of farm life has probably tended to narrow the gap between the farm and nonfarm mode of living.<sup>60</sup> On the whole, however, it seems probable that that gap has been and still is so great that the second assumption must be considered as doing less violence to the facts.

With this consideration in mind, and in view of the severe criticisms of direct comparisons between farm and nonfarm incomes, the concept of income parity can probably be appraised more favorably in terms of changes over time than as a direct comparison. On the other hand, the measurement of income parity in current dollars instead of 'real' income might be considered as involving a direct comparison on the assumption that farm and nonfarm people have the same wants and tastes. But whichever point of view is adopted, the difficulties in the way of satisfactory comparison are of the same type. And the general characteristics of these difficulties must be considered first.

Any use of income estimates as a quantitative indication of relative welfare—and in either of its aspects, income parity involves comparing the welfare of one group of people with that of another—will encounter three major obstacles: <sup>61</sup> (1) the possibility of interpersonal comparisons of utility must be conceded; and certain assumptions must be made concerning the relation between needs, income, and satisfaction; (2) it must be assumed that changes in economic welfare and in total welfare are closely and directly correlated; (3) even granting the first and second assumptions, there remains the insuperable difficulty that the thing to be measured is not actually measurable, necessitating the use of some less satisfactory substitute. Brief consideration is given below to each of these problems in their relation to income parity.

To say that two things must be comparable if they are to be

<sup>60</sup> John A. Hopkins, 'Changing Technology and Employment in Agriculture', U. S. Department of Agriculture, Bureau of Agricultural Economics, May 1941, pp. 33-4.

<sup>61</sup> Hicks, 'The Foundations of Welfare Economics', pp. 697-8.

compared is a truism. But in comparing the welfare of farm and of nonfarm people, or of people on farms today and of people on farms 30 years ago, an unverifiable assumption is involved: namely, that the groups are made up of essentially the same kind of people with similar wants and capacities for satisfaction. In effect, some sort of equality of individuals is postulated, although it can be argued that for large groups, such as farm and nonfarm, only the equality of the groups, not that of the individuals composing them, need be assumed.

Use of income to compare the welfare of individuals further involves the correlative assumption that the equality of the individuals in their capacity for satisfaction is not disturbed by any *inequalities* in the distribution of income itself. Thus, it can be argued that the rich, by virtue of being rich, have acquired a greater capacity for satisfaction than the poor; and any redistribution of incomes would diminish the welfare of the former without immediately adding to that of the latter.<sup>62</sup> Or, conversely, it can be argued that welfare is a function of income and needs, but that needs increase or decrease with income so that, in the long run, welfare is a constant for any individual regardless of his income.<sup>63</sup> Both arguments must be rejected or welfare cannot be measured and compared on the basis of income.

The assumption of equality may be based more on ethical than on scientific grounds; but even those who insist that the 'normative' and 'positive' elements in economics should not be confused concede that "it is fitting that such assumptions should be made and their implications explored. . . ." <sup>64</sup> The postulate of the equality of farm and nonfarm people, or of farm and nonfarm people now and 30 years ago is not likely to cause objection.

The second necessary assumption, that differences or changes in economic welfare reflect those in total welfare, presents a somewhat higher hurdle, but perhaps not an insurmountable one. Economic welfare may be defined as "that part of social welfare that can be brought directly or indirectly into relation with the measuring rod of money".<sup>65</sup> But an adequate definition of total welfare has yet to be devised. Man does not live by bread alone; but what he does live by eludes the wisdom of the wise.

<sup>62</sup> Pigou, *op. cit.*, pp. 90-2, and Jastram, *op. cit.*, p. 156.

<sup>63</sup> Pigou, *op. cit.*, p. 84.

<sup>64</sup> Robbins, *op. cit.*, p. 641.

<sup>65</sup> Pigou, *op. cit.*, p. 11.

The noneconomic aspects of welfare are many and varied, though difficult to specify. Perhaps the most important are derived from wholesome and sanely adjusted conditions of daily work and surroundings and from carefree time or leisure. The relative importance of economic and noneconomic welfare varies with the wants and preferences of the individual. But for most people the noneconomic items are of considerable importance. "It is an exaggeration which may be useful to say that economic goods as a class are predominantly 'necessary' rather than truly valuable. The importance of economic provision is chiefly that of a prerequisite to the enjoyment of the free goods of the world. . . ." <sup>66</sup>

Yet with social institutions and attitudes what they are, it is probably fair to say that, for the average person, economic welfare represents a sufficiently large part of total welfare to be a fairly satisfactory index of the latter, except when important noneconomic satisfactions have to be foregone in order to gain those included on the economic list. This exception, however, casts doubt on the validity of any direct comparison of farm and nonfarm incomes, for it is obvious that farm people enjoy many noneconomic satisfactions not available to the majority of nonfarm people.<sup>67</sup> In other words, economic welfare probably represents a smaller part of total welfare for farm than for nonfarm people.

On the other hand, there is no reason to suppose that the ratio of economic to total welfare has changed significantly in the last 30 years for either the farm or nonfarm population considered as a whole. Changes in economic welfare, for such large groups, probably represent changes in total welfare with reasonable accuracy. Considered from this viewpoint, therefore, there is little or no reason to question the validity of income parity.

Third and most heroic of the assumptions involved in any welfare comparison is that the estimates of income that are available or can be constructed are suitable measures of differences or changes in economic welfare. For a precise quantitative comparison, the measures should reflect the sum of the consumers' surpluses derived by the individuals involved from each economic good and service at their disposal.<sup>68</sup> In other words, income as a measure of

<sup>66</sup> F. H. Knight, quoted by Eugene Staley in 'World Economy in Transition; Technology vs. Politics, Laissez Faire vs. Planning, Power vs. Welfare' (Council on Foreign Relations, 1939), p. 67.

<sup>67</sup> Whittaker, *op. cit.*, gives a forceful statement of this point.

<sup>68</sup> Pigou, *op. cit.*, p. 57.

welfare should represent the sum of the utilities or satisfactions derived from the net output of commodities and services minus the sum of the disutilities or dissatisfactions associated with the effort involved in their production.

This is clearly an unworkable concept. Income estimates embodying it are nonexistent and statistically impossible of realization. Net income as usually conceived is 'net' in the sense that the value of goods consumed in the process of production has been deducted. But it is not 'net' in the sense of deducting the total disutility of the effort involved in production from the total utility derived from that production. It does not even represent total utility without deducting disutility. To do so, the weights applied to the various commodities and services included in income would have to be proportionate to the average utility per unit received from each commodity and service. Assuming free markets the price weights actually used may be presumed to represent marginal utilities.<sup>69</sup> But that is not the same thing at all.

The ideal measure of economic welfare, therefore, could not be based on fixed weights. As the available supply of a commodity is reduced, the 'average' consumers' surplus received from it would tend to become larger, and the weight assigned to it should be increased proportionately. If income at current prices could be abstracted from purely monetary changes, it would partly fulfill this requirement in the sense that price changes would ordinarily be in the right direction. But the difficulty would remain that prices are presumably proportionate to marginal utilities rather than average consumers' surpluses.

In the absence of more appropriate measures, it is customary to rely on estimates of 'real' income to indicate changes in welfare, the flow of commodities and services being valued at fixed prices, or, more often, the same thing being approximated by dividing money income by a suitable index of prices. The first definition of income parity specified measures of this type.

Assuming no change in tastes, and no change in the distribution of purchasing power, measures of real income can be relied on to show whether economic welfare is *more* or *less* at one time than another. But they cannot be counted on to indicate the precise *amount* or percentage of change. The implications of this fact are serious. Where the comparison is over a period as long as 30 years,

<sup>69</sup> Hicks, 'The Valuation of the Social Income', p. 113.



the assumption of no change in tastes is hardly reasonable. And where the point at issue is the precise amount of disparity in the change for one group as contrasted with that for another, the inability of the data to show actual amounts of change puts the comparison in a rather dubious light.

The current definition of income parity, however, abandons real income for income in current prices as the basis for comparison. This change was presumably made on the ground that prices paid by farm and nonfarm people, though different, have probably fluctuated fairly closely together. That is, the differences between the price fluctuations for the two groups were not considered to be as great as the errors that might be introduced by the deflation process with available price index numbers. The differences between the changes in the two current price income series are then to be taken as approximating the differences between the changes in real income for the two groups.

In sum, therefore, income parity is determined on the basis of approximations to a yardstick which, even if precisely constructed, would not be the true measure sought. It must be concluded that the economic foundations of income parity as now measured are shaky in the extreme. As already noted, income parity is still definitely secondary to price parity in its importance as a guide to agricultural policy. Practical decisions relating to specific action programs and to the determination of price ceilings for farm products have been made on the basis of parity prices rather than parity income. Though the latter may have much to recommend it as a general indication of the relative economic status of farm people, it is evidently not a precise measure at all.

But perhaps all these scientific and quasi-scientific considerations are really beside the point. Perhaps the only appropriate test of the validity of income parity is whether the people whose welfare is contrasted consider it valid. As already pointed out, the development of the parity concept and the way it has been used make it more of a political than an economic concept, and any attempt to force it into a framework of economic theory is a rationalization largely lacking in reality. The popular mind is not cluttered up with notions about individual differences in wants and patterns of consumption, or with distinctions between economic and non-economic aspects of welfare. It considers income a matter of dollars and cents; and a dollar is a dollar in anyone's pocket. So the pre-

scribed method of determining income parity may be politically valid even if it fails to pass other tests of validity.

Because of the difference in tastes and patterns of consumption between farm and nonfarm populations, particularly because of their difference with respect to the noneconomic elements in the content of living, it was concluded that income parity made more economic sense when appraised as a measure of changes from the base period for each group than as a direct year by year contrast between the two groups. But the definition of income parity may be interpreted as calling for direct comparisons. Moreover, the reference to 'income' without the 'purchasing power' modification may be similarly interpreted, the assumption that farm and nonfarm people have identical wants and standards of welfare being implied.

If the latter assumption were granted, together with the corollary assumption that differences in noneconomic aspects of welfare between farm and nonfarm people are nonexistent or can be ignored, then the method used for measuring income parity would be largely valid. It would still not give the precise measure required in the sense of a summation of farm and nonfarm 'consumers' surpluses'; but it would be close enough for all practical purposes.

The average farmer or nonfarmer, if he knows anything about it at all, probably views income parity as a direct comparison of farm and nonfarm incomes with assumptions similar to those just stated in the back of his mind. He probably does not assign much significance to noneconomic elements in welfare. And this, together with his ideas concerning the equality of men, probably blinds him to the effect of differences in wants and tastes on the significance of money income. Perhaps we ought to grant forthwith the assumptions underlying this viewpoint, and let it go at that.

In any event, it is sure that income comparisons will continue to be made whether or not they really mean what some take them to mean. We must strive to improve our knowledge and estimates of income as measures of welfare to the end that the inevitable comparisons based on them will be more reliable. A major objection to the present concept of income parity is its determination on the basis of over-all national averages, ignoring regional and individual differences. Comparisons of incomes as between farm and nonfarm people are likely to be more reliable and meaningful if made for areas smaller than the nation as a whole, with due consideration for the respective size distributions of income. So more

detailed income data, by regions and size classes, might provide the basis for a better approach to the problem of income parity for agriculture.

## Discussion

A. G. HART

In interpreting 'parity', Mr. Grove indicates that two concepts underlie it: 'balance' (associated with price parity) and 'welfare' (associated with income parity). It should never be forgotten, however, that, while 'balance' is presented as a necessary and sufficient condition for national prosperity, the farm bloc look upon parity as a program of retaliation against the rest of the economy. Whenever a farm leader is pressed on the point, we find that the back of his mind is filled with bitter thoughts about tariffs, monopoly practices, freight-rate discrimination, and the like. The reality of these grievances is, of course, undeniable. What is relevant here, though, is that they underlie the movement for 'parity', and that the most favored means of attaining parity is to imitate the industrial monopolist and withhold goods from the market so far as may be necessary to reach the desired price.

Retaliation infects not merely the concept of 'balance' but also that of 'welfare'. If the notion of welfare were taken seriously, it should mean trying to correct the distribution of income by size in favor of low income farmers. Needless to say, a great deal of stress is placed by the farm movement on the low incomes of many of its members. But in the distribution of farm benefits (which is roughly proportionate to gross farm income, I understand), the higher income farmers get the lion's share. From the standpoint of the low income farmer, it is a sort of community fund campaign for his benefit, under which the promoters pocket roughly a 75 per cent collection commission. The politics of the situation make it impractical for the low income farmer to object, since it is the political power of the more prosperous farmers that gets favorable governmental action. Because the low income farmer contributes only his needs as a pretext for agitation, and the prosperous farmer contributes the power, the logic of politics awards the prosperous farmer most of the results. But is this 'welfare'?

Economists concerned with national income should certainly have a hand in the discussion of farm parity. But in that discussion they are under obligation to insist on the recognition of two facts: 1) The notion of 'balance' cannot mask the fact that pushing farm prices up means getting more out of the national income by putting less in. The farm groups prefer price increases for their products to cash subsidies, on the ground that the former represent 'earned' income. The idea that an increase in income can be 'earned' by a decrease in output should be punctured.

2) The notion of 'welfare', adequately analyzed, means leveling up incomes that fall below minimum standards. By leaving the notion imperfectly analyzed we make it possible to distort the legitimate claims of the low income farmer into a source of gain for the prosperous farmer. What is called for is simply to popularize the elementary notion that an average is not a perfect representation of a statistical distribution, with special reference to the fact that, though the average farm income is low relative to the average nonfarm, the two distributions overlap. If recognition of this notion leads to the thought that low income urban consumers should not be burdened to benefit high income farmers, nobody has any right to object.

Even the complete abandonment of the parity concept would not leave the farmer without claims. (1) To begin with, his grievances against the price policy of the industrial community are valid, and in the public interest corrective steps are called for. (2) While we can scarcely expect the adoption of wholesale income-equalizing measures, the time is ripe to advocate shifting tax burdens to those who can best bear them and providing free services (public health and the like) to the public in general. (3) Farmers are right in arguing that they are rearing the bulk of the next generation in this country; consequently, rural education, recreation, child health, and housing are largely the responsibility of the urban community. Action along these lines would take care of the legitimate claims which the farmer and the urban public sense lie behind 'parity'.

#### O. C. STINE

We must do more than concede that the prescriptions of parity in agricultural legislation are imperfect. The legal prescriptions have been determined to some extent by the availability of data, and to a considerable extent represent compromises of different viewpoints

as to what is desirable or practicable. It is our responsibility not only to construct the best possible measures from the data now available, but also to improve the data, to try to clarify concepts, and to prepare the way for an improvement in practice, i.e., in the use of parity concepts and parity measures in determining national policies.

The concept of parity is useful in considering welfare and the utilization of resources. In view of the obvious limitations dollar income has in measuring welfare, we should try to find other measures. Sociologists are experimenting. We need measures that are generally accepted in terms of physical units or concrete achievements for which we can determine the monetary requirements. Parity can be defined in terms of the income necessary to provide equivalent food, clothing, housing, health, education, and other opportunities. In other words, parity should be a measure of the income distribution necessary to provide equality of opportunity as between urban and rural communities.

Another valid use of the parity concept would be to extend it to the consideration of how to make the best possible use of national resources. We should ask with reference to agriculture, what output is required to provide the best balance? Had capital and labor complete mobility they could be so applied as to equalize marginal returns all around; then it would be a matter of indifference to any individual whether he was employed in agriculture or in industry, at one point or another. But we do have a high degree of inertia and a considerable amount of monopolistic practice that retard or prevent perfection in the use of our resources to meet our requirements. It seems to me, however, that we ought to be seeking measures that will indicate clearly where and when the adjustments are required so as to obtain the best balance between production and wants, and to improve the equity of distribution among the several factors used in production. The important question is how to maximize national income.

To be more specific, parity for agriculture should be answered not only in terms of income per person engaged in agriculture, but also with reference to how much agricultural production the nation really wants or what agricultural production constitutes a proper balance with the production of other goods. This involves, of course, considerations of efficiency in the use of agricultural resources and manpower. How many farms and how many farmers should we keep on the land, year in and year out, to guarantee a supply of

farm products in proper balance with other products? And the same questions, of course, are to be answered with reference to other fields of activity.

#### M. A. COPELAND

The possible retaliatory implications Mr. Hart notes in the parity concept are especially significant at a time like the present when the stage is set for inflation.

Mr. Stine has suggested that parity should be made to indicate equality of opportunity as between urban and rural communities. This, I take it, is a longer run meaning of 'parity'. I am not sure how income measurements can be made to reveal equality of opportunity as distinguished from equality resulting from taking advantage of opportunity. Something about opportunity, however, would be revealed if fuller attention were given to a comparison of the distributions of incomes by size as between urban and rural communities. I see no reason to assume that we should desire on ethical grounds anything approaching equality between the upper ends of the income scales. On the other hand, there is good reason to hold that a common national minimum of living should prevail as between city and country. A statistical measurement of income might be made to reveal whether parity in this sense has been attained.

It has been noted that the term parity has also a short term or cyclical significance. It would seem better to abandon the term entirely in this connection. What is meant, I take it, is not parity but stability of income.

#### JULIUS T. WENDZEL

Mr. Grove has performed a real service in exploring certain implications of income parity for agriculture. The general concept of agricultural parity has come to have great weight in the determination of national policy with respect to agriculture. I doubt, however, that many of us fully understand the philosophy, economics, and politics involved. I shall not discuss his paper in detail. I wish merely to say that his treatment leaves the impression that price parity is considered a much more satisfactory basis for agricultural policy than income parity.

Mr. Grove develops a somewhat artificial association of income

parity with 'welfare' on the one hand and of price parity with 'balance' on the other. He apparently feels that the concept of price parity implies primarily a concern for economic stabilization not only of agriculture but of the economy as a whole; whereas income parity implies primarily a concern with the 'fairness' of the farmers' share in national income.

After interpreting income parity as concerned primarily with welfare rather than balance, he considers whether income parity is a sound basis for comparing the relative welfare of farm and non-farm groups. He concludes in general that it is not; that income parity, as defined in the Agricultural Adjustment Act of 1938, is quite unsatisfactory as a means of determining whether people on farms are as well off, on the average, relative to people not on farms now as they were in 1910-14; consequently, that income parity is also unsatisfactory as a guide to agricultural policy.

Early in his paper Mr. Grove was careful to point out that income parity is a recent offshoot of the agricultural parity plant and that it is still secondary to price parity as a basis for agricultural policy. His statements at this point (see Sec. III) are in historical terms with no implication that income parity *should be secondary*. After holding (1) that income parity is primarily a welfare concept, (2) that it is not a sound basis for comparing relative welfare, and (3) that it is not a sound basis for agricultural policy, he again emphasizes that it is definitely secondary to price parity as a basis for agricultural policy. At this point (Sec. VII) the implication is very strong that income parity is not only younger but *inferior* as a basis of agricultural policy.

It is very doubtful that income parity can be so exclusively associated with a concern for fairness or relative welfare as to warrant dismissing it as a basis of agricultural policy simply because the income parity formula is not considered a good measure of relative well-being. It can be admitted that income parity is not a satisfactory measure of relative welfare without holding that it has no value as a basis for agricultural policy. Income parity may still be explored and compared with price parity as a standard for achieving economic balance.

Parity for agriculture has been advocated and supported on grounds of both economic balance and ethics or welfare in the sense that the term is used by Mr. Grove. Both economic and ethical considerations may be applied to the concept of parity for agriculture whether parity is expressed in terms of relative prices

or of relative incomes. Parity incomes and parity prices are merely alternative standards of agricultural parity and it is doubtful that the philosophy associated with these respective standards is substantially different. It may be true that there has in recent years been a shift to welfare as a justification for aids to agriculture and that there has also been more consideration of income parity in recent years. It does not follow, however, that the two are causally related and that the push for income parity was due primarily to a concern for welfare. Mr. Grove's earlier observation, that the inclusion of income parity in the 1936 agricultural legislation was prompted by a realization that parity prices multiplied by low output might not maximize farmers' income, bears definite emphasis in this connection.

I do not wish to defend income parity as a basis for agricultural policy. It seems important, however, to question the implied superiority of price parity. If income parity is to be analyzed as a standard of fairness, the equity searchlight must also be focused on price parity. I am sure Mr. Grove would not claim any advantage for price parity in this realm. In short, both income and price parity should be compared with reference to the objectives or considerations of both balance and welfare.

As now calculated, both income and price parity have serious limitations for national policy with respect to agriculture. Both are still too largely tied to an historical base period and a period that is well above the desirable trend of agricultural prices and incomes for many commodities. To serve a major social purpose a concept of agricultural parity, whether in terms of parity prices or parity incomes, would have to be conceived as a socially desirable modification of historical trends. It would have to give more recognition to changing relationships among commodities and regions. It is doubtful that any concept of parity for agriculture as a whole, especially if calculated in terms of a static historical base, has any very significant meaning. A significant classification of economic groups for establishing parities would also have to give definite recognition to the distribution of income by size.

I am doubtful about the feasibility of getting acceptance of a parity concept that also looks to the future and is calculated in terms of desirable ends as seen by society as a whole. If in terms of prices, such a concept would provide a basis for adjusting prices either up or down. If in terms of incomes, it would provide a basis for programs of production and prices that might result in either



higher or lower incomes. It would be designed to establish, and minimize deviations from, socially desirable trends for agricultural activity. Technically, the development of such a formula should be possible. If developed for comprehensive and simultaneous application with corresponding formulas for various significant groups in society, concepts of parity, whether in terms of incomes or prices, might prove a valuable aid in economic adjustment.

#### REPLY BY THE AUTHOR

The concept of price parity has been given some consideration in my paper because of its importance as an antecedent of income parity. But I made only a cursory appraisal of the validity of price parity, and drew no conclusion as to the relative merits of income parity and price parity as guides to agricultural policy. Nevertheless, Mr. Wendzel's inference that such a conclusion—in favor of price parity—was intended is understandable. It arises from some additions to the original paper inserted at the behest of 'information specialists' in the Bureau of Agricultural Economics. Alarmed at the unfavorable light shed on income parity, they insisted on frequent and conspicuous reference to the dominant role of price parity and the relative unimportance of income parity in current agricultural programs. In the interest of prompt approval of the paper for presentation to the Conference, it seemed wise to make these insertions. The statements made are perfectly true; but they have led to misinterpretation.

I doubt that there is any real disagreement between Mr. Wendzel and myself concerning the relative merits of income and price parity. Neither is very satisfactory as it now stands; but both present possibilities for development. Perhaps the potentialities of income parity are greater. I cannot agree, however, that income parity as it is now defined contains any important implications of economic balance. With the present formula parity income for agriculture could be achieved under conditions of extreme imbalance both within the agricultural economy and as between the farm and non-farm sectors of the national economy. The present formula must be considered as an attempt to provide an over-all indicator of average comparative welfare, and to establish a standard of relative welfare which as far as the formula itself is concerned may be attained without regard to means. On the other hand, it must be conceded that parity formulas based on income might be devised

to provide a standard for the achievement of economic balance, and that the exploration of such possibilities is desirable.

In the concluding paragraph of the paper I indicated the probability that greater reliability and significance could be attained in the comparison of farm and nonfarm incomes if they were made in terms of regional and size distributions of income. Many of the comments have also pointed in this general direction, with some emphasis on the desirability of distinguishing the claims of low-income persons in each group from those of the group as a whole. It may not be out of order to conclude that a general consensus concerning the most fruitful direction for further research on the problem exists.

*Part Four*

**SIGNIFICANCE OF  
INTERNATIONAL TRANSACTIONS  
IN NATIONAL INCOME**

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# Significance of International Transactions in National Income

ROLLIN F. BENNETT

## I Accounting Relationships

HOW INTERNATIONAL TRANSACTIONS enter national income accounts can best be summarized by recalling the conceptual distinction between income produced in an area and the income received by (i.e., accruing to) its residents. The latter is rather inappropriately called 'income produced' in most discussions; here the term 'domestic income' is used to denote income produced in the United States; 'national income' refers to income accruing to residents of the United States.

### *A Domestic income*

Income produced in an area (domestic income) can be most easily defined and estimated in terms of the consolidated accounts of all enterprises operating within its boundaries. For the sake of simplicity, the consolidated enterprise is considered to include, besides farming and other business, all professional and other services sold directly to consumers, governmental activities, and the proprietorship in all dwelling houses, patents, etc., i.e., all income yielding functions of people and things in the area except labor hired by enterprise. The borderline between the enterprise accounts and the personal accounts is naturally somewhat arbitrary and conventionalized, but having once fixed it, we can speak of domestic income as comprising simply the 'payroll' plus the 'profits' of the enterprise, the latter being the amount distributed among the creditors and proprietors, plus undistributed earnings. Obviously, special problems are met in accounting for nonprofit-sharing activities such as those of the government; and some solution of these problems is implicit in the simplified summary presented here.

Profits of the consolidated enterprise are computed by deducting the following items from sales of goods and services (including sales by one unit to another within the enterprise): .

Depreciation on productive assets and depletion of natural resources

Value of net withdrawals from inventories held for sale

Direct costs of current output, comprising:

- a) current purchases of goods and services (including labor)
- b) value of net withdrawals from working inventories

In this calculation 'sales' are taken to include the value of facilities constructed by a unit of the enterprise for its own use, 'betterments' in existing installations, and deliveries of goods and services to employees (payment in kind) or to one's self (entrepreneurial withdrawals), as well as ordinary shipments or deliveries of goods and services. Since the value of sales by one unit to another within the consolidated enterprise equals the value of intra-enterprise purchases, consolidated profits may be expressed as equal to:

Sales of goods and services to residents (national consumption, excluding tourist expenditures abroad)

plus sales of goods and services to non-residents (exports, including expenditures of foreign tourists within the area)

plus gross value of additions to or betterment of domestic equipment	}	(gross capital formation)
plus value of net increases in all inventories		

minus purchases by the enterprise of services rendered domestically (payroll)

minus purchases by the enterprise of goods and services from abroad (imports, excluding tourist expenditures abroad)

minus depreciation and depletion (capital consumption)

If expenditures of nationals touring abroad are added to national consumption and also to imports in the above expression, the value of consolidated profits remains unaffected. Payroll plus profits (total domestic income) may then be written:

Total national consumption

plus exports (of all goods and services)

minus imports (of all goods and services)

plus net investment (gross capital formation minus capital consumption)

### *B National income*

*Domestic* income, which thus equals domestic capital formation plus national consumption plus the balance of trade in goods and services, differs from *national* income by an amount, hereafter called 'supplementary income', composed of (1) net earnings on foreign investments, accruing directly or indirectly to residents; (2) net wages received by residents for work performed outside the income area; (3) net noncommercial remittances construed as income by the recipients.

The total net foreign balance on account of goods, services, and the three items just enumerated equals the total net capital movement, or net foreign investment. National income, therefore, equals national consumption plus net investment (domestic and foreign). The expression 'change in claims against foreign countries' is ambiguous and should be avoided. Net foreign investment (capital movement) is not synonymous with 'change in net creditor position', for there may be a large discrepancy between the two owing to changes in the international balance sheet arising from:

Revaluations of directly owned physical assets

Fluctuations in the market value of securities (if valued at current market)

Revaluations occasioned by exchange fluctuations

Uni-directional remittances on capital account (inheritances, indemnities, etc.)

Change in the residence of individual property owners (whatever or wherever the property may be)

Residence, for purposes of income accounting, is based on place and permanence of abode, not on citizenship. Persons temporarily abroad for purposes of touring, intermittent employment, or service in the national army, navy, or merchant marine retain their residence status; persons working or living continuously abroad do not.

### *C Statistics of foreign transactions*

There is an ambiguity about the notion of purchases and sales of shipping services. If merchandise imports and exports are accounted for by valuations at the national border, it is clear that no freight charges (as such) could be counted as service imports, unless foreign vessels were permitted to carry coastwise traffic; correspondingly, *all* freight receipts of domestic vessels for the carriage of exports and imports and for service between foreign ports must be counted as a service export. On the other hand, if imports are recorded not at the border value (as in most foreign trade statistics) but on an f.o.b. basis (the United States practice), then freight charges on imports carried on foreign vessels must be counted as a service import. The import freights received by domestic vessels must be excluded from the service exports of the latter.

Of the total expenditures of residents touring abroad, fares paid to domestic vessels must be excluded from the international service accounts, since domestically registered ocean vessels are treated as within the income area; likewise the expenditures of foreign tourists

are counted only while they are within the income area or on domestic ships.

In general, the annual balance of international payments of the United States prepared by the Bureau of Foreign and Domestic Commerce provides consistent estimates of all the important service transactions needed for computing income produced within the United States customs area. Unfortunately the area ordinarily used for income purposes differs from the customs area in that Alaska, Puerto Rico, Hawaii, and the Virgin Islands are excluded from the former but included in the latter. In addition to providing estimates of services, the balance of payments contains corrections of the ordinary trade statistics for omissions of sales and purchases of such items as ships and bunker fuel, and for estimated under- or overvaluations in customs declarations. In the summary table for each year, however, several items are included in the subtotal 'trade and service items' that belong in separate categories for income purposes; e.g., interest and dividend payments, noncommercial remittances, war debt receipts, Panama Canal profits, tax remittances to the Philippines, and various intergovernmental indemnity payments. Some of these transfers should be regarded as income payments contributing to the difference between domestic income and national income; the others might appropriately be treated as capital gains and losses to residents of the income area and so not counted at all. Royalties received from motion pictures exhibited abroad are counted as a service export. When the film remains in the possession of Americans, however, it might be more appropriate to count royalties with interest and dividends as earnings on foreign investments.

The method of reporting gold and silver movements in the balance of payments requires special attention, for earmarked holdings are treated as if they were outside the income (or customs) area, at least in the subtotal of net movements. These figures can be consistently used only if earmarked holdings are excluded from inventories in the calculation of domestic capital formation. For all other metals and materials, location rather than possession is the basis of trade and inventory statistics. It would be equally consistent, and perhaps more appropriate, to exclude the precious metals entirely from exports and imports, to include only domestic output in inventory accumulation, and thus by implication to treat gold and silver acquired from abroad as merely a claim against foreigners. The choice of treatment should obviously depend on

the use to which the data are put. To analyze fluctuations in income causally, it would seem more appropriate to treat gold as money than as merchandise. The formulas for the components of income are of course valid, whichever way gold is treated.

The compilers of the balance of payments estimate most of the 'supplementary income' items currently, but their summary table includes, for earnings on foreign capital, only amounts that are declared, or distributed, or transferred. (It is not clear which of these three criteria is the basis of the reports; in any case there is an irreducible element of ambiguity in each, especially in the case of earnings credited to inter-company accounts.) The amounts classified as 'reinvested' are currently reported in the text and subsidiary tables of the balance of payments.

The second item of 'supplementary income', international wage payments, is apparently negligible in the United States. In certain other countries it would probably be an important element in the income of seamen and migratory farm laborers. Some types of wage remittance should be, and are, counted as service imports (e.g., remittances to diplomatic and military personnel stationed abroad) and have been debited against domestic income. Since the recipients, as a rule, are classified as nonresidents, no further adjustment is needed.

The third item of 'supplementary income', voluntary contributions of individuals and institutions, seems adequately covered in the balance of payments. Indeed, the coverage may be too adequate. There is some justification for excluding items that both donor and recipient regard as a transfer of capital, e.g., inheritances.

The compilers of the balance of payments attempt to make a direct and independent annual estimate of the net capital movement, based largely on reported transactions in currency, banking funds, bills and securities, and on reported payments between American corporations and their foreign branches or subsidiaries. Because the data are incomplete, particularly for transfers of short term capital, this direct estimate of capital movements cannot be considered very accurate; a substantial discrepancy, or 'residual' usually exists between it and the indirect estimate based on merchandise, services, etc. The indirect estimate is ordinarily considered more reliable; it would in any case be preferable for national income purposes since it can be completely itemized without including unallocable elements. If a relatively accurate direct esti-



mate of capital movements is ever made, it should be reconciled with the indirect estimate by suitable adjustments of the more uncertain components of the latter.

## II Significance of the Foreign Component of Income

To illustrate the position of international transactions in national income, a summarized account for 1938 is presented herewith.

	MILLIONS OF DOLLARS	
1) National consumption		62,500
2) Net domestic capital formation, incl. accumulation of gold & silver		3,686
3) Trade balance in gold & silver	-1,864	
4) Trade balance in other mdse	1,152	
5) Trade balance in services	-337	
6) Total trade balance		-1,049
7) Total domestic income		65,137
8) Net earnings on foreign capital		413
9) Net noncommercial remittances		-150
10) Total net supplementary income		263
11) National income		65,400

Because the net foreign investment, or capital movement (the algebraic sum of items 6 and 10), is negative, national income was apparently \$786 million less than it would have been had the United States been economically isolated and produced for consumption and capital formation the amounts indicated in items 1 and 2. Since this negative contribution was largely due to the importation of gold, one might interpret it by saying that national income was less than it would have been had all domestic capital been formed from domestic output (rather than in part from imported gold). According to this interpretation, national income was diminished as a result of foreign transactions.

On the other hand, if this gold and silver had been accounted for as a claim against foreigners rather than as an imported increment of inventories (i.e., as money instead of as merchandise), there would have been a *positive* increment of claims against foreign countries in 1938 amounting to \$1,078 million, but domestic capital formation would have been only \$1,822 million. This would give the impression that national income was appreciably augmented as a result of foreign transactions. Evidently the notion of a foreign component of income or of capital formation is ambigu-

ous, if the method of accounting is not explicitly indicated. In Figure 1 and subsequent discussions gold is treated as money, rather than as merchandise.

In any case, *fluctuations* in such a component would afford a better measure of its *importance* than would its absolute magnitude; and they could conceivably generate parallel fluctuations in other components that would make total income far more dependent on international transactions than any static description would ever suggest.

Fluctuations in foreign trade greatly influence profit prospects and business plans. Aside from this indirect influence through the possible repercussions on the rate of domestic investment, foreign trade obviously contributes sufficiently to national income, through the foreign component of total investment, to merit special attention during periods such as the present when fluctuations in this component threaten to be large and unpredictable.

During 1919-38 fluctuations in net foreign investment were never very large compared with fluctuations in other components of capital formation (see Fig. 1). But this relative stability has in the past been due largely to a synchronization of major United States business cycles with cycles in foreign countries that caused imports to vary approximately with exports. With the interruption of this synchronization, the balance of trade has become more unstable; it increased, for example, from \$33 million in 1936 to \$1,395 million in 1940. In view of present uncertainties, one might even measure the potential variability in the export surplus in terms of total exports, whose value in 1940 was almost twice the average annual value of total net capital formation during the decade 1929-38.

As previously suggested, the separation of total capital formation into foreign and domestic components is a rather arbitrary accounting procedure; interpretation depends on the methodology. One might, for purposes of analyzing fluctuations, account for national income as follows:

- 1) National consumption
- 2) minus imports of services and merchandise other than gold and silver
- 3) plus government capital formation (including domestically produced gold and silver)
- 4) plus consumers' capital formation (e.g., in dwellings)
- 5) plus business capital formation

6) plus exports of services and merchandise other than gold and silver

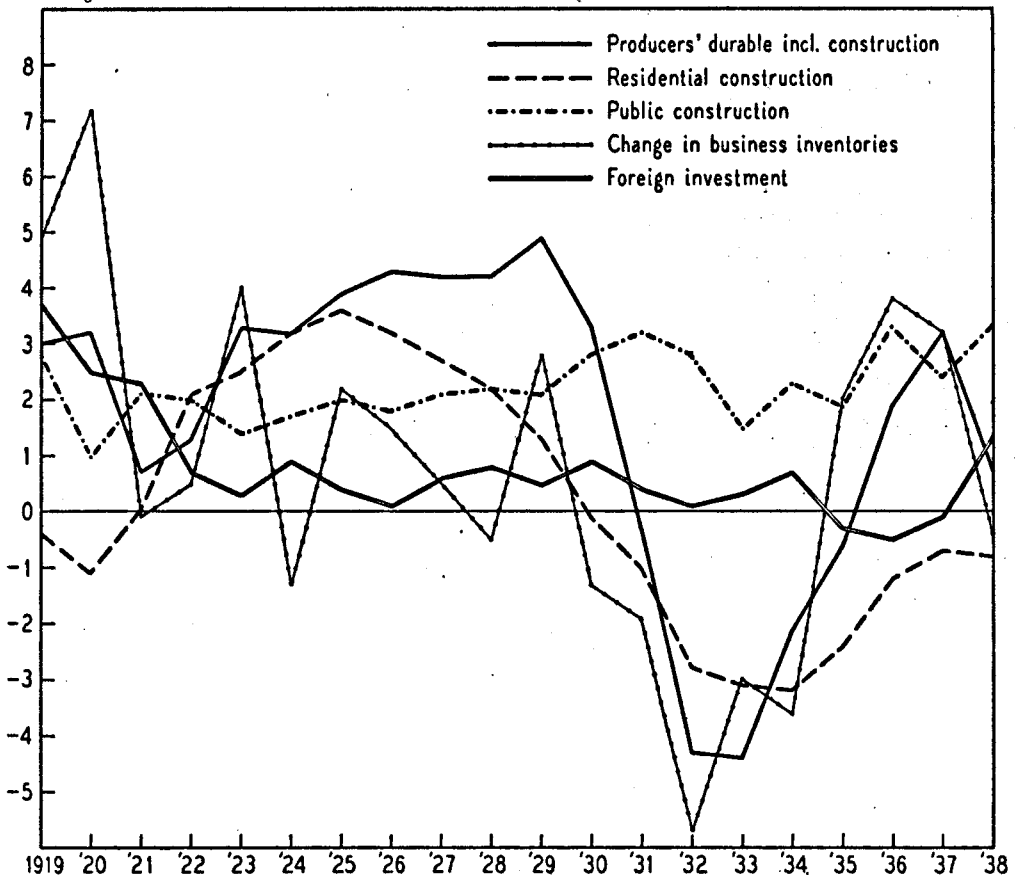
7) plus supplementary income (interest from abroad, etc.)

