The Valuation of the Social Income

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By J. R. Hicks

The Social Income consists of a collection of goods and services valued in terms of money. Its precise definition thus involves two problems: one of the correct enumeration of the real goods and services to be included, and one of the money values by which this heterogeneous collection is to be reduced to a common denominator. I am concerned in this paper with the second of these problems.

The practical statistician has generally been content to take it for granted that every commodity entering into the aggregate should be valued at its market price. I want to ask: what is the basis for this valuation? Does it hold without exception or are there exceptions? Are the prices we use for valuation prices in their own rights or do they stand for something else (say marginal utilities or marginal costs) to which market prices are taken as approximations? These questions ought to be answered before we can have a clear idea of what National Income calculations mean. And they need to be answered before we can settle some of the disputed points about actual computation.

I have myself been led to think about these questions as a result of the discussions on one of these disputed points. As is well known, Mr. Colin Clark adds the proceeds of indirect taxation to the total of declared incomes before arriving at his aggregate; Professor Bowley has held that such an addition ought not to be made. In an earlier paper to which I myself contributed[1] an attempt was made to deal with this difficulty by the usual method of enumeration —by considering what real goods and services ought to be included in the aggregate, and working out the way in which these goods and services will be reflected in the sum of incomes. At the time this treatment seemed to me sufficient, but I have been brought to realise that it did not go deep enough. Professor Bowley has himself

[1] J. R. and U. K. Hicks, "Public Finance in the National Income" (*Review of Economic Studies*, February, 1939).

performed the same enumeration and in his hands it leads to a different result.[2] A close comparison shows that the difference between us is purely one of valuation, of the values we put upon the commodities included. Such a difference is extremely likely to come up over questions of Public Finance, since in this field the ordinary rule of weighting by market prices tends to break down. Taxed commodities have two prices (those including and excluding tax) so that in their case the rule is ambiguous; while the public services, upon which much of the proceeds of taxation are spent, are not sold on the market—so they have no market prices at all.

Thus it is only possible to achieve a final solution of this particular problem if we are prepared to go back to the general issue and enquire into the whole *rationale* of valuation in National Income calculations. When we do this it seems to transpire that the right system of weights to be used for valuing the National Income depends upon the purpose for which the calculation is to be used. As National Income calculations are used for all sorts of purposes, we may have to be prepared to use more than one system of weights. It is not at all obvious without examination that the same system of weights which is appropriate for comparing real income over time is also appropriate for studying questions of distribution. There may be more than one *Money Value of the Social Income*, each corresponding to a different purpose of calculation. At least we ought to be aware of this possibility from the start.

Let us therefore begin by selecting some one possible purpose and proceed to enquire, as carefully as we can, what system of valuation is appropriate to that purpose. Afterwards we can enquire how far that system is appropriate to other purposes.

1. Social Income and Economic Welfare. There can be little doubt what is the purpose with which we ought to begin. The most thorough theoretical analysis of the Social Income is that given by Professor Pigou in the *Economics of Welfare*; and Professor Pigou is only the leading representative of a long line of economists who have sought in the Social Income an index of economic welfare,

[1] "The Measurement of Real Income" (*Manchester School*, April, 1940). Although I am going to disagree with this paper of Professor Bowley's, I should like to express my appreciation of what I have learned from it.

of the wealth of nations. We have little choice but to follow in this tradition.

We are, however, at liberty to reinterpret it to some extent. For my own part, I should distinguish the question of economic welfare from any conceivable broader question of welfare in general, by the rule that comparisons of economic welfare must proceed under the hypothesis of *constant wants*. It is only under this hypothesis that quantitative comparisons are possible. In order to be able to compare the positions of a particular individual in two different situations, we must assume that his wants are the same in the two situations. If this assumption cannot be granted, the question whether he is better off in one situation or in the other loses all economic meaning. If he has undergone a spiritual conversion in the interim, so that he has given his goods to feed the poor, the question of his relative well-being in the two situations is a spiritual question, not an economic one. Comparisons of economic welfare are comparisons of welfare in general, under the assumption of unchanged tastes. They are significant so far, and only so far, as we *judge* the assumption of unchanged tastes to be a tolerable assumption with reference to any particular actual comparison. Is it near enough to the truth for the results of such assumption to be interesting?