For purposes of studying the dynamics of change, it is inappropriate to combine imports with exports into a net item. When condensation is needed, it is more logical to combine imports with

FIGURE 1

Components of Capital Formation as Percentages of Income, 1929 Prices  
1919 - 1938

Percentage of national income



SOURCE: Simon Kuznets, *National Income and Its Composition*, Table 38.

consumption, with which its fluctuations are more closely correlated. 'Strategic' variables should be selected on the basis of homogeneity with respect to variations. The most effective are aggregates that are relatively homogeneous internally but relatively independent among themselves. Application of this criterion to the seven income components listed above has led some economists to treat items 3-6 as 'strategic' variables, to ignore item 7 as negligible, and to treat items 1 and 2 as dependent variables.

Whatever the merits of this approach, it would seem at the outset greatly to enhance the importance of exports in income. If, for example, exports should be reduced to one-half of their 1940 level (Britain alone took almost one-fourth of the total in that year), and if this reduction in this source of income, by reacting on consumption, should induce a threefold drop in total income, then the final loss in national income would amount to about \$6 billion, greater than the gain in income between 1938 and 1939.

The type of hypothesis just described, commonly known as the 'multiplier' principle, needs more careful examination than it has ordinarily received. According to most interpretations (and there are many), the multiplier is the ratio between changes in national income and in the sum of the strategic variables enumerated above (or any one of them, the others being given). And according to most theories, this multiplier is supposed to be fairly constant, as a consequence of a supposedly simple dependence of imports and consumption upon income.

If, for example, it were found (e.g., by regression analysis) that consumption equals a constant  $h$  plus a constant  $k$  times income; and that similarly imports are determined by the formula  $m$  plus  $n$  income; then, by substituting these formulas in the equation defining income as a sum of its components, we would obtain

$$\text{income} = \frac{h + m}{1 - k + n} + \frac{\text{sum of strategic variables}}{1 - k + n}$$

(The small 'supplementary' income is ignored here, for the sake of simplicity.) The coefficient  $\frac{1}{1 - k + n}$  is then called the multiplier

since it apparently determines the amount by which income will change per unit of change in the sum of the strategic variables.

There is also an alternative, simpler, and less interesting form of multiplier, one applicable to total investment rather than to the strategic elements used above. In its derivation, imports, instead of being treated as a dependent variable, are considered implicitly as 'given', since the net foreign balance is one element in total investment.

This multiplier, equal to  $\frac{1}{1 - k}$ , is derived as a coefficient of total investment by substitution of the formula, consumption =  $h + k$  income in the equation, income = consumption + total investment.

The supposition of a functional relationship between consump-

tion and income is fundamental to either type of multiplier. In the above illustration a linear equation was given merely for convenience. If a curvilinear relation had been assumed, one would obtain the same formulas for the multipliers;  $k$  would then have to be interpreted as varying with the size of income, and a multiplier computed for any given level of income would be relevant solely for small changes in the vicinity of that value. This hypothetical curve relating consumption to income is called the (schedule of) propensity to consume, in Keynesian terminology. The coefficient  $k$  is called the marginal propensity to consume and can be pictured as measuring the slope of the curve. Like other economic coefficients, such as elasticity of demand, it may be supposed to vary either with a shift along the curve or with a change in the shape of the curve through time.

In other words, in estimating the current magnitudes of  $k$  (and of  $n$ , for that matter) it need not be assumed that they have remained fixed over a period of years. In regression analysis, however, an improvement of apparent 'goodness of fit' by prior elimination of trends does not necessarily lead to greater confidence in the estimate of the coefficient.

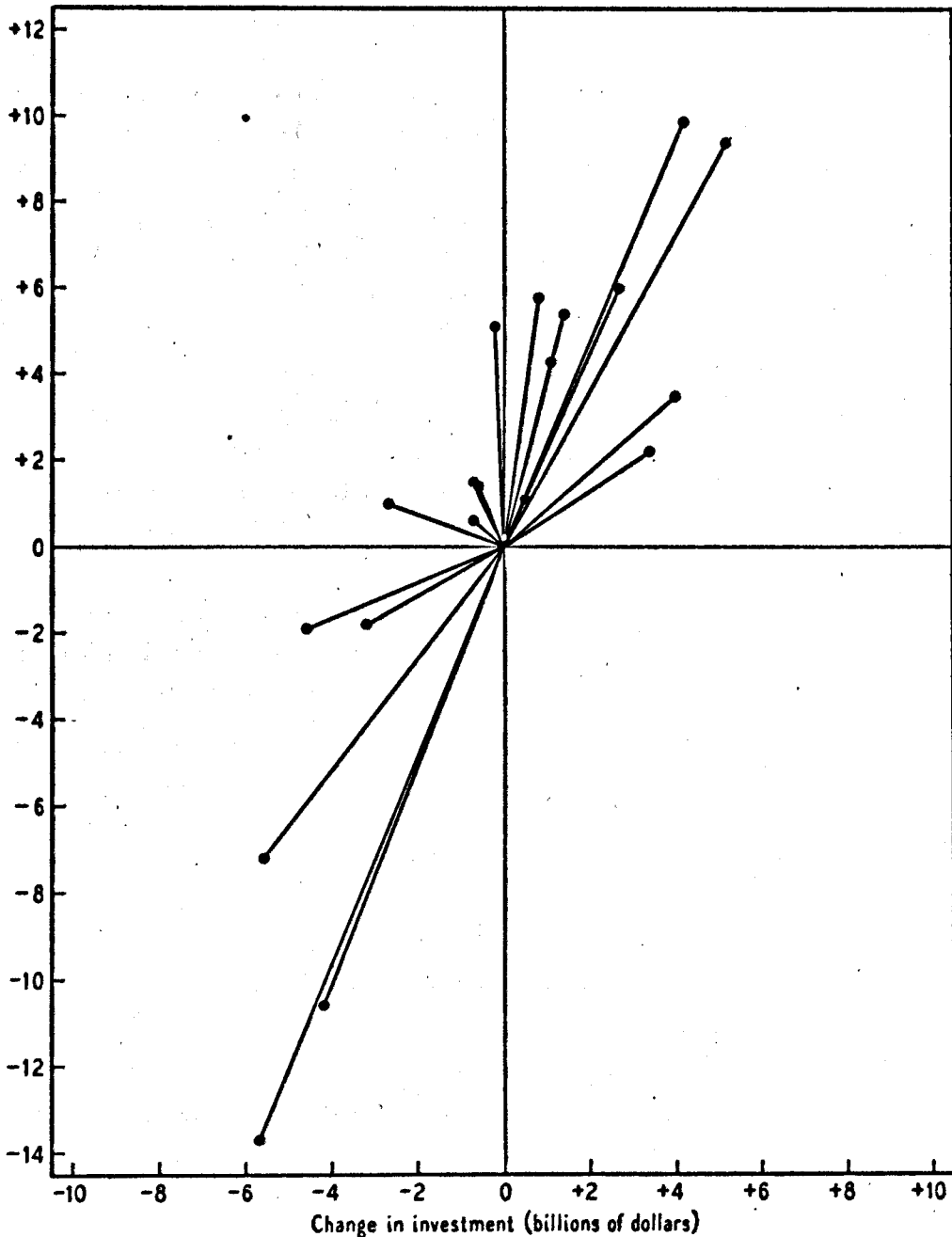
An alternative method of estimating the marginal propensity to consume (not applicable to imports) involving no assumption about trend (or lack of it) uses records of consumers' expenditure (in a recent year) by income classes. Implicit in it are the assumptions that the members of one income class would behave like the members of the next higher class if their incomes were raised to the higher level and that the percentage distribution of national income by size is fixed (or is a function exclusively of total income).

Finally, the proportion of their incomes that people choose to consume is governed by 'real' income rather than by mere money income, so far as any defensible *a priori* theory is concerned. Therefore, the shape of the propensity curve and the value of its coefficient  $k$  should be estimated, strictly speaking, from data deflated by a cost of living index and expressed on a per capita basis.

Attempts have been made to estimate the multipliers as defined above for various countries by using one or another of the methods outlined. Investigators working with United States data seem to have confined their attention to the 'simple' multiplier  $\frac{1}{1-k}$ . A summary of the results can be found in Colin Clark's *The Condi-*

**FIGURE 2**  
**Changes in National Income and in Investment, 1929 Prices**  
**1919 - 1938**

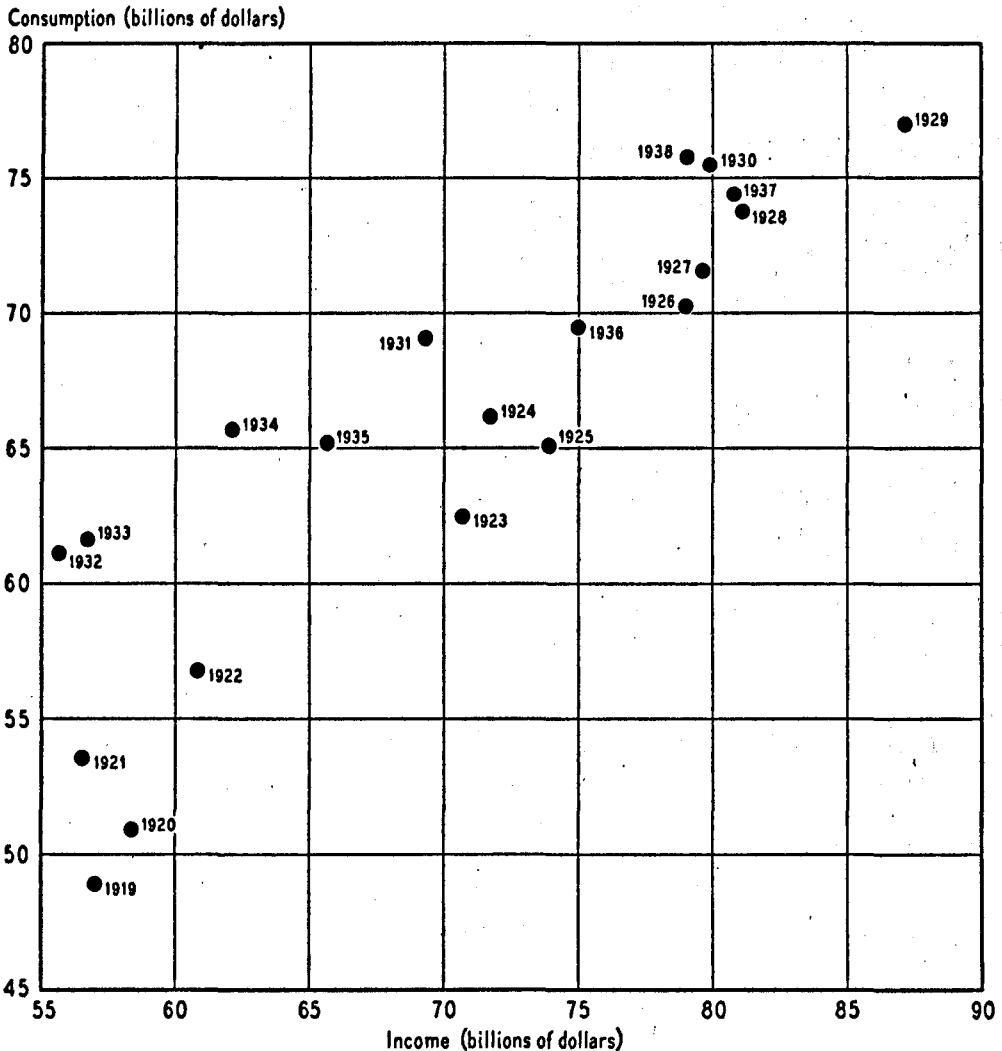
Change in national income  
 (billions of dollars)



SOURCE: Simon Kuznets, *National Income and Its Composition*, Table 37.

tions of *Economic Progress*, Chapter 15.<sup>1</sup> He quotes estimates of  $\frac{1}{1-k}$  for the United States (four methods were used) ranging from 3.08 to 3.3. The close correspondence between the estimates based

FIGURE 3  
Consumption and Income, 1929 Prices  
1919 - 1938



source: Simon Kuznets, *National Income and Its Composition*, Table 5.

on time series data and those based on income group data inspire some confidence in the validity of the hypothesis and the accuracy of the estimates.

The dependability of the consumption-income relationship and of the corollary income-investment relationship has sometimes

<sup>1</sup> London, 1940.

been challenged on irrelevant grounds. Clearly, confidence in the coefficients describing such relationships should be based on tests of significance appropriate to the method by which they were calculated. For example, the 'multiplier', when derived from one or more regression coefficients, should be tested accordingly. It is not customary or appropriate to compute the multiplier as an average of ratios between the yearly increments in an income series and the yearly increments in an investment series; and it would be quite absurd to test its significance by the variability of such ratios computed from successive pairs of years. Such ratios are shown graphically in Figure 2 as slopes of lines radiating from the origin. It is clear that there is much less certainty concerning the average of these slopes than concerning the slope of a regression line fitted to points in Figure 3.

In estimating the level of income that can be expected in association with a hypothetical rate of investment, reference should be made directly to the line of normal relationship between income and investment; it would be inefficient to compute the expected change in income as the product of the multiplier and the expected change in investment, for such a procedure ignores evidence concerning the deviation of income from normality with respect to investment in the base year. The expected change in income should be the algebraic sum of the change attributable to a change in investment and the change that would be expected in the absence of any change in investment. By operating only on first differences in the series, disregarding other information in the original data, account can be taken solely of the first element in the sum just mentioned. The result of such a procedure, though unbiased, is clearly unsatisfactory. Considerations of the usefulness and the validity of the multiplier may be summarized as follows:

- 1) The notion of a schedule of propensity to consume is useful to the extent that the proportion of income that people choose to consume is predictable on the basis of (real) income.
- 2) Undoubtedly other identifiable and measurable factors besides income influence consumers' outlay and are responsible for apparent deviations from the propensity curve (i.e., shifts in the position or shape of the curve); e.g., 'capital gains and losses' and some index of equality of distribution of income among consumer units.
- 3) Progress can be made only by actual analysis of the *joint* influence of these other factors along with income. It is more pertinent



to assess the relative importance of the various factors than to raise questions concerning the 'validity' of the propensity hypothesis.

4) So far as the additional factors (income distribution, capital gains, *et al*) are in fact temporally correlated with national income itself, their influence is already *implicitly* taken account of in any propensity curve derived from time series.

5) In this technical sense the propensity relation may be in part 'spurious'; i.e., when the joint influence of other factors is actually ascertained one may discover that the independent (or 'partial') influence of aggregate income upon consumption is somewhat less than any simple correlation would indicate. But the usefulness of this simple and technically spurious relation between consumption and income is not impaired by these considerations, for in it income serves merely as a convenient index of the combined net influence of several variables.

6) Implied in the propensity to consume concept is a corresponding relationship between total investment and income. The latter has significance and usefulness of its own; for example, it can be used to predict income on the basis of an assumed rate of investment—in particular, to predict a definite change in income, even when the rate of investment is assumed to maintain its level, because it affords a basis for determining the amount by which the previous income level had deviated from its normal relation to investment as a consequence of 'random' disturbances.

7) Implied in the example just given is an explanation of the anomalous instability of the ratio between year to year changes in income and investment.

8) Because of the instability of this ratio one must conclude that the multiplier concept, formulated as an average of annual ratios, leads to a good deal of confusion and error. Whatever merit and validity there may be in the general concept can be amply revealed by direct application of such derived relationships as the one mentioned in (6).

9) Condensed versions of these relationships in the form of misleading coefficients with catchy titles had better be avoided when possible. The multiplier coefficient, if used at all, should be used to compute, from a given change in the rate of investment, the amount by which income will exceed what it *would have been* in the absence of any change in the rate of investment.

The relation between income and consumption shown in Figure 3 is not very close or regular. There are several reasons, however,

for supposing that these data (National Bureau estimates) are not well suited to the propensity concept and that other variants of income and consumption would provide a fairer test.

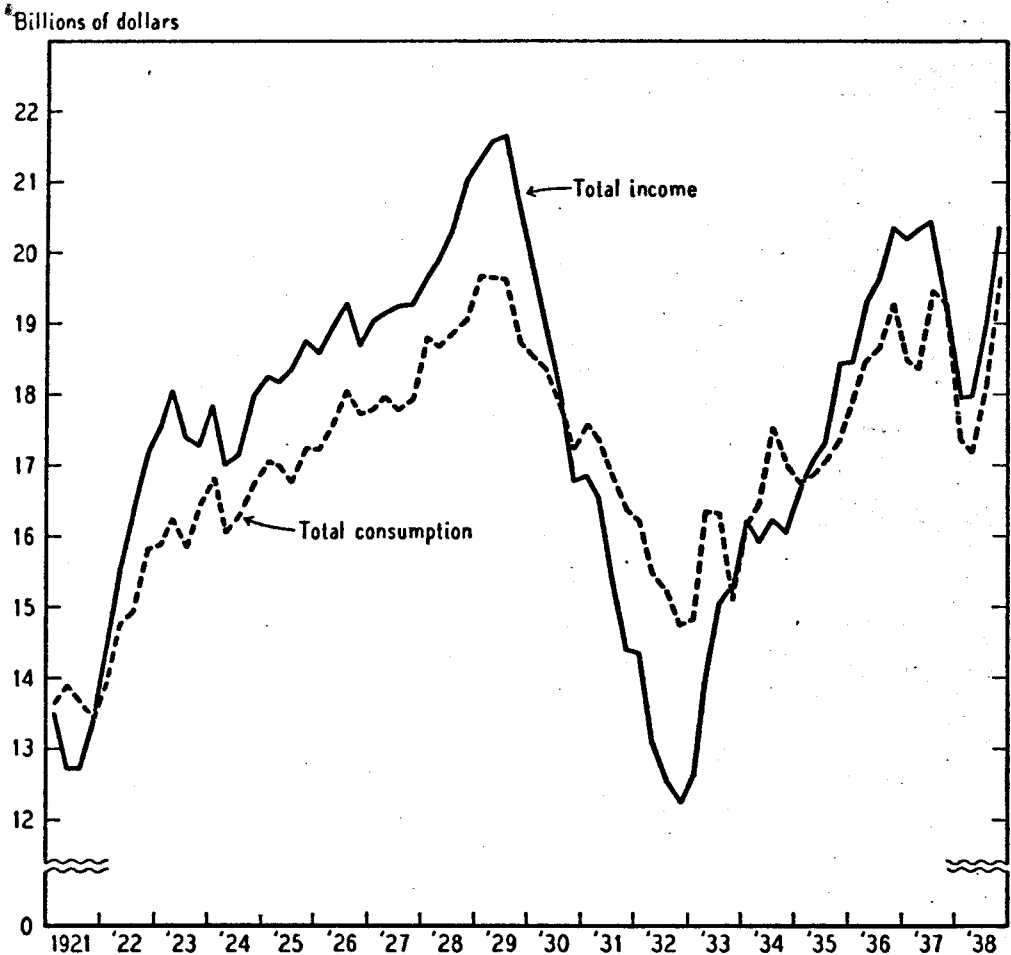
- 1) The accuracy of the consumption estimates is admittedly low, since services are included merely as a residual item.
- 2) The scope of the estimates is probably too extensive. It might be better to consider only those elements of income that are at the direct disposition of individuals in one form or another and only elements of consumption over which direct individual choice can be exercised. It would therefore be appropriate to exclude income items that accrue to the community as a whole, such as 'government saving' and 'government services to consumers' (as measured by personal taxes). The latter item should be excluded from consumption as well. The elements of income remaining might be termed 'individuals' income' and would include business saving (since it accrues to individual stockholders, who have the opportunity to liquidate it by selling part of their portfolio in the open market), individuals' saving out of distributed income (after personal taxes), and individuals' consumption (government services excluded). It can easily be shown that individuals' income as thus defined also equals individuals' consumption, plus nongovernmental net investment (domestic and foreign), plus the governments' aggregate net deficit (on all accounts including acquisition of all gold and silver).
- 3) So far as corporate profits influence consumers' expenditure at all (and it may be a devious influence, *via* the paper gains accruing through appreciation in share quotations), it is probably the profits that are reported, rather than 'true' profits, that are relevant. There is no reason to suppose that most consumers are astute enough to allow for erroneous accounting methods employed by corporations. For this reason it would probably be appropriate to leave income unadjusted for errors in inventory valuation, rate of depreciation, etc. These adjustments should be eliminated from the National Bureau's estimates of income for the purpose of studying consumers' behavior.
- 4) The 'real income' that is relevant to consumers' behavior must be derived from a cost of living index rather than by any other method of deflation. The National Bureau's estimates of income in 1929 prices (used in Fig. 2 and 3) do not exactly meet this requirement.

Harold Barger has prepared quarterly estimates of income and

consumption in current prices, which I have had deflated by the National Industrial Conference Board's index of living costs (but not by the size of the population).<sup>2</sup> Barger's estimates are substantially free from the objections just enumerated, except that taxes

FIGURE 4

Total Income and Total Consumption by Quarters, Adjusted for Seasonal Variation, 1921-1938, Deflated by National Industrial Conference Board Cost of Living Index (1923 = 100)



SOURCE: For consumption and income in current prices, see Harold Barger, *Outlay and Income in the United States*, Tables 11 and 18; for the index, 1921-34, see M. Ada Beney, *Cost of Living in the United States, 1914-1936*; for the index, 1935-38, see the *Survey of Current Business*, January 1941, Table 5.

paid directly by individuals (the National Bureau's measure of government services to individuals) have not been deducted. The quarterly movement of income and consumption is shown in Figure 4, and their relation in Figure 5. A line fitted to the points in

<sup>2</sup> *Outlay and Income in the United States, 1921-1938* (National Bureau of Economic Research, 1942).

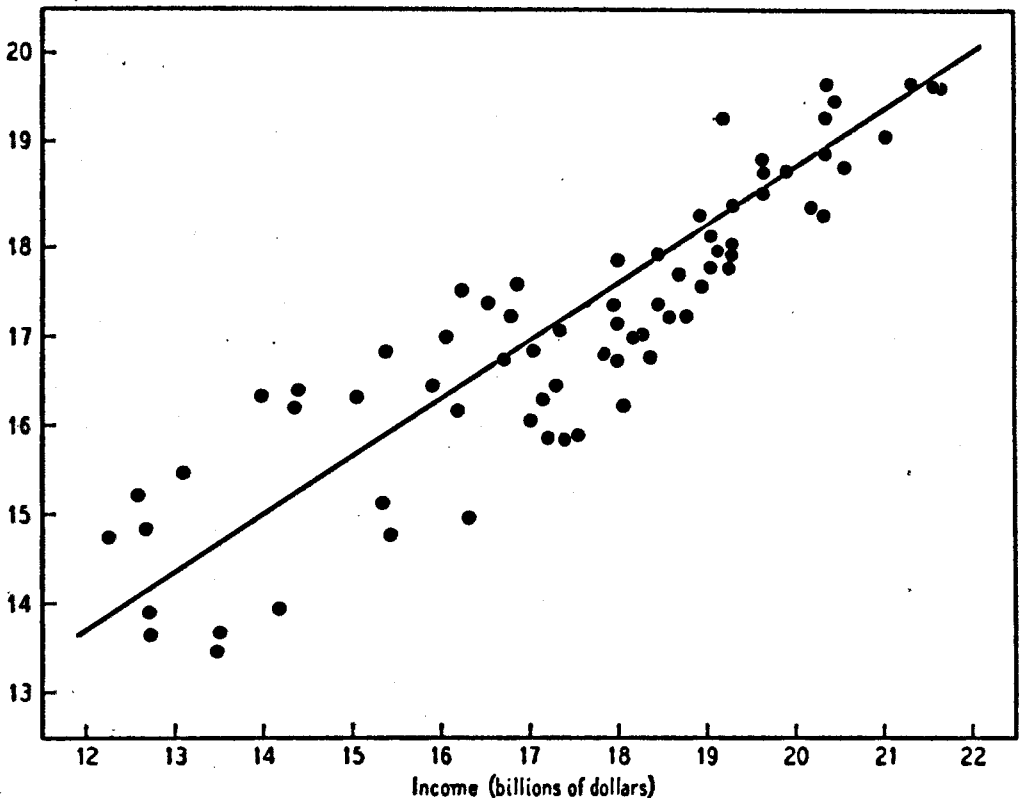
Figure 5 seems to have a slope of about five-eighths, which would give a value of about 2.7 to the multiplier coefficient  $\frac{1}{1-k}$ , a somewhat lower value than those cited above from Clark.

Though there is some evidence of a slight lag (less than three months) of consumption behind income at certain cyclical turns, it

FIGURE 5

Total Consumption and Total Income by Quarters, Adjusted for Seasonal Variation, 1921-1938, Deflated by National Industrial Conference Board Cost of Living Index (1923 = 100)

Consumption (billions of dollars)



SOURCE: See note to Figure 4.

does not seem to be sufficiently pronounced or regular to be worth allowing for in correlating the two.

In many studies of the multiplier, efforts have been made to relate imports, as well as consumption, to income. The effect of imports on income, being negative, is often referred to as a 'leakage', and is interpreted as reducing the net influence of domestic investment on income.

In studying the relation between imports and income there is also some question which variant of income is most appropriate, and

whether some part of imports should not be excluded and separately analyzed. Why should imports vary with income at all? For some commodities it is obviously because demand is traceable rather directly and exclusively to consumers' outlay. In the United States this is true of coffee, sugar, silk, wine and spirits, fruits, nuts, and vegetables, cotton manufacturers, meat products, fish, wool and mohair and their products, cacao, and tea, to name only a few of the most outstanding examples. These products alone accounted for 35.6 per cent of merchandise imports in 1938. In this category belongs also an important 'invisible' import, the travel expenditures of American tourists, which constituted about 26 per cent of the value of merchandise imports in 1938.

Another category of imports includes items most of which are used in making goods for domestic consumption but some of which may be used in durable equipment or in exports. Rubber, paper, pulp, pulpwood, vegetable oils and seeds, tin, hides and skins, and furs alone contributed 27.8 per cent to total merchandise imports in 1938. Several important imports such as lumber and the ferro-alloys are used very largely in capital goods (a part of which are also exported as machinery, vehicles, etc.). A few materials, notably copper, have been imported in recent years almost exclusively for refining or manufacturing and re-export. None of these categories is distinct. Even such articles as coffee contribute sporadically to domestic capital formation in the form of inventories, and small percentages of practically all imported materials find their way eventually into exported products. Of the three major sources of demand for imported materials, consumption clearly predominates in the United States, but the influence of the other two should not be ignored.

It might seem that the relative influence of the three factors could be ascertained by analyzing the origin of materials entering into exports, increments of inventory, domestically installed equipment, and consumers' goods. The proportions in which imports entered these ultimate uses would then provide the necessary coefficients, it would seem. But this approach disregards several complicating factors. In the case of copper, for example, such information would be quite irrelevant. Until 1932, when copper was made subject to an import tax, exports of domestically refined or manufactured copper had been drawn from current output irrespective of the origin of the raw materials. The seller and the foreign buyer

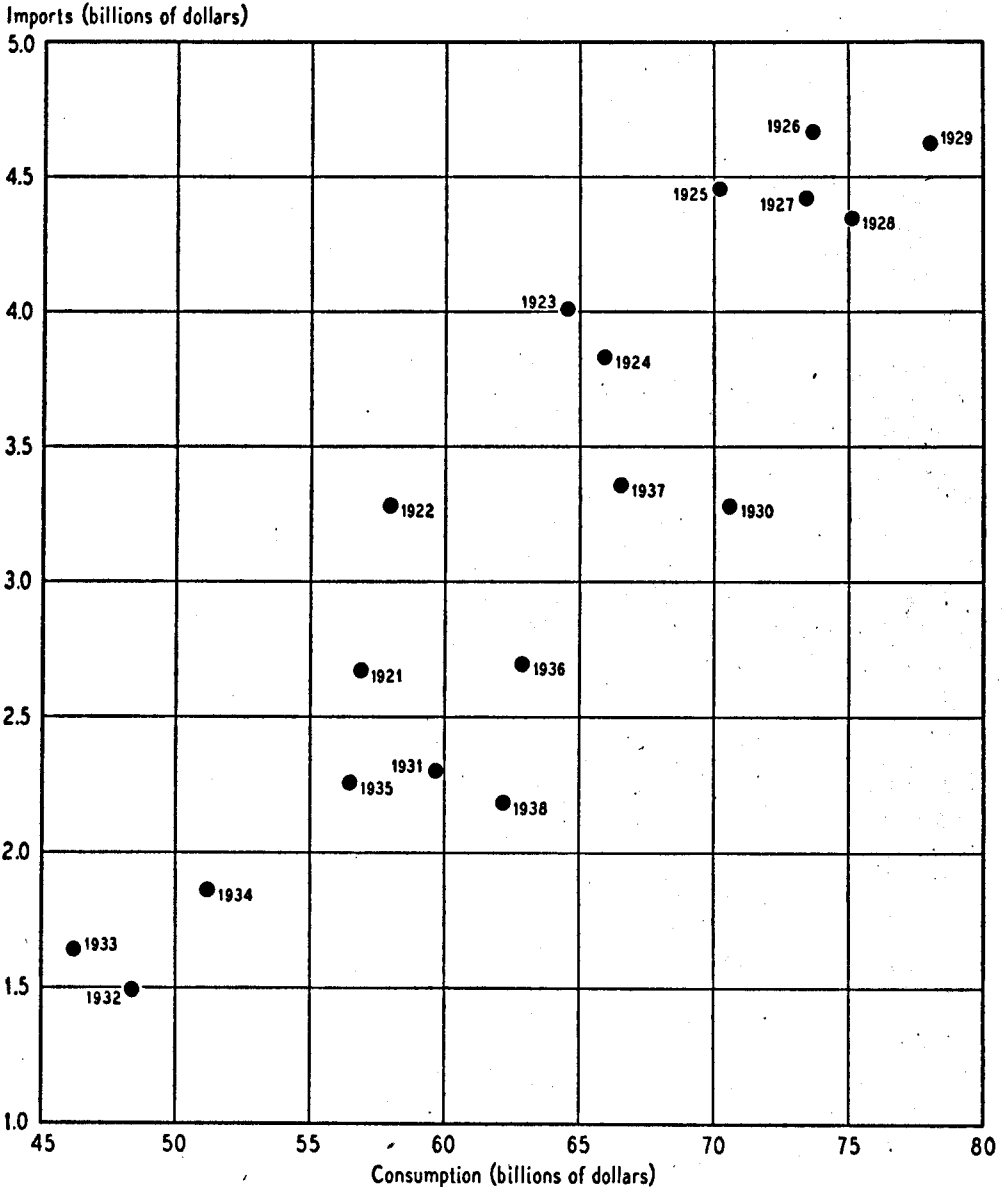
knew or cared no more than the government whether a particular bar of electrolytically refined copper came from foreign materials, domestic ore, or scrap. The origin of the material, even if ascertainable, would not have been useful information. The only question of economic importance is the proportion in which domestic and foreign materials tend to contribute to *changes* in total supply. Because the foreign supply of copper has been relatively inelastic and growing rapidly, any decline in demand (whether for export or domestic use) tended, before 1932, to affect imports less than the output of domestic mines. Since the imposition of the import tax of 4 cents per pound in 1932, the exportation of copper refined or manufactured from imported materials (tax free under bond or with tax remitted on exportation) has been almost entirely independent of, and non-competitive with, domestic production and consumption. Only since 1932, therefore, does the origin of materials in exported copper products have any significant bearing on the response of imports to changes in export demand.

Though in the United States consumer demand is ordinarily the predominant influence on imports, in other countries such as Japan and Great Britain, where probably as much as one-fifth of the value of exports is normally allocable to imported materials that have no close domestic substitutes, careful study of the export-import relationship is essential in any analysis of the dynamics of income. On the other hand, in the 'younger' countries that must import most of the equipment for their growing industries, imports bear a relatively close relation to domestic capital formation, which should be given explicit attention in analyzing income. For example, if a country's entire capital formation for a year consisted of imported equipment, any stimulus to income on account of this investment would be felt exclusively in the region from which the equipment had been exported.

Even in the United States particular attention should be paid to the relation between imports and inventory accumulation. Many items in the government's stock of strategic reserves, e.g., tin, chromium, tungsten, and rubber, come almost exclusively from foreign sources. Recent reports have suggested that even for copper the government will draw on foreign sources, partly for the sake of economy (the government does not count the tax as a cost) and partly in the interest of good-neighborliness. Private inventory accumulation of many materials is also a stimulus to imports. In

other words, current inventory accumulations, unlike other forms of capital formation, are making less net contribution to national income, in a causal or dynamic sense, than is often supposed.

FIGURE 6  
Imports and Consumption, Current Prices  
1921 - 1938



SOURCE: For consumption see Harold Barger, *Outlay and Income in the United States*, Table 1; for imports see the *Statistical Abstract*.

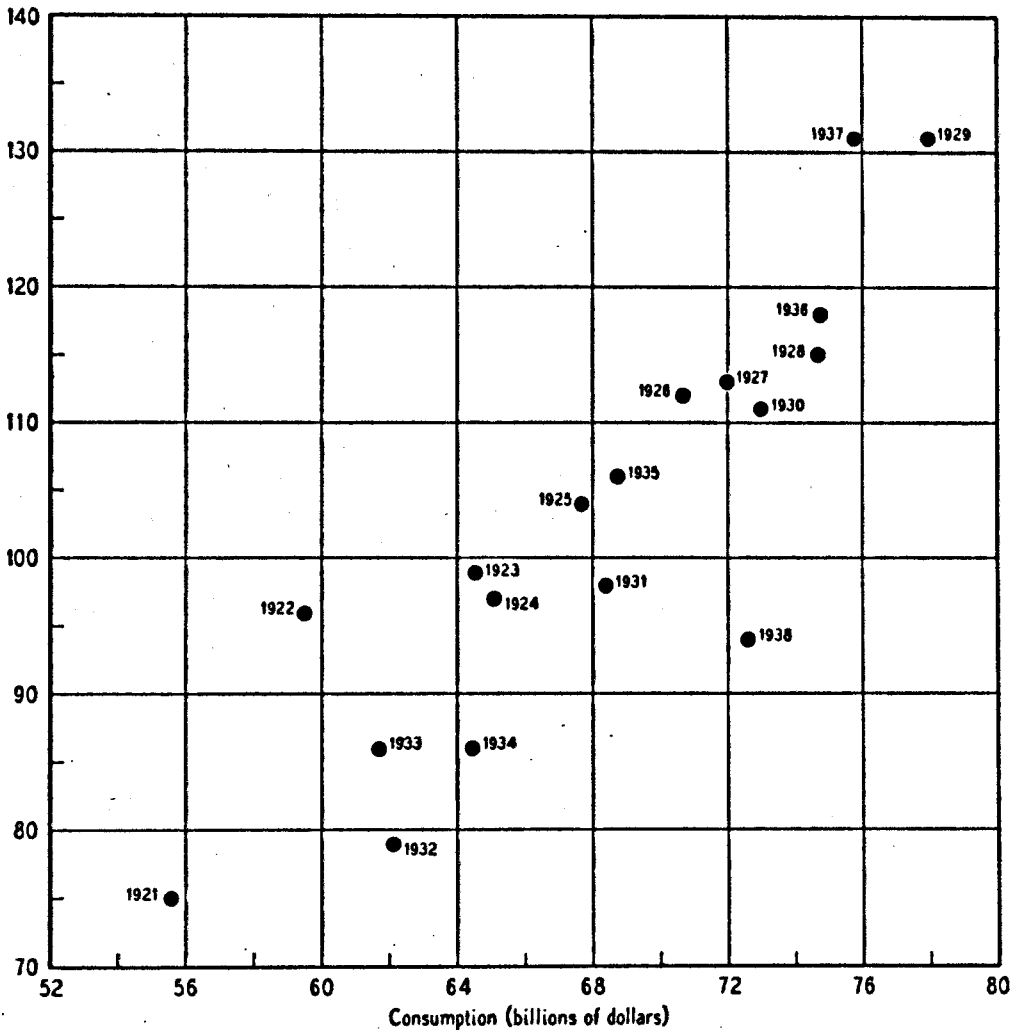
The assumed relation between imports and consumption in the United States has been neither close nor regular, at least as reflected in current values (Fig. 6). On the average, changes in imports seem to be about one-tenth as large as corresponding changes in con-

sumption. Some of the irregularity must be attributed to changes in inventory; the increase in imports between 1936 and 1937 is probably a good example (the quantity index of imports rose 11 per cent). But of chief importance is the erratic behavior of prices

FIGURE 7

Quantity of Imports, Department of Commerce Index, and Consumption, Deflated by National Industrial Conference Board Cost of Living Index (1923 = 100)  
1921 - 1938

Index of quantity imports  
(1923-25=100)



source: For consumption in current prices see Harold Barger, *Outlay and Income in the United States*, Table 1; for the N. I. C. B. index see Figure 4; for index of quantity of imports see the *Statistical Abstract*.

of imported materials relative to prices of consumers' goods in general. When a quantity index of imports is compared with the deflated values of consumption, the relation seems somewhat closer (Fig. 7). Apparently it would be appropriate to consider some index of import prices (or the ratio of this index to the cost of living



index) as an independent variable in analyzing the relation between consumption and imports.

To sum up, it seems desirable in general to relate imports not merely to income but to at least four variables: consumption, exports, domestic capital formation, and the price ratio just described. Even with this 'refinement' in method, one should not expect to obtain a very dependable formula for imports. Each of the four variables is an aggregate whose variations in composition (other than those regularly associated with fluctuations in the aggregate itself) can disturb the behavior of imports not a little. At the same time, application of even this simple refinement presents serious statistical problems. A formula derived by multiple regression is not likely to inspire much confidence, principally because one cannot safely assume stability of the relation during a period long enough to provide the necessary data. In the case of the propensity to consume, this type of difficulty can be surmounted to a considerable extent by use of contemporary data drawn from different income classes. No such alternative method seems to be readily available for analyzing the behavior of imports. These considerations are of less weight for the United States than for most other countries for two reasons: first, because of the predominant influence of consumption upon imports; second, because of the relative unimportance of imports in income.

Undoubtedly the most satisfactory way to analyze the relation of imports to other components of income would be by the laborious process of studying separately the behavior of each important commodity imported, then aggregating the results for purposes of generalization. For each commodity the normal relation (if any) between imports and total supply (imports plus domestic production), and the normal relation (if any) between stocks (irrespective of origin) and total domestic inventories should be ascertained. The amount of the commodity (irrespective of origin) embodied in exports would have to be estimated and its relation to total exports studied. The amount embodied in current consumption would also have to be estimated and its relation to total consumption considered. From these four relationships an equation relating imports of a particular commodity to total consumption, total exports, and total domestic inventory formation could be derived; but the relation would be simple and useful only if the price factor proved unimportant.

If it were possible to obtain a credible equation relating total

imports to consumption, exports, and domestic investment (ignoring the price factor here, for the sake of simplicity), that had the form: imports = a + b consumption + c investment + d exports, then it would be necessary to distinguish two kinds of multiplier co-

efficients: an export multiplier, whose formula would be  $\frac{1-d}{1-k+bk}$

and a domestic investment multiplier, whose formula would be

$\frac{1-c}{1-k+bk}$ . In view of the number of assumptions implicit in these

formulas and the danger of their misinterpretation, it is probably wise to use them as sparingly as possible, even in abstract discussion, and to interpret directly whatever analytic relations the data reveal without condensation into coefficients.

### III Some Implications of Current Developments in Foreign Trade

The prospective influence of foreign trade on the national income of the United States depends, like so many things today, almost entirely on the course of the war. In the absence of any basis for prediction, it is feasible to consider only the implications of recent trends in the foreign trade of the United States.

In analyzing these trends, it is convenient to distinguish six influences of the war on the foreign trade of the United States:

- 1) Larger exports of war materials to Great Britain
- 2) Higher costs of most imports
- 3) Accumulation of imported materials in domestic inventories
- 4) Accumulation in domestic inventories of certain materials normally exported, especially agricultural products
- 5) Replacement of part of the lost European markets by South American markets (aided by loans from the Export-Import Bank)
- 6) Partial replacement of imports no longer receivable from Continental Europe by domestic commodities and by imports from other areas.

Of these trends, probably the first three will be of growing importance in the future. The status of the last three is not likely to change much as long as the war lasts, since the indicated adjustments have by now probably worked themselves out. Shipments of food to Spain, unoccupied France, and possibly even occupied areas may increase moderately. Exports to Latin America may decline some-

what as a result of foreign exchange difficulties there. Efforts to promote purchases of Latin American products (e.g., cheese, wine, fabrics, tourist services) in substitution for unavailable European supplies may have some success. But on the whole, the most important developments affecting national income through foreign trade will probably be a continued rise in the price level of imported goods, a continued upward trend in shipments to Great Britain, and a continued or accelerated accumulation of reserves of imported raw materials.

Though the value of merchandise exports will probably rise more rapidly than the value of merchandise imports, the stimulus to income may be partly mitigated by a larger net deficit on shipping account. In other words, the c.i.f. cost of imports is rising even faster than the f.o.b. cost; and expanded earnings of American ships may not entirely offset this increase (though according to recent estimates they did so during 1939-40). In 1939 about 77 per cent of the \$742 million expended for water transportation of American exports and imports was received by foreign vessels. If this ratio persists, a general rise in shipping rates will swell the net deficit on shipping account. Nevertheless, the balance of claims seems to be growing more 'favorable'; and will therefore contribute more and more to national income.

To appraise fully the contribution of the foreign component would require some kind of conjecture about its repercussions on the domestic components of income. The best that can be attempted here is to ignore the influence of export expansion and import contraction (in some lines) upon decisions to enlarge domestic manufacturing capacity, and upon inventories of exportable products, and to focus attention on the effect of trade trends apart from such influence. Though the conclusions, being highly conjectural and artificial, are of little value in themselves, the discussion may serve to suggest types of economic data worth compiling in order to facilitate this branch of income analysis.

As a guide to the future, we may review the partial and relatively direct effects on national income of changes in the foreign trade of the United States during 1939 and 1940, abstracting from those relationships that do not lend themselves to analysis by means of the 'multiplier'.

Largely because of the war, merchandise exports contributed \$845 million more to national income in 1940 than in 1939, rising from \$3,177 million to \$4,022 million. Under the assumption that

consumers normally spend about five-eighths of any addition to their incomes and that one-tenth of the larger consumption is accounted for by imported materials (i.e., nine-sixteenths of the income increment is spent in such a way as directly to regenerate income), one could attribute to exports, using the multiplier analysis, about \$1,930 million of the estimated 1939-40 increase of \$4,500 million in national income. The remaining increase in national income (\$2,570 million) would be attributable, according to this interpretation, to the combined net effect of a higher rate of domestic investment and of the difference between 'random' elements of income in 1939 and 1940. Any 'abnormal' change that may have occurred in the level of imports constitutes one of these random elements and deserves special attention.

Between 1939 and 1940 merchandise imports rose from \$2,318 million to \$2,625 million; the increase, \$307 million, exceeds by \$26 million the amount expected on the basis of 'normal' relations between imports and consumption (Fig. 6) and between consumption and income (Fig. 5). These \$26 million in turn are attributable to the combined net effect of a higher rate of domestic inventory accumulation (or at least an abnormal share of imported materials therein) and of a curtailment of foreign supplies.

To compute the value of imports embodied in net inventory accumulation would entail, as suggested above, a difficult compilation and summation, covering commodities both in their original state and at all stages of fabrication. Were annual estimates of this component of inventory formation available, we might be able to distinguish between import changes normally associated with changes in the rate of aggregate net inventory accumulation and those that were 'abnormal'. The immediate importance of the latter is indicated, rather inadequately, by the fact that government agencies were expected to disburse about \$700 million during 1941 and 1942 for reserves of tin, chromite, tungsten, manganese, and antimony alone. In addition, rubber and other materials will continue to be imported, and most strategic materials in private inventories will probably be accumulated at a relatively high rate.

In the absence of any direct estimate of the contribution of imported materials to inventories during the last two years, a comparison of imports with production may provide a rough indication of its general order of magnitude. The average level of the Federal Reserve Board index of industrial production rose 13 per cent between 1939 and 1940, while the Commerce Department

quantity index of imports of industrial raw materials rose 22 per cent. If the difference, 9 per cent, were expressed in current values, the rate of flow of imported materials to inventory could be said to have been roughly \$70 million higher in 1940 than in 1939.

If this figure were taken as correct, the aforementioned 'abnormal excess' of \$26 million would be more than accounted for, and an 'abnormal deficiency' of \$44 million attributable to changes in the conditions of supply of imports would remain. The most conspicuous aspects of the latter were a decline of \$133 million in imports from Continental Europe and a rise of 7.3 per cent in the average f.o.b. price of all imports (while average domestic wholesale prices rose only about 2 per cent). These changes are further reflected in the 12 per cent rise in the average price of manufactured imports (excluding food) together with a 16 per cent decline in the quantity imported. Imported foodstuffs declined in both quantity and price.

In addition, American tourist expenditures declined drastically. The balance on tourist account in 1939 is estimated at \$299 million, of which \$163 million represents net payments to Canada and \$50 million net payments to Europe. A preliminary estimate for 1940 puts the net deficit on travel account at \$142 million. Though certain elements in the two figures are not comparable, the decline in net tourist expenditures was certainly not far from \$150 million. If this amount were added to the last mentioned 'abnormal deficiency' in United States imports, one could say that events abroad during 1939-40 had the direct effect of reducing total imports (of goods and services) \$194 million.

Since these events also increased exports \$845 million, the net direct effect was to 'improve' the trade balance by \$1,039 million. The balance actually became only \$688 million more favorable (including the estimated decline on tourist account), so that the residual of \$351 million must be interpreted as a passive response to changes in domestic components of income: \$70 million of it being imputed (as a rough guess) to domestic capital formation and the other \$281 million to consumption (computed, as above, at one-sixteenth of the \$4,500 million increase in income).

This type of analysis ignores any relation between exports and domestic investment, not by assuming that the latter is governed by entirely separate motivating factors, but rather by abstracting from these factors and taking domestic investment as 'given'. This abstraction puts an especially artificial interpretation on fluctuations in inventories of products for which the export market is really an

important influence. For example, shipments to Britain of military equipment not currently produced were included in exports, even though they brought no immediate income, the export being directly offset by an inventory decumulation, both in the income accounts and in a causal sense.

To sum up, this method of interpreting changes in income components assigns an active and independent role to certain elements in the trade balance and to that part of domestic investment not directly accounted for by the accumulation of imported materials. On the basis of the propensity estimates previously used, the \$1,039 million 'autonomous' improvement in the trade balance from 1939 to 1940 must have been responsible for an increase in income amounting to \$2,375 million, or more than half of the total increase. The remaining increase in income, \$2,125 million, is attributable to a higher rate of domestic investment (other than the part of inventory excluded above) and to random factors not already accounted for.

Conjectural though all these figures are, they suggest that developments abroad, even apart from their influence on domestic plant expansion, have caused an increase in national income during 1939-40 that possibly exceeds that of domestic capital formation and is certainly unprecedented in the last twenty years.

*Part Five*

FORECASTING  
NATIONAL INCOME AND  
RELATED MEASURES

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Although the authors of this paper take responsibility for all specific statements, the forecasting of national income, farm income, prices, and related measures is a joint responsibility of an entire Division of the Bureau of Agricultural Economics, and any credit that may arise from the development of these procedures must be distributed among all past and present members of the Division who have worked on these problems. The authors wish to acknowledge especially the constructive criticism of the rough manuscript by O. C. Stine, Head of the Division of Statistical and Historical Research.

# Forecasting National Income and Related Measures

F. L. THOMSEN AND P. H. BOLLINGER

FORECASTS OF national income and related indications of the purchasing power of consumers are very useful to the United States Department of Agriculture and to the farmers and agricultural business men it serves through the 'outlook work' of the Bureau of Agricultural Economics. Changes in consumer incomes are responsible in large part for year to year changes in the prices of farm products, and to an even greater extent for the changes in farm income. In administering its various action programs, the Department is directly and vitally concerned with changes in the purchasing power of consumers, which greatly influence the funds required, the type of program likely to be most effective, the timing of action, and the formulation of procedural details.

## I Methods

Numerous attempts have been made to derive mathematical or statistical barometers that could be used in forecasting business conditions and related factors. The Bureau staff engaged in analyzing and forecasting national income and related demand conditions has not found any such automatic forecasting devices upon which reliance can be placed. Although many statistical indications are utilized, the ultimate forecasts are in large degree subjective, that is, they are based on appraisals. Lack of satisfactory quantitative measures of many of the conditions affecting changes in income impede objectivity. Unfortunately, business or industrial data in general are much less complete than the agricultural data used by the Bureau in forecasting agricultural commodity prices.

The authors of this paper, therefore, wish to emphasize at the outset that the charts and other statistical devices used in forecasting national income and related economic factors are not intended as objective statistical tests of hypotheses concerning relationships among these factors, but rather are for the purpose of forming such hypotheses. This paper is intended to describe some of the methods used by the Bureau staff in forecasting economic conditions affecting national income; not to advance, prove, or disprove any theories regarding the causes of changes in national income. Some of the problems encountered may be illustrated by referring to forecasts



of national income for 1942 as made in September 1941 and revised in January 1942, but no attempt will be made to describe the complete basis for such forecasts.

*A Forecasting nonagricultural national income •*

Separate forecasts of nonagricultural and of agricultural national income are combined to constitute a forecast of national income.

A forecast of industrial activity, as represented by Federal Reserve indexes, is the starting point for all methods of forecasting nonagricultural national income. Under what we may designate Method I the approach is through several steps: (a) factory production is estimated by weighting estimates for various industrial groups; (b) factory employment is estimated from expected factory production, by readings from the regression line for 1934-40 (Fig. 6); (c) factory payroll per worker is estimated partly from its relation to the level of employment (Fig. 7) (for 1942, it was necessary to base the estimate largely on an appraisal of trends prevailing during World War I as shown on the chart, and which evidently are being repeated in this war): (d) the two foregoing estimates are then multiplied and the result used as an independent variable in estimating nonagricultural employees' compensation, based on Figure 8 (the position of the observations for 1938-41 was a determining factor in the estimate for 1942); (e) nonagricultural income payments are estimated from nonagricultural employees' compensation by using Figure 9 (again, in forecasting 1942, much weight was given to the position of the observations for 1938-41); (f) nonagricultural national income is estimated from income payments by using Figure 3. By this method nonagricultural national income for 1942 was forecast as \$100 billion.

The charts used in the foregoing procedure merely formalize a process of building up the estimate of nonagricultural national income that has been used in the Bureau for many years. The approach is really much less mechanical than the brief description might indicate. The large element of personal judgment involved has disadvantages as well as advantages. In an effort to evolve a procedure having fewer steps, two other methods of arriving at a forecast of nonagricultural income have been developed.

Under Method II, the situation is first appraised without regard to changes in the price level, then an adjustment is made for prospective price changes. For this purpose it is necessary to use some factor as a 'deflator' which should be as nearly as possible a measure

of changes in the general level of prices of goods and services entering into national income. As there is no such measure, a series, believed to be correlated with the desired measure, is substituted. Various analysts working in this field have used the Bureau of Labor Statistics cost of living index, which purports to be an index of retail prices of goods and services. Another series commonly considered an index of the movements of the general price level is the Bureau of Labor Statistics index of wholesale prices of all commodities. It, however, does not include prices of services, which constitute a substantial part of total business transactions. Moreover, wholesale prices may fluctuate more than wages, service fees, and all other prices entering into what may be termed the general price level. In other words, the cost of living series, although not representing the measure actually desired as a deflator, may be more highly correlated with it than any other available series. In any case, higher correlations are obtained between nonagricultural national income and industrial activity when the cost of living is used as a deflator instead of wholesale prices. Nevertheless, strong differences of opinion exist among the Bureau staff regarding the justification for using the cost of living index.

Using this deflator, the procedure under Method II is relatively simple. Figure 1 shows the relation between industrial production and deflated nonagricultural national income, with regressions for three periods. Given a forecast of industrial production, estimated by methods outlined in Section I D, an estimate of nonagricultural income in 1940 dollars may be obtained by reading from the regression line, using judgment liberally. In making a forecast for 1942, for example, a large degree of extrapolation was necessary. This was done by extending a line passing through 1938-40. The preliminary estimate for 1941, made after the line was placed on the chart, was found to be very close to the line. Reading from the 1938-40 line gave \$87 billion for 1942 in 1940 dollars. The next step was to adjust for the prospective change in living costs, as estimated by methods noted in Section I E. After rounding, this gave nonagricultural national income for 1942 of about \$105 billion.

Method III uses Figure 2 to obtain a forecast of nonagricultural income payments, and Figure 3 to obtain a forecast of nonagricultural national income. It gives only a slightly higher nonagricultural national income for 1942 than Method II, if in Figure 2 the extrapolation is based on a line passing through 1939, 1940, and 1941.

The 1941 tendencies and the probable effect of war conditions on nonagricultural income payments in relation to industrial production are the justification for this procedure.

### *B Forecasting agriculture's contribution to national income*

Agriculture's contribution to national income was forecast by first estimating cash income from farm marketings, using Figure 4. The 'nominal value of farm production', used as the independent variable in this chart, is a combination of separate estimates of prices received by farmers and of agricultural production. The latter was used instead of marketings because a forecast of this item is available when the national income forecasts are made; production, however, includes quantities for consumption on the farm, and it is expected to be replaced by marketings when a better basis for forecasting marketings becomes available. The forecast of prices received by farmers was obtained by methods described in Section I E.

In forecasting cash income from marketings in 1942, the line representing the 1938-40 relationship (Fig. 4) was again used, despite the relatively small scatter about the line for the entire period 1910-40. This decision was based partly upon the positions of the observations for recent years and partly upon a detailed analysis of the situation by commodities, which indicated that cash income from farm marketings would bear a higher relation to the so-called 'nominal value of farm production' in 1942 than in most of the years included in the chart.

Given the forecast of cash income from marketings, the next step was to relate it to agriculture's contribution to national income as shown in Figure 5. An extrapolation of the regression for 1922-40 was used, since the relation seemed to have been fairly consistent throughout the period and the observation for 1941 fell close to the line.

After government payments had been allowed for and the figures rounded, these two computations indicated that agricultural national income would be about \$10 billion in 1942.

### *C The national income forecast*

The final step in forecasting national income by these procedures is to choose among the several forecasts of nonagricultural national income and combine the selected figure with the estimated agricultural contribution. In this choice, a large element of judgment

is necessarily involved. There is danger, of course, of selecting the estimate that agrees with the forecaster's *a priori* judgment or hunch, then rationalizing this choice. This danger could be obviated by first taking into account all the considerations relating to the appropriateness of the several methods, choosing one, and sticking to the result regardless whether it agreed with the more intuitive preliminary appraisal of the situation. Such objectivity, however, does not seem to be justified at the present stage of forecasting techniques.

In forecasting national income for 1942 there were reasons for believing that income would be somewhat lower than the prospective levels of industrial production and prices might indicate. There were good reasons to believe that nonagricultural national income would not be as high as usual relative to production in 1942. Services could hardly be expected to increase in their usual ratio to industrial production, in view of the prospective shortage of labor, the decline in the use of automobiles, and the general draft of wartime requirements on non-essential industries and occupations. Moreover, much of the wartime industrial production does not enter into the ordinary channels of trade and hence requires less servicing in marketing. These conditions had been taken into account to some extent in extrapolations of the regression lines in the chart, but it was believed that no such use of historical relationships would sufficiently allow for them.

For these reasons, among others, the lowest of the three forecasts of nonagricultural national income, \$100 billion, was used. Adding to this figure the forecast of agriculture's contribution, \$10 billion, brought the total for 1942 to \$110 billion.

This was the figure finally used as the Bureau's forecast of national income for 1942. However, it was made before recent revisions in the estimates of national income by the Department of Commerce raised the estimates for recent years and affected the basis for forecasting income for 1942 and subsequent years. Allowance for this factor would make the effective forecast for 1942 between \$110 and \$115 billion.<sup>1</sup>

Each method of forecasting nonagricultural national income uses as a base a forecast of industrial production (as measured by the Federal Reserve index). The agricultural portion depends also

<sup>1</sup> Revisions have added about one half billion dollars for 1940, a billion for 1941, and the official estimate for 1942 is \$120 billion. Had these revisions been used in the charts top range of the forecast for 1942 would probably have been \$117 billion.

upon a forecast of prices, and the latter also is an essential element in forecasting nonagricultural income under Methods II and III. Hence, a description of the methods used by the Bureau in forecasting national income would not be complete without reference to the procedures followed in forecasting industrial activity and the general price level.

#### *D Forecasting industrial production*

In general there are two methods of forecasting industrial production: (1) the over-all approach, (2) the individual industry approach. Both are used to some extent by the Bureau, as by practically all forecasters.

Forecasting by either method presents a dilemma fully as difficult as that of the chicken and the egg. The output of individual industries is importantly conditioned by industrial activity as a whole; but the latter is only the sum of production in the several industries. Hence, either approach involves an objectionable though unavoidable degree of circular reasoning.

Various general or over-all economic criteria are commonly used in forecasting industrial production, including: (1) changes in factors affecting over-all money purchasing power, including the net contribution of the government, of private investment and saving, and of the international balance of payments; (2) the relation between the production of durable and of nondurable goods; (3) the relations among prices and costs; (4) indications of 'business confidence' or lack of it, as given by such measures as the ratio of stock prices to bond prices; (5) the movement of various financial or banking measures; (6) characteristic features of different phases of the business cycle, such as speculative activity, advance buying; (7) comparison of the timing of the prevailing movement with a 'typical cycle'; (8) changes in the items included in the over-all industrial 'balance sheet', such as production, consumption, inventories, and new and unfilled orders, subject to data difficulties previously referred to.

In the Bureau's forecasting all these general criteria are taken into account, yet little reliance is placed on any one. The reasons for this lack of faith are too numerous and complicated to mention. Suffice it to say that in actual experience no one criterion has proved satisfactory as a basis for forecasting.

The second type of approach, based on forecasts of the output of

individual industries, has been found more consistently reliable. Under it the output of the major lines of production is estimated and the weighted index is derived. This is not as complicated or endless a procedure as might at first be assumed, since relatively few industries have a very large total weight in the index. Figure 10 shows fluctuations in these important industries contributing to the Federal Reserve index from 1923 through 1941, the lines for the separate items taking into account both the actual changes in their output and their weights in the index.<sup>2</sup>

In estimating the output of the several individual groups of products it is of course necessary to take into account the general economic situation, but the forecaster has as a starting point the general situation as it exists when the forecast is made. What, then, is there in the situation for each separate industry that would be expected to increase or decrease output during the period ahead? Many factors must be considered. Ordinarily these relate chiefly to prospective demand for the products in question, but with demand (at current prices) in excess of supplies of many commodities under wartime conditions the problem since mid-1941 has become more that of forecasting capacity than demand. Since the capacity of some industries has changed greatly subsequent to peak operations in 1929 this situation has presented new difficulties.

Some of these difficulties may be brought out by referring to the Bureau's forecast of industrial activity for 1941 made in September 1940. It proved too low, partly because of a revision of the index in 1941, but largely because of gross underestimation of the output of two groups of items: machinery and transportation equipment. The subsequent increase in the output of machine tools of perhaps 50 per cent indicates that too much trust was placed in semi-official statements issued in autumn 1940 that this industry was already operating at capacity. Rapid changes in the composition of machinery production during the war also add to the forecaster's difficulties. For example, with airplanes given less weight than ice cream in the index, but with airplane motors included in the output of machinery on a man-hour basis without much opportunity for determining their relative importance, there has been little upon which to base appraisals of the effect of increasing production of airplanes on the machinery index as a whole. The same applies to

<sup>2</sup>Lack of time has prevented adjustments in the chart to allow for recent minor revisions in the index.

other war equipment. The revision of the Federal Reserve index in 1940 to include the industrial vitamin B complex, machinery, was indeed a hard blow to the forecaster even though it improved the index!

In relating the general situation to that in individual industries charts similar to Figure 11 are used. Output in individual industries such as iron and steel is estimated on the basis of the preliminary over-all forecast of industrial activity, and resulting estimates are compared with appraisals of reasonable industry outputs based on other criteria. This is a quite different procedure, however, from the mechanical process of starting with a preliminary over-all estimate and combining individual industry estimates obtained by readings from the several regression lines. The latter procedure may be quite misleading. If the correlations were perfect (or if partial regressions were used) the end result would be the same as the preliminary forecast! Thus, any difference between the final and the preliminary forecast would represent merely noncompensating errors in the relationships as depicted by the charts, and the final 'corrected' estimate would have no more meaning than the preliminary.

This cursory survey of the general procedure followed by the Bureau in forecasting industrial activity may be illustrated by the forecasts for 1942 as made in September 1941 and revised early in January 1942. Needs for war equipment, centering largely in the metal trades, could be expected to keep output in these lines at capacity during most of 1942, allowing for the effects of the change-over from peacetime production during the first part of the year. But even this change-over could not be expected to reduce production materially in these lines for the year as a whole, since it would be logical to assume that all the metals and associated materials to become available during the year would be utilized. Industrial production had been advancing rapidly during the first half of 1941, but on a seasonally unadjusted basis had been almost stationary since midyear. This could be taken to indicate that the capacity of existing facilities had been about reached, and that the prospective large increase in the production of war goods would be mainly at the expense of the output of civilian goods made from the same materials. Large inventories of materials had been accumulated by manufacturers during 1941, however, and probable partial utilization of these supplies plus the coming into operation of

some new steel-making and other metal trades facilities offered prospects of a relatively slight increase in the average rate of operations in 1942 compared with those prevailing during the latter part of 1941. Numerous other factors in the general situation had to be taken into account, of course, but the conclusion based on over-all conditions was that the general level of industrial activity in 1942

TABLE 1

Industrial Production, United States, 1925, 1929, 1932, 1937-1941,  
and Forecast for 1942  
(Federal Reserve Board index, adjusted for seasonal, 1935-39 = 100)

	% weight <sup>a</sup>									
	1925	1929	1932	1937	1938	1939	1940	1941 <sup>b</sup>	1942 <sup>c</sup>	
<i>Manufactures</i>										
Iron and steel	11.00	108	133	32	123	68	114	147	186	195
Machinery	10.81	89	130	43	126	82	103	135	210	275
Transportation equipment	5.92	106	134	38	123	72	103	145	234	350
Nonferrous metal	2.81	104	136	52	122	80	115	137	183	200
Lumber and products	4.39	148	146	51	113	90	106	116	134	135
Stone, clay and glass	3.00	101	110	51	114	92	114	121	152	150
Textiles and products	11.22	84	94	71	106	85	112	114	151	155
Leather and products	2.28	88	95	76	102	93	104	97	121	130
Manufactured food products	10.92	85	101	79	103	101	108	114	128	150
Alcoholic beverages	1.84				108	96	98	101	116	110
Tobacco products	1.24	85	96	79	103	102	106	109	120	135
Paper and products	3.13	66	85	65	107	95	114	123	140	150
Printing and publishing	6.44	84	104	74	109	96	106	111	124	125
Petrol and coal	2.14	69	96	69	108	100	110	116	127	140
Chemicals	6.27	63	89	68	112	96	104	114	139	180
Rubber products	1.39	81	100	64	104	83	113	123	148	75
<i>Minerals</i>										
Fuels	13.01	87	103	72	109	99	105	114	121	135
Metals	2.19	121	134	36	127	86	113	134	149	160
Total industrial production	100.00	90	110	58	113	89	108	123	156	177

<sup>a</sup> Percentage weights assigned to the various groups in the new Federal Reserve index of industrial production.

<sup>b</sup> Preliminary, annual average of monthly indexes without seasonal adjustment.

<sup>c</sup> Advance BAE forecasts.

would average somewhat higher than in the latter part of 1941, with a continuation of the sidewise movement during the first part of the year followed by a resumption of the upward movement.

The next step was to estimate the output of individual industries, but no attempt was made to bring the weighted average into conformity with the forecast based on over-all conditions. The estimates for the various groups of industries are shown in Table 1 with



data for some preceding years for purposes of comparison. They vary from a reduction of about 50 per cent to an increase of as much. It would require a volume to delineate the considerations taken into account in making these individual industry estimates, including as important items priorities, military requirements, and availability of materials.<sup>3</sup> When weighted and summed, the separate industry forecasts indicated an average index for the year of 177 which was within the range of 10 to 15 per cent (172-180) above the 1941 average indicated by the over-all analysis.

It was recognized that both the over-all and individual industry indications might be too low because of the shift of the Federal Reserve index to more nearly a man-hour basis combined with a coincident increase in the number of man-hours per ton of raw materials in the production of industrial goods in wartime. However, there being no satisfactory statistical basis for an allowance for this factor, none was made.

### *E The general price level*

Many of the considerations discussed in connection with the forecast of the general level of business activity are encountered in forecasting the general level of wholesale and retail prices. Both the over-all and the individual commodity approaches are used.

It was assumed that the purchasing power of consumers was likely to increase in 1942 as a result of the war effort and that the output of goods for civilian use would decline, creating a strong upward pressure on prices. One over-all approach to forecasting the price level in 1942 was an attempt to measure the degree of these forces. As the method described below had not yet been tested by experience and is subject to criticism on several counts, it should be taken as the responsibility of the authors, not of the Bureau.

To estimate the money available to spend on consumer goods and services, national income at the 1941 general price level, made by the methods described above, was first forecast. Then an estimate of the prospective increase in federal, state, and local taxes applying to individuals was subtracted. The result was taken to be a rough estimate of the purchasing power of consumers in 1942 assuming

<sup>3</sup> In thus inviting disaster by releasing these individual industry estimates, the authors wish to offer an alibi by pointing out that many of the decisions that will govern the utilization by industries of available materials and labor are still to be made, and that changes in the allocation of man-hours among industries included in the index might bring radical changes in the individual items yet not greatly affect the total.

no change in the general price level. It indicated a slight increase in 1942 over the average for 1941.<sup>4</sup>

The quantity of processed goods to become available for civilian use in 1942, estimated by deducting from estimated total output the quantity likely to be diverted to war production and exports, was about 20 to 25 per cent below the 1941 level, or at about the 1939 level.<sup>5</sup> Partly offsetting this reduction, of course, might be a considerable (absolute) increase in the services purchased by consumers. But if we assume no change in the latter, the combined volume of goods and services available to consumers would be somewhat less than 20 per cent smaller in 1942 than in 1941. This would mean an increase in purchasing power relative to goods and services, or what is sometimes referred to as the 'inflation gap', of about 25 per cent (that is, a ratio of available money to available goods, with 1941 as a base, of 1.25) and, therefore, a strong upward pressure on prices.<sup>6</sup> If the marked increase in inventories of consumers' goods in the hands of dealers and producers in 1941 and the probable substantial decrease in 1942, and the proportion of the increase in defense bond sales that would actually affect consumer expenditures were allowed for, the 'gap' would be much smaller, ranging from 0 to 15 per cent depending upon the particular assumptions with respect to these factors.<sup>7</sup>

Actually, of course, the so-called inflation gap must be covered either by diverting the excess income to other uses (taxes, defense bonds, and other savings) not allowed for by the computations or by a rise in the level of prices sufficient to absorb the excess income. Although no attempt was made to translate this gap directly into

<sup>4</sup> In addition, of course, increases in sales of defense bonds might be deducted. The actual effect on money available to consumers for current spending is difficult to evaluate, however, because a considerable proportion of such sales are to institutional investors or are paid for from funds representing idle bank deposits, and hence do not constitute a deduction from current income that would otherwise be used for purchasing. The same may be said, of course, of some taxes that have been deducted, but in the authors' opinion to a lesser degree.

<sup>5</sup> The procedure makes no allowance for inventory changes, and assumes: (a) war expenditures in line with the President's message to Congress, (b) no change in prices, (c) a number of man-hours per ton of raw materials no greater in the production of war than of civilian goods.

<sup>6</sup> This inflation 'gap' or 'wedge' is much smaller than similar estimates made (in terms of dollars rather than ratios) by several other agencies, some of which, at least, seemed to be erroneously based on a deduction of gross war expenditures from national income, a 'net' figure.

<sup>7</sup> If any percentage within this range is applied to the 1941 level of prices, the indicated level for 1942 is lower than the forecast, or than the level actually attained.

specific price forecasts, it seemed to check with forecasts made on other bases, as described below. This approach to forecasting the general price level, although relatively new and untried, may become more useful in the future as certain details are brought into better focus.

Other general factors in the price situation for 1942 included speculative or advance buying by business men, inventory policies, and the distribution of available supplies by commodities. During 1941 many of these forces were pushing hard on the general price level: both business men and consumers were attempting to buy against future shortages and prospective price advances. In addition, some new, and changes in some old, government programs affecting farm prices had served to accelerate the advance. With requisitioning of inventories and materials for defense purposes and other government controls in the picture for 1942, some of these pressures could be expected to diminish in 1942, although others would become stronger.

An influential factor in the situation would be more direct government controls over prices, expected to have an important influence on prices of raw and semifinished commodities which in turn importantly influence prices of other industrial goods. But it was recognized that even some controlled prices would have to rise if the inflation gap were not otherwise absorbed and if wages and other costs rose substantially. It might be necessary or desirable, also, to permit some price increases in order to encourage increased production.

Supplementing this appraisal of the general conditions affecting the probable movement of prices in 1942, prices of groups of commodities making up the Bureau of Labor Statistics index were forecast (Table 2). The final result of these computations was within the range of our over-all forecast of an increase in wholesale prices of all commodities in 1942 as a whole of about 15 to 20 per cent above the 1941 average.

Prices received by farmers may be related to wholesale prices of all commodities, as shown in Figure 12, and a forecast of the former made by using a forecast of the latter as determined by methods outlined immediately above. This forecast, in turn, is checked against one based on a weighted average of individual agricultural commodity price forecasts made by the several commodity analysts.

In forecasting living costs or retail prices, used as a deflator in

forecasting national income, Figures 13 and 14 are used. In these charts, and in others previously cited, price relationships tend to change from one period to another in what may be termed zig-zag fashion. Going up on one line, one series of prices relative to another is likely to decline on another line, rather than run back on the original, and to form still another line on the next general rise, although variations of individual observations within each period tend to be consistent with the relationship in effect for the period. Consequently, the greatest errors in using such relationships for forecasting purposes are likely to be encountered at the beginning or end of one of such periods composing a given line. In Figure 13 the observations for 1940 and 1941 are close to the

TABLE 2

Wholesale Prices, United States, 1917, 1918, 1941,  
and Forecast for 1942 (Indexes, 1926 = 100)

	1917	1918	1941	1942
<i>All commodities</i>	118	131	87	105
Farm	129	148	82	105
Food	105	119	83	105
All excluding farm and food	114	125	89	105
Hides and leather	124	126	108	125
Textiles	99	137	85	115
Fuel and light	105	109	76	85
Metals	151	137	99	109
Building materials	88	99	103	115
Chemicals	165	187	85	100
House furnishings	74	93	94	120
Miscellaneous	122	134	82	100

line representing 1933-40. But since the pattern of change during World War I was quite different from that prevailing before and after, the relationships had to be interpreted with a large degree of judgment for purposes of making a forecast for 1942. It was believed that the rise in retail prices of nonagricultural products from 1941 to 1942 would be less precipitate than during the corresponding years in World War I because of more widespread and effective government controls, and the determined effort to keep purchasing power in more normal relation to the goods and services available for civilian consumption. Similar considerations were involved in the interpretation of Figure 14 in estimating retail food prices for 1942. After a purely judgment estimate of changes in rents from 1941 to 1942, the over-all living cost index was forecast by weighting the several components.

## II Reliability of Forecasts

The reliability of forecasts of national income and related items is difficult to evaluate chiefly for two reasons. In the first place, the published forecasts are usually not in strictly quantitative terms, resort being had by most forecasters to various terms indicating degree of change, such as 'slightly', 'somewhat', and 'materially'. Recognizing that these terms are not interpreted in the same manner by all readers, the Bureau has made some effort to standardize usage and otherwise reduce the confusion resulting from this practice, but for policy and other reasons the forecaster's language must remain less explicit than would be desirable from some standpoints. In addition, some forecasts are hedged by indicating possible alternative movements and in other ways. Hence, what is to be evaluated as to reliability is the net over-all impression given the reader by the forecast and its setting; consequently the evaluation must be in a certain degree subjective.

In the second place, the accuracy of even definite quantitative forecasts made for internal administrative use is difficult to evaluate. Suppose, for example, that a rise of 10 per cent in national income is forecast, and a rise of 15 per cent actually occurs. What quantitative measure of accuracy or its lack could be assigned to this forecast? If the forecast were stated as a range, and the actual figure fell within the range, it might be counted as 100 per cent accurate, but this might be misleading since the range could be made wide enough to give some very pleasing appraisals!

Moreover, even if it were possible to find a satisfactory method of arriving at such a percentage of accuracy, the question of 'tolerance' would arise, or the standard with which the percentage of accuracy should be compared. For example, weather forecasts might be correct in a large percentage of cases and yet not be helpful, since it would be possible merely by always predicting fair weather to have a high percentage of accuracy. Similarly, merely by following a general trend until a new one develops it would be possible to have an impressive average percentage of accuracy in forecasting national income and other economic conditions, but at the same time some important temporal changes would be entirely missed. A given percentage error in one forecast may lead to much more serious mistakes on the part of its user than would a similar error in the forecast of another factor. For such reasons, one series of

forecasts might be more helpful or 'reliable' than another even though its percentage of accuracy was lower.

The general policy of the Bureau has been that the forecasts are valuable if users (farmers, agricultural business men, and government officials) are better able to project future trends. According to this standard, an accuracy of 55 per cent in price forecasts for one commodity might be more helpful than an accuracy of 85 per cent for another commodity for which it is relatively easy to anticipate changes. Even forecasts of less than 50 per cent accuracy might be helpful to many people, since under several possible conditions their own forecasts might have an even lower percentage of accuracy. This would be true, for example, of many farmers and business men who tend to expand after periods of prosperity and to contract after depressions. Fortunately, however, the Bureau has not had to rely upon such cases in justifying the degree of accuracy attained in its forecasting.

Since February 1937 when forecasts of probable future changes in business conditions and national income were first published in the Bureau's monthly *Demand and Price Situation*, several fairly distinct movements of these conditions have occurred: (1) the depression beginning in autumn 1937, (2) the recovery beginning in spring 1938, (3) a relatively small recession, little more than a side-wise movement, in the first part of 1939, (4) the rise in the second half of 1939, (5) a rather sharp downturn in the first part of 1940, followed by (6) a rise through 1942.