It is as a means of giving precision to this assumption of unchanged tastes that we have to introduce the concept of a scale of preferences. We say that tastes are unchanged between two situations if any preference for one collection of goods over another, which holds in one situation, holds also in the other. This assumption can be expressed by assuming a given utility function or sufficiently by assuming given indifference surfaces.

One consequence of this interpretation ought to be noted before proceeding. A given indifference map necessarily refers to a given number of goods, this number being reflected in the number of dimensions in which the indifference map is drawn. If we assume a constant indifference map in n dimensions, we are automatically assuming that the individual's satisfactions are not affected by anything which happens to the availability of goods not included in the list. Now the list of sorts of goods to be included is to some extent arbitrary, and it is in fact conventional to exclude certain things " not brought into relation (perhaps

one should say *close* relation) with the measuring-rod of money ", household services and the like. It is also conventional to pay no attention to changes in the amount of labour effort needed to acquire the collections of positive utilities. Nevertheless, it is important to observe that we are at liberty to frame our definition of *constant wants* more or less strictly, so that in cases where a narrower definition would be obviously intolerable, something can sometimes be done about it by extending the range of sorts of utilities (or disutilities) to which the definition refers. We shall encounter some important instances of this later on.

2. THE COMPARISON OF INDIVIDUAL SATISFACTIONS. I shall now proceed to set out very briefly the fundamental propositions upon which the use of the social income as a measure of economic welfare depends. These propositions are not new; I shall introduce only a small degree of refinement into Professor Pigou's demonstration; but since later researches[1] have enabled us to put a slightly sharper edge upon the demonstration (and for later purposes we shall need all the precision we can get), I think I must go over the ground again.

The logical problem which presents itself is as follows. In Situation I market prices are such and such, and the individual buys such and such quantities. In Situation II market prices are such and such, and the individual buys certain other quantities. From these data, can one say that one position or the other is a preferred position?

On the indifference diagram (Fig. i) we have given the price-lines P_1P_1 and P_2P_2 (indicating the opportunities of purchase open in the two situations) and also the positions Q_1 and Q_2 actually chosen on those price-lines. *We do not know the actual positions of the indifference curves.* But we do know that Q_1 and Q_2 are the positions actually selected in these two situations, so that the indifference curves through Q_1 and Q_2 must touch the respective price-lines at those points. Further, they must be convex towards the axes at those points and cannot intersect their corresponding price-lines anywhere.

It follows at once that the indifference curve through Q_1 must lie wholly to the right of the price-line P_1P_1. Thus all positions which are preferred to Q_1 must lie to the right of this price-line; whence it follows that all positions to

[1] See particularly R. Frisch, "The Problem of Index-Numbers", *Econometrica*, 1936.

the left of P_1P_1 must be inferior to Q_1. It does *not* follow that any position to the right of P_1P_1 will be preferred to Q_1; it will be if it contains more of both goods than Q_1 does, since both goods are supposed to have positive utilities; but otherwise the question depends upon the curvature of the indifference curve through Q_1, and on that subject we have no information.

In the diagram as we have drawn it, Q_2 is necessarily preferred to Q_1 because Q_1 lies to the left of the price-line P_2P_2.