The Bureau's annual and monthly outlook reports correctly anticipated each of these movements, not only of general business activity and national income, but also of most of the less important factors making up the over-all picture. The one important exception was the forecast made in the autumn of 1938 of 'somewhat higher' average commodity prices in 1939. Practically all groups of commodity prices averaged slightly lower in 1939 than in 1938, although they were rising during the second half of the year and nearly all measures of demand conditions were up in 1939 compared with 1938.

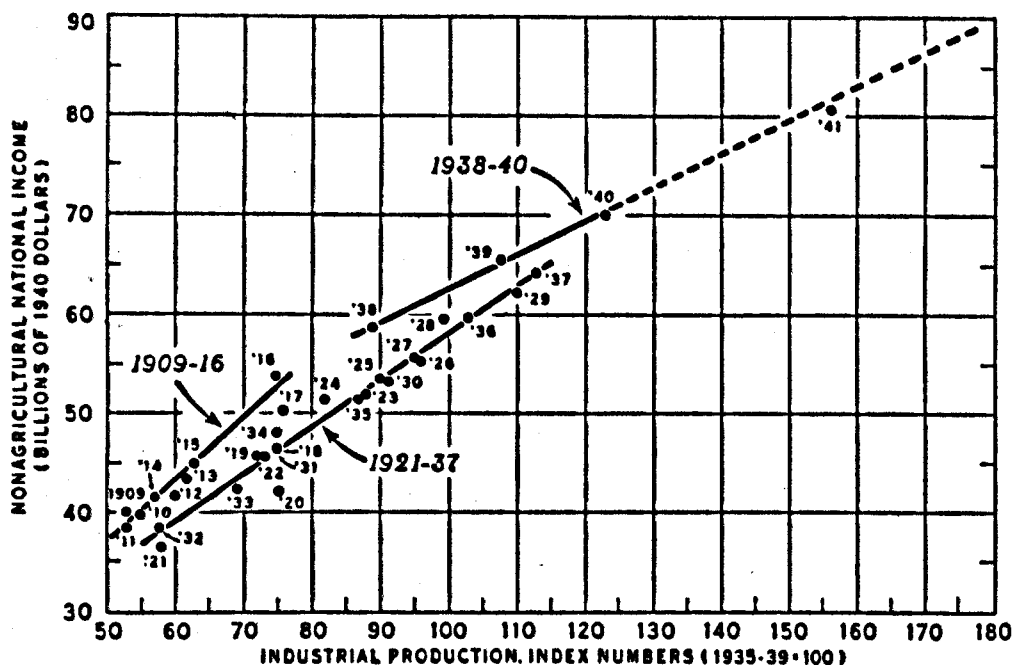
The authors of this paper wish it were possible to conclude with this pleasing picture of the accuracy of Bureau forecasts, but the record of the reliability of the forecasts with respect to the degree of movement is much less favorable. There was little in the forecast for 1938 (prepared in summer 1937) to indicate the severity of the depression that actually occurred. The speed of the recovery in the

second half of 1938 was also underestimated. Again, the degree of rise in 1941 proved much greater than that indicated by the Bureau's forecast issued in autumn 1940.

Despite these failures, the record as a whole during these years in which the Bureau has been making rather definite forecasts has been so good that the authors are confident it is due in no small degree to Dame Fortune. A longer period will be required to ascertain how many of the successes have been due to good luck and how many to progress in the development of a forecasting technique.

No one realizes more than the Bureau's staff the inadequacy of the methods. The principal need is for forecasting procedures in which personal judgment is exercised *a priori* in the selection of methods, weights, etc. as opposed to the selection of specific methods after the results of their application to the facts at any one time are known. This would help to avoid the danger, so great under present methods, of merely going through a statistical process of rationalizing hunches. As long as results depend so largely upon personal judgment they will be of fluctuating reliability, and changes in staff will mean the discarding of much valuable experience. A main impediment to the development of this kind of objectivity is the lack of comprehensive and reliable data. Method cannot be refined beyond limits set by the nature of the data. We have no satisfactory measures of the output and prices of services, an essential element in forecasting national income. Even the measures applicable to commodities are far from complete and satisfactory for these purposes. The estimates of national income itself are not entirely beyond question, and it is not always easy to determine whether an apparent error in forecasting is due to error in the forecast or in the estimate of the income for the year in question.

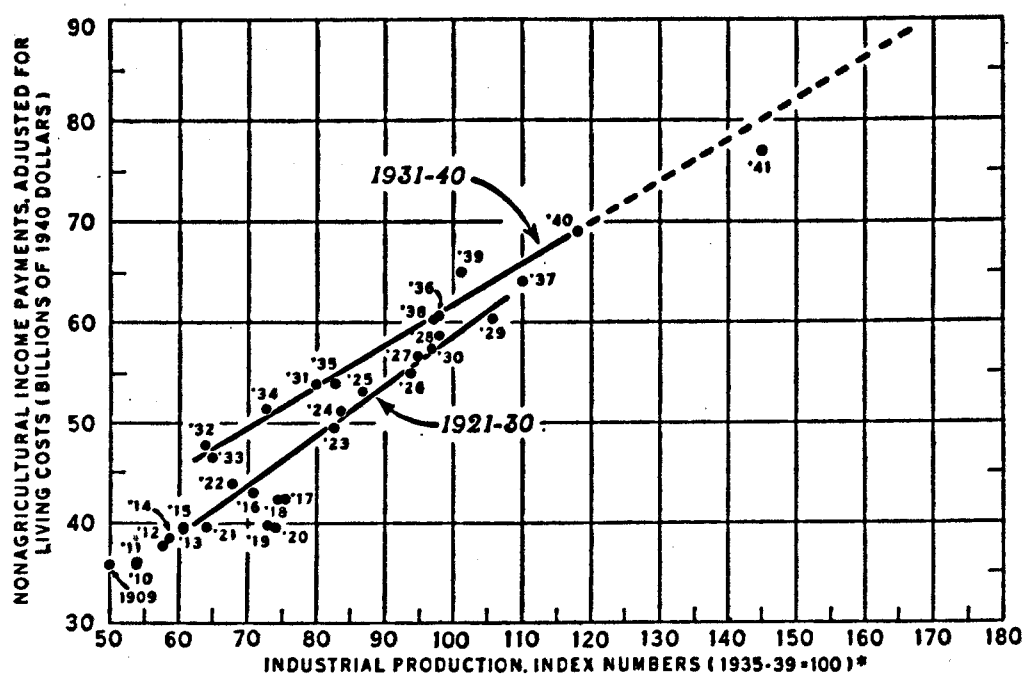
**FIGURE 1**  
**NONAGRICULTURAL NATIONAL INCOME RELATED TO INDUSTRIAL PRODUCTION, UNITED STATES, 1909-41**



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**FIGURE 2**  
**NONAGRICULTURAL INCOME PAYMENTS RELATED TO INDUSTRIAL PRODUCTION, UNITED STATES, 1909-41**



\* CURRENT YEAR WEIGHTED BY 2 AND PRECEDING YEAR BY 1

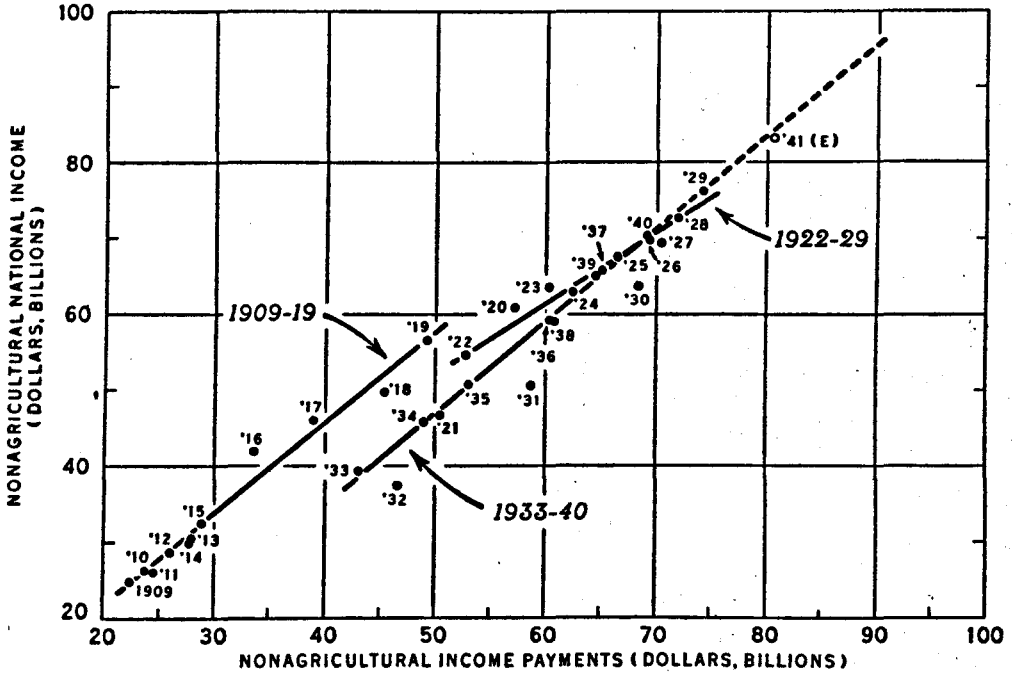
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FIGURE 3

NONAGRICULTURAL NATIONAL INCOME RELATED TO NONAGRICULTURAL INCOME PAYMENTS, UNITED STATES, 1909-41

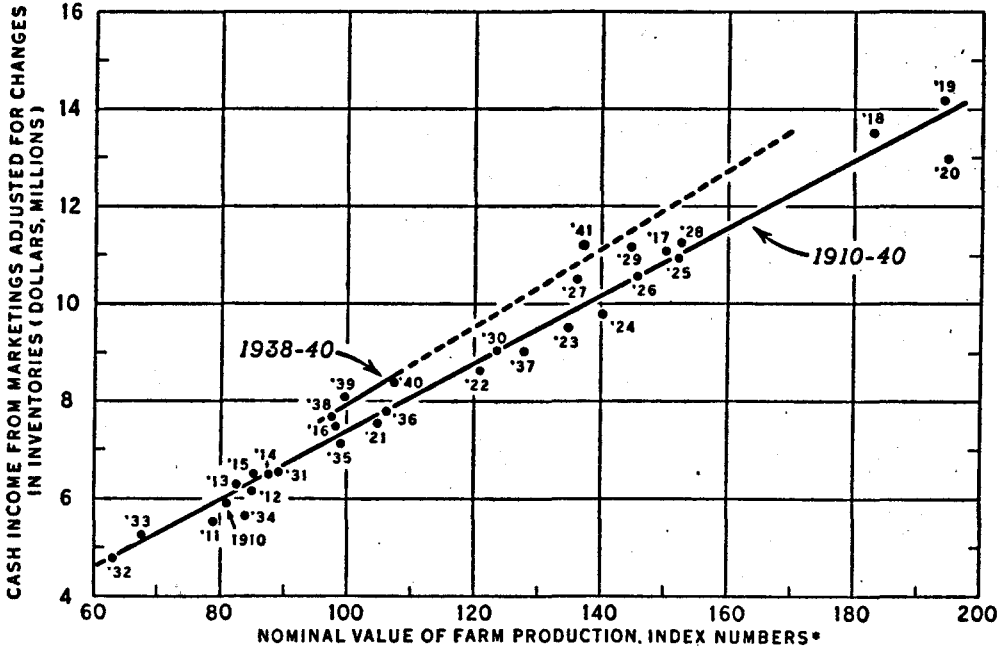


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FIGURE 4

CASH INCOME FROM MARKETINGS RELATED TO NOMINAL VALUE OF FARM PRODUCTION, UNITED STATES, 1910-41



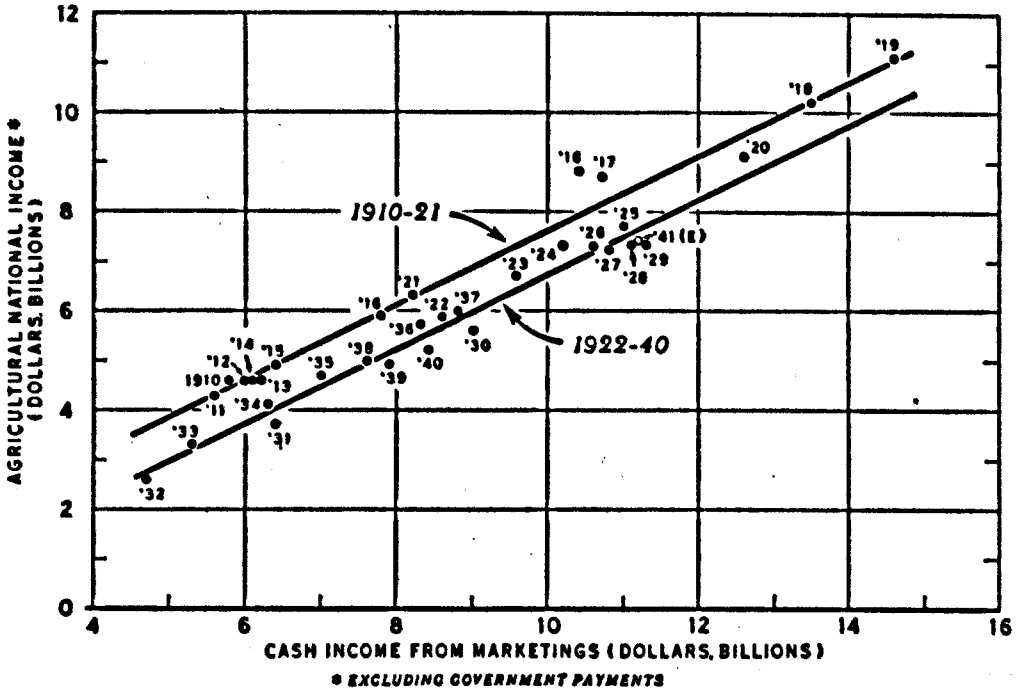
\* COMPUTED ON BASIS OF PRODUCTION ON 1935-39 BASE AND PRICES ON 1910-14 BASE.

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FIGURE 5

AGRICULTURE'S CONTRIBUTION TO NATIONAL INCOME RELATED TO CASH INCOME FROM MARKETINGS, UNITED STATES, 1910-41

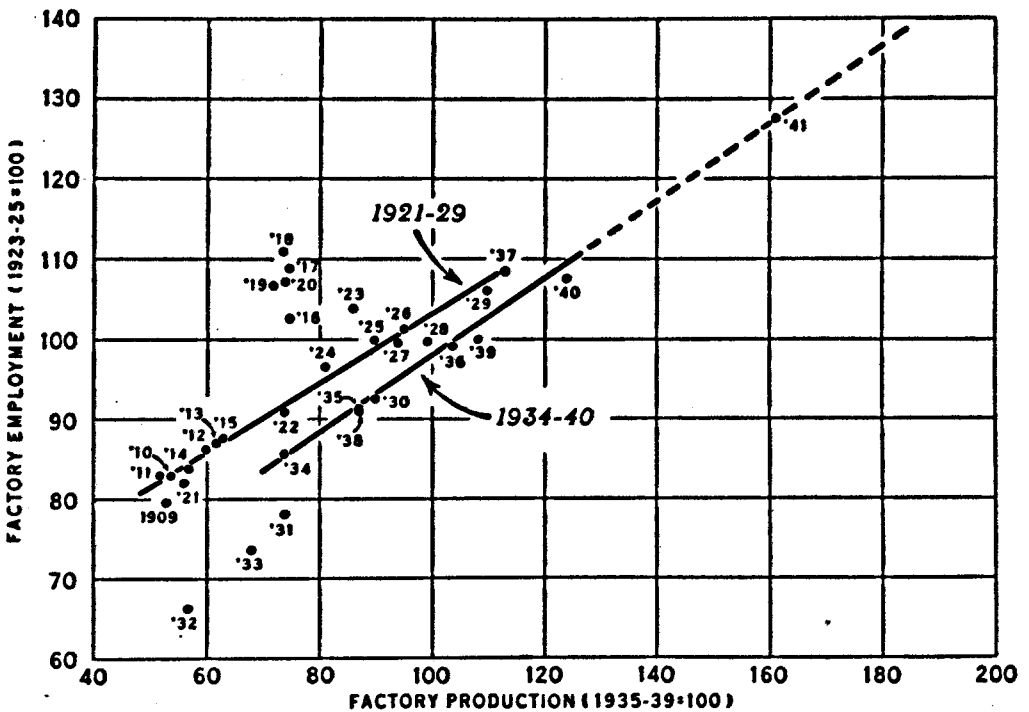


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FIGURE 6

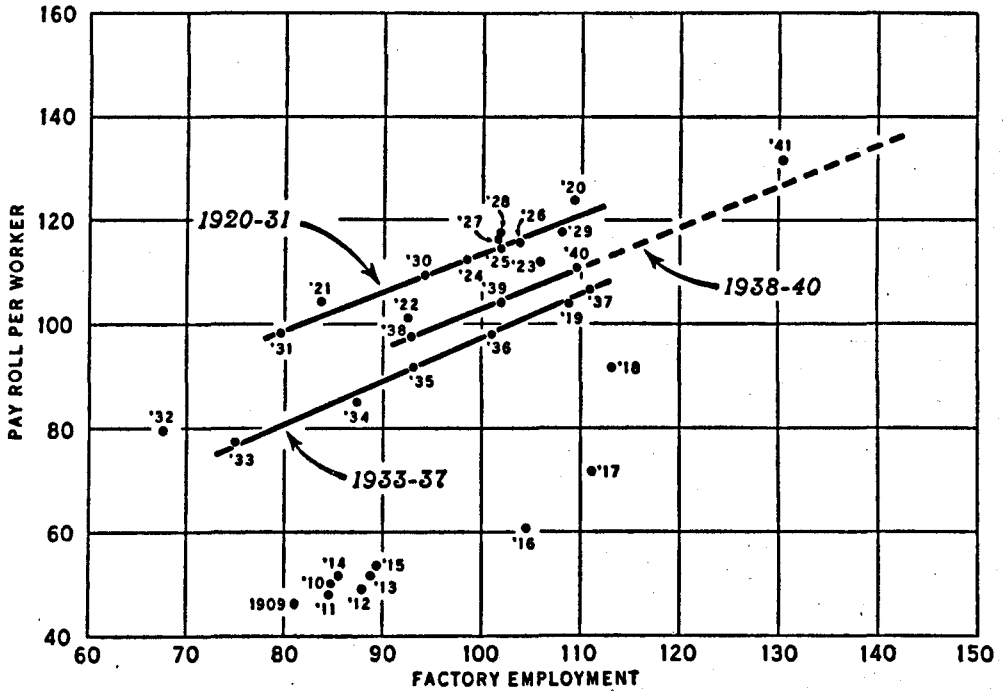
FACTORY EMPLOYMENT RELATED TO FACTORY PRODUCTION, INDEX NUMBERS, UNITED STATES, 1909-41



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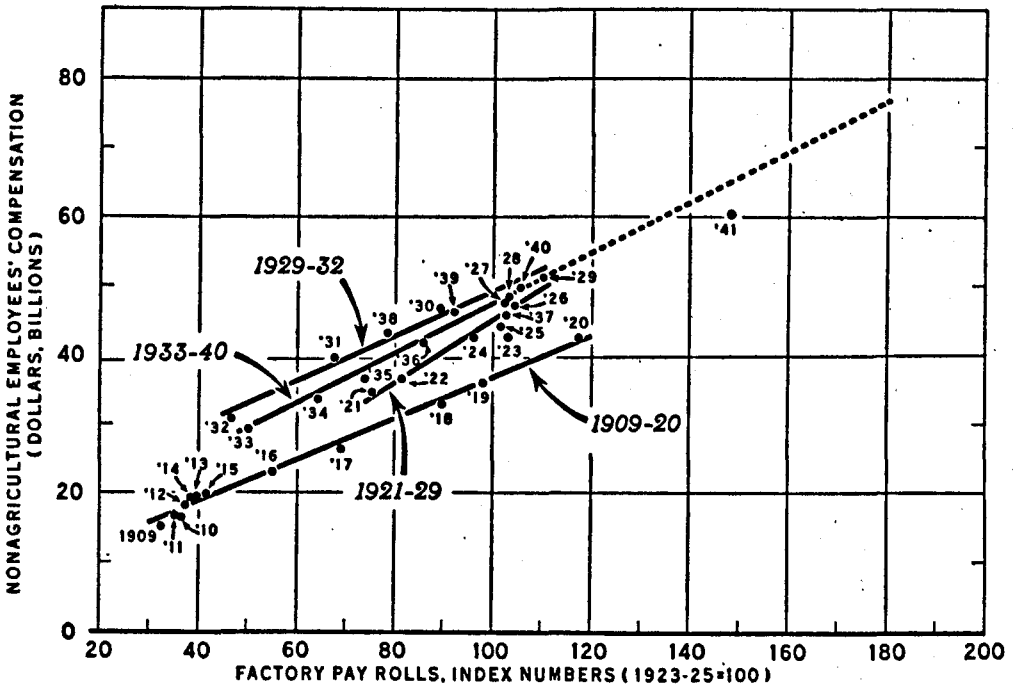
**FIGURE 7**  
**FACTORY PAY ROLL PER WORKER RELATED TO FACTORY**  
**EMPLOYMENT, UNITED STATES, 1909-41**  
 INDEX NUMBERS (1935-39=100)



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**FIGURE 8**  
**NONAGRICULTURAL EMPLOYEES' COMPENSATION RELATED TO**  
**FACTORY PAY ROLLS, UNITED STATES, 1909-41**



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FIGURE 9

NONAGRICULTURAL INCOME PAYMENTS RELATED TO NONAGRICULTURAL EMPLOYEES' COMPENSATION, UNITED STATES, 1909-41

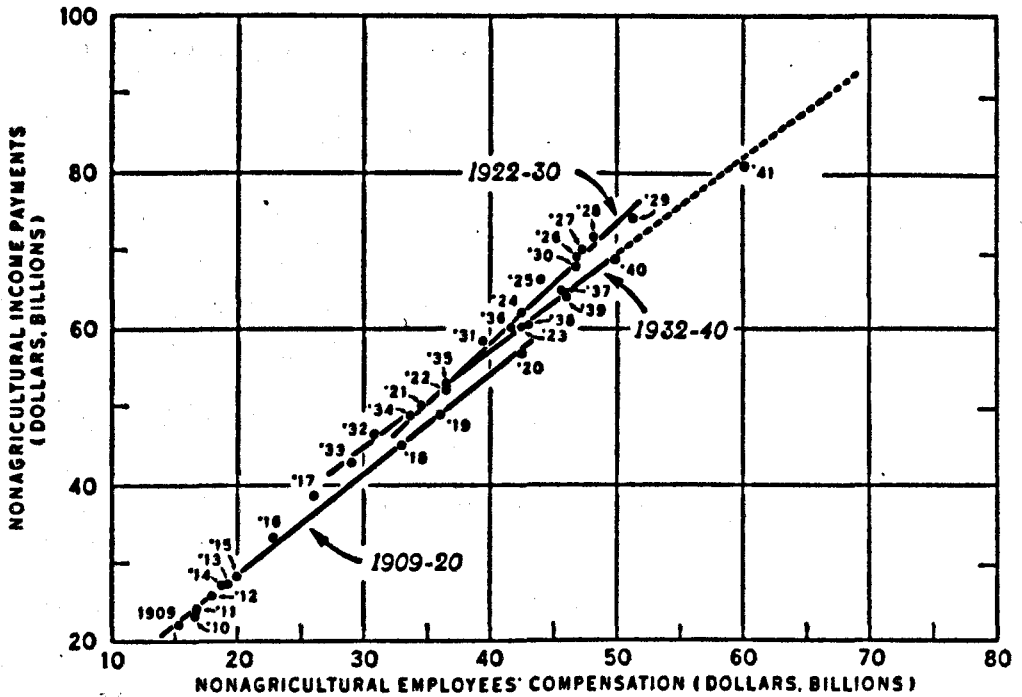
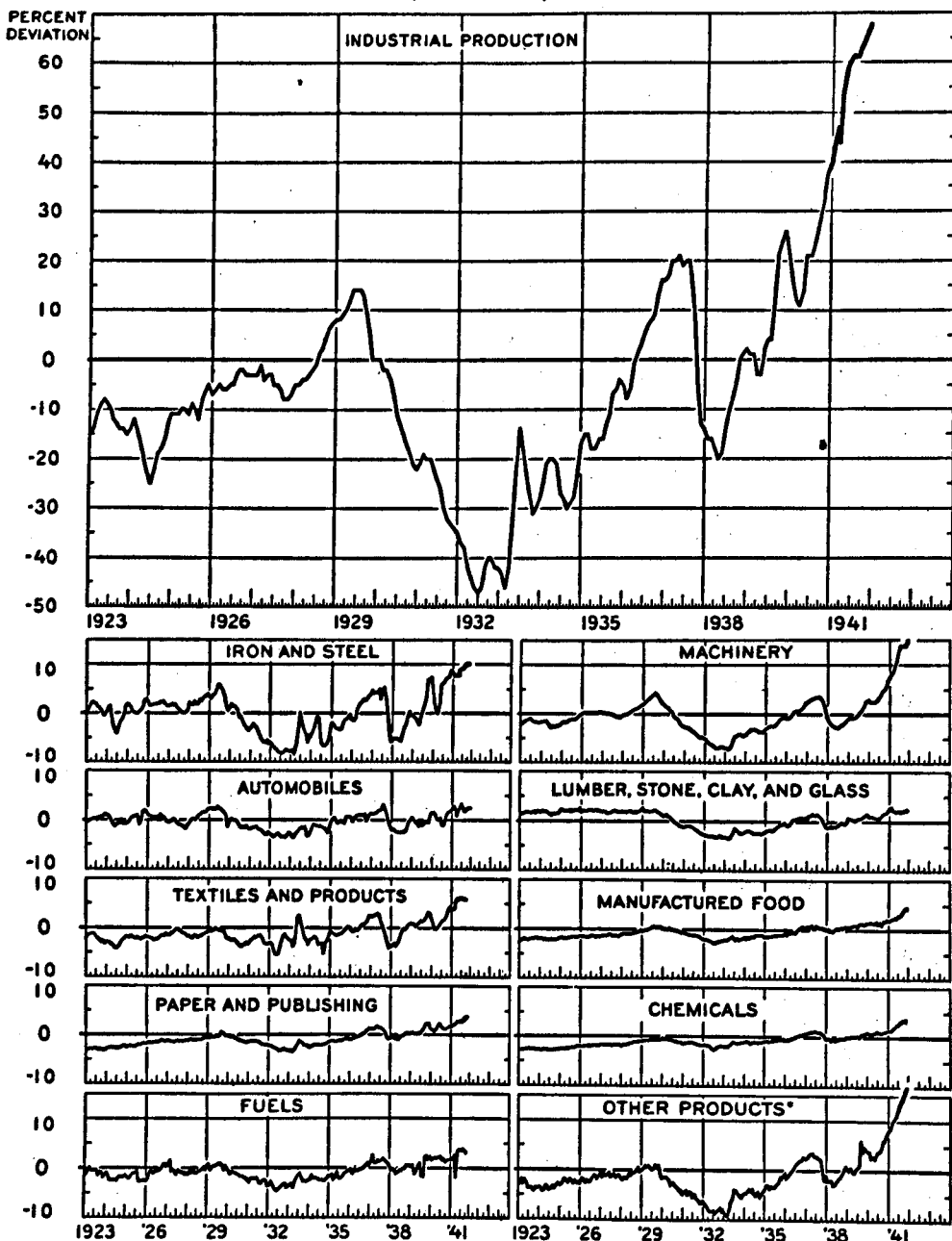


FIGURE 10

CONTRIBUTION OF INDIVIDUAL INDUSTRIES TO CHANGES IN  
FEDERAL RESERVE INDEX NUMBERS OF INDUSTRIAL  
PRODUCTION, UNITED STATES, 1923-41

(1935-39 = 0)

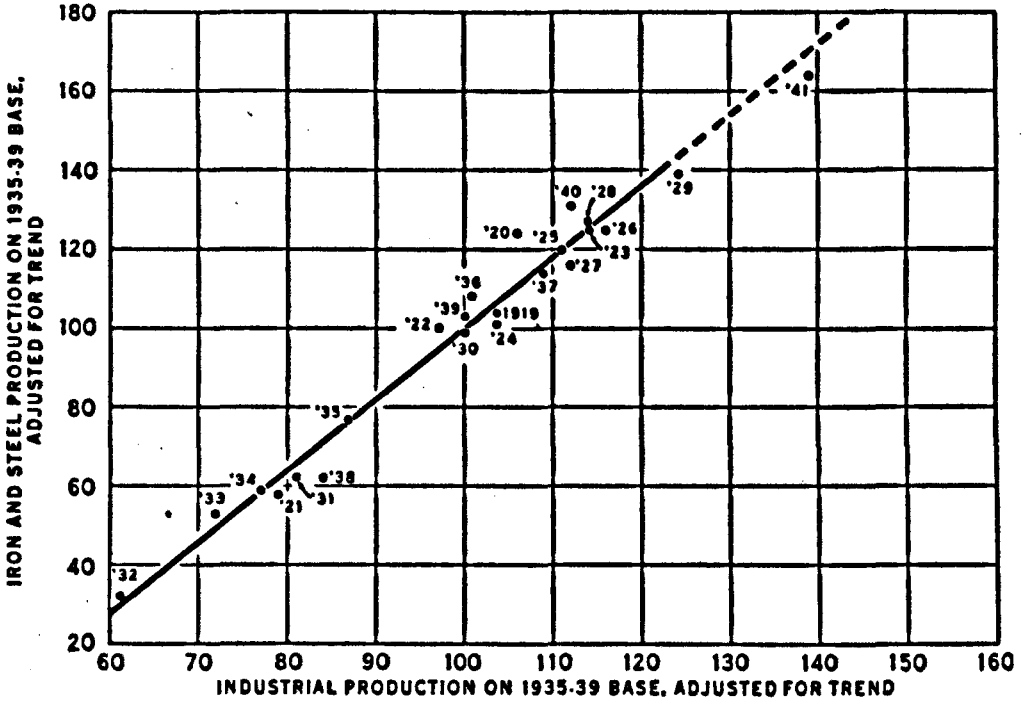


THE CONTRIBUTION OF INDIVIDUAL INDUSTRIES OR COMMODITIES TO FLUCTUATIONS OF THE NEW FEDERAL RESERVE INDEX OF INDUSTRIAL PRODUCTION DEPENDS UPON: (1) THE CHANGE IN OUTPUT; (2) THE WEIGHT IN THE INDEX. IN THE LOWER SECTIONS OF THIS CHART, THE INFLUENCE OF BOTH OF THESE FACTORS HAS BEEN COMBINED. THE DEGREE OF FLUCTUATION IN THE LINES REPRESENTING THE SEVERAL INDUSTRIES INDICATES THEIR RESPECTIVE CONTRIBUTIONS TO THE TOTAL VARIATION OF INDUSTRIAL PRODUCTION. THE ALGEBRAIC SUM OF THE MONTH TO MONTH CHANGES IN THE INDIVIDUAL LINES IS EQUAL TO THE NET CHANGE IN THE INDEX.

\*OTHER PRODUCTS: AIRCRAFT, RAILROAD EQUIPMENT, LOCOMOTIVES, SHIPBUILDING, NONFERROUS METALS, FURNITURE, LEATHER, ALCOHOLIC BEVERAGES, TOBACCO, PETROLEUM AND COAL PRODUCTS, RUBBER PRODUCTS, AND METALS

**FIGURE 11**

**RELATION BETWEEN IRON AND STEEL AND INDUSTRIAL PRODUCTION, INDEX NUMBERS ADJUSTED FOR TRENDS, UNITED STATES, 1919-41**

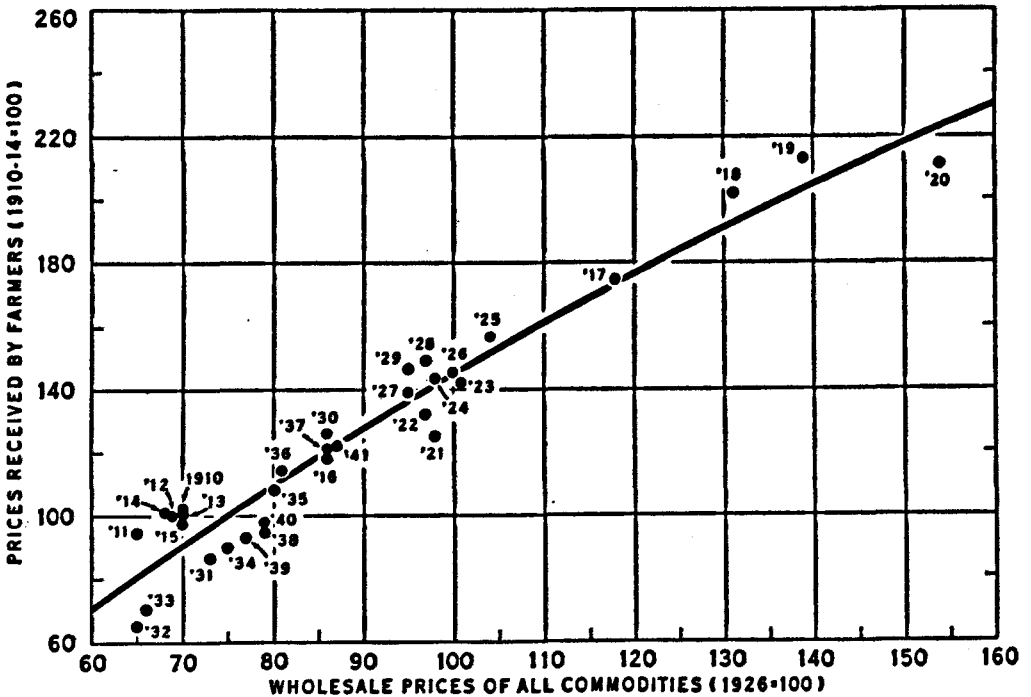


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**FIGURE 12**

**PRICES RECEIVED BY FARMERS RELATED TO WHOLESALE PRICES OF ALL COMMODITIES, INDEX NUMBERS, UNITED STATES, 1910-41**

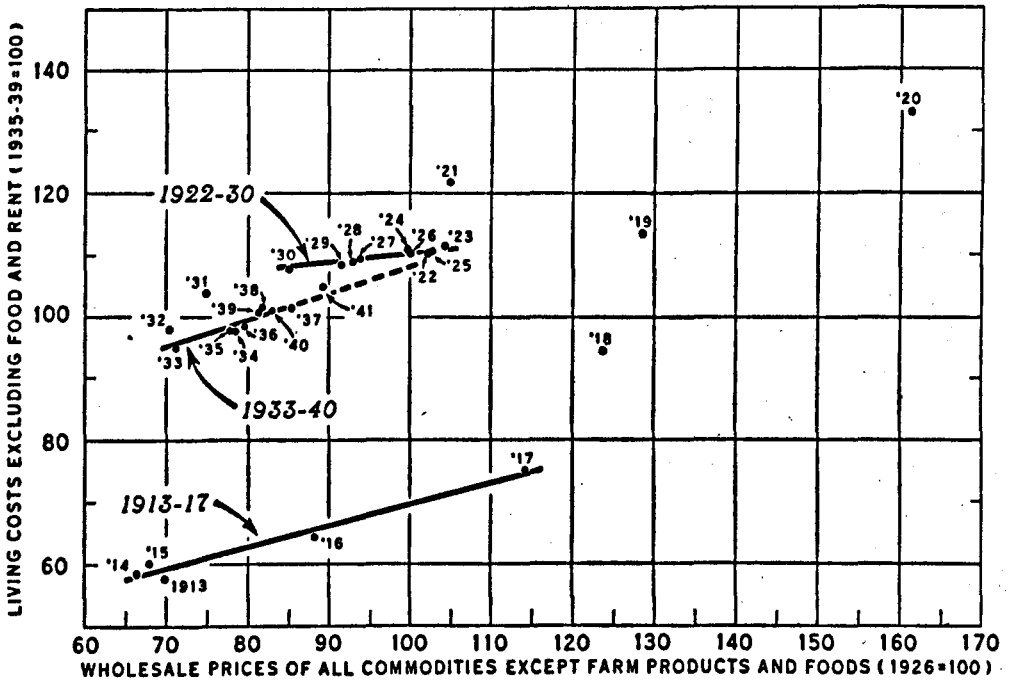


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FIGURE 13

LIVING COSTS RELATED TO WHOLESALE PRICES OF NONAGRICULTURAL PRODUCTS, INDEX NUMBERS, UNITED STATES, 1909-41

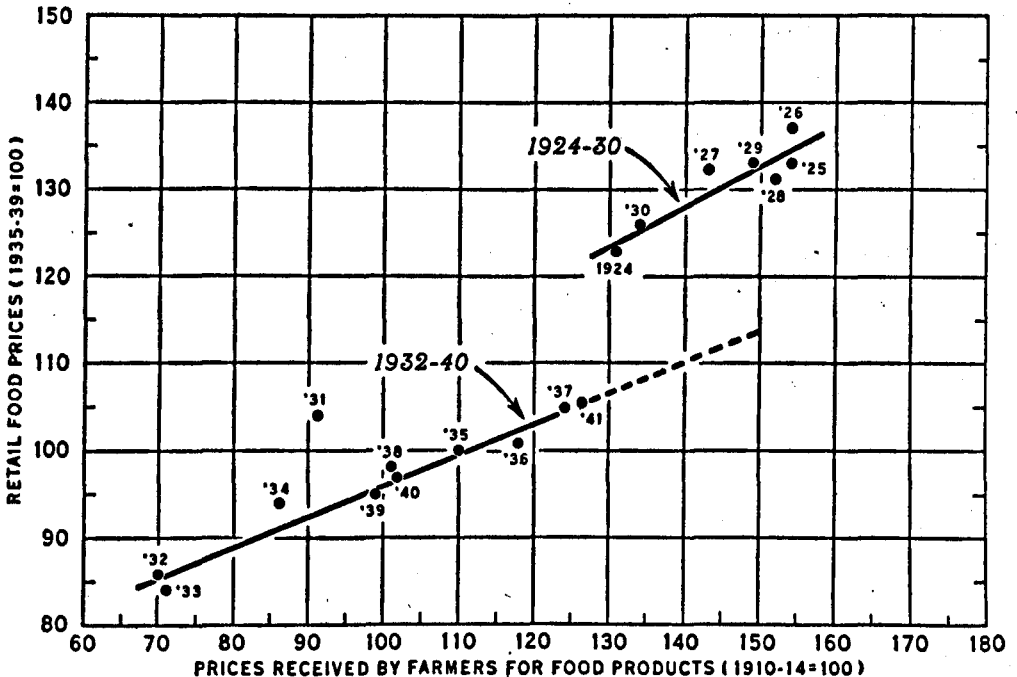


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FIGURE 14

RETAIL FOOD PRICES RELATED TO PRICES RECEIVED BY FARMERS FOR FOOD PRODUCTS, UNITED STATES, INDEX NUMBERS, 1924-41



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## Discussion

FRANK R. GARFIELD

The authors of this paper are in an unusual position—after several years of continuous public forecasting, they can speak a good word for Dame Fortune.

The major fault the authors find with their present technique is that it involves the use of too much common sense: "as long as results depend so largely upon personal judgment they will be of fluctuating reliability and changes in staff will mean the discarding of much valuable experience". Seeking more certainty and continuity, they urge the development of "procedures in which personal judgment is exercised *a priori* in the selection of methods, weights, etc. as opposed to the selection of specific methods after the results of their application to the facts at any one time are known". In their view a main obstacle to the development of such 'objective' procedures is lack of adequate data, particularly in the industrial field.

Undoubtedly more data are needed; it seems, however, that the nature of economic change is a much more fundamental impediment to the successful mechanization of economic forecasting. If basic conditions and relationships were generally simple and regular enough to fit into such formulas as statisticians devise, forecasts might be made with more statistical formality and less personal judgment. But many important changes in basic conditions and relationships are far too complex and irregular for expression in any formulas so far developed or likely to be developed in the near future. Consequently, it would seem essential for forecasters to adopt methods that leave them free at every stage of the process to use all information bearing on conditions in the period for which they are forecasting. The nation may then be at peace or at war; the course of production may be determined largely by market demand or by government order, subject to limitations of plant capacity, supplies of materials, and the like; and prices may be going up or down, depending in part on policy decisions concerning price ceilings, taxes, wage rates, parity loans, consumer credit, and a host of other things. In one situation large inventories may forebode a decline in production, in another encourage further expansion; at one time a rise in industrial production may increase trade, at another cause it to decline. On all such matters, relating to basic conditions and relationships and their effect on human



behavior, the forecaster must make his own judgments for each period.

In forecasting industrial production the authors themselves reject various mechanical approaches, for reasons "too numerous and complicated to mention"; and throughout their current work they allow themselves a considerable range of judgment concerning results. This is true despite the formal appearance of the relationships shown on most of the charts presented. For example, in forecasting nonagricultural national income for 1942 they weigh heavily the many special conditions likely to affect industrial production, select all sorts of different past periods for drawing regression lines to project apparent relationships into the future, and in the end, when answering the \$64 question, choose one extreme of a \$5 billion range of alternative estimates.

In any program for improving forecasts, attention might well be given first to the basic choice of what to forecast in order to gauge demand for farm products. The present choice is national income. In view of the basic purpose of forecasts, disposable consumer income (income payments minus personal taxes) would seem definitely preferable and income payments more suitable than national income. Increases in corporate savings and social security taxes would hardly reflect increases in income likely to be used to purchase farm products. As it is, the disposable income notion is discussed only incidentally in the consideration of price prospects, and estimates of income payments are used merely as a stepping stone to estimates of national income. Also, consideration might be given to the possibility of estimating savings, to be deducted from disposable income in order to approximate more closely the current funds available for buying all sorts of goods and services. A further refinement might be to take account of the amount of such funds likely to be spent by consumers for purposes other than the purchase of farm products, in view of probable shortages, changes in the distribution of income, and the like.

Second, would it be preferable to calculate nonagricultural income payments by adding the estimated parts rather than by a series of inferences from estimates of industrial production? Such a procedure would seem to have many advantages similar to those the authors find in estimating industrial production by parts. Estimates of the total so calculated should be more accurate because past estimates could be checked in detail against the final figures and also because account would be taken of many of the differences

among industry groups that increase the hazard in such over-all comparisons as those used by the authors in the several steps from industrial production to national income. Estimates of the various parts—wages and salaries, dividends, and the like by broad industry groups, such as transportation and trade and their major divisions—might be very useful themselves; their usefulness, however, might be mainly for purposes other than the analysis of demand for farm products. In this approach, as in others, the lack of adequate data would be a handicap but what data are available could be exploited to better advantage. One principal question about such a procedure would be the labor involved. Of course it takes time to make careful judgments and there would be many. In the end experiment alone will reveal whether the benefits warrant the labor.

In estimating income payments in the fashion here suggested the forecaster would be able to check his basic notions at many more points and to grasp more fully their impact on the final estimates. He would be making more personal judgments but most of them would be less decisive; moreover, the basis for most of the decisions should be much better, except so far as the estimate of each part might be affected by preliminary hunches about the course of affairs generally. In all his judgments the forecaster would consider clues gleaned from the study of past developments, especially when he had good reason to suppose that things closely related in the recent past would be similarly related in the immediate future. In every case, however, the final judgment would have to be made without undue respect for projection of regression lines representing average performance during various past periods, especially when the levels in prospect are unprecedented. Proceeding in this fashion, the forecaster could have as much faith in his own work as would be warranted in view of the difficulties of the problem.

The third step under Method I was to estimate factory payroll per worker, partly from factory employment. This is a long jump in any year, but especially in one such as 1942 in view of changes in the composition of factory employment, the dispersion of wage rates, differential changes in wage rates by industries, and varied changes in the proportion of overtime work. The authors recognize the limitations of the recent past as a guide to their over-all decision here; but in reaching for a better answer they seek a parallel in the inadequate records of the very different first World War period, 25 years ago, rather than grapple with specific factors likely to determine the course of developments in the future. The figures for

the World War period shown in Figure 7 seem to afford little basis for any sort of judgment. Might it not have been more satisfactory to start with estimates of employment, hours, wage rates, and average hourly earnings in factories during 1942, by major industries or industry groups?

In the fourth step under Method I, from estimated factory payrolls to nonagricultural employees' compensation, great weight was given to the apparent relationship in 1938-1941. In view of the prospect for increasing concentration on industrial production in 1942 at the expense of some other activities, it seems doubtful that such a regression line could be of much assistance; and this question might be still more important with respect to 1943. Certainly the forecast as well as the economic history of these war years should take into account the growth of the armed forces, the widespread reallocation of labor among the various sectors of the economy, and differential changes in rates of pay.

One step in the procedure under Method II is to move, on the basis of a regression line, from an estimate of industrial production to an estimate of the production of all nonagricultural goods and services (nonagricultural income deflated by the cost of living). The authors raise some questions about the appropriateness of the cost of living as a deflator for nonagricultural income and finally choose it only because there is nothing better in sight. The difficulties seem even more serious than they admit. If one considers nonagricultural income in terms of the components used in its computation, the amplitude and timing of the fluctuations in the cost of living index certainly cannot be expected to be closely similar to those in a hypothetical index of wage rates, dividend rates, and other price factors affecting various components of nonagricultural income. The several price series in the cost of living index are weighted in accordance with the importance of various items in the cost of living, not in nonagricultural income. For example, rent, which fluctuates quite in its own fashion, has a heavy weight in the cost of living index but is a very small factor in nonagricultural income; also, nothing in the cost of living index directly represents the prices of armaments and of other goods sold to the government. Or, if one considers nonagricultural income figures to represent the value of output, the same serious weighting problems are involved; also, the cost of living figures are based on market prices whereas national income figures are something else again, as indicated in current discussions contrasting national income and gross national

product at market prices. Altogether the deflated nonagricultural income figures as calculated by the authors seem to mean little. Even if they do represent physical production in this sector of the economy, it is by no means clear that any relationships apparent in the past between this series and industrial production should hold for 1942, when activity is being concentrated in increasing degree in industrial establishments.

Some of the drawbacks of Method II are reflected in Figure 1, which shows a regression line for 1938-40 sharply different from that for the preceding period. How good would the estimate for 1938 have been if based on the 1921-37 regression line? How much reliance can be placed on the extension of the 1938-40 line to 1942 levels, even though it hits 1941 quite closely?

In Method III choosing 1939-41 for projection purposes may have been wise, and the use of different periods in establishing the various relationships probably reflects a desirable flexibility. Nevertheless, it seems as though any comfort to be derived from a close fit of data would be limited considerably by the thought that the choice of years is determined by that fit and that the year being forecast may easily be the beginning of a new period rather than a continuation of the old.

The estimates of industrial production, which provide the starting point for all three estimates of nonagricultural income, are made with special care, mainly on the basis of a study of prospects for selected industries and groups of industries, taking account of current war objectives, limited resources, and the like. A chart showing deviations from the 1935-39 average for selected industries in terms of points in the total index is a useful innovation. Little is said about efforts to relate production in particular industries to the total of industrial output (both adjusted for trend) and it seems unlikely that in a year like 1942 such comparisons would yield very dependable results.

One or two remarks about the Reserve Board's index of industrial production are a bit puzzling. It is implied in the last paragraph on forecasting industrial production that the series based on man-hours, adjusted for estimated changes in productivity, are unsatisfactory because they move somewhat differently from the consumption of materials. Is there any reason to believe that series based on the consumption of materials, if available, would always be better measures of changes in production, value added at constant prices, than series based on man-hours? Does it not depend

on the nature of the industry? The statement that airplanes are given less weight than ice cream seems to imply much more than is meant or warranted. Currently the number of points in the total index represented by the airplane series is several times that for the ice cream series; airplane production has expanded much more than ice cream production since the base period. The remark about lack of opportunity for determining the relative importance of airplane engines and other components of the machinery group seems too strong; the Bureau of Labor Statistics publishes data on employment and average hours for several industries in the machinery group.

These, however, are subsidiary problems. The main questions, as noted earlier, are what to forecast in gauging demand for farm products and what emphasis to place on various forecasting methods. It has been suggested that for the purpose in hand estimates of income payments or some refinement of them would probably be more useful than estimates of national income. As noted, more reliance might be placed on informed judgment and direct estimates of parts to be added to a total and less on mechanical projection into the future of over-all relationships apparently prevailing in the past. The authors themselves have indicated many of the limitations inherent in mechanical procedures, especially for a war period, and appraised in detail many probable developments, going further in this direction than some other forecasters.

The flexible judgment approach will have special advantages in the next few years. During 1942 economic life was being further converted to a war basis; the main forecasting problem was to estimate how fast various phases of this conversion would come about and how far they would go. Regression lines for prewar years are not of much help. Sooner or later peace will come; and if there is any chance of forecasting when this will be, it lies in personal judgment. During the transition to some sort of peacetime economy, as well as in the succeeding period, the forecaster will need to use all the knowledge and judgment he can command, unhampered by undue respect for any particular mechanical device. Of course in every period the forecaster must be informed about past developments and have opinions about their effect on the future. The argument is not that the past should be ignored but rather that it should be considered in more detail and that in forecasting each new period the relevance of generalizations drawn from the past should be reviewed anew.

If in the troubled years ahead forecasters are not too busy they may come to rely less on mechanical devices and more on informed judgment about a wide range of affairs. And informed judgment may then acquire a new respectability among forecasters, especially if meanwhile Dame Fortune does her part.

#### CHARLES A. R. WARDWELL

The basic equipment of a forecaster is threefold: (1) quantitative information, as basic and as comprehensive as possible, describing the past and present trends of the governing factors; (2) statistical techniques of measuring, analyzing, organizing this information in such ways as to extract its true significance and apply it to the problem in hand; (3) a clear understanding of how our economy functions in response to changing conditions or stimuli.

Both authors, as their paper shows and as I know from many discussions with them of the business outlook during recent years, are exceedingly well equipped. The forecasts of 1942 national income, industrial production, and wholesale prices, made originally in September 1941 and revised in January 1942 were, in general, remarkably good. The methods they describe seem to be those now rather widely and generally employed by forecasters possessing the necessary equipment. Since any very helpful discussion would necessarily be devoted largely to details of their application and to shades of judgment in arriving at conclusions and to the nature and quantity of underlying and supporting data, I shall not attempt it here. Suffice it to say that in my opinion the methods are in general the best now available and that progress in forecasting will come from extending and improving them.

Several comments which I hope will be constructive, however, suggest themselves. First I should like to stress the point that foretelling the future is an art. It is definitely *not* a science. The quality of the forecasts therefore hinges in some degree on the talent of the forecasters. This point merits emphasis so that people will not take it for granted that other forecasters employing the same methods will achieve equally good results. Moreover, some periods are far more difficult to forecast correctly than others. Consequently, the forecaster who hits a home run one time may strike out the next. In stressing that forecasting is not a science, I do not overlook the fact that forecasters may employ many scientific devices to measure and analyze past and present governing factors; e.g., in-

dexes and correlation techniques. But the process of formulating definite predictions (in 1944, say) as to what is going to happen (say, in 1945) is purely subjective. The helpfulness and accuracy of these techniques depend largely on the forecaster's mastery of his art.

From this standpoint, then, continued improvement in economic forecasting will require the training of more and more people and the development of their skill to an ever higher pitch.

The second point I wish to stress is closely related to the first. The goodness of the forecasts made by Messrs. Thomsen and Bolinger or any other forecasters employing the same methods is in large degree determined by the very first step in their procedure: the initial qualitative analysis and appraisal of the outlook and the formulation of the primary, broad hypothesis fixing the general features of the outlook for the future period covered. If this primary diagnosis and hypothesis is largely erroneous, the forecasts based on it will be disastrously wrong both as to direction of movement, such as predicting continuation and expansion of prosperity just before a downturn sets in, and as to timing and magnitude. On the other hand, if the primary hypothesis is largely correct, the forecasts can be in error only in predicting the amplitude and timing of the coming moves. It is thus at this initial stage that the experience and skill of the forecaster are most invaluable and essential, for they will determine the soundness of the very foundation upon which rests all the subsequent elaboration of quantitative measurements and detailed forecasts of minor components.

Because this primary hypothesis is the very crux of the forecast, the forecasters must state their initial hypothesis fully; in particular (1) what are believed to be the major governing factors in the outlook, (2) what basic assumptions were made concerning any of the governing factors, and (3) how the economy is expected to function under the circumstances in order to bring about the situation outlined in the forecast. An adequate explanation enables others to determine the extent to which the major assumptions concerning the governing factors were arbitrary and unreasonable and to decide whether the expected functioning of the economy is worked out in accordance with the probabilities of the present situation.

The ability to deal with this formulation of the basic, primary hypothesis is at an especially high premium in troubled times like these; for economic forecasts and diagnoses are based in large degree on the manifestations of the regularity of economic change in

the past. The highest skill of the forecaster is required to determine the nature and amount of the departures from previously established regularity likely to be caused by various unprecedented features of the unique current situation and to adjust his primary hypothesis accordingly. This is always difficult, but especially when the outlook hinges in part upon various unpredictable factors. The predicament of Messrs. Thomsen and Bollinger in January 1942 in forecasting the price level is an example. A price level forecast made at that time was largely a forecast as to whether the government would attempt price control and, if so, when and how effective it would be. Their forecast of the prices of farm products, largely exempted from control or controlled only at higher ceilings, will prove in the light of recent developments to be more accurate than their forecasts of industrial ('all other') prices which they evidently did not expect to be controlled as soon or as effectively.

The third point is the imperative need for better economic data as the foundation on which most forecasts rest. The need here is for more data of better quality and more promptly available. Then forecasters will be troubled by fewer areas where absence of data forces them to make outright guesses based on virtually nothing, fewer cases where the crudities, of their index numbers, for instance, introduce margins of error wider than would be the case otherwise, and fewer instances where it is necessary because of lags in reporting data to make a 2- or 3-month forecast in order to know what is happening currently. Especially needed are more and better data on consumer incomes, spending, and saving, on all types of investment by consumers, businesses, and government, on inventories held in various stages of the economic process in the several industries and in various hands, on the quantity and incidence of taxation, on costs and profits of doing business, and a host of others. It is to be hoped that the public will realize the necessity for more and better data if economic forecasting is to be improved and will give its support and cooperation to help achieve this goal.

#### REPLY BY THE AUTHORS

Messrs. Garfield and Wardwell have been very kind in their reviews of our paper. Perhaps more caustic criticisms were withheld out of consideration for a couple of rural practitioners lost in the big city clinic.

We must agree with nearly all their criticisms. We especially



approve of the statements in the fifth paragraph of Mr. Garfield's comments. In fact, in our demand outlook work for the B.A.E. we have attempted to do exactly what he suggests. These considerations were omitted from our paper for two reasons: (1) the subject of the paper as given to us was forecasting national income, not the demand for farm products; (2) some members of the Bureau staff strongly disagree with the position taken by Mr. Garfield with respect to the measures he discusses.

Mr. Garfield points, particularly in his last two paragraphs, to the fact that some of the forecasting devices referred to in our paper are largely impracticable in forecasting economic conditions in a war year such as 1942. Perhaps these devices were overstressed in relation to the 1942 forecasts; but it was more our desire to illustrate some of the methods we have used in the past and that may be used in the future than to discuss particularly the 1942 outlook. Some of the relationships depicted in the charts would be more useful in forecasting economic conditions in more normal times.

Both Mr. Garfield and Mr. Wardwell devote considerable attention to what they seem to consider a lack of merit in more 'objective' approaches to business forecasting. Mr. Garfield seems to assume erroneously that objectivity necessitates tying everything into a formula, and pleads for methods under which the forecaster must "make his own judgments for each period". Mr. Wardwell insists that business forecasting must continue to be an art rather than a science. The senior author of the paper, particularly, continues to disagree with this viewpoint. All scientists use judgment in applying their science in the solution of specific operating problems. The difference between forecasting as an art and forecasting as a science is the difference between astrology and astronomy.

For many years economists and even statisticians have clung to subjective methods, but we are making some progress toward objectivity. For example, in estimating the production of an agricultural commodity in the United States in a given year several quantitative indications are available. Each variable for past years may be related to production in those years to determine relationships in the form of regressions which can be used in forecasting. The forecast obtained by using any one of the variables in estimating production is likely to be different from that obtained by using one of the other variables. Perhaps the most common method of forecasting production under such circumstances is to ascertain the production on the basis of each variable, then select one or obtain

an average by using selected weights assigned to each. The variable or the weights are chosen after the production indicated by each variable is known. Under such circumstances the estimator cannot escape being influenced by his preconceived notions of what the production is. If, however, he assigned weights to the several variables before knowing the production indicated by them, on the basis of their previous performance as correct indicators or on the basis of the peculiar conditions influencing the probable merits of the several variables as indicators in that particular year, his judgment would not be influenced by his preconceived ideas or hunches as to production. Thus, a high degree of objectivity would be attained in making the production estimate without sacrificing the benefits of judgment.

Much the same sort of objective procedure can be applied in business forecasting. The degree of objectivity attained will depend not only upon the ingenuity of the forecaster and the kind of data available, but also upon the persistence of forecasters in attempting to attain this objectivity. It is for this reason that we labor the point and urge that it be given more consideration by forecasters in the future.

*Part Six*

A STATISTICAL STUDY OF  
INCOME DIFFERENCES AMONG  
COMMUNITIES

HERBERT E. KLARMAN

*Discussion*

DANIEL S. GERIG, JR. AND LAURA WENDT

SOCIAL SECURITY BOARD

DWIGHT B. YNTEMA

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

This paper was originally written for a seminar conducted by Milton Friedman at the University of Wisconsin. Mr. Friedman contributed extensive suggestions, technical and editorial, at every stage of the manuscript's preparation.

# A Statistical Study of Income Differences Among Communities

HERBERT E. KLARMAN

MANY FACTORS that might be used in explaining differences in average income among communities can readily be listed: e.g., size of community, regional location, employment opportunities, climate, racial composition, and standard of literacy. It is the purpose of this paper to analyze two of these factors, namely, size of community and region, in an attempt to ascertain their respective importance as measures of intercommunity income differences.

Community size and region in themselves do not determine income levels. Each, however, reflects a multiplicity of substantive economic factors that bear directly upon income. Large cities, for example, provide remunerative employment in financial organizations, and professional persons with relatively large incomes tend to concentrate there. Farming, on the other hand, was for a long time a depressed, over-supplied occupation. In the absence of substantial mobility in the factors of production areas that lack resources tend to remain economically inferior.

Whether income differences among communities are correlated with community size or with regional location has considerable weight in deciding the direction of the investigation into the substantive factors that affect income. If either region or size of community has no close association with income differentials, the whole set of economic factors underlying the uncorrelated term may be excluded from further study.

The answer to this question has implications also for governmental action, in the fields, for example, of agriculture, internal migration, education, and welfare. By way of illustration, reference may be made to certain implications of a federal policy of grants-in-aid to the states, which employs average income as the index of a state's fiscal capacity. Presumably the aim of such a policy is to equalize essential governmental services among the states, without simultaneously causing undue disparities in their respective tax efforts. Federal funds are therefore to be distributed in direct proportion to need and in inverse proportion to fiscal capacity or average income.

It is of some moment, however, whether in a given instance a mean is truly a measure of central tendency or merely a resultant

of arithmetic computation. The implications of a low average income for a state are not the same when it describes a more or less homogeneous set of low income communities as when it describes a heterogeneous conglomeration of small and large income communities, with the small overwhelmingly predominant. In the first instance, if the entire group is uniformly poor, outside help for every community is indicated. In the second, if the low mean income for the state results from the combination of many poor communities and several rich communities, help is indicated only for the poor ones. Such aid may come from the rich communities within the state as well as from rich communities located elsewhere.

In this paper an attempt is made to study the nature of the geographic distribution of income that underlies statewide averages.

TABLE 1

Average Incomes of Families in Five Geographic Regions

GEOGRAPHIC REGION	AVERAGE INCOME PER FAMILY			
	Median		Mean	
	All families	Nonrelief families	All families	Nonrelief families
New England	\$1,230	\$1,365	\$1,810	\$2,011
North Central	1,260	1,410	1,786	1,973
South	905	985	1,326	1,431
Mountain and Plains	1,040	1,220	1,363	1,537
Pacific	1,335	1,485	1,775	1,937

SOURCE: *Consumer Incomes in the United States*, Table 6, p. 22.

We want to ascertain whether income differences are smaller within regions than between regions; and whether the differences are smaller within than between groups of communities of the same size. If it is found that income differences among communities are correlated with the size of community and not with regional location this would call for help to poor communities from rich ones rather than for outside help for an entire region (or state). In the latter event, internal equalization would be the foremost consideration in a grants-in-aid policy.

It is important to recognize that the estimates of per capita income discussed in this paper are in terms of money income, not of real income. No attention is given to the influence of differences in the cost of living upon money income, or perhaps even more significantly, to the bearing of differences in standards of living

upon money income. Both are difficult problems. In the absence of adequate information, the initial presumption is against the operation of differentials that offset observed differences in money income.

Average family income is higher in the North than in the South; likewise, it is higher in large cities than on farms. The data published by the National Resources Committee do not cast doubt on these relations (Tables 1 and 2). They do, however, raise several questions. Differences in income exist among both geographical regions and communities of varying size. Are these differences in-

TABLE 2

## Average Incomes of Nonrelief Families in Six Types of Communities

TYPE OF COMMUNITY	AVERAGE INCOME PER FAMILY	
	Median	Mean
Metropolises	\$1,730	\$2,704
Large cities	1,560	2,177
Middle-size cities	1,360	1,813
Small cities	1,290	1,653
All urban communities	1,475	2,064
Rural nonfarm	1,210	1,607
Farms	965	1,259
All rural communities	1,070	1,408
All communities	1,285	1,781

SOURCE: *Consumer Incomes in the United States*, Table 7, p. 23.

dependent, or does one set of differences merely reflect the other? For example, may not the differences among communities of different size be the basic factor, and the relatively high income in the North merely reflect the predominance of large cities there? This possibility could be ruled out only if the distribution of communities by size were the same in every region. If this were the case, either the average income would be nearly the same in every region or size of community would not be one of the basic factors explaining income differences among regions.

### I The Data Used

The best data for answering the question whether income differences among communities are associated with regional location or with size of community would be on average incomes of all families

in representative communities, classified both by region and by size of community. Data approximately satisfying these requirements were provided by the Study of Consumer Purchases.<sup>1</sup>

To get uniformity of observations from the Study of Consumer Purchases data, it was necessary to use income averages that do not cover all families in the communities sampled. The averages are restricted to native white complete nonrelief families. A family signifies two or more persons, dependent on a common income, who live together as an economic unit. It is native if both husband and wife are native born. It is complete if it contains both a husband and wife, with or without other persons. It is a relief family if any of its members received any direct or work relief from any source at any time during the year covered by the estimates.

The utilization of data pertaining only to nonrelief native white complete families narrows the scope of the investigation and hence limits the generality of the conclusions. If the groups excluded from this study constituted the same percentage of the population in every community sampled, their exclusion would not affect the reliability of the conclusions. The fact that native white complete nonrelief families represent in general a small percentage of all families would not be material. However, Table 3 shows that this percentage varies considerably, from 25 per cent in New Britain, Connecticut, to 64 per cent in Muncie, Indiana. But it also shows that the variations are sizable within both regions and size of community classes. The conclusions drawn from our sample are probably no less reliable than those drawn from the Study of Consumer Purchases as a whole.

The data used in this study are the mean and median incomes of nonrelief native white complete families in certain communities (Tables 4 and 5); and for the same communities and families, the mean incomes of three occupational groups, namely, wage earning, clerical, and business and professional (Tables 8, 9, and 10).

The communities have been grouped into five regions, New

<sup>1</sup> The Consumer Purchases Study on Family Income and Expenditures was conducted jointly by the Bureau of Labor Statistics, Department of Labor, and the Bureau of Home Economics, Department of Agriculture. Income data were collected from approximately 300,000 families in cities and villages and on farms in thirty states. The information on income was obtained in personal interviews with the families, through random house to house canvassing, chiefly from July 1935 through June 1936. For details, see *Consumer Incomes in the United States* (National Resources Committee, Washington, 1938).

TABLE 3

### Nonrelief Complete Native White Families, Number of and as a Percentage of all Families in Various Communities

REGION AND COMMUNITY *	NONRELIEF COMPLETE NATIVE WHITE FAMILIES AS A % OF ALL FAMILIES		NUMBER OF FAMILIES				Negro & other color
	Total		Total	White Non-relief complete native	Other native	Foreign born	
<i>New England</i>							
Providence, R. I.	27.4	60,077	58,455	16,457	11,479	30,519	1,622
New Britain, Conn.	24.6	16,073	15,983	3,917	1,825	10,211	90
Haverhill, Mass.	30.5	12,870	12,791	3,928	3,458	5,405	79
Wallingford, Conn.	35.5	3,083	3,079	1,094	462	1,523	4
Willimantic, Conn.			3,054			1,312	14
<i>North Central</i>							
Columbus, Ohio	53.2	79,263	70,850	42,148	21,990	6,712	8,413
Springfield, Ill.	57.1	20,981	19,866	11,986	5,039	2,841	1,115
Springfield, Mo.	61.4	16,655	15,977	10,223	5,384	370	678
Muncie, Ind.	63.7	13,738	12,805	8,754	3,723	328	933
New Castle, Pa.	39.1	11,682	11,230	4,572	2,868	3,790	452
Dubuque, Iowa	49.2	11,068	11,052	5,447	4,108	1,497	16
Logansport, Ind.	58.0	5,548	5,487	3,219	1,973	295	61
Beaver Falls, Wis.	40.0	4,156	3,951	1,665	1,072	1,214	205
Mattoon, Ill.	53.9	3,884	3,848	2,097	1,674	77	36
Peru, Ind.	61.7	3,452	3,411	2,132	1,167	112	41
Connellsville, Pa.	44.4	3,272	3,151	1,454	1,075	622	121
<i>South</i>							
Atlanta, Ga.	42.0	67,749	45,430	28,511	14,679	2,240	22,319
Mobile, Ala.	35.3	16,277	9,472	5,748	3,031	693	6,805
Columbia, S. C.	41.9	10,851	6,753	4,549	2,002	202	4,098
Gastonia, N. C.	57.1	3,791	2,890	2,166	683	41	901
Albany, Ga.	28.1	3,762	1,565	1,056	470	39	2,197
<i>Mountain and Plains</i>							
Denver, Colo.	49.2	86,095	83,086	42,356	26,197	14,533	3,009
Pueblo, Colo.	43.4	12,937	11,925	5,615	4,082	2,228	1,012
Butte, Mont.	33.4	9,565	9,462	3,197	2,612	3,653	103
Billings, Mont.	56.3	4,894	4,753	2,753	1,194	806	141
<i>Pacific</i>							
Portland, Ore.	48.0	88,115	87,112	42,261	22,461	22,390	1,003
Aberdeen-Hoquiam, Wash.	36.5	9,320	9,261	3,404	2,413	3,444	59
Bellingham, Wash.	40.1	8,689	8,655	3,485	2,540	2,630	34
Everett, Wash.	35.8	8,580	8,529	3,071	2,444	3,014	51

\* Communities in each region are arranged in descending order of population.

SOURCE: *Study of Consumer Purchases.*



England, North Central, South, Mountain and Plains, and Pacific; and into five size of community classes: <sup>2</sup>

Large cities	( 6)	100,000 to 1,500,000 population
Middle-size cities	(14)	25,000 to 100,000 "
Small cities	(29)	2,500 to 25,000 "
Village units	(10)	rural nonfarm communities up to 2,500 population
Farms	(20)	

To answer the question whether income differences among communities are associated with regional location or with size requires, as already suggested, a twofold classification. Grouping the mean and median incomes of the several communities by region and size of community results in a five by five table with twenty-five cells, each cell containing one or more communities. Since the mean figures for the southern farms were unavailable in the summer of 1941, when this analysis was made, the entire farm group is neglected in the analysis of mean incomes, with a loss of five cells. In the analysis of median incomes, however, all twenty-five cells were used.

For each cell a simple arithmetic mean of the individual community means was computed (Table 6). Likewise a median income was obtained for each cell by finding the middle item of its combined frequency distribution, derived in turn by summing the frequency distributions of the communities in the cell (Table 7).

## II Size of Community Differences in Income

The table of mean incomes displays a fairly consistent order when size of community is viewed as the primary classification (Table 6a). In every region incomes are highest in the large cities. Except in the South, incomes are uniformly lowest in the villages. Greater variation prevails, however, with respect to the middle-size and the small cities.

The pattern of steady descent in the income scale from the large city through the middle-size city, small city, village unit, to the farm is nowhere to be found in the table of median incomes (Table 7a). Still, this pattern seems to be more or less typical, since only one size

<sup>2</sup>The number in the parenthesis indicates the number of communities in the particular size grouping that were sampled by the Consumer Purchases Study. The regional and size of community classifications here employed are those used in the Study (*Consumer Incomes in the United States*, pp. 42-43). The Study sampled also two metropolitan communities, New York and Chicago, but we have made no use of the data for these communities.

TABLE 4

Mean Incomes of Families in Several Communities, Classified by Region and Size of Community, 1935-1936

Region	LARGE CITIES		MIDDLE-SIZE CITIES		SMALL CITIES		VILLAGE UNITS		FARM UNITS	
	Name	Mean income	Name	Mean income	Name	Mean income	Name	Mean income	Name and type of farming	Mean income
New England	Providence, R. I.	\$1955	New Britain, Conn.	\$1764	Wallingford, Conn.	\$2231	Vermont-Massachusetts	\$1682	Vermont (Dairy)	\$1346
			Haverhill, Mass.	1653	Willimantic, Conn.	1951				
					Westbrook, Me.	1517				
					Greenfield, Mass.	1778				
North Central	Columbus, Ohio	2058	Dubuque, Iowa	1504	Beaver Falls, Pa.	1663	Pennsylvania-Ohio-Mich.-Wis.-Ill.-Iowa	1379	Pennsylvania (General)	1654
			Muncie, Ind.	1710	Connellsville, Pa.	1664				
			New Castle, Pa.	1726	Logansport, Ind.	1463				
			Springfield, Ill.	1951	Peru, Ind.	1484				
			Springfield, Mo.	1511	Mattoon, Ill.	1581				
					Mt. Vernon, Ohio	1531				
					New Phila., Ohio	1478				
					Lincoln, Ill.	1439				
					Beaver Dam, Wis.	1412				
					Boone, Iowa	1529				
					Columbia, Mo.	1918				
					Moberly, Mo.	1450				
								Iowa (Animal)	1103	

South	Atlanta, Ga.	2158	Columbia, S. C. Mobile, Ala.	2408 1832	Albany, Ga. Griffin, Ga. Gastonia, N. C. Sumter, S. C.	2221 1572 1483 1908	Georgia- S. C. N. C.- Mississippi	1579 2428	N. Carolina (Self-sufficient) N. Carolina (Cotton, tobacco) S. Carolina (Cotton, tobacco) Georgia (Cotton) Mississippi (Cotton)	Data not yet re- leased
Mountain and Plains	Denver, Colo. (Omaha, Neb.)	2063 *2022)	Butte, Mont. Pueblo, Colo.	2149 1652	Billings, Mont. Greeley, Colo. Logan, Utah Provo, Utah Dodge City, Kan.	2268 1872 1718 1656 1513	Kansas- N. Dak. Colo.- Montana- S. Dak.	1447 1762	North Dakota (Wheat) Kansas (Wheat) Colo.-Mont.-S. Dak. (Livestock)	763 994 1193
Pacific	Portland, Ore.	1890	Aberdeen- Hoquiam, Wash. Bellingham, Wash. Everett, Wash.	1763 1597 1668	Astoria, Ore. Eugene, Ore. Klamath Falls, Ore. Olympia, Wash.	1884 1839 1919 1848	Calif. Oregon- Wash.	1760 1449	Washington (Dairy) Oregon (Fruit & g'l) Central Calif. (Fruit, dairy) South Calif. (Fruit)	1386 1430 1787 1983

\* In computations of variance analysis, figure for Omaha was used in several places where Denver was intended.

SOURCE: *Study of Consumer Purchases.*

TABLE 5

Median Incomes of Families in Several Communities, Classified by Region and Size of Community, 1935-1936

LARGE CITIES		MIDDLE-SIZE CITIES		SMALL CITIES		VILLAGE UNITS		FARM UNITS		
Region	Name	Median income	Name	Median income	Name	Median income	Name	Median income	Name *	Median income
New England	Providence, R. I.	\$1554	New Britain, Conn.	\$1508	Wallingford, Conn.	\$1690	Vermont-Massachusetts	\$1477	Vermont	\$1181
			Haverhill, Mass.	1459	Willimantic, Conn.	1529				
					Westbrook, Me.	1299				
					Greenfield, Mass.	1595				
North Central	Columbus, O.	1751	Dubuque, Iowa	1279	Beaver Falls, Pa.	1449	Pennsylvania-Ohio-Michigan-Wisconsin-Illinois-Iowa	1167	New Jersey	1468
			Muncie, Ind.	1468	Connellsville, Pa.	1508			Pennsylvania	1471
			New Castle, Pa.	1486	Logansport, Ind.	1303			Ohio	1214
			Springfield, Ill.	1657	Peru, Ind.	1322			Michigan	1105
			Springfield, Mo.	1315	Mattoon, Ill.	1373			Wisconsin	1305
					Mt. Vernon, O.	1307			Illinois	1519
					New Phila., O.	1276			Iowa	966
					Lincoln, Ill.	1186				
					Beaver Dam, Wis.	1253				
					Boone, Ia.	1400				
					Columbia, Mo.	1508				
					Moberly, Mo.	1269				

South	Atlanta, Ga.	1879	Columbia, S. C.	1975	Albany, Ga.	1820	Georgia-	1308	N. Carolina	917
			Mobile, Ala.	1532	Griffin, Ga.	1256	S. Carolina		N. Carolina	1591
					Gastonia, N. C.	1166	N. Carolina-		S. Carolina	1153
					Sumter, S. C.	1596	Mississippi		Georgia	794
							Mississippi	1202		
Mountain and Plains	Denver, Colo.	1705	Butte, Mont.	1817	Billings, Mont.	1947	Kansas-	1209	N. Dakota	705
			Pueblo, Colo.	1517	Greeley, Colo.	1556	N. Dakota		Kansas	857
					Logan, Utah	1486	Colo.-		Colorado-	
					Provo, Utah	1422	Montana-		Montana-	
					Dodge City, Kan.	1327	S. Dakota		S. Dakota	971
Pacific	Portland, Ore.	1654	Aberdeen-		Astoria, Ore.	1683	California	1268	Washington	1182
			Hoquiam, Wash.	1512	Eugene, Ore.	1652	Oregon-		Oregon	1199
			Bellingham, Wash.	1387	Klamath Falls, Ore.	1689	Washington		Central Calif.	1429
			Everett, Wash.	1477	Olympia, Wash.	1676			South Calif.	1534

\* See Table 4, same column, for type of farming.