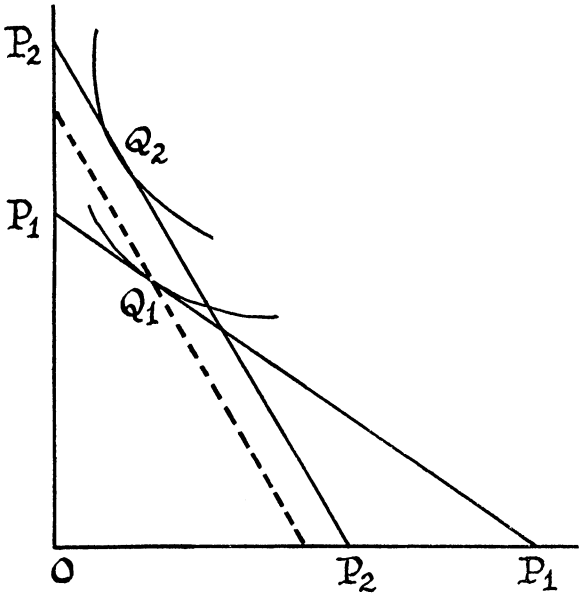

Fig. i

Let us now proceed to state this condition in less geometrical language. If Q_1 lies to the left of P_2P_2, the price-line[1] through Q_1 parallel to P_2P_2 (which expresses the opportunities open to an individual, confronted with the same prices as at Q_2, but with an income just sufficient to purchase the collection Q_1, if he chose to do so) must lie to the left of P_2P_2, and therefore represent a lower income. Therefore if p_1, p_1', are the prices of the two goods in the first situation, p_2, p_2', in the second situation, q_1, q_1', q_2, q_2', the corresponding

[1] Dotted in the diagram.

quantities actually chosen, we shall know that the second situation must be preferred to the first if

$$p_2q_2+p_2'q_2'>p_2q_1+p_2'q_1' \qquad \text{i.e., } \Sigma p_2q_2>\Sigma p_2q_1$$

and that the first situation must be preferred to the second if

$$p_1q_1+p_1'q_1'>p_1q_2+p_1'q_2' \qquad \text{i.e., } \Sigma p_1q_1>\Sigma p_1q_2$$

Although the above argument has been written out with an eye upon a diagram in which only two goods were represented, a little re-examination will show that this limitation has never been actually used. Precisely the same argument will hold for any number of goods. But this general validity may be made more convincing if the argument is checked over in another way.

So long as all the goods in question have a positive utility (a condition implied by the downward slope of the indifference curves), it is clear that the individual will always be better off in Situation II than in Situation I if the quantities of goods which were available in I are still available to him, though he rejects them for a preferred collection. This will be the case if the value of his purchases at II, valued at II prices, is greater than the value of his I purchases, also valued at II prices. For this condition ensures that the I collection of goods is still available in the II situation, though it is rejected in favour of the II collection.

The failure of the opposite inequality to be significant can readily be seen in the same way. If $\Sigma p_2q_2<\Sigma p_2q_1$, the individual will be unable to purchase the I collection of goods in the II situation; if he tries, he will fall short somewhere, and get less of some of the goods. But this does not establish that he must be worse off in Situation II. All it shows is that there is a collection of goods available in the II situation which is inferior to that actually chosen in the I situation; but since it is also inferior to that actually chosen in the II situation (for it is not the position which is actually chosen), all we learn is that there is a position inferior both to the I and to the II positions; but that does not enable us to compare these positions directly.

3. Social Comparisons. We have thus established the validity of the criteria for any number of goods, but so far we have only established it for a single individual. What can be done about generalising the test so as to make it applicable to society as a whole?

It is best to begin by taking the criteria as they stand and enquiring what meaning they have when they are

applied to a group of individuals. The p's are still market prices, the q's are now the total quantities of the various commodities acquired by the group as a whole. The Σpq's can still be calculated. What does it signify if $\Sigma p_2 q_2 > \Sigma p_2 q_1$?

It should first of all be noticed that since this condition refers only to the total quantities acquired, it can tell us nothing about the distribution of wealth among the members of the group. There may be a drastic redistribution of wealth among the members and the aggregates will remain exactly the same. Thus what the condition $\Sigma p_2 q_2 > \Sigma p_2 q_1$ tells us is that there is *some* distribution of the q_1's which would make every member of the group less well off than he actually is in the II situation. For if the corresponding inequality were to hold for every individual separately, it would hold for the group as a whole.