SOURCE: *Study of Consumer Purchases.*

of community group is ever out of line in a given region.) The large cities have the highest incomes in three regions and the second highest in two. The middle-size cities show the second highest earnings in two regions, and the third highest in the remaining three. The small cities once again display the least uniformity. The village units rank fourth in three regions, third and fifth in the other two. The farms rise above the lowest rank in only one instance.

TABLE 6

## Mean Incomes of Families, by Region and Size of Community

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGE UNITS	AVERAGE
New England	\$1,955	\$1,709	\$1,869	\$1,682	\$1,804
North Central	2,058	1,680	1,551	1,461	1,688
South	2,158	2,120	1,796	2,004	2,019
Mountain and Plains	2,063	1,901	1,805	1,605	1,843
Pacific	1,890	1,676	1,873	1,605	1,761
Average	2,025	1,817	1,779	1,671	1,823

SOURCE: Table 4.

## a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEAN INCOME, FIVE REGIONS

New England	1	3	2	4
North Central	1	2	3	4
South	1	2	4	3
Mountain and Plains	1	2	3	4
Pacific	1	3	2	4

## b) RANKS OF REGIONS BY MEAN INCOME, FOUR SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	4	3	1	2	5
Middle-size cities	3	4	1	2	5
Small cities	2	5	4	3	1
Village units	2	5	1	3-5	3-5

The impressions conveyed by these tables of ranks are confirmed by statistical tests of significance. An analysis of ranks yields a  $\chi^2$  of 12.12 for Table 6a and of 15.2 for Table 7a, values that would be exceeded by chance less than once in a hundred times.<sup>3</sup> An analysis of variance based on Table 6 yields a similar result.

<sup>3</sup> Milton Friedman, 'The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance', *Journal of the American Statistical Association*, Dec. 1937. The degrees of freedom available are respectively 3 for Table 6a and 4 for Table 7a.

TABLE 7

Median Incomes of Families, by Region and Size of Community

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGE UNITS	FARM UNITS
New England	\$1,554	\$1,481	\$1,510	\$1,447	\$1,181
North Central	1,751	1,430	1,376	1,154	1,255
South	1,879	1,740	1,345	1,474	1,150*
Mountain and Plains	1,705	1,630	1,735	1,322	837
Pacific	1,654	1,455	1,670	1,405	1,287

\* Since the data for the farms of the South were not available in the summer of 1941, the median for that cell is a guess.

SOURCE: Table 5.

a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEDIAN INCOME, FIVE REGIONS

New England	1	3	2	4	5
North Central	1	2	3	5	4
South	1	2	4	3	5
Mountain and Plains	2	3	1	4	5
Pacific	2	3	1	4	5

b) RANKS OF REGIONS BY MEDIAN INCOME, FIVE SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	5	2	1	3	4
Middle-size cities	3	5	1	2	4
Small cities	3	4	5	1	2
Village units	2	5	1	4	3
Farms	3	2	4	5	1

III Regional Differences in Income

A ranking of regions by size of mean incomes (Table 6b), unlike the ranking of size of community classes, displays no discernible order) except in the South, which ranks first in three of the four size of community classes.<sup>4</sup> New England ranks second twice and

<sup>4</sup> The unexpectedly high incomes in the South have so far escaped efforts at explanation.

At first glance, the exclusion of Negroes from the data used might seem to account for the apparent prosperity (high average income and low relief ratio, *Consumer Incomes in the United States*, p. 74, Table 9A) of the South. The average income of nonrelief Negro families is about one-third that of nonrelief white families (*ibid.*, p. 28 and p. 100, Table 22B), and the exclusion of this numerically large stratum of the population raises the average income of the region to what is perhaps an unaccustomed level. However, this argument loses much of its force in view of a general tendency for foreign born whites to locate in other regions. The latter group is also subject to occupational disabilities, although probably in less degree. Table 3 shows that the proportion of total families represented by the sample of complete nonrelief

third and fourth once; the North Central region fifth twice, and third and fourth once. The Mountain and Plains region ranks second twice, third once, and ties with the Pacific region for third and fourth place in the village group. In addition to this tie, the Pacific region ranks fifth twice, and first once.

A ranking of the five regions by median income (Table 7b) displays even greater variability. The haphazardness of the regional rankings is such that the Mountain and Plains region occupies a first, second, third, fourth, and fifth place.

Statistical tests of significance reveal that the observed degree of consistency among the regional rankings might easily have arisen by chance. For Table 6b,  $\chi^2$  is 5.95; for Table 7b, 1.6. The former would be exceeded by chance more than one time in ten; the latter, more than half the time.<sup>5</sup>

#### IV Explanation of Size of Community Differences in Income

Statistical analysis points to the conclusion that income differences among communities are correlated with differences in community size, not with regional location. We shall now attempt to account for the relation between size of community and income.

Some factors that may underlie it cannot be measured. On the Pacific Coast, for instance, two groups of villages of the same size have entirely different income levels.<sup>6</sup> Clearly, neither factor under investigation in this paper explains this income difference. The explanation lies in the industrial structure of the villages. One group, in Washington and Oregon, is composed of independent communities; the other, in California, of what are almost suburbs

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native white families is about as high and just as variable in the South as in the other regions.

The authors of *Consumer Incomes in the United States* have suggested unrepresentative sampling as the explanation (*ibid.*, p. 36). However, this admission is not conclusive in the face of a review that blames unrepresentative sampling for exactly the opposite error, that of consistently understating the income of the South in communities of each size (Rufus S. Tucker, 'The National Resources Committee's Report on Distribution of Income', *Review of Economic Statistics*, Feb. 1940, p. 165). Mr. Tucker finds that the sample communities in the South "were on the whole abnormally deficient in the comforts of life", that is, abnormally in relation to actual living conditions in that region.

<sup>5</sup> Four degrees of freedom are available in both tables. To obtain comparability with the analysis of the means (Table 6), the farm group was then omitted from the analysis of the median incomes (Table 7). The results were not affected.

<sup>6</sup> Consumer Purchases Study, *Family Income and Expenditures*, Pacific Region, Part One, Urban and Village Series, p. 110.



TABLE 8

## Mean Incomes of Wage Earning Families in Several Communities, Classified by Region and Size of Community, 1935-1936

Region	LARGE CITIES		MIDDLE-SIZE CITIES		SMALL CITIES		VILLAGE UNITS	
	Name	Mean income	Name	Mean income	Name	Mean income	Name	Mean income
New England	Providence, R. I.	\$1420	New Britain, Conn.	\$1407	Wallingford, Conn.	\$1574	Vermont-Mass.	\$1364
			Haverhill, Mass.	1350	Willimantic, Conn.	1362		
					Westbrook, Me.	1312		
North Central	Columbus, Ohio	1624	Dubuque, Iowa	1251	Greenfield, Mass.	1544	Pennsylvania-Ohio	1115
			Muncie, Ind.	1446	Beaver Falls, Pa.	1431	Michigan-Wisconsin	1108
			New Castle, Pa.	1438	Connellsville, Pa.	1521	Illinois-Iowa	957
			Springfield, Ill.	1478	Logansport, Ind.	1338		
			Springfield, Mo.	1267	Peru, Ind.	1411		
					Mattoon, Ill.	1438		
					Mt. Vernon, Ohio	1334		
					New Phila., Ohio	1202		
					Lincoln, Ill.	1150		
					Beaver Dam, Wis.	1219		
					Boone, Iowa	1375		
					Columbia, Mo.	1215		
					Moberly, Mo.	1374		
South	Atlanta, Ga.	1599	Columbia, S. C.	1515	Albany, Ga.	1613	Georgia-S. Carolina	1079
			Mobile, Ala.	1349	Griffin, Ga.	1154	N. Carolina-Miss.	1187
					Gastonia, N. C.	1092		
					Sumter, S. C.	1222		
Mountain and Plains	Denver, Colo.	1457	Butte, Mont.	1697	Billings, Mont.	1700	Kansas-North Dakota	927
			Pueblo, Colo.	1451	Greeley, Colo.	1176	Colo.-Mont.-S. Dakota	1216
					Logan, Utah	1103		
					Provo, Utah	1187		
					Dodge City, Kan.	1194		
					Aberdeen-Hoquiam, Wash.	1469	Astoria, Ore.	1438
Pacific	Portland, Ore.	1529	Bellingham, Wash.	1353	Eugene, Ore.	1504	Oregon-Washington	1131
			Everett, Wash.	1467	Klamath Falls, Ore.	1569		
					Olympia, Wash.	1488		

SOURCE: Study of Consumer Purchases.

TABLE 9

## Mean Incomes of Clerical Families in Several Communities, Classified by Region and Size of Community, 1935-1936

Region	LARGE CITIES		MIDDLE-SIZE CITIES		SMALL CITIES		VILLAGE UNITS	
	Name	Mean income	Name	Mean income	Name	Mean income	Name	Mean income
New England	Providence, R. I.	\$1878	New Britain, Conn.	\$1742	Wallingford, Conn.	\$2028	Vermont-Mass.	\$1785
			Haverhill, Mass.	1723	Willimantic, Conn.	1738		
North Central	Columbus, Ohio	2089	Dubuque, Iowa	1694	Westbrook, Me.	1534	Pennsylvania-Ohio Michigan-Wisconsin Illinois-Iowa	1505 1618 1385
			Muncie, Ind.	1777	Greenfield, Mass.	1857		
			New Castle, Pa.	1749	Beaver Falls, Pa.	1870		
			Springfield, Ill.	2004	Connellsville, Pa.	1818		
			Springfield, Mo.	1643	Logansport, Ind.	1562		
					Peru, Ind.	1421		
					Mattoon, Ill.	1678		
					Mt. Vernon, Ohio	1598		
					New Phila., Ohio	1492		
					Lincoln, Ill.	1717		
					Beaver Dam, Wis.	1747		
					Boone, Iowa	1632		
					Columbia, Mo.	1927		
					Moberly, Mo.	1569		
South	Atlanta, Ga.	2190	Columbia, S. C.	2215	Albany, Ga.	2026	Georgia-S. Carolina N. Carolina-Miss.	1681 2024
			Mobile, Ala.	1867	Griffin, Ga.	1799		
					Gastonia, N. C.	1783		
					Sumter, S. C.	2085		
					Billings, Mont.	2107		
Mountain and Plains	Denver, Colo.	2000	Butte, Mont.	1989	Greeley, Colo.	1635	Kansas-North Dakota Colo.-Mont.-S. Dakota	1533 1668
			Pueblo, Colo.	1743	Logan, Utah	1543		
					Provo, Utah	1637		
					Dodge City, Kan.	1555		
					Astoria, Ore.	1953		
Pacific	Portland, Ore.	1899	Aberdeen-Hoquiam, Wash.	1826	Eugene, Ore.	1848	California Oregon-Washington	1829 1508
			Bellingham, Wash.	1668	Klamath Falls, Ore.	1962		
			Everett, Wash.	1739	Olympia, Wash.	1965		

SOURCE: Study of Consumer Purchases.

TABLE 10

Mean Incomes of Business and Professional Families in Several Communities, Classified by Region and Size of Community,  
1935-1936

Region	LARGE CITIES		MIDDLE-SIZE CITIES		SMALL CITIES		VILLAGE UNITS	
	Name	Mean income	Name	Mean income	Name	Mean income	Name	Mean income
New England	Providence, R. I.	\$3066	New Britain, Conn.	\$2596	Wallingford, Conn.	\$3718	Vermont-Mass.	\$2394
			Haverhill, Mass.	2323	Willimantic, Conn.	3132		
North Central	Columbus, Ohio	2776	Dubuque, Iowa	2152	Westbrook, Me.	2334	Pennsylvania-Ohio Michigan-Wisconsin Illinois-Iowa	2043 2012 1796
			Muncie, Ind.	2428	Greenfield, Mass.	2553		
			New Castle, Pa.	2392	Beaver Falls, Pa.	2192		
			Springfield, Ill.	2732	Connellsville, Pa.	2070		
			Springfield, Mo.	2017	Logansport, Ind.	1802		
					Peru, Ind.	1875		
					Mattoon, Ill.	1988		
					Mt. Vernon, Ohio	2189		
					New Phila., Ohio	2098		
					Lincoln, Ill.	1849		
South	Atlanta, Ga.	2890	Columbia, S. C.	3382	Beaver Dam, Wis.	1952	Georgia-S. Carolina N. Carolina-Miss.	2135 3093
			Mobile, Ala.	2568	Boone, Iowa	1857		
					Columbia, Mo.	2761		
					Moberly, Mo.	1779		
					Albany, Ga.	2954		
Mountain and Plains	Denver, Colo.	2836	Butte, Mont.	3233	Griffin, Ga.	2712	Kansas-North Dakota Colo.-Mont.-S. Dakota	1779 2366
			Pueblo, Colo.	2111	Gastonia, N. C.	2631		
					Sumter, S. C.	2646		
					Billings, Mont.	3034		
					Greeley, Colo.	2259		
					Logan, Utah	2127		
					Provo, Utah	1908		
Pacific	Portland, Ore.	2517	Aberdeen-		Dodge City, Kan.	1770	California Oregon-Washington	2514 1913
			Hoquiam, Wash.	2415	Astoria, Ore.	2492		
			Bellingham, Wash.	2123	Eugene, Ore.	2308		
			Everett, Wash.	2172	Klamath Falls, Ore.	2837		
					Olympia, Wash.	2341		

SOURCE: Study of Consumer Purchases.

of metropolitan centers. The communities in the second group partake to a large extent of the income characteristics of the cities of which they are suburbs, and their income level is higher.

### A Size of family

Size of family is clearly not important in explaining family income differences among urban communities. The mean number of persons per family in the urban group varies from 3.5 to 3.7. It is only on farms that the average rises to 4.5.<sup>7</sup>

TABLE 11

Mean Incomes of Wage Earning Families, by Region and Size of Community

REGION	(a) LARGE CITIES	(b) MIDDLE-SIZE CITIES	(c) SMALL CITIES	(d) VILLAGE UNITS	AVERAGE
New England	\$1,420	\$1,379	\$1,448	\$1,364	\$1,403
North Central	1,624	1,376	1,334	1,060	1,349
South	1,599	1,432	1,270	1,133	1,359
Mountain and Plains	1,457	1,574	1,272	1,072	1,344
Pacific	1,529	1,430	1,500	1,302	1,440
Average	1,526	1,438	1,365	1,186	1,379

SOURCE: Table 8.

### a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEAN INCOME OF WAGE EARNING FAMILIES, FIVE REGIONS

	(a)	(b)	(c)	(d)
New England	2	3	1	4
North Central	1	2	3	4
South	1	2	3	4
Mountain and Plains	2	1	3	4
Pacific	1	3	2	4

### b) RANKS OF REGIONS BY MEAN INCOME OF WAGE EARNING FAMILIES, FOUR SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	5	1	2	4	3
Middle-size cities	4	5	2	1	3
Small cities	2	3	5	4	1
Village units	1	5	3	4	2

### B Occupation

In each region and community size group, incomes tend to be highest for professional and business families, next highest for clerical families, and lowest for wage earning families (Tables 11,

<sup>7</sup> *Consumer Incomes in the United States*, p. 23. It will be recalled that the conclusions of this paper regarding size of community income differences do not depend on the inclusion of the farm group in the analysis (footnote 5).

12, 13). The distribution of families among these three occupational groups is apparently not the same in all communities, the business and professional families tending to be concentrated in the larger communities.

To test whether differences in the occupational composition of communities account in part for the observed differences in average family income, hypothetical averages that eliminate the influence of occupational distribution were computed (Table 14). The hypo-

TABLE 12

Mean Incomes of Clerical Families, by Region and Size of Community

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGE UNITS	AVERAGE
New England	\$1,878	\$1,733	\$1,789	\$1,785	\$1,796
North Central	2,089	1,733	1,669	1,503	1,749
South	2,190	2,041	1,923	1,853	2,002
Mountain and Plains	2,000	1,866	1,695	1,601	1,790
Pacific	1,899	1,744	1,932	1,669	1,811
Average	2,011	1,823	1,802	1,682	1,830

SOURCE: Table 9.

a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEAN INCOME OF CLERICAL FAMILIES, FIVE REGIONS

New England	1	4	2	3
North Central	1	2	3	4
South	1	2	3	4
Mountain and Plains	1	2	3	4
Pacific	2	3	1	4

b) RANKS OF REGIONS BY MEAN INCOME OF CLERICAL FAMILIES, FOUR SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	5	2	1	3	4
Middle-size cities	5	4	1	2	3
Small cities	3	5	2	4	1
Village units	2	5	1	4	3

thetical averages are weighted averages of the values in the corresponding regional-size-of-community cells of Tables 11, 12, and 13, which show respectively the average incomes of wage earning, clerical, and business and professional families. The weights are equal to the percentage of all families in the United States in each occupational group and are the same for all cells of Table 14. When the occupational distribution is the same for all cells, differences among the cells cannot be attributed to differences in occupational composition.

There is greater variability in averages of actual family incomes than in those of hypothetical (Tables 6 and 14).<sup>8</sup> Some part of the variability in Table 6, of income differences among communities, is therefore attributable to differences in occupational composition.

It is clear from Table 14a, however, that differences in occupational composition do not account for all the income differences among size of community classes. In every region the hypothetical

TABLE 13

### Mean Incomes of Business and Professional Families, by Region and Size of Community

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGE UNITS	AVERAGE
New England	\$3,066	\$2,460	\$2,934	\$2,894	\$2,714
North Central	2,776	2,344	2,034	1,950	2,276
South	2,890	2,975	2,736	2,614	2,804
Mountain and Plains	2,836	2,722	2,220	2,073	2,463
Pacific	2,517	2,237	2,745	2,214	2,428
Average	2,817	2,547	2,534	2,249	2,537

SOURCE: Table 10.

#### a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEAN INCOME OF BUSINESS AND PROFESSIONAL FAMILIES, FIVE REGIONS

New England	1	3	2	4
North Central	1	2	3	4
South	2	1	3	4
Mountain and Plains	1	2	3	4
Pacific	2	3	1	4

#### b) RANKS OF REGIONS BY MEAN INCOME OF BUSINESS AND PROFESSIONAL FAMILIES, FOUR SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	1	4	2	3	5
Middle-size cities	3	4	1	2	5
Small cities	1	5	3	4	2
Village units	2	5	1	4	3

means are lowest in villages; in three of the five regions they are highest in large cities and in the other two, next to the highest.  $\chi^2$  for Table 14a is 10.68, somewhat less than the corresponding value for Table 6a, but still quite large since it would be exceeded by chance less frequently than twice in a hundred times.

A ranking of the five regions by hypothetical mean income

<sup>8</sup> Variability is measured by the sum of squares of the differences between cell means and the grand mean. The sum of squares for Table 6 is 754,771; for Table 14, it is 685,906; the difference is 68,865.

(Table 14b) displays less consistency.  $\chi_r^2$  is 6.40, which would be exceeded by chance more than ten times in a hundred.

Similar tests of regional and size of community differences in income have been made for each occupational group separately. The tables of ranks on which they are based are given in Tables 11a, 11b, 12a, 12b, 13a, and 13b, and the values of  $\chi_r^2$  and the proba-

TABLE 14

Hypothetical Mean Incomes of Families, Assuming Uniformly Distributed Working Population, by Region and Size of Community

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGE UNITS	AVERAGE
New England	\$1,955	\$1,741	\$1,917	\$1,726	\$1,835
North Central	2,028	1,709	1,590	1,389	1,679
South	2,066	1,970	1,796	1,677	1,877
Mountain and Plains	1,938	1,942	1,612	1,448	1,735
Pacific	1,870	1,710	1,922	1,621	1,781
Average	1,971	1,814	1,767	1,572	1,781

SOURCE: Tables 11, 12, and 13 and occupational percentages 52.9, 20.2, and 26.9 for wage earning, clerical, and business and professional families, respectively, adapted from *Consumer Incomes in the United States*, p. 26.

a) RANKS OF SIZE OF COMMUNITY CLASSES BY HYPOTHETICAL MEAN INCOME, FIVE REGIONS

New England	1	3	2	4
North Central	1	2	3	4
South	1	2	3	4
Mountain and Plains	2	1	3	4
Pacific	2	3	1	4

b) RANKS OF REGIONS BY HYPOTHETICAL MEAN INCOME, FOUR SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	3	2	1	4	5
Middle-size cities	3	5	1	2	4
Small cities	2	5	3	4	1
Village units	1	5	2	4	3

bilities attached to them, in Table 15. The tests of size of community differences for these tables yield values of  $\chi_r^2$  which, while higher than could reasonably be attributed to chance, are on the borderline of significance, the probabilities all being slightly larger than one in a hundred. The regional differences for each occupational group, like those for all groups combined, are not significant. Apparently, therefore, incomes within an occupation are somewhat more homogeneous than incomes in general. To the extent that this

homogeneity exists, differences in occupational composition are important for the explanation of the income differences among size of community classes.

TABLE 15

Summary of  $\chi^2$  and Corresponding Probability in Study of Mean Incomes of Occupational Groups.

a) TESTS OF SIGNIFICANCE OF SIZE OF COMMUNITY DIFFERENCES <sup>1</sup>

	$\chi^2$	P
Wage earning families	10.68	.01 to .02
Clerical families	10.20	.01 to .02
Business and professional families	10.68	.01 to .02

b) TESTS OF SIGNIFICANCE OF REGIONAL DIFFERENCES <sup>2</sup>

Wage earning families	1.4	>.50
Clerical families	7.6	>.10
Business and professional families	9.6	.02 to .05

<sup>1</sup> In test of size of community income differences, 3 degrees of freedom are available. The corresponding  $\chi^2$  at P = .01 is 11.341; at P = .05,  $\chi^2$  is 7.815.

<sup>2</sup> In test of regional income differences, 4 degrees of freedom are available. The corresponding  $\chi^2$  at P = .01 is 13.277; at P = .05, it is 9.488.

## V Summary

Analysis of the data from the Study of Consumer Purchases shows that income differences among communities varying in size are significant. The distribution of the better paid occupations, like the professions and executives of corporations, in favor of the large cities may be one factor explaining this significant difference. The income differences among regions are apparently not significant.

## Discussion

DANIEL S. GERIG, JR. AND LAURA WENDT

Mr. Klarman analyzes differences in average income among communities of varying size within the same region and among communities of the same size in different regions. His analysis is based on income figures for one color-nativity group, native born whites. Restriction of the comparison to this particular group limits the generality of his conclusions, particularly since the omission of other groups does not affect all regions to the same degree. Mr.



Klarman concludes that variations in average income are more closely correlated with size of community than with regional location, average income tending to be low in small communities and high in large communities. He does not make clear, however, the bearing of this differentiation upon the problem of allocating federal grants-in-aid among states.

The grants-in-aid administered by the Social Security Board are made not to regions as such, or to individual communities, but to state governments. The funds are distributed among its subdivisions by the state itself. Accordingly, it is necessary in allocating grants among states in accordance with fiscal capacity to work with a summary figure for each state, such as the state per capita income. Presumably low average income is a sign of low fiscal capacity, whether the community is large or small. Thus, if a state consists primarily of low income communities, sufficiently preponderant to cause the state's per capita income to be low, the state would seem to be eligible for favorable treatment in the distribution of grants regardless whether most of its communities are large or small.

Mr. Klarman states that if a low per capita income of a state results from the combination of many poor communities with several rich communities, the rich communities should be able to take care of some of the welfare needs of the poor communities. The extent to which this is possible depends, of course, on the actual proportion of the two types of community. Under the public assistance programs the states now provide one-half of the total cost. Presumably the wealthier communities in each state are already contributing a more than proportionate share of state revenues and thus, to some extent, are already aiding the poorer communities. This is not to imply, however, that the former can bear the entire cost of welfare needs in a state, for even though there may be concentrations of wealth in the large cities, neither their tax systems nor that of the states can tap this wealth as effectively as can the federal government. Furthermore, the existence of a high average income in a large community does not preclude the possibility of a large volume of welfare need in the same community.

We should like to make clear that the proposed use of state per capita income figures for grants-in-aid is not primarily as a series for measurement of the need but as an index reflecting relative differences in tax raising ability. The ascertainment of the total need under the public assistance program comes about through the

intake and case work activities of the state agencies, which determine the number of needy persons in each state who will receive aid and the size of the payment to each person. The state per capita income figures would not be used to throw any additional light on the aggregate amounts needed in the states but rather to provide a basis for varying the percentage share of the total cost to be borne by the federal government in inverse relation to the capacity of the states to finance their share.) We do not think that the omission of foreign born whites and Negroes in the North is by any means a complete offset to the omission of Negroes in the South. The ratio of the incomes of Negroes to native whites in the South is undoubtedly considerably below that of the incomes of foreign born to native whites in the North. Likewise, the incomes of Negroes in the South are considerably below those of Negroes in North Central cities, and the ratio of incomes of Negroes to those of native whites is lower in the South than in the North Central cities. In other words, (the typical lowness of incomes of Negroes is an extremely important factor in the general lowness of average income in the South, and the omission of data on the incomes of Negroes from any study of regional differentials makes such a study incomplete) Mr. Klarman states in his introduction that the omission of incomes of other than native white persons limits the generality of the possible conclusions but he has not adequately qualified his subsequent generalizations to take account of this limitation.

In order to show the importance of including all color-nativity groups in this comparison when its implications for a grants-in-aid policy are under consideration, we have compiled figures from the Study of Consumer Purchases relating to average incomes of families in all color-nativity groups by size of community and region. Whereas Mr. Klarman's comparison was made on the basis of non-relief native white normal families only, the figures we present in Tables 1 and 2 relate to all nonrelief families—native white, foreign born white, Negro and other color, including both normal and broken families. They were available from a study conducted previously in the Bureau of Research and Statistics of the Social Security Board, in which published and unpublished data from the National Resources Committee study on *Consumer Incomes in the United States* were used to study differences in income distribution among regions and states. Mr. Klarman's figures on average income are developed on the basis of raw sample data from the Study of Consumer Purchases classified by size of community within region.

The figures in Tables 1 and 2 below are based on the sample data from the Study of Consumer Purchases after their processing by the National Resources Committee. Samples for communities of the same size in a region were averaged by the National Resources Committee to obtain a composite sample for that type of community within the region, a color-nativity break being maintained where

TABLE 1

Mean Incomes of Nonrelief Families in United States, by Region and Size of Community, 1935-1936

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGES	FARMS
New England	\$2,289	\$1,750	\$2,264	\$1,856	\$1,392
North Central	2,379	1,835	1,568	1,578	1,441
South	1,841	1,824	1,527	1,578	1,111
Mountain and Plains	2,160	1,868	1,803	1,689	1,021
Pacific	2,072	1,713	1,790	1,837	1,987

a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEAN INCOMES, FIVE REGIONS

New England	1	4	2	3	5
North Central	1	2	4	3	5
South	1	2	4	3	5
Mountain and Plains	1	2	3	4	5
Pacific	1	5	4	3	2

b) RANKS OF REGIONS BY MEAN INCOMES, FIVE SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	2	1	5	3	4
Middle-size cities	4	2	3	1	5
Small cities	1	4	5	2	3
Villages	1	4	5	3	2
Farms	3	2	4	5	1

SOURCE: *Consumer Incomes in the United States*, National Resources Committee, August 1938, and unpublished data from the National Resources Committee.

the sample data permitted. There is one further difference in the two sets of figures to which attention should be called. The sample data used in our tables are the National Resources Committee data after adjustment for under-representation of families with high incomes.<sup>1</sup> The sample income data for the individual communities Mr. Klarman used had not been adjusted for this factor.

The mean income for each type of community (Table 1), consists of a weighted average of the mean incomes of all color-nativity groups in that type of community, obtained by weighting the means

<sup>1</sup> This adjustment was made by the National Resources Committee with the use of data from income tax returns. See *Consumer Incomes in the United States*, pp. 80-7.

for each group by the number of families in the group. The distribution of families by color-nativity group and size of community was estimated largely from the 1930 Census.

The median incomes for these families (Table 2) have been derived from the distribution of all nonrelief families by income level in each type of community within each region, as published in *Consumer Incomes in the United States*, Tables 14B-18B. This method differs from that used by Mr. Klarman in calculating the median incomes. At the end of Section I he states "a median income was obtained for each cell by finding the middle item of its combined frequency distribution, derived in turn by summing the frequency distributions of the communities in the cell". His method is somewhat open to question in that it has the effect of involuntarily weighting the several samples for a type of community by the percentage of coverage of each sample. This is undesirable. In the absence of any objective system for weighting the various communities of the same size, it would be better to average the percentage income frequency distributions for the various communities of the same size and then obtain the median from this average distribution. Actually there may be little difference in the size of the medians obtained by the two methods, but technically the method suggested seems more desirable than the one used by Mr. Klarman.<sup>2</sup>

Table 1, showing the mean incomes of nonrelief families by region and size of community, should be compared with Table 6 of Mr. Klarman's paper, while Table 2, showing the median incomes of these families classified in the same manner, should be compared with his Table 7.

The ranking of the mean incomes by size of community as the primary classification (Table 1a) shows some consistency. Large cities rank first uniformly, while farms rank lowest with the exception of the Pacific region. There is not as high a degree of consistency in the other size units. When the median is used as the basis for comparison, there is somewhat less consistency.

There is one outstanding difference in the ranks of regions with respect to the average income in each size of community in Tables 1b and 2b as compared with Mr. Klarman's figures. When all color-nativity groups are compared, the South ranks *lowest* in 7 out of

<sup>2</sup>The method suggested is the procedure used generally by the National Resources Committee in combining the sample income data from communities of the same type in the same region. See *Consumer Incomes in the United States*, p. 54.

10 cases. In contrast it ranked *highest* in 6 out of 9 cases in Mr. Klarman's study, where the comparison was restricted to native-white normal families.

Thus, when all color-nativity groups are taken into account, the low average incomes in the South appear to result not only from the prevalence of small communities and farms in that region, as Mr.

TABLE 2

Median Incomes of Nonrelief Families in United States, by Region and Size of Community, 1935-1936

REGION	LARGE CITIES	MIDDLE-SIZE CITIES	SMALL CITIES	VILLAGES	FARMS
New England	\$1,361	\$1,326	\$1,419	\$1,457	\$1,184
North Central	1,646	1,370	1,293	1,163	1,236
South	1,484	1,272	1,093	1,159	780
Mountain and Plains	1,607	1,571	1,493	1,341	860
Pacific	1,544	1,392	1,545	1,433	1,349

a) RANKS OF SIZE OF COMMUNITY CLASSES BY MEDIAN INCOME, FIVE REGIONS

New England	3	4	2	1	5
North Central	1	2	3	5	4
South	1	2	4	3	5
Mountain and Plains	1	2	3	4	5
Pacific	2	4	1	3	5

b) RANKS OF REGIONS BY MEDIAN INCOME, FIVE SIZE OF COMMUNITY CLASSES

SIZE OF COMMUNITY	NEW ENGLAND	NORTH CENTRAL	SOUTH	MOUNTAIN & PLAINS	PACIFIC
Large cities	5	1	4	2	3
Middle-size cities	4	3	5	1	2
Small cities	3	4	5	2	1
Villages	1	4	5	3	2
Farms	3	2	5	4	1

SOURCE: *Consumer Incomes in the United States*, National Resources Committee, August 1938, and unpublished data from the National Resources Committee.

Klarman has shown, but also from a general lowness of incomes in all sizes of communities in that region as compared with other regions. To the extent that our data are valid, it seems that regional location is of more importance in connection with average income than Mr. Klarman's analysis suggests.

✓ DWIGHT B. YNTEMA

Despite its limitations, Mr. Klarman's paper is of considerable interest because it directs attention to analysis of income data per-

taining to different areas of the country. Investigations of this kind are clearly needed at present. They provide the basis for proper interpretation of data now available and pave the way toward further developments in the field. They become important indeed if inter-area income data are to serve any useful end in the formulation of administrative decisions such as might be made in connection with the government programs to which Mr. Klarman alludes. It is unfortunate that Mr. Klarman did not develop in some detail his discussion of the several lines of investigation that inter-area studies might take and the qualifications that apply to findings in this field. I should like to comment briefly on these and related matters.

The fact that the consumer income data used by Mr. Klarman are for family incomes during the 1935-36 period in different regions and in communities of different sizes, measured in current local prices, points to three important considerations. The composition of the family, in the first place, is not necessarily uniform as among areas. Consequently, family incomes will tend to vary as a result of several factors such as the demographic characteristics of the family's breadwinners, including number, race, nationality, age, sex; the number and quality of the vocations represented in the family; and the amount of non-labor income accruing to members of the family. Furthermore, families in different areas are situated in different environments that affect both the income-earning capacities of family members and the income-spending habits of families. Finally, special mention should be made of a particular environmental consideration, namely, prices. Inter-area price differentials will affect family incomes through their effects upon wages, salaries, and other returns. They will also affect expenditure patterns and real incomes through their effects upon the prices of the many commodities and services that the family buys. I mention these points because they seem necessary to proper orientation of Mr. Klarman's study.

Mr. Klarman elects to abstract successively from certain of the numerous factors contributing to inter-area heterogeneity. In the first place, he limits his study to consideration of family incomes of native white complete nonrelief families. This at once restricts the analysis to a specific type of income-receiving and income-spending unit that is much more homogeneous than would be implied in an agglomeration of family and single individual types of all kinds. In consequence, of course, findings are also limited to the specific family type unless a broader applicability can be established. (The

reasoning in support of such broader applicability is far from conclusive.) A second element of homogeneity is deduced from information concerning family size as measured in terms of number of persons per family. Family size, Mr. Klarman finds by reference to the data, is substantially constant among cities and villages although somewhat larger on farms. Finally, a positive step in the direction of homogeneity is made by Mr. Klarman through his separate study of incomes of wage earning, clerical, and business and professional families in cities and villages and the development of hypothetical average incomes based upon constant weights for these three types of families. The analysis, in the end, centers upon differences in income received in various regional and urbanization areas by native white complete nonrelief families in cities and villages after standardization of broad occupational groups.

Tentative conclusions are indicated by Mr. Klarman at successive stages in his analysis. The conclusions follow from the given line of study and, strictly interpreted, can apply only to the particular family type considered. It is quite natural that Mr. Gerig and Miss Wendt should question the application of the findings to all families when the underlying data are exclusively for native white complete nonrelief families. Mr. Gerig and Miss Wendt desire an inter-area index of capacity to raise the state and local public funds required to defray part of the costs of certain programs in which the federal government has elected to become a participant. For this purpose, they prefer a composite average income of all families actually located in the different areas. The two lines of study are in interesting contrast with each other. I would suggest, however, that a large number of additional factors making for heterogeneity still remain to be taken into account in connection with either study.

The family income data, as stated above, measure income in terms of what was called 'current local prices'. The expression has far-reaching implications from the income-earning as well as from the income-spending standpoint. Immediately apparent is the fact that the existence of inter-area differentials in prices of identical factors or products (illustrated, respectively, by wage rates for specific types of labor and prices of specific consumption commodities or services) will directly affect real family incomes. Conceptually, it is just as important to adjust for inter-area price differences as it is to adjust for period-to-period changes in prices when study is made of the real income of a given economy over a period of years. Although there is no need to develop this seemingly obvious point,

I am constrained to suggest that in many cases the influence of price differentials is too readily assigned an inconsequential role.

Equally important, perhaps, are quantity and quality differentials on both the income-earning and income-spending sides. Mr. Klarman's attempt to abstract from heterogeneity among broad occupational classes may be used in illustration of one quantity differential that is operative on the income-receiving side. Allowance for this factor is only the beginning since in standardizing family earnings among areas it would be desirable to recognize several additional factors, e.g., hours and weeks worked, particular occupations, earnings of secondary family workers, and non-labor incomes of families. Even if moderately fine adjustments be made in abstracting from actual quantitative differentials, it is likely that qualitative differences will still persist within these categories. Thus, the fact that better paid occupations (like 'the professions and executives of corporations' to which Mr. Klarman alludes) appear to be relatively more numerous in large cities is supplemented by the strong possibility that on the average the earning capacity of persons in these pursuits is more or less positively correlated with the size of the community in which they have located. This suggests many factors (training, experience, working conditions, climatic influences, etc.) that may tend to produce important qualitative differentials among areas.

On the expenditure side, quantity and quality differentiation is also present. Habits of consumers are not uniform because of differences in climate, vocation, and many other factors intrinsic to the physical, economic, and cultural characteristics of the areas. Evidence of inter-area variation is present among as well as within major budget categories. Both the relative size of the total food and clothing budgets, for example, and their composition are influenced by the peculiarities of the given settings. In the recreation category, differences are likely to be especially striking. Here, the relative costs of recreation and the availability of facilities for recreation in combination with differences in tastes tend to introduce striking disparities in consumption patterns. It must be remembered, of course, that the question is not one of the proportion of total consumer expenditure devoted to any given budget category. Rather the question is that of the real return from actual expenditures after allowance for differentials in prices and recognition of peculiarities in the quantitative and qualitative composition of budgets. Ideally, the budgets themselves should not neglect



goods that are substantially free in some areas and definitely economic in others.

The foregoing comments are intended to stress the importance of price and budget factors in modifying observed inter-area differences in incomes as measured in 'current local prices'. These factors are commonly recognized as imposing severe limitations on comparisons of incomes among nations. Yet the two cases have much in common; they are different chiefly in degree. Factors of this kind constitute a major barrier to successful application of income data to inter-area problems within the nation as well as among nations.

On the assumption that this problem may some day be acceptably resolved, I should like to add to Mr. Klarman's list of uses to which findings may be put. He speaks of their bearing upon government action in such fields as agriculture, internal migration, education, and welfare. I would add a quite different field—that of taxation, and especially federal taxation of personal incomes—as a case deserving particular attention. As long as personal income tax rates were at fairly low levels, failure to take into account inter-area differences in real incomes was not of great consequence. But, with the much higher rates now prevailing, the elemental equities of the case call for some recognition of inter-area differentials in real income deriving from given dollar incomes of various amounts. This point is made with all due respect for the administrative complexities and the legal (constitutional) obstacles involved. It is added because the inter-community differences in family incomes that Mr. Klarman calls to our attention would seem to result in part from inter-community differences in real incomes accruing from given dollar incomes.

*Part Seven*

ADEQUACY OF ESTIMATES  
AVAILABLE FOR COMPUTING  
NET CAPITAL FORMATION

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This paper is necessarily in considerable part simply a means of bringing together observations made by the pioneer estimators. The National Bureau of Economic Research is responsible for, and Simon Kuznets is the author of, the basic methods, measures, and compilations in this field. Mr. Kuznets' monumental work, *Commodity Flow and Capital Formation*, blazed a trail of preeminent importance in economic statistics, a trail now being extended and improved in the Department of Commerce.

The National Bureau's publication, *Capital Consumption and Adjustment*, by Solomon Fabricant, affords the complementary estimates necessary for derivation of Mr. Kuznets' 'approximate' measures of net capital formation. No one could be as well aware as these two notable statisticians of the weaknesses that inhere in the measures. Their works contain most of the observations that can be made concerning the adequacy of their measures of gross capital formation and capital consumption. The writer is, accordingly, deeply indebted to both.

# Adequacy of Estimates Available for Computing Net Capital Formation

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**NATIONAL INCOME** by type of product can be defined, if international trade is disregarded, as the sum of the values of new consumer goods and services and new producer goods of all kinds, less the value of the current expiration of usefulness of producer goods; i.e., the value of 'consumption' plus the value of 'net capital formation'. National income may be built up by analysis of the net yields of the various goods and services produced by the economy, classifiable in either of these two components. However, estimates of net capital formation are of more interest to economists for their own sake than as terms required in order to derive such totals. The average level of net capital formation in various periods, its secular trend, and its cyclical fluctuations are regarded as facts of peculiar significance.

In view of the frequent reference by many economists and statisticians to the concept of net capital formation (NCF) and to measures designed to give substance to it, a critical guidebook to estimates of NCF and related quantities is an important desideratum. Examination of estimates of the two quantities entering into the subtraction that yields NCF in the form of durable goods raises a wide range of questions, both theoretical and statistical. Outstanding among the latter are those concerning the comparability in scope of the estimates of gross capital formation (GCF) and capital consumption (CC). Do the two sets of estimates match in terms of their breadth of coverage, i.e., of the various classifications, by type, by ownership (final holder), by producer, of durable goods newly produced and of corresponding durable goods being used up? With respect to a given product, do the estimates of value produced match qualitatively those of value used up? How do the components of each estimate compare with the appropriate concept?

This paper is directed toward these questions. The aim is observation and summarization of points bearing on the merits of the subtraction of estimates of capital consumption from estimates of gross capital formation. The points relate to inclusions and exclusions characteristic of each set of estimates that violate a consistent set of definitions of GCF and CC for which justification can be found on grounds broader than statistical expediency alone.

The investigation of the adequacy of the measures of the variant

of GCF most suitable in the measurement of NCF can be conducted decisively only if the definition is precise. The present purpose therefore calls for an attempt to justify the definition to be accepted.

A critical review of capital consumption estimates requires consideration of the peculiarities of data whose use does not ensure complete comparability of scope for estimates of GCF and CC. This can best be done in the course of a systematic survey of methods of accounting by their final holders for goods entering into GCF. A special problem arising in connection with such basic data as relate to the using up of natural resources receives attention here, although discussion of it is in the nature of a digression.

The adjustment for price changes of accounting data bearing on capital consumption and the choice of method for allocating capital expenditures among time periods as charges against revenues are of great theoretical as well as statistical importance but are not discussed here.

## I The Concepts of Gross Capital Formation and Capital Consumption

### *A Variants of capital formation*

Net capital formation in the most inclusive sense, designated here as Variant A, is the net change in the stock of future services between the start and end of a given period of accounting. It makes the cleanest possible distinction between that portion of the net product of the economy actually realized as final benefits within the period of reckoning and the remainder which is the net change in the stock of future contributions to final benefits. Practically speaking we would include in Variant A the value of the net change in the inventories of (1) all kinds of produced goods, including (a) producer goods of all grades of durability and (b) all kinds of goods in the hands of ultimate consumers, and (2) unextracted natural resources. Variant A includes in (1a) that portion of the value of maintenance and repair work on all types of durable goods performed within a period which is imputable to the yield of benefits from such work to be derived subsequent to the end of the period.

It is analytically desirable as well as practically necessary to distinguish between the value of gross additions to the stock of durable goods and their value used up or lost in a given period. In what immediately follows, therefore, the variants of capital formation referred to are variants of gross capital formation, and it will be

understood that complementary variants are indicated for capital consumption.

The capital formation concept under discussion is one subsidiary to the concept of production. Only that part of the net change in the stock of future benefits brought about through the actual inputs of productive factors, i.e., produced in the given period, is wanted in the concept of capital formation. New discoveries of natural resources at values exceeding the value of opportunity cost incurred in prospecting, it is generally agreed, do not constitute value produced.<sup>1</sup> Although discoveries give rise to effective additions to the stock of future final benefits, unknown resources can be regarded as a part of the inventory at the start of a period of reckoning just as are unexploited known resources.

Several less inclusive definitions of capital formation, useful for various purposes, can be set up. A series of variants can be defined by way of successive exclusions. The following components and subdivisions of Variant A exemplify possible steps in restricting the scope of capital formation:

Stocks of goods of the several grades of durability in the hands of ultimate consumers

Perishable	Moderately durable
Semidurable	Highly durable

Stocks of goods of the several grades of durability held by governmental agencies and private nonprofit agencies, other than those mainly concerned with the production of goods and services of the type produced by private business agencies

Stocks of goods of the several grades of durability held by governmental and private nonprofit agencies devoted to satisfying kinds of wants chiefly met by private business

Stocks of goods of varying durability held by private business

The series of exclusions may be carried forward at some stage in terms of broader categories, for example:

Maintenance and repair of durable goods held by all agencies

New producer durable goods of low durability

Intangible durable goods that actually represent the fruits of production rather than part of the capital value of future monopolistic rents on tangible goods exceeding amounts sufficient to justify their cost.

One variant commanding special interest for divers reasons, here

<sup>1</sup> Cf. Mr. Kuznets' 'Uses of National Income in Peace and War', *Occasional Paper 6*, National Bureau of Economic Research, 1942, p. 3, footnote.

designated Variant B, may be taken as covering only the following:

- a) Physically tangible new producer durable goods reaching their final holders, including those going to public agencies, excluding residences as well as all repairs and maintenance, however durable. For this variant durable goods are to be considered as including only types having an average life of three years or more.<sup>1a</sup> New durable goods are to be understood as including major alterations, i.e., improvements of old durable goods other than mere repairs, however durable.

- b) All other new producer goods (so-called 'inventory goods')
- c) New residences and major alterations of old residences

This paper is concerned mainly with Variant B exclusive of the net change in inventories listed under (b) above. For convenience this remainder is designated Variant B<sub>1</sub>. It is substantially Variant B, including further only the net increase in claims against foreign countries, that has so far been adopted for use in measuring net capital formation.<sup>2</sup> An obvious reason lies in statistical convenience; however, explanation of the special importance attached to Variant B actually lies deeper.

<sup>1a</sup> This criterion has been taken over from the National Bureau for the final products analysis work now being carried on in the Department of Commerce. In practice there has been an inevitable and justifiably common sense tendency not to take the criterion so seriously as to break up unduly groups of commodities falling in the same category according to some other criterion, such as type of benefit furnished, e.g., clothing, sporting goods, auto parts and supplies. Lack of positive information sometimes disallows a clear-cut distinction according to average durability. Since the basis for the particular criterion of durability adopted is completely pragmatic, there is no reason why other equally pragmatic and more insistent considerations should not be permitted to modify the definition of durability. The use of more or less conventional categories is helpful for many purposes.

<sup>2</sup> See Mr. Kuznets' *National Income and Capital Formation, 1919-1935* (National Bureau of Economic Research, 1937), pp. 34-9. It is pointed out that estimates of net capital formation could be made only according to Variant I (IV in his *Commodity Flow and Capital Formation*). Of Mr. Kuznets' variants, this is the closest to Variant B<sub>1</sub> above.

In 'Uses of National Income in Peace and War', Mr. Kuznets defines "real investment or capital formation as . . . (1) the value of producers' durable equipment reaching the business and public enterprises that use it, at cost to them; (2) the value, at cost, of all new construction including major repairs and alterations; (3) net additions to stocks of commodities held as inventories by business enterprises; (4) changes in net claims by individuals, firms, and public units in this country against individuals, firms, and public units in other countries".

*B Basis for a variant of GCF restricted to new producer durable goods*

The desirability and the justifiability of setting out a variant including new producer durable goods, but excluding durable repairs and maintenance on them, may be questioned. It is appropriate, therefore, to consider at this point whether there is any analytical basis for setting up a concept of capital formation that distinguishes new producer durable goods from durable repairs and maintenance of old. For this purpose a still more restricted variant is the proper subject of discussion, i.e., Variant B<sub>2</sub> of GCF, confined to new producer durable goods (item (a) of Variant B).

It is true that from a business standpoint there is merely a difference of degree between scrapping particular durable goods and substituting new on the one hand, and maintaining the old in operating condition on the other. The one is, within limits, readily substitutable for the other, and under varying economic conditions numerous substitutions in either direction can be made. Actually, however, new types and designs of capital goods introduce a difference in kind between these alternatives. Substitution instead of maintenance furnishes an especially significant nexus of analysis for the economist, since the peculiar factor differentiating the maintenance of capital by repair and its maintenance by replacement is the virtual exclusion of technological changes under the former and the possibility of incorporating the latest technological advances under the latter. Even under conditions of no technological change the possibility of choice is significant.

The extent of capital maintenance by replacement relative to repair has, for example, important implications for business cycle analysis. The value of new structures (movable as well as fixed) passing into the hands of producers is especially significant as an indicator of the expansion of productive capacity. One definition of capacity might be set up in terms of quantities of durable goods available and the requirements of such goods per unit of output. This suggestion may be exemplified by a simple situation where there is only one type of durable aid (equipment) to production and only one type of product. Then capacity may be defined as the periodic output per capital equipment unit (i.e., the reciprocal of the technical coefficient of production for equipment, which is defined as the quantity of equipment per unit of periodic output) multiplied by the number of equipment units in existence. But the

creation of new structures leads directly to the augmentation of these multipliers in addition to the probable introduction of reduced technical coefficients. Thus varying accretions in aggregate productive capacity occur with the creation of new durable goods whether or not there is technological change. The actual amount of increase depends on rates of scrapping which are flexible within wide limits. No amount of repairs to existing structures can swell productive capacity of existing plant beyond its maximum potential output when new. On the other hand, it is conceivable that under certain conditions the entire output of new structures can become effective additions to capacity, if scrapping can be reduced to zero by sufficient maintenance and repairs. Of course, the actual maximum expansion of total effective capacity measured in terms of all resources would probably require scrapping the most expensive capital assets.

For these reasons, at least, it seems clear that a variant of GCF that measures the addition of distinguishable new structures to the capital inventory is desirable. These reasons are independent of the technical requirement of a variant usable for the computation of net capital formation in the course of deriving a measure to fit into the definition of net national product. As for the measurement of capital consumption, the productive capacity argument above suggests that estimates of the scrapping or retirement of producer durable goods would be of considerably greater value in some types of problem than estimates of capital consumption of the types now available.

### *C The proper inclusiveness of valuations in the measurement of GCF*

The definition of gross capital formation has so far been considered solely in terms of breadth of coverage, that is, the types of product that should be included. Something more is needed if a definition of any variant of GCF is to be complete. For example, let us consider the valuation to be used for any particular unit or block of durable goods falling in Variant B<sub>2</sub> of GCF. The producer of the equipment finds his product possessing value to the extent of the sales price because, under conditions of adequate foresight, the capitalized value of rents appropriable through possession of the equipment is equal to or exceeds not only that price but also the sum of the price and *all other* penalties incident to the acquisition. Thus conceptually a closer approximation to the economic



values brought into being by the production of producer durable goods ordinarily can be found than that afforded by the evidence of explicit transactions. There will be no question about the propriety of including in the value of a new durable good not only the purchase price but also all other costs obviously incident to the acquisition, such as costs of transportation and installation. Moreover, certain other costs incurred by a firm and attributable in the marginal cost sense<sup>3</sup> to the acquisition of new equipment are just as properly part of the value in place of new equipment. In fact, when opportunity cost is involved, the inputs of certain factors on which the economic cost is fixed rather than variable are imputable to the acquisition of durable goods, as well as to other operations.

#### *D Definition of capital consumption*

A first approximation to a definition of what is meant by current consumption of durable goods may be made under the assumption of stationary conditions with no accidental losses. Under these conditions capital consumption may be defined as the decline during a given period in the capitalized value of the future rents obtainable from (a) the stock of durable goods completed before the start of the period, and (b) additions to the stock of durable goods from the dates of their first availability for production to the end of the period. This is a gross decline, just as the value of new durable goods completed in the period is a gross addition. The algebraic sum of the two is the net change in the stock of capital—positive or negative net capital formation.

Under conditions of correct foresight and changing production or demand functions or changing quantities of production factors, but with unchanging interest rates, the definition suitable for stationary conditions can be taken over with one important modification; namely, depreciation under such changing conditions includes not only declines in value resulting from wear and tear, the sole capital-consuming forces operating in the hypothetical stationary state, but also declines resulting from those gradually operating forces whose effects are referred to as 'normal obsolescence'. These forces of normal obsolescence include the gradual changes in the arts of production, in desires for final products, and in the quantities of productive factors; theoretically they can be

<sup>3</sup> As distinguished from the arbitrary allocation of certain costs over units of output as practiced in some cost accounting.

taken fully into account in estimating the capitalized value of future rents obtainable from an asset.

Finally, under true dynamic conditions, where final adjustment to the future cannot often be achieved because future events are so difficult of prediction, changes in capital values that are a function not only of the expiration of the given period but also of changes in the evaluations of prospects for future periods take place. There is rather general agreement that the concept of periodic national income should be defined to exclude changes in values of old assets other than reductions in the values of durable goods attributable to wear and tear and normal obsolescence. Upward changes in the values of old assets, that is, capital gains, are not due to inputs of production factors during the period, i.e., cannot be regarded as values *produced*. They take place because of downward changes in the rate of interest at which future rents that assets will earn are discounted, and because of upward changes in estimates of future rents obtainable. Capital losses are corresponding downward value changes, due to increases in rates of discount and downward revision of estimates of future rents obtainable, rather than to the passage of the current period proper.<sup>4</sup> These types of value change have nothing to do with the absolute decline of service potential during the current period. The appropriate valuation to be placed on this current decline is accordingly the change in the capitalized value of future services between the beginning and the end of the period exclusive of the change due to the revision of expectations regarding (a) the net rents to be received from the asset subsequent to the close of the period, and (b) the interest rate at which the future rent series should be discounted; that is, capital consumption should be differentiated from what may be described as capital adjustment.<sup>5</sup> The consumption of durable goods in any period may be defined, then, as the decline in the current value of durable goods attributable to the current expiration of service potential.<sup>6</sup>

<sup>4</sup> Accidental losses are usually distinguished from capital losses traceable to changes, actual and expected, in the environment in which an enterprise operates. The distinction is between losses realized in the period from the standpoint of the community and the socially unrealized capital losses represented by other valuation changes not arising from the expiration of the current period.

<sup>5</sup> The distinction is that so well formulated by Mr. Fabricant; see *Capital Consumption and Adjustment*, Ch. 2, pp. 7-20.

<sup>6</sup> Mr. Fabricant has formulated a definition for use in defining the net value of the national product: "Capital consumption . . . is the current value of durable goods used up in production" (*ibid.*, p. 19). The method of depreciation apparently pre-

### *E Accidental losses as capital consumption*

So far capital consumption has been defined regardless of accidental losses. The current value of capital consumption in the form of accidental loss is simply 'equal to the value of the assets immediately before their loss. It may be wondered whether accidental loss is not really analogous to capital adjustment from the standpoint of defining capital consumption attributable to a given period. However, it must be realized that in the case of accidental loss the decline in service potential due to the loss is fully realized in the period in the course of which the loss occurs, and hence, in this decisive respect, resembles capital consumption as already covered by the definition set forth above. In fact, this definition may be taken without modification to include accidental loss.<sup>7</sup>

ferred by Mr. Fabricant is that which allocates the original value of an asset equally per unit of output. Such a procedure seems to imply limitation of the concept of depreciation to 'user cost' (see J. M. Keynes, *General Theory of Employment, Interest, and Money*, Harcourt Brace, 1936, pp. 66-72).

It is generally believed, and abundant confirmation can be had in terms of prices, that much if not most of the maximum of service available in a period is simply lost through non-use, rather than left in the good for future exploitation. It may be true that many business men anticipate a cyclical pattern in the prospective utilization of assets. Even so, and notwithstanding the appropriateness of the use of a 'natural' period, i.e., a full cycle, rather than a period so arbitrary as the year, for adequate determination of profitability, the value decline with the passage of time, aside from changes in the estimated present value of future rents obtainable from assets, goes on, and service capacity not exploited is simply lost, without offsetting absence of user cost. The allocation of only a part of capital cost is more in accord with economic fact, and that part is appropriately measured by the cost of use as against non-use, whether or not the owners of assets take account of the cyclical environment.

<sup>7</sup> See Mr. Kuznets' estimates of net capital formation. These involve the offsetting of the value of actual losses due to fire in a period against GCF.

It may at first seem puzzling that the deductions from GCF to allow for capital consumption should include (1) depreciation, which might be thought of as allowing for retirement on the accrual basis, and at the same time (2) the value of current losses rather than the value of risks incurred, that is, losses allowed for on the accrual basis. The essential point is that a definition establishing the concept of capital consumption in a period can have economic meaning only if it is actually at bottom the notion of change in capitalized value of future earnings (properly restricted to exclude unwanted effects). That is, 'depreciation accrued' in a period more or less crudely measures decline in capitalized value exclusive of the effects of the probability of accidental loss. This decline is an economic fact rather than a technicality of record-keeping. Likewise, value of actual loss measures the actual current decline in the capitalized value of future earnings. In the case of ordinary use or holding, the decline is gradual because of the character of market forces and the durability of the asset during successive outputs. In the case of accidental loss, the decline in value occurs all at once because the realization of future earnings is nullified by the accident.

*F Natural resources in capital consumption*

Gross capital formation has been defined above to include only *produced* additions to the stock of future benefits. Must the definition of capital consumption for the purpose of establishing a measure properly comparable to that of GCF cover only the consumption of durable goods included in GCF? Is there any compulsion to exclude the value of natural resources consumed in a period from the measure of capital consumption to be so used? A categorical answer is not possible; an estimator is at liberty to define his concept of capital consumption as he chooses. He may wish the concept to be completely inclusive, in which case he may hold that one must look beyond GCF to the total of wealth at any point of time, a total that includes the value of natural resources in excess of the value of the developments thereof. That is, a full account of real capital change in a given period could be made only by taking into account the consumption of natural resources notwithstanding the exclusion of new discoveries from GCF for the period. On the other hand the estimator may well satisfy his purpose adequately with a definition of capital consumption excluding the using up of natural resources.<sup>8</sup> In any case, however, a separate category will be desired for the consumption of durable goods whose creation constitutes gross capital formation.

The discussion in Section II of the comparability of measures of capital consumption is based upon a definition of capital consumption that excludes natural resources as such but includes capital represented by the development of natural resources. The outline of accounting methods for durable goods and of the characteristics of the basic data available for direct use in measuring capital consumption leads naturally to comment on the relationship between accounting for depletion of natural resources in the calculation of enterprise profits and the problem of estimating the real value of natural resources used up.<sup>9</sup>

<sup>8</sup> Mr. Kuznets follows the latter alternative. Having excluded discoveries from GCF, he evidently feels compelled to exclude drafts upon natural resources from capital consumption. See *Occasional Paper 6*, pp. 3-4, footnote. Although Mr. Kuznets uses Mr. Fabricant's measures of capital consumption with the intention just indicated, these measures seem to have been regarded by their author as covering not only the expiration of the value of developments of resources but also the value of the reduction of unextracted mineral inventories.

<sup>9</sup> See Sec. II D, below.

## II General Character of the Data Available for Measuring Gross Capital Formation and Capital Consumption

### *A Basic data on capital formation, Variant B<sub>1</sub>*

Two broad categories of data provide bases for estimating the flow of new producer durable goods. From values of building and other construction work, new residential, public, and commercial construction completed and new industrial plant can be estimated annually. Continuous estimates of the values of other new producer durable goods, i.e., equipment, can be derived from production data.

1) In the case of construction, the values of projected construction in terms of building permits issued serve as the basis for estimating the values of new residential structures completed. From statistics of construction contracts awarded the values of most other types of construction can be estimated, except work done on force account. Finally, accounting or budgetary data on expenditures for new construction can be obtained for certain agencies, chiefly governmental bodies and public utility corporations. Since these cover both contract and force account work, they are used in estimating total construction for the accounts of these agencies. Various adjustments and manipulations of the basic data, founded on certain assumptions, are necessary in order to get estimates that include all new construction (wherever located and whatever the size of the project), have proper meaning (i.e., represent construction activity, or construction work completed), and cover the total cost of new structures.

2) The value of manufactured output compiled in the *Census of Manufactures* is the basis for estimating the flow of new durable goods other than fixed structures. The commodity data reported by the Census must be classified into the following categories:

- A Unfinished (all construction materials, and all other commodities exclusively bought by business except durable goods in finished form)
- B Finished (commodities ready for distribution solely to ultimate consumers, and producer durable goods)
  - i Consumer perishable goods
  - ii Consumer semidurable goods

- iii Consumer durable goods
  - iv Producer durable goods
- C Mixed (commodities, except durable goods, in finished form, i.e., in form purchased by ultimate consumers, partly purchased and consumed by business)
- i Consumer perishable goods
  - ii Consumer semidurable goods
  - iii Unfinished portions used up in business

Further classification is necessary to segregate producer durable goods exclusive of those going to ultimate consumers and consumer durables actually going to producers and hence properly regarded as producer goods. In general, the values so obtained are manufacturers' sales values of output. Certain adjustments, made in order to approximate the final values of goods when transferred to final holders, are designed to allow for changes in manufacturers' inventories of finished goods (finished in the present sense), for exports and imports of goods classifiable as final products, and for transportation and other distributive margins between fabricators' sales values and cost to final holders. The sum of the final values so estimated for producer durable goods constitutes the equipment component of GCF.

Only to a limited extent do the data constituting the estimates come directly from the final holders of durable goods.

Various breakdowns can be obtained from these data and procedures. Construction estimates can be shown according to kind, e.g., buildings, roads, and according to general types of final holders, e.g., commercial, factory, public utility, public. The flow of equipment is available by kind of product in great detail at the stage of production, also in some detail by producing industry. But for most equipment no great detail of final values is possible. Much equipment at producers' values can, of course, be classified by type of final holders through scrutiny of the possible uses. But it is not possible to go far in deriving totals of new structures and of equipment having comparable inclusiveness for subclassifications by type of final holder; for example, not even for the major subgroups of manufacturing.

#### *B Basic data on capital consumption*

Since actual data on current capital consumption can be obtained only from the holders of durable goods, a survey of their nature is

a necessary step in ascertaining the comparability of measures of GCF and CC. Discussion of methods of accounting for durable goods classifiable in Variant B<sub>1</sub> of GCF forms part of a wider discussion of possible accounting methods for all producer durable goods. Such an inclusive outline is introduced here.

In general ultimate consumers do not keep systematic records of their holdings of durable goods. Governmental agencies necessarily keep some records, but these are highly incomplete in coverage of agencies, kind of property, and the types of data (e.g. maintenance, depreciation). A similar statement is applicable to private agencies exempt from federal income taxation. The records of private business, although somewhat more complete, are seriously wanting in uniformity and suffer from major omissions. The available data are confined chiefly to business corporations. In fact, virtually the only data derived from the records of holders of durable goods directly useful for estimating periodic capital consumption are those on depreciation and depletion reported by all corporations to the Bureau of Internal Revenue (BIR) and published in *Statistics of Income*, those reported in published statements, and those reported to and compiled by regulatory authorities.<sup>10</sup>

### *C Methods of accounting for acquisition and dissipation of durable goods*

The following outline of methods of accounting for durable goods applies for the most part, then, to business enterprises alone.

Acquisitions of durable goods are accounted for according to some one of the methods described under either of the following two headings:

- 1) By offsetting values of durable goods acquired in each period against gross revenues of the same period
  - a) This is the method known as maintenance accounting when followed for new durable goods that are replacements for existing

<sup>10</sup> As defined by the BIR the term 'corporation' in the Internal Revenue Code includes associations, joint stock companies, and insurance companies, both stock and mutual. As for associations, "it is immaterial whether such organization is created by an agreement, a declaration of trust, a statute or otherwise". It includes all 'trusts' except those of the traditional kind, which are ". . . created by will or by declaration of the trustees or the grantor, the trustees of which take title to the property for the purpose of protecting or conserving it as customarily required under the ordinary rules applied in chancery and probate courts". See U. S. Treasury Department, Bureau of Internal Revenue, *Regulations 103—Income Tax—Internal Revenue Code, 1940*, pp. 662-6.

assets. In this case the values standing on the books for old assets are simply not written off. It is the method used with few exceptions for the non-separable durable products of repair and maintenance work. An important use is found in the accounting of railroads for replacement rails and ties and other renewals.

b) When applied to accounting for other producer durable goods, the method is referred to simply as charging capital expenditures to income.

It is followed by most companies owning oil and gas wells in accounting for 'intangible development cost' in their federal income tax records.<sup>11</sup> The BIR requires that certain types of outlay in other mining industries, in the nature of capital expenditures, be charged to the expense of the period.<sup>12</sup>

Capital expenditures on other types of durable goods are often charged to income. In addition to the erratic charging of improvements to income, there is a considerable tendency toward using this method of handling expenditures for relatively short-lived durable assets such as tools, dies, fixtures, and patterns, which often may be intended primarily for particular models or orders and may be of doubtful or uncertain usefulness otherwise. There is, perhaps, a greater tendency to charge expenditures to income when the outlay per unit or the total outlay in a transaction is low, such as for tools, accessories, attachments, office equipment, furniture. Certain types of expenditure on durable goods as a matter of general business practice may be charged against income as they occur, such as furniture and fixtures in the banking business.

The method of maintenance accounting or charging capital ex-

<sup>11</sup> These costs are ". . . expenditures for wages, fuel, repairs, hauling, supplies, etc., incident to and necessary for the drilling of wells and the preparation of wells for the production of oil or gas . . .", in general, everything not accounted for in the acquisition prices of durable goods that are prescribed by the BIR as bases for depreciation, i.e., assets that have salvage value, including materials going into fixed structures as well as equipment. Taxpayers were given, in 1918 and again in 1925, the option of charging to expense or to capital account, subject to the restriction of no subsequent change in method for a given property. A new taxpayer must choose at the time of the first return. See U. S. Treasury Department, Bureau of Internal Revenue, *Regulations 103—Income Tax—Internal Revenue Code, 1940*, pp. 116-8.

<sup>12</sup> These are "Expenditures for equipment (including its installation and housing) and for replacements thereof, which are necessary to maintain the normal output solely because of the recession of the working faces of the mines, and which (1) do not increase the value of the mine, or (2) do not decrease the cost of production of mineral units, or (3) do not represent an amount expended in restoring property or in making good the exhaustion thereof for which an allowance is or has been made . . ." See *ibid.*, p. 116.



penditures to income is one that accounts at once for acquisition and, however arbitrarily, for using up or expiration of usefulness.

2) By setting up values, usually cost to the holder, to be carried on the books subject to eventual write-off, with or without periodic or occasional adjustment

a) The principal method under this heading is depreciation accounting, i.e., periodic reduction of original cost values and corresponding offsets to revenues, usually according to a general rule which, given original cost, estimated salvage value less cost of removal, and estimated period of usefulness, determines the charge for each year. The BIR, while willing to countenance any other ". . . recognized trade practice, such as an apportionment of the annual sum over units of production . . ." <sup>13</sup> strongly favors the method of equal annual installments. A description of the method is not complete without reference to the handling of net positive values that may be standing in account books for assets when abandoned, or the excess of book value over the difference between the amount realized from the sale and the cost of disposal.

One method, favored by the BIR, is that followed as a phase of the 'group plan' of depreciation. When carried out systematically it consists in grouping a firm's assets into several classes according to the length of prospective economic life, and applying an average depreciation rate (straight line formula) to the assets of each group. The method assumes that any individual retirement is already covered by the depreciation reserve, just as, for an insurance scheme, any individual casualty is covered by the insurance reserve, having been actuarially taken into account in the computation of premium rates. Accordingly, the book values of assets retired are charged against the depreciation reserve. In the group plan these values are the original values, since the scheme does not call for a separate depreciation allowance account for each asset.

On the same basis, when assets are depreciated individually, residual book values may be written off against the depreciation reserves in the aggregate if there are corresponding offsets through the building up of the aggregate reserve by charges for depreciation on other assets over periods of use beyond the expected useful lives assumed in the rates. This method, although frequently used in corporate records, is not permissible for income tax computation.

The usual method of treating residual book values at retirement

<sup>13</sup> See *ibid.*, p. 93.

consists of charging them against the income of the period in which retirement occurs. The BIR requires this plan when the asset in question has been the subject of separate depreciation allowances.

Residual book value at retirement may be canceled against surplus. This is the surplus adjustment method, favored by those who wish the final net profit figure exhibited for a given fiscal period to be free from the effects of entries that are essentially no more than corrections of entries made in earlier periods.

b) Other methods involve the cancellation, at the time of retirement, of original book values

i) With corresponding charges against the revenues of the periods in which retirements occur. The pure retirement accounting method is prescribed by the BIR when depreciation is not allowable because useful life is unpredictable.<sup>14</sup>

ii) With corresponding deductions made in installments from the revenues of two or more periods subsequent to actual retirement. This method is known as suspense accounting. Although examples are frequently found in published financial data of public utility corporations, suspense accounting is not permitted for federal income tax computation.

iii) With charges to revenues periodically that are intended to represent a smoothing out of the series of periodic charges against revenues that would be had if the pure retirement method were followed. This is the retirement reserve method.<sup>15</sup> The reserve is credited periodically with amounts charged against revenues. Book values of assets are removed from the books by offsetting them against the reserve. The determination of the amounts to be charged as periodic expense may be more arbitrary than by any depreciation formula, since no rules are established at the outset that substantially if not completely determine the charges for any period on account of a given durable asset or group of assets. Unless a substitute formula is set up, the determination of the total charge to expense must be made separately for each period. Such a substitute formula may be simply a prescription of equal charges in

<sup>14</sup> If circumstances arise that positively indicate a short further life of such an asset, it may be written off over that remaining life through depreciation charges deductible in computing taxable net income. Such a circumstance would be, for example, an order of a regulatory commission authorizing abandonment by a specified date, or a similar decision of a board of directors when no authorization is needed.

<sup>15</sup> The retirement reserve is regarded as a surplus reserve rather than as an asset valuation reserve since it is not determined in such a way as to measure the progress, on the average, of a group of assets from acquisition toward the scrap heap.

every period for a specified number of periods or the determination of periodic charges by application to periodic gross operating revenues of a percentage held fixed through time.

Pure retirement accounting is required by the BIR for assets whose useful lives are so much a matter of conjecture that the deduction of annual depreciation charges for the computation of taxable net income is not permitted. The principal and by far the most important kind of asset to which this restriction applies is railway roadbed. Street and electric railways and electric and gas utilities for many years followed retirement methods of accounting. In the last several years most of them have changed over to depreciation accounting in their corporate records, and all are now required to use depreciation accounting for income tax records.

c) Expenditures on some types of item, usually when the cost per unit is low, are often handled on an inventory basis. That is, the expenditures are carried to deferred charge accounts which are adjusted periodically by charges against income sufficient to reduce the balances to levels dictated by the results of actual inventory taking. This is in effect a method of retirement accounting. There is a tendency to handle small tools, containers, etc., in this fashion.

d) The expiration of values of durable goods due to accidental losses covered by insurance is charged against revenues by the insured in the form of periodic insurance expense rather than retirement loss. A difference between book value written off and value recovered gives rise to the adjustment of surplus or of net income. The collective effect of variations in actual losses from the rate assumed in the determination of premiums gives rise to adjustments in insurance company reserves. In any period, actual losses are measured by insurance company entries for losses, i.e., charges against reserves; expectation of loss, or risk, is measured by premium rates.

e) The acquisition and development cost of mines, quarries, and oil and gas wells is apportioned equally over the estimated total output so that periodic adjustments of asset values are made proportional to output. Depletion and amortization accounting of this sort is strictly analogous to depreciation accounting except for the method of allocation among time periods. However, federal income tax regulations permit deductions for depletion on two other bases. Depletion may be computed on the basis of discovery value in the case of mines other than coal, metal, sulphur, and oil and gas wells. Discovery value is the "fair market value . . . at date of discovery

or within 30 days thereafter . . ." if the property is not acquired by purchase of a proven tract, and ". . . if the fair market value is materially disproportionate to cost".<sup>16</sup> In the case of oil and gas wells, and coal, metal, and sulphur mines, depletion computed as a percentage of gross income for the period, subject to certain restrictions, may be deducted in deriving taxable net income. Percentage depletion is not limited in cumulative amount to the ordinary cost basis for depletion or to a 'discovery value' basis.<sup>17</sup>

The fact that total depletion through time is not necessarily limited to the cost of development raises an important issue concerning the acceptability, in estimates of national income produced according to distributive shares, of estimates of profits as affected by such depletion charges. It is convenient in the same connection to consider the suitability of accounting depletion data for estimating the total value of natural resource depletion. A digression dealing with these matters is introduced here, after which the accounting data available for the measurement of current capital consumption are discussed.

#### *D Digression on accounting depletion and the estimation of national income*

In connection with the estimation of national income by distributive shares, the question has been raised whether accounting estimates of net profits in mining industries (including oil and gas production), calculated according to federal internal revenue laws and regulations, should be allowed as a deduction from the profit share of income produced in mining. It may further be asked whether a rejection of tax depletion charges for the purpose of distributive share estimates of national income should imply the necessity or desirability of a similar rejection of tax depletion charges as a usable basis for estimating capital consumption in the form of the extraction of natural resources of limited potential supply.

A class difference seems to exist between the mining industry and other industries with respect to divergences between tax and book net income arising from charges for depreciation and depletion. Inspection of the reports of individual mining corporations reveals a substantial tendency in computing book net income to use de-

<sup>16</sup> *Regulations 103*, p. 102.

<sup>17</sup> The cost of developments having an (average) durability of three years or more should but actually does not for the most part enter into existing measures of GCF (see below, Sec. III A).

pletion deductions much smaller than those allowable for income tax computation.<sup>18</sup>

The essential difference in taxable net income for mining compared to other industries lies in the fact that total depletion recoverable, unlike depreciation, is not limited to cost or fair market value as of March 1, 1913. Bureau of Internal Revenue regulations permit the use of 'discovery value' if the 'fair market value is materially disproportionate to cost',<sup>19</sup> also for certain mining industries 'percentage depletion' calculated by applying percentages fixed by law to gross income (gross revenues from the sale of minerals at prices exclusive of transportation). Percentage depletion, moreover, is not limited in cumulative amount recoverable to the amount of any of the three bases permitted for computing depletion per unit of output. The Treasury apparently regards these provisions as so liberal as in effect to give mining industries a subsidy. Evidently taxable net income in mining is to some extent not properly comparable with the same item for other industries.

From our standpoint, the measurement of capital consumption, there are two questions. First, should the estimates of capital consumption cover elements, i.e., values of natural resources, never shown in GCF? There is no question, of course, concerning the inclusion of development costs in GCF and of amortization of development costs in CC. Second, are the data on depletion charges sufficiently good to serve as bases for estimating the value of natural resources used up in production?

Undoubtedly most exploited bodies of natural resources possess net economic value. Also the intra-marginal quantities of such resources withdrawn for use in production partake of those values; in fact, the former have value because the withdrawals are sufficiently important under certain conditions for prices to be paid to cover costs of withdrawal and premiums that include pure rent. If all economic goods are to be accounted for, the value of natural resources used up in production must be included. However, any estimator is at liberty to define his aggregate net value concept so as to include as an offset to the value of durable goods produced only the value of produced durable goods used up. Or he may choose actually to include values of natural resources used up as an offset to values of final products, not as a component of the consumption or negative component of the net output of new pro-

<sup>18</sup> See Fabricant, *op. cit.*, pp. 91-7.

<sup>19</sup> See *Regulations 103*, p. 102.

ducer durable goods, but rather as a separate item of social capital consumption.