As compared with this particular distribution, every other distribution of the q_1's would make some people better off and some worse off. Consequently if there is one distribution of the q_1's in which every member of the group is worse off than he actually is in the II situation, there can be no distribution in which everyone is better off, or even as well off. Thus if we start from any actual distribution of wealth in the I situation, what the condition $\Sigma p_2 q_2 > \Sigma p_2 q_1$ tells us is that it is impossible to reach, by redistribution, a position in which everyone is as well off as he is in the II situation.

This would seem to be quite acceptable as a definition of increase in real social income. Let us say that the real income of society is higher in Situation II than in Situation I, if it is impossible to make everyone as well off as he is in Situation II by any redistribution of the actual quantities acquired in Situation I. If this definition is accepted, our criteria can be applied to it without change.

4. The Criteria in Index-Number Form. The practical application of our criteria is, of course, modified by the fact that we do not ordinarily proceed by counting the quantities of goods acquired at two dates and valuing them at various sets of prices. What we do is to reckon the total money expenditures and correct for changes in prices by the use of price index-numbers. For this purpose we need a little rearrangement of our formulæ.

Let E $(\Sigma p_2 q_2 / \Sigma p_1 q_1)$ be the index-number of money expenditure at the second date, using the first as base.

Let L $(\Sigma p_2q_1/\Sigma p_1q_1)$ be the index-number of prices on Laspeyre's method (weighting by the quantities of the first date). Let P $(\Sigma p_2q_2/\Sigma p_1q_2)$ be the index-number of prices on Paasche's method (weighting by quantities of the second date). Then our criterion for a higher real value at the second date is $\Sigma p_2q_2 > \Sigma p_2q_1$, and this implies that $E > L$ (dividing by Σp_1q_1). Our criterion for a higher real value at the first date is $\Sigma p_1q_1 > \Sigma p_1q_2$, i.e., $\frac{1}{\Sigma p_1q_1} < \frac{1}{\Sigma p_1q_2}$ which implies that $E < P$ (multiplying by Σp_2q_2).

Four alternative possibilities now present themselves. (1) E may be greater than either of the two price index-numbers. In this case the first test is satisfied but not the second, so there is clearly a rise in real income. (2) E may be less than either. In this case there is clearly a fall. (3) E may be less than L and greater than P. In this case neither test is satisfied, so that our information is not sufficient to tell us whether real income has risen or fallen. It is true that there will nearly always be some values of E less than L which do actually indicate a rise in real income, and some values of E greater than P which do actually indicate a fall; even though we cannot distinguish these values with the information actually available to us, we shall often be justified in saying that real income has *probably* risen if E is only a little less than L, *probably* fallen if E is only a little greater than P. That is as far as we ought to go.[1]

(4) Finally, E may be greater than L and less than P. If this happens (and the data may sometimes indicate a situation of this sort) we are apparently told that real income has risen and fallen at the same time—which is nonsense. In this case the whole comparison breaks down; something has gone wrong with the assumptions. The most likely explanation will usually be that we are dealing with a situation to which our original hypothesis of constant wants

[1] Very ingenious efforts have been made by Staehle, Frisch, Wald and others to close the gap further. Since all these methods involve the use of additional assumptions and additional data, they have not been examined here, where our purpose has been to set out the minimum theoretical basis on which National Income calculations must rest. Nevertheless the new methods must be recognised as marking a substantial advance on the earlier ways of calculating "ideal" index-numbers.

It follows at once from what has been said above that the precise point between P and L, which divides those values of E indicating a rise from those indicating a fall in real income, can only be determined further by introducing new information about the indifference systems. It cannot be determined *a priori* by geometric averages or otherwise.

is inapplicable. The data themselves tell us that the hypothesis is intolerable; and so we can get no further.[1]

5. THE PROBLEMS OF VALUATION. SOME MINOR DIFFICULTIES. I have had to make this long excursion into what is usually regarded as the theory of index-numbers because I believe that it is on these propositions that the significance of the Social Income as an index of economic welfare depends. It is only by using these propositions that we can compare real incomes; consequently the only way to settle disputed questions about valuation is to go back to these propositions and enquire what values we ought to put upon the various sorts of goods and services entering into the social income, in order to preserve the validity of the index-number tests. In nearly every case this leads us to a solution.