The problem of profits estimation requires attention to capital maintenance from the standpoint of the business firm. Such capital maintenance demands, in the first instance, recovery of the original investment (cost), assuming no change in prices. But the social value of natural resources as measured by net economic rents may depart widely from the sum of private investments made to acquire the rights to derive incomes by exploiting natural resources. Therefore the depletion charges appropriate from the standpoint of breaking down enterprise net revenues into the two components, return of investment and net income on investment, may not be acceptable as measures of the values of natural resources used up in production.

We have, then, set forth a distinction that makes possible rejection of unrevised allowable depletion charges as determinants of profits in mining industries, even though they might be acceptable for measuring values of natural resources, in combination with values of mining developments, used up in production. Allowable depletion charges may afford as good a basis for measuring the value of natural resources used up in production as do accounting depreciation charges for measuring the values of produced durable goods used up in production, perhaps significantly better in certain respects.<sup>20</sup> In other words, the two sets of data may be of the same order of badness. However, only through careful study of the economic conditions of mining industries could it be hoped to get some notion of the direction and general magnitude of error inherent in any estimates of the value of natural resource consumption founded on charges for depletion made under federal income tax regulations.

Since students are interested in breakdowns of GCF, CC, and NCF by type of holder, it is desirable to distinguish between the share of each on private account and on public account. These breakdowns would call for isolation of the part of the value of privately owned natural resources and developments used up that may be regarded as the return of investment to private firms. This would be done automatically by adjusting depletion data in order to derive profits estimates for mining industries having the proper meaning.

<sup>20</sup> That is, so far as percentage depletion produces estimates of resource use approximating the values that could ideally be imputed to the resources as well as to the factors employed in the production of the resources.

*E Accounting data and the measurement of current capital consumption*

Comprehensive data on accounting depreciation and depletion charges for income tax records are available for all corporations subject to federal income taxation. From these, estimates can be made to cover most of the remainder of the business economy. Data arising from other capital accounting range in availability down to nonexistence. For maintenance and repairs, rather good data exist covering the important public utility industries, and considerable recent sample data have been brought together for industrial concerns.<sup>21</sup> Some accounting data are available on other capital expenditures charged to income, chiefly 'intangible development cost' of oil and gas well drilling. Few data exist on actual retirement charges.

In what senses do periodic accounting data, i.e., charges for depreciation, depletion, maintenance and repairs, retirements, capital expenditures, and accidental loss, measure current capital consumption? Capital consumption current in a period is defined above as the decline in the current value of durable goods attributable to the current expiration of service potential. Charges against income for the cost of new capital, replacements, or maintenance, cannot be presumed, in the light of the arbitrary character of their determination, to bear the same relation to this definition as do depreciation charges. The objection to charges by the pure retirement method is equally strong. In a perfectly stationary economy where there would be no changes in the age composition, no price changes, and no accidental loss of capital equipment, the sum of the three measures could be taken as a satisfactory over-all measure of periodic capital consumption. However, these conditions do not prevail. It is obviously necessary, if the measurement of capital consumption is to be founded upon accounting data, to adopt a variant of GCF comparable to whatever measures of capital consumption can be constructed. Depreciation and depletion charges are the sole body of such data directly relating to current capital consumption.

As a practical matter, then, since no adequate data are available for measuring the consumption of consumers' movable durable goods and their durable repairs and servicing, they may be eliminated from GCF. If this category is assumed to include movable

<sup>21</sup> See *Survey of American Listed Corporations* (various issues), a Work Projects Administration study sponsored by the Securities and Exchange Commission.

durables in the hands of governments, the problem of the consumption of naval vessels, military equipment, etc., is also removed. Measures of maintenance and repairs may be eliminated for lack of a reliable basis for estimating the rates of expiration of the values produced by such work. Thus we are left with GCF substantially in the form of Variant B<sub>1</sub>, defined above. This category is still somewhat more inclusive than components passing into the hands of business firms for which accounting data on depreciation and depletion are available. Plausible estimates have been inferred for most noncorporate business from data for corporations. Synthetic measures, based on estimates of the types of GCF concerned and assumptions concerning the length of useful life, have been constructed for nonfarm residential construction, for farm fixed structures and equipment including dwellings, and for equipment and new construction for the account of governmental agencies. Corresponding segments of gross capital formation constitute the principal nonbusiness components of Variant B<sub>1</sub> of gross capital formation.

The data on capital consumption are available in detail by industries which are the final holders of durable goods. For important major divisions, primarily certain public utility industries, comparable data on the acquisition of new durable goods and on capital consumption can be obtained. Additional breakdowns, of manufacturing industries for example, thus far do not appear feasible because of the few details by final holder available in estimates of GCF.<sup>22</sup>

### III Defects in Estimates of Gross Capital Formation and Capital Consumption

#### *A Gross capital formation*

Critical discussion of the gross capital formation and capital consumption estimates used by Mr. Kuznets in computing net capital formation should in the first instance be undertaken in the light

<sup>22</sup> This statement applies to direct estimates of GCF made by following the goods produced through to their holders. Data on capital expenditures by manufacturing industries have been used in 'indirect' estimates of periodic capital expenditures of certain manufacturing industries. See Lowell J. Chawner, 'Capital Expenditures in Selected Manufacturing Industries', *Survey of Current Business*, Dec. 1941, pp. 19-26; see also his 'Capital Expenditures for Manufacturing Plant and Equipment—1915-1930', in *ibid.*, March 1941.



of the definitions basic to the estimates, those pertaining to his Variant IV of capital formation. Variant B<sub>1</sub> does not differ from the durable goods components of his Variant IV. The former includes major alterations to old durable goods on the grounds that new structures (fixed or movable) are in fact created to the extent of those improvements, and that special interest attaches to the production of new structures. Mr. Kuznets' Variant IV likewise includes major alterations and excludes repairs.<sup>23</sup> Thus, commentary on the estimates in comparison with the concepts to which they have been related is applicable with slight and obvious modification to their comparison with Variant B.

1) Attention may be paid first to gaps in the estimates of new construction. Since Mr. Kuznets' estimates of capital formation used in his later volume, *National Income and Its Composition* (National Bureau of Economic Research, 1941), were based, for the construction component, on *Construction Activity in the United States, 1915-1937* (U. S. Department of Commerce, 1938), the shortcomings in those estimates may be noted. The estimates of construction by type in Mr. Kuznets' *Commodity Flow and Capital Formation* (National Bureau of Economic Research, 1938), based on substantially the same sources, embody the same defects as well as others, notably failure in some cases to measure activity.<sup>24</sup> The following omissions are noted in the Department of Commerce bulletin:

a) Value of construction for the account of miscellaneous private utilities, including water supply, piers and docks, steam companies, toll bridges, and other public utilities under private ownership except railroads, street railways, subways, pipe lines, electric utilities, gas production and distribution, and telephone and telegraph communications. It is thought that this omission may have been as much as \$100 million in some years.<sup>25</sup>

b) Miscellaneous private works, other than buildings and miscellaneous private utility construction, such as roads and other improvements on private estates, waterfront improvements by private companies, construction other than buildings in connection with

<sup>23</sup> See *Commodity Flow and Capital Formation*, pp. 5-9, 469-71.

<sup>24</sup> Actually it is estimates of construction projects completed that are wanted for inclusion in GCF. Changes in inventories should therefore include changes in the value 'in place' of construction work in process. Work is now being done in the Department of Commerce to derive estimates of construction completed.

<sup>25</sup> See *Construction Activity*, p. 14.

golf courses, and a number of other types of work for which no suitable statistics appear to be available, also roads, dams, and earthworks for private subdivisions, etc. It is thought that these omissions constitute not more than a small fraction of total non-residential construction.

c) Other construction work, including work on force account, e.g., oil and gas well-drilling, mining and forestry development, building additions and alterations (not contract, or not requiring permits in the case of residences).

2) The following shortages exist in estimates of producer durable goods other than fixed structures:

a) Output for own use of durable goods and their parts except durable repair work, other than fixed structures.<sup>26</sup> This omission covers a wide variety of force account durable goods output: tools, dies, patterns, jigs, fixtures, drawings, models, machines, samples, etc. For some manufacturing industries such items must be quite insignificant. No doubt they are important in certain of the metal working industries. Although there are no data to indicate the magnitude of production of finished commodities for use within the producing establishments,<sup>27</sup> “. . . it may be surmised that the volumes . . . are insignificant, at least for nonfarm business establishments.”<sup>28</sup>

b) Understatement of the flow of producers' durables resulting from the method of allocation according to preponderant use.<sup>29</sup>

3) There are certain other minor omissions from Mr. Kuznets' Variant IV:

a) Elements that constitute part of the total cost of producer durable goods to their ultimate holders but are not invariably or ordinarily taken into account in accumulating the total values of

<sup>26</sup> See *Commodity Flow and Capital Formation*, p. 276.

<sup>27</sup> Largely because the *Census of Manufactures* compiles totals from reports of manufacturers' value of product 'for sale or interplant transfer' only. A guess has been hazarded by George Terborgh as to the value of output of equipment for own use. See his 'Estimated Expenditures for Durable Goods', *Federal Reserve Bulletin*, Sept. 1939. Terborgh assumed that production of equipment for use within the same plant accounted for 15 per cent of total charges to equipment accounts in mining and manufacturing.

<sup>28</sup> *Commodity Flow and Capital Formation*, p. 276.

<sup>29</sup> This defect, recognized by Mr. Kuznets, was introduced in *Commodity Flow and Capital Formation* by the classification of passenger automobiles entirely as consumers' durable goods. For the estimates of durable goods flow now being prepared in the Department of Commerce an allocation has been made between producers' and consumers' durable goods.

producer goods at their destinations after manufacture, transport, and distribution. Such things as engineers' and architects' fees are obvious cases in point. Although specific allocations may not or perhaps cannot ordinarily be made, certain other firm costs are properly allocable to new durable goods acquired, such as cost of services of staff analysts and engineers for forecasting and estimating durable goods requirements, planning and arranging productive setups to accommodate new machinery, equipment, etc; purchasing, and perhaps other activities required in connection with acquisitions of capital goods. Because of allocation difficulties, costs of these types are probably on the whole not charged to capital account and hence are omitted from charges for depreciation and depletion. These are further examples of capital expenditures charged to income but properly chargeable to the account of tangible business assets.

b) Overstatement of the value of contract, custom, and repair work for others. Classified by Kuznets as 'repairs and servicing of durable goods', this item probably includes some work constituting production of new finished producers' durables. Such work probably amounted to not more than \$100 million for 1929.

4) Errors of inclusion may also be discussed under (a) new construction, and (b) other new producer durable goods.

a) Construction contract data (Dodge) have the defect of covering more than new structures and additions to and improvements of existing structures. If the adjustments of the data made to cover all areas, all sizes of contracts, and such items as engineering and architectural fees, not included in the reported values of contracts are accurate, the figures would be excessive according to the definition of Variant IV by the amount of contracts for repairs to existing structures, including replacements of parts not regarded for purposes of capital accounting as distinct from the structures into which they enter. Repairs are covered in the contract data if two or more trades are involved, and if the contract value is greater than a specified minimum. Accordingly there is a conceptual overstatement of new building construction; it is regarded, however, as quantitatively unimportant.<sup>30</sup>

This objection does not apply to new public utility buildings, for which estimates are based on actual reports of capital expenditures,

<sup>30</sup> *Construction Activity*, p. 7.

so far as the criteria used in capitalizing expenditures are consistent with the definitions advanced above.

Construction estimates for residences, based on building permit data, also include major repairs as well as alterations and new structures. This factor may or may not be offset in the estimates of residential construction by failure to adjust perfectly for other imperfections in the basic data. Estimates of farm construction of all kinds are similarly inclusive.

A further difficulty with construction data lies in two sorts of duplication. First, capital expenditures reported include some expenditures represented in values of contracts. Second, capital expenditures reported include expenditures on equipment, whose value of output is covered in the equipment component of GCF. These duplications have not yet been completely eliminated in the computation of total GCF.

b) There seems to be an error of inclusion, not accepted as such in *Commodity Flow and Capital Formation*, in the totals of new producer durable goods other than construction. The list of producer durable goods includes several items of parts for sale as such, including parts for machinery, farm equipment, locomotives and railroad cars, aircraft, etc. In some cases the classification does not permit breakdowns between accessories, which it may be possible to assume to be additions to finished movable durable goods, and parts that to some extent at least are simply raw materials for use in repairs. To the extent that the latter is the case, such elements should properly be allocated to the category used for durable contract and repair work, 'repairs and servicing of durable goods'. In this case the establishment manufacturing repair parts for producer durable goods is simply doing part of a job of repair for sale, instead of an entire repair job which would obviously be classifiable as repair work to be counted as part of repairs and maintenance in a variant of GCF broader in scope than Variant IV. Possibly this inclusion could be justified on the ground that it offsets a certain error of omission. The omission is that part of the contract component of contract and repair work on account of producer durable goods which consists of new durable goods that properly should be classified in Variant IV. However, Kuznets' position is that ". . . especially among producers' durable commodities, parts have a rather long life; and the total of several machines may be treated as a combination of parts since they are ordinarily replaced piece by piece until only the framework of the machine survives. It there-

fore seemed advisable to treat parts of producers' durable commodities for sale as such as finished durable commodities . . ." <sup>31</sup>

We may ask what justification there is for distinguishing between durable repairs and maintenance and durable parts used for replacement other than that of mere convenience. The basis for distinction between Variant B<sub>1</sub> and other versions of GCF set forth in this paper calls for the inclusion of such parts only in a variant more inclusive than that intended to measure the flow of new producer durable goods.

### *B Accounting estimates of capital consumption*

Estimates of capital consumption may be defective, that is, they may not cover everything that should be included in GCF, or they may include certain components for which the corresponding asset item should not enter into GCF. There are two classes of defects in existing measures: (1) those arising from the peculiarities of the available business accounting data; (2) the incompleteness and the inadequacies of the procedures for estimating the consumption of durable goods held by other agencies than those business enterprises for which we have data.

Estimates of the depreciation on residences must be based upon estimates of new residential construction. Estimates of the consumption of farm structures and equipment and of producer durable goods held by governments must likewise stem directly from estimates of GCF for the accounts of these agencies. Accordingly there can be no question in these instances of the proper comparability of GCF and CC. As for business depreciation, pertinent to the first type of defect it has already been noted that (1) some capital expenditures are charged directly to income, (2) some are charged to income in entirety at retirement, (3) some are so charged only to the extent of undepreciated book values,<sup>32</sup> and (4) some are charged in the course of the periodic adjustment of deferred charge accounts used as records of durable supplies. Income deductions of these types are frequently shown in juxtaposition to depreciation in published statements or even, in the case of (3), in combined aggregates.<sup>33</sup> They are, however, not classifiable as depreciation in

<sup>31</sup> *Commodity Flow and Capital Formation*, p. 14.

<sup>32</sup> In the cases of (2) and (3), such charges should be understood to include uninsured accidental losses, and any excess of book value of lost assets over insurance recovered.

<sup>33</sup> Numbers (1), (2), and (4) obviously indicate omissions with respect to the measurements of current capital consumption. Item (3) bears a different relation to the concept. What this shows in the first instance is that errors, shown up *ex post* in the

computing taxable net income. Usually, if not invariably, they are reported in 'other deductions' or in 'losses' on the face of the income tax return, and are classified as 'other deductions' in *Statistics of Income*.<sup>34</sup>

Certain further technical points may be noted concerning the suitability of accounting data for measuring capital consumption: 1) The data include depreciation on values in excess of original cost new, when assets have been transferred to new holders and recorded, for purposes of federal income tax accounting, at values greater than the depreciated values on sellers' books.<sup>35</sup>

If depreciation is to be viewed as a decline in the 'current value' of durable goods, the desired estimates of depreciation may seem more closely approximated by depreciation charges calculated from bases revised from original cost through later transactions. This may be true only if the revised bases represent competitively determined prices for produced durable goods as such, rather than a price for an enterprise as a whole based on the earning power, not simply of particular durable goods, but actually of a going concern, perhaps with established business relations, locational advantages, a good working force, etc.

From the standpoint of this paper, even the first type of valuation change is inappropriate because the problem of correcting for price change has been ruled out of consideration. Further, it is inconsistent with Mr. Fabricant's method of converting depreciation from accounting prices into current prices which involves the assumption that depreciation bases are always original cost new. Finally, the relationship, extremely crude as it is, between the fluctuating current prices of newly produced goods and the revaluations of old assets in business income tax records involves grossly excessive time lags which disallow any supposition that the prices

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undepreciated balance at retirement or the excess of book value over net yield from disposal, have been made in the allocation of depreciation charges among time periods. Therefore, unlike the other items, item (3) has a highly uncertain implication and in fact necessarily small significance for the measure of capital consumption for a given short period.

<sup>34</sup> Statements by officials of the BIR support this observation.

<sup>35</sup> The BIR does not permit goodwill as a part of the basis for depreciation of tangible assets acquired in the purchase of a business; however, it does permit the use of values higher than original cost. In the case of public utilities, for example, the basis would be determined in the light of valuations according to reproduction cost less depreciation when available, or according to the vendor's book value if ascertainable and acceptable, or if not, by negotiation.

implicit in depreciation bases revised from original cost are systematically closer to current prices than are original cost prices.

2) Depletion charges in federal income tax accounting may include, in addition to development cost, the spreading over output of other elements, chiefly representing capital gains. These may be (a) the acquisition cost of a resource so far as applicable to the resource *per se* rather than the development, (b) 'discovery value', and (c) taxes and other carrying charges on properties while unimproved and unproductive. Percentage depletion in effect involves similar inclusions.<sup>86</sup>

3) A statistical ambiguity arises in the use of Bureau of Internal Revenue data on charges for depreciation and depletion. There are two versions, the preliminary and the final. The latter are determined after the auditing of the returns. Amounts of such charges disallowed are reported as a lump sum for all corporations.<sup>87</sup> The revised depreciation deductions may be presumed to be more reliably established than those originally reported.

Depreciation data are more susceptible to direct change as a result of legislation or of administrative action than are the data basic to the estimation of GCF. Legislation has produced important changes in deductions from income for depletion. More recently administrative action has substantially affected the depreciation deductions allowed.<sup>88</sup>

4) Another statistical point, of opposite effect, is the inclusion of some depreciation and depletion charges in 'cost of goods sold'. In recent issues of *Statistics of Income* it is pointed out that this item includes depreciation and depletion ". . . only to the extent that these deductions are reported as part of such costs". However, the income tax return form prescribes on its face a deduction to be derived on a depreciation schedule which calls for a final total of depreciation necessarily including amounts that may be charged into the cost of goods sold in cost accounting systems. The Bureau of Internal Revenue assures us that depreciation included in the cost of goods sold is negligible.

5) Depreciation may be deducted, in computing taxable net income, to amortize the cost of intangible assets such as patents, trade-

<sup>86</sup> See *Regulations 103*, pp. 97, 311, 321. Questions raised by this situation are discussed in Sec. II D.

<sup>87</sup> See *Annual Report of the Commissioner of Internal Revenue*, various years.

<sup>88</sup> See Treasury Decision 4422 (1934), and Fabricant, *Capital Consumption and Adjustment*, pp. 84-6.

marks, copyrights, licenses, and franchises whose use or usefulness is definitely limited in duration.

6) Incomparability in estimates of GCF and capital consumption may exist so far as depreciation is charged on assets not actually classified as durable in estimating GCF. The opposite type of situation is covered under other headings above. This omission may be more than negligible, but is doubtless not large.

7) Capital consumption in the form of producer durable goods cannot be inclusively estimated without taking into account accidental losses. NCF has so far been computed without allowance for such losses other than fire losses covered by insurance.

8) There are excesses in the breadth of scope of the corporate accounts that underlie *Statistics of Income*. Depreciation data include charges on some assets located outside the continental boundaries of the United States (excluding Alaska). Such durable goods are not included in the national stock of durable goods, the additions to which constitute gross capital formation according to Variant B1. Domestic business concerns carrying on operations outside the United States<sup>39</sup> must file income tax returns on the basis of all operations, foreign as well as domestic, subject to important exemptions in the case of operations in United States possessions.

9) In considering the merits of accounting estimates of depreciation it should be emphasized that the underlying records are often if not usually highly imperfect. The depreciation aggregate for corporations is in large part a sum of charges for enterprises that are, or in the past have been, derived on a highly indefinite basis rather than from meticulous record-keeping and careful forecasting. This fact is strongly reflected in the controversies between the Bureau of Internal Revenue and taxpayers over income tax depreciation deductions.<sup>40</sup>

Existing estimates understate capital consumption because producer durable goods held by certain classes of agencies are not cov-

<sup>39</sup> That is, not through the medium of foreign subsidiaries. However, a foreign subsidiary "organized under the laws of Canada or Mexico and maintained solely for the purpose of complying with the laws of such country as to title and operation of property", when the entire capital stock is held directly or indirectly may by irrevocable election be included with the parent in a consolidated return. See *Regulations 103*, p. 403.

<sup>40</sup> See A. B. Hossack, 'Accounting Procedures for Capital Assets and Depreciation', *National Association of Cost Accountants, Year Book, 1936*, pp. 121-37.



ered. Foremost among these omissions is the depreciation on streets, roads, highways, and sewers. As has properly been pointed out,<sup>41</sup> the assumption, forced by lack of data, that the using up of these types of government-owned durable goods is measured by maintenance outlays is quite unsatisfactory. Obviously maintenance work does not completely offset the expiration of usefulness of these assets resulting from wear and tear and obsolescence. The economic life of a highway or street pavement, subject as it is to the wear and tear of use and the elements, may be predicted as reliably as that of many business-owned durable goods on which depreciation charges are figured. Furthermore, it is common knowledge that facilities of these types frequently become obsolete. The old pavement is eventually scrapped and replaced. Sometimes sewers cannot be improved; instead the old structure has to be abandoned. In both cases entries are made to the account of GCF (IV); corresponding entries should be made to the depreciation account. The correct estimate of depreciation on these types of public capital goods must clearly be enormous, a substantial addition to existing measures of capital consumption.<sup>42</sup>

Second, the following gaps in the coverage of noncorporate business, ranked roughly in the probable order of quantitative importance, may be noted:

- 1) Service industries: personal, business, auto repair and service, other repair service, custom manufacturing industries, services allied to transportation, amusements, professional service, private education, and other service industries, except motion picture production.
- 2) Finance, real estate, and related businesses, except for rented business real estate held by individuals.
- 3) Oil and gas wells.
- 4) Transportation: taxicabs, buses, etc.
- 5) Other utilities: gas, radio broadcasting, aviation and allied activities, etc.
- 6) Fisheries (also corporations so classified).
- 7) Forestry (also corporations so classified).
- 8) Illegal enterprises other than those operating under the guise of corporations.

Third, there are other important omissions outside the range of

<sup>41</sup> Fabricant, *op. cit.*, p. 123.

<sup>42</sup> *Ibid.*, p. 137, note.

corporations subject to federal income taxes and complementary noncorporate private businesses, consisting of other private agencies, nonprofit associations, and tax exempt corporations: <sup>43</sup>

- 1) Churches.
- 2) Corporations, funds, foundations, organized and operated exclusively for religious, charitable, scientific, literary, or educational purposes; civic leagues or organizations operated exclusively for the promotion of social welfare; local associations of employees net earnings of which are devoted exclusively to charitable, educational, or recreational purposes; hospitals.
- 3) Labor, agricultural, or horticultural organizations.
- 4) Fraternal beneficiary societies, orders, or associations; voluntary employees' beneficiary associations.
- 5) Mutual savings and cooperative banks; nonprofit mutual domestic building and loan associations; mutual nonprofit cemetery, ditch, irrigation, telephone, local life insurance, farmers' or other mutual casualty companies; teachers' retirement funds of a purely local character.
- 6) Cooperatives: agricultural marketing or purchasing, and affiliated credit corporations; etc.
- 7) Banks provided for by the Federal Farm Loan Act.
- 8) Business leagues, chambers of commerce, real estate boards, boards of trade.
- 9) Clubs organized and operated exclusively for pleasure, recreation, and other nonprofitable purposes.
- 10) Corporations organized for the exclusive purpose of holding title to property, collecting income therefrom, and turning over the entire amount thereof, less expenses, to organizations exempt from taxation.

Finally, certain omissions and discrepancies not pointed out earlier should be noted. Neither GCF nor CC covers orchards, an important type of agricultural capital. GCF includes nothing for the cost of growing timber, although deductions for timber depletion are made for income tax computation. The estimates include no allowance for depletion of the soil, for obsolescence of agricultural capital in the form of farm improvements other than structures, or for the loss of such capital through soil depletion and erosion. The values of new farm improvements other than structures are not covered in GCF.

<sup>43</sup> See *Regulations 103*, pp. 228-41.

## IV Summary

### *A Summary of defects—prospects for their measurement*

It is evident that the lack of correspondence between estimates of gross capital formation and of capital consumption can be explained largely by the fact that they have been derived from sources of quite different types. Net capital formation derived from these estimates is essentially a byproduct. In essence, the procedure consists of (1) constructing plausible estimates of capital consumption where possible, and (2) taking as the minuend to be used in deriving NCF the variant of GCF having the same general order of scope, suitably adjusted for price changes, as the estimate of capital consumption. No detailed effort has been made to construct supplementary estimates of capital consumption to fill the gaps or to fit the scope of gross capital formation to the somewhat obdurate estimates of capital consumption.

The deficiencies in the estimates of gross capital formation and of depreciation and depletion necessary for measuring capital consumption may be summarized with comment on prospects for correction. There seems to be no reliable way of estimating force account output of new durable equipment. Estimates have been made of oil, gas, and mining development outlays.<sup>44</sup> Some progress can be expected with respect to agencies not at present covered and other imperfections in construction estimates. In that field such omissions are more or less offset by the inclusion of major repairs. A clearer distinction between durable parts for replacement and output of new parts for assembly or of attachments and accessories that are additions to stocks of durable goods may be possible. Refinement should also be possible for (1) consumer type durables going to business and other agencies, (2) producer type going to consumer and other agencies, and (3) contract, custom, and repair work. Estimation of expenditures in connection with the acquisition and installation of producer durables does not seem feasible. The same might be said of the value (cost chargeable to capital account) of orchard and timber growth. Probably only a few details in the cost of agricultural improvements other than structures and equipment can be estimated.

Rough estimates are possible of at least major components of the

<sup>44</sup> See *Capital Consumption and Adjustment*, p. 50, and Table 10, and George Terborgh, 'Estimated Expenditures for Durable Goods', *Federal Reserve Bulletin*, Sept. 1939.

depreciation or depletion not calculated because capital expenditures were charged to income or because deferred-charge accounting was used. Little can be done about retirements or about expenditures made in connection with the acquisition of durable goods but not charged to capital account for allocation to periodic revenues through charges for depreciation and depletion. If estimates of capital consumption are based on accounting data from *Statistics of Income*, the erratic influence of write-ups and write-downs, which arise exclusively from the exchange of old producer durable goods in the case of income tax accounting, cannot be eliminated. The systematic upward bias arising from the depreciation (or 'amortization') of intangible assets can only be guessed at.<sup>45</sup> Estimation of depreciation and depletion charges on property outside the United States does not seem possible; however, they are probably quite small. For only a few of the kinds of noncorporate business not at present covered does any basis for estimating depreciation exist. When possible, such estimates at best would be flimsy, but the quantities involved are no doubt small. Very rough estimates may be feasible for private agencies exempt from federal income taxation. Lack of data makes any possible estimate of the depreciation of a most important element of government-owned durable goods almost wholly a matter of conjecture. Estimation of at least some accidental losses other than those by fire should be feasible.<sup>46</sup> Soil depletion and the obsolescence of agricultural improvements other than structures are not likely subjects for measurement; however, there is no corresponding element in GCF for the former, and for the latter such a component need not be included for purposes of a working definition.

The importance of certain of the disparities between GCF (IV) and CC can be adjudged from data on value of output. Statistics on manufacturing output of final products and on construction for various types of agency are available in breakdowns that to some extent are helpful for this purpose.

### *B Expenditures on new durable goods charged to income*

Some light on the degree to which the content of GCF IV is not represented in depreciation data can be had by examining the

<sup>45</sup> It has been asserted that intangibles amounted to about 5 per cent of all fixed assets in 1934. An upper limit of \$200 million is suggested for depreciation of intangibles in that year, if the average rate of depreciation for intangibles is taken as equal to that on tangibles. See Fabricant, *op. cit.*, p. 30, footnote 1.

<sup>46</sup> See *ibid.*, pp. 56-8.

detailed compilation of manufactured commodities recently prepared in the Department of Commerce.<sup>47</sup> This compilation differs little from that presented in *Commodity Flow and Capital Formation* in terms of the classification of commodities into 'finished' and 'unfinished', and the former into producer durable, consumer durable, etc. A detailed check of the list of products makes possible the segregation of three special classes of items: (1) predominantly replacement parts (when indicated), (2) commodities going almost entirely to business concerns covered in the depreciation estimates but for which depreciation is probably not booked, and (3) products going either to business not covered in existing business depreciation estimates or to nonbusiness private agencies. For the most part, items of class (1) are not given separately or cannot be distinguished from parts for new assemblies. The latter are of course chiefly classified as 'unfinished', but to a small extent are no doubt present in 'finished'. It is thought that the allocations to class (2) are on the whole quite conservative. Most of the true components of class (3) are of course indistinguishable.<sup>48</sup>

The value of output of class (2) durables was estimated for each biennial census year, 1929-39, on the basis of the census values for the components of the 1939 total for which separate data are available for the earlier census years. Such items accounted for 77 per cent of the 1939 total. The average value of the estimated output of class (2) durables in the census years 1929-39 is \$640 million. Inasmuch as these products may be assumed to be of low average durability, this figure is a close approximation to the average annual total of accounting depreciation that might be accrued on the stock of such durable goods, and presumably is not covered in existing estimates of depreciation based on actual accounting depreciation data. The total of class (1) durables is so incomplete that it is not worth while to do more than cite the total of \$46 million for 1939. Group (3) exclusive of aircraft and aircraft

<sup>47</sup> See William H. Shaw, 'The Gross Flow of Finished Commodities and New Construction, 1929-41', *Survey of Current Business*, April 1942, pp. 13-20. This report is based on the compilation referred to in the text.

<sup>48</sup> Class (2) as compiled for this paper includes all the commodity group 'tools', most of 'all other subsidiary durable equipment', well over half of 'durable containers', a considerable portion of 'machine tools', and scattered items, the largest of which is office and store furniture. The class (2) components of the machine tools group include a large item consisting of jigs, fixtures, dies, etc., and many products of small total value each, such as drills and cutters. Group (3) includes a substantial part of 'professional and scientific equipment', and scattered items, e.g., barber shop and beauty parlor furniture.

products averages \$80 million for the censal years. From 1929 to 1939 the aircraft commodity group ranges in censal years from a low of \$33 million in 1933 to a high of \$225 million, and averages \$89 million. The sum of the average for (2) and (3) exclusive of aircraft <sup>49</sup> gives a closer approximation than the figure for (2) alone to the probable extent of omission from depreciation estimates due to noncoverage of certain types of holders and to the use of other methods of accounting than depreciation.

### *C Depreciation on account of tax exempt agencies*

A rough idea of the gap in depreciation estimates due to the non-coverage of tax exempt private agencies can be obtained through the estimates of construction activity made in the Department of Commerce.<sup>50</sup> These estimates include separate figures for three types by function of private construction, for which the owning agencies are entirely or predominantly exempt from federal income taxation: <sup>51</sup> religious and memorial, educational, and hospitals.

These three classes of ownership fall far short of exhausting the list of agencies eligible for exemption. The additional omissions probably more than offset any taxable agencies that may be included in the preceding three categories.

Estimates of total private construction activity, 1920-36 cumulative, amount to \$88.0 billion for all private construction including public utility, and to \$41.5 billion for nonfarm residential. For this period total construction in the three tax exempt classes was \$4.1 billion. Fabricant's accounting estimates of the depreciation on nonfarm residences, 1919-35, are based on an average depreciation rate not far from 2.5 per cent per year (straight line formula). If retirements implied by the procedure are disregarded, the increase in depreciation during the period arising from new residential construction should be approximately \$1.0 billion a year. Calculating depreciation on tax exempt construction at a 2 per cent rate, the

<sup>49</sup> The aircraft group is not actually counted in (3) because of the importance in it of military output.

<sup>50</sup> *Construction Activity in the United States, 1915-1937*; also, table prepared in the Bureau of Foreign and Domestic Commerce, dated February 1942: 'Construction Activity in the United States, by Function and Ownership, 1929-1941'.

<sup>51</sup> The writer has verified this presumption by consultation in the Income Tax Unit, Bureau of Internal Revenue. Hospitals are, in terms of number, at least 60-70 per cent tax exempt, including most of the large hospitals in the principal cities. A larger proportion of total educational institutions than of hospitals are tax exempt; furthermore, it may be supposed that the non-tax-exempt educational institutions individually own less property than the tax exempt.

addition to annual depreciation for the period on account of new tax exempt construction should be approximately \$0.1 billion. The proportion of nonfarm residences existing in 1920 to residences constructed in 1920-36 was no doubt larger than the proportion of existing tax exempt property at that time to subsequent tax exempt construction. Hence, the retirements implied in any synthetic accounting estimates of depreciation would offset the increase due to new construction more for residences than for tax exempt property. Fabricant's accounting estimates, based on residential construction estimates which differ from those of the Department of Commerce, range in 1920-35 from a low of \$0.7 billion for 1920 to a high of \$1.7 billion for 1933.

Gross capital formation in the form of construction for the account of these three largely tax exempt agencies has varied substantially relative to residential construction. During 1920-36 the proportion was 10 per cent, whereas during 1937-41 it was only 6 per cent. Accordingly, the additions to calculable depreciation on account of these agencies should be relatively low for the last few years.

On the basis of the total, \$4.7 billion of construction for the account of tax exempt agencies for the period, the total of accounting depreciation for all agencies in the latest year is probably understated by roughly \$100 million. This figure might well be doubled to cover depreciation on the property of these agencies constructed before 1920 (after allowance for retirements of such structures), depreciation on structures owned by other agencies exempt from federal income taxation, and depreciation on other durable assets held by all tax exempt agencies.

#### *D Natural resource development costs charged to income*

Natural resource development costs are largely missing from both GCF and CC. Intangible development costs in the oil and gas well industry to a very large extent have been charged to income for the purpose of federal income tax computation.<sup>52</sup> Such wells as a rule enjoy high production for a relatively short time, and may thus be regarded as possessing rather low durability. Hence, the average annual value of intangible development is a good indicator of the omission from depreciation because of capital expenditures charged to income. A substantial amount of development

<sup>52</sup> The writer has been so informed by the Natural Resources Oil and Gas Section, Income Tax Unit, Bureau of Internal Revenue.

expenditures in other mining industries are charged to income. Estimates of all natural resource development costs charged to current operations during 1919-35 average \$260 million annually.<sup>53</sup>

## V Conclusion

In the course of choosing a definition of gross capital formation suitably restricted for the purpose in hand, the distinction between new durable goods and durable repairs to old was justified on grounds other than statistical convenience. It was suggested that alterations of old durable goods, unlike repairs that simply restore the old structure, are properly regarded as constituting new durable goods. It was proposed that the concept of consumption for a period be defined as "the decline in the current value of durable goods attributable to the current expiration of service potential".

There are numerous elements of incomparability between economic estimates of gross capital formation and accounting estimates of capital consumption from which economic estimates are derived. Several, at least, are sufficiently large to constitute ample evidence supporting the description of the estimates of net capital formation, derived from the estimates under discussion in this paper, as approximate.

Certain changes can be made relatively easily in the estimates of gross capital formation and capital consumption to improve comparability, in lieu of adopting more restricted variants that would have similarity of scope:

Additions to measures of gross capital formation

Mining development

Oil and gas well intangible development

Other construction not now covered

Additions to measures of capital consumption

Allowances for past capital expenditures charged to income (oil and gas wells, mining); also producer durable goods manufactured for sale or interplant transfer

Allowance for past capital formation for accounts of tax exempt agencies

<sup>53</sup> Fabricant, *op. cit.*, p. 50, Table 10. Estimates of construction activity and GCF do not include mining, petroleum, and natural gas development work. The option to charge as expense does not apply to that part of the value of oil and gas well development represented by expenditures having a salvage value, i.e., derricks, tanks, pipe lines, and other physical structures. See *Regulations 103*, pp. 116-7.



Subtractions from measures of capital consumption  
Audit reductions of reported depreciation

However, the measures would remain quite imperfect after these few revisions. An expedient that could be embraced for ensuring comparability is the method necessarily used in estimating the depreciation on residences and government-owned producer durables. That is, depreciation in accounting form can be estimated for every ascertainable type of product classified according to assumed lengths of useful life. This has in fact been done as a step in the derivation of price indexes for the conversion of accounting depreciation charges, which are in terms of cost or revaluation prices, to prices current during the period of measurement.<sup>54</sup>

There is perhaps no adequate basis for the acceptance of over-all capital consumption estimates based on actual accounting data in preference to estimates more synthetically derived. However, a great disadvantage of synthetic estimates is the difficulty of breakdown by type of asset-holder. Since accounting depreciation data are important as such in conjunction with profits data for analysis of the sources and uses of business funds, and since comparable measures of the uses are needed, breakdowns of GCF by type of holder as represented in industry breakdowns of accounting charges for depreciation are strongly desired. Consequently, it is desirable to work toward the extension and refinement of the breakdowns of GCF by type of final holder, which would permit the calculation of net capital formation according to variants of more restricted scope on the basis of more comparable estimates of gross capital formation and capital consumption than can now be used.

<sup>54</sup> See Fabricant, *op. cit.*, Ch. 10.

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