It will be already apparent that the reason why we use prices as weights, when measuring the social income as an index of economic welfare, is because prices give us some indication of marginal utilities, because the slope of the price-line at a point of equilibrium is the same as that of the indifference curve through that point. The particular prices chosen must always be those which will correspond most closely to relative marginal utilities; this usually means that we must take those prices which actually confront the consumer. We must take retail prices not wholesale prices, prices after tax or subsidy, not before, and so on.

There are, however, certain exceptions. Prices of commodities on the market only correspond to relative marginal utilities if the consumer's choice is free—if he can buy as many units as he likes at the market price. If there is any restriction on the number of units which can be purchased—if, speaking generally, there is anything like a system of rationing of any of the commodities—then the consumer will not be able to proceed down the price-line as far as the point Q which he would have preferred, but must stop somewhere short of it. At the point where he is compelled to stop, the price-line is still intersecting the indifference curves; consequently the slope of the price-line gives us no clue about the slope of the indifference curve through the point reached, and the index-number tests break down.

[1] If $P > L$ there is a positive correlation between movements of relative prices and movements of quantities acquired, not (as we should expect with constant wants) a negative correlation. But in strict theory the condition $P > L$, though improbable, is not necessarily inconsistent with constant wants, so long as E is greater than P and L, or less than both. It is only the case $P > E > L$ which is excluded.

We can only restore the validity of the index-number tests if we mark up the market prices of the rationed commodities more or less as they would have to be marked up if demand were to be cut down by higher prices to the amount of the ration. Of course, this can only be done by guesswork; the important thing is that rationed commodities ought to be weighted more heavily than they would be if we used their market prices as weights.

The same kind of device can be used in another difficult case, that in which new sorts of goods are introduced in the interval between the two situations we are comparing. If certain goods are available in the II situation which were not available in the I situation, the p_1's corresponding to these goods become indeterminate. The p_2's and q_2's are given by the data, and the q_1's are zero. Nevertheless, although the p_1's cannot be determined from the data, since the goods are not sold in the I situation, it is apparent from the preceding argument what p_1's ought to be introduced in order to make the index-number tests hold. They are those prices which, in the I situation, would *just* make the demands for these commodities (from the whole community) equal to zero. These prices cannot be estimated; but we can observe that between the two situations the demands for these commodities will have increased from zero to certain positive quantities; and hence it is reasonable to suppose that the " prices " of these commodities will usually have fallen relatively to other prices. This principle is sufficient to give us a fairly good way of dealing with the case of new goods.

Since, for the new goods, $q_1=0$, the indeterminate p_1's do not affect the calculation of either E or L. We can still say definitely that real income has risen if $E>L$. It is only the calculation of P, the Paasche index-number, which is affected. But if we are prepared to admit that the " prices " of the new goods must be supposed to have fallen relatively to other prices, it follows that we shall be justified in proceeding to calculate a Paasche index including only those goods which are present in both situations; for we shall know that this index will generally be greater than the true Paasche index, by an amount which depends very largely upon the importance of the new goods in the second situation. Thus E and L are unaffected; P is likely to be slightly overestimated; we can go ahead with the use

of our criteria, subject to a slight caution about the lower limit.

6. PUBLIC FINANCE. These principles can also be used to deal with those problems of Public Finance and the inclusion of indirect taxation which were alluded to at the beginning of this paper. In doing so, I shall avoid all questions of detail (about which reference may be made to the *Review of Economic Studies* article); I shall confine myself to the central questions of principle which were not fully cleared up in that place.

A Government raises its revenue by direct and indirect taxes; it spends it in three main ways. One is by paying out incomes which are not in return for current services. Call this Pensions (it includes interest on National Debt). One is by subsidising the production of certain commodities. Lastly, and most important, it spends it on paying for the production of certain Public Services, Defence, Police, Justice and Administration, Education, Health, Roads and so on, which are supplied to the public without specific payment. It is over these Public Services that the difficulties arise.

It is common ground that Pensions should not be double counted. It follows at once from our central principles that subsidised goods should be reckoned at their subsidised prices. But what of the Public Services? Should they be reckoned as subsidised to the extent of 100 per cent. of their cost, and consequently valued at zero, or should they be reckoned in some other way?

It ought to be said, first of all, that since the Public Services do not enter into the market mechanism, there are strong grounds for the view that they are better excluded altogether from National Income calculations. To do this would be perfectly legitimate provided we were prepared to interpret Economic Welfare in a sufficiently narrow sense; provided we only reckoned on our list goods produced for the market and were prepared to accept the assumption of constant wants in terms of those goods. In a fairly *laisser-faire* economy, this might perhaps be a wise solution; we should not be narrowing down the problem very much and we should get a perfectly clear and consistent index of economic welfare, as far as it went. Even when the economic activities of government are extensive, the Social Income of Private Goods does not lose all its significance;

everyone must have felt how peculiar it is to reckon a large production of armaments as a contribution to current economic welfare; the Social Income of Private Goods would be actually superior to that usually calculated as an index of economic welfare in war time.

Defined by the "census of production" method, the Social Income of Private Goods equals the value of the net output of non-public goods and services, valued at their market prices (after tax or subsidy). It is thus equal to Private Consumption *plus* Private Investment. By the aggregation of incomes method, it equals the sum total of private incomes *minus* direct taxation and *minus* government borrowing. (This social income of private goods has the incidental advantage that calculation of the corresponding index-numbers begs fewer questions than is the case with wider definitions.)

If we are not contented with this limited scope, we have to impute a value to the public services. Here I can see no alternative but to assume that the public services are worth, to society in general, at least what they cost; and that this principle holds also at the margin. One may well feel considerable qualms about such an assumption—it is obvious that the government spends far too much on this, far too little on that; but if we accept the actual choices of the individual consumer as reflecting his preferences (clearly we must do so for these purposes), then I do not see that we have any choice but to accept the actual choices of the government, even if they are expressed through a Nero or a Robespierre, as representing the actual wants of society. (To those who cannot stomach this I have indicated a way of escape.) Thus unless we have any reason to suppose that the public services are produced under diminishing costs, we can take their average costs of production as a rough estimate (a lower limit) of their marginal utilities. The public services should thus be valued at cost.

The cost of production of the Public Services (the expenditure on them) equals

> Public Revenue (from Direct Taxation, Indirect Taxation and Loans) *minus* Public Expenditure on Pensions and Subsidies.

In order to get the Social Income including Public Services, we must add this amount to the Social Income of Private

Goods. Consequently the *Social Income including public services* equals

All private incomes + Indirect taxes – Subsidies – Pensions.

Substantially, this is the National Income as calculated by Mr. Colin Clark.

[The argument by which a different result is reached by Professor Bowley has now been made clear in his Manchester paper. He thinks of the public services of the state as being paid for in two different ways. The raising of direct taxes and their expenditure on public services is thought of as a clubbing-together by the public to purchase certain public goods, and the value of these goods is thus taken to equal the money spent on them. Expenditure on public services out of indirect taxation is regarded as subsidisation of these services to the degree of 100 per cent.; consequently the prices of services paid for out of indirect taxes are taken as zero. This device has a very pleasingly symmetrical effect on the calculation; for the subsidies are marked up by Professor Bowley's method until they cancel out the indirect taxes; or rather this symmetrical effect would be achieved if Professor Bowley could bring himself to suppose that the whole of indirect taxation is spent on public services or subsidies and none on Pensions. In practice, he cannot bring himself to this point; and therefore the actual value of the social income on Professor Bowley's method is not reached (as might at first be supposed) by merely subtracting the total of Pensions from the total of Private Incomes. It is only that part of Pensions which is paid out of direct taxation which must be subtracted; but who is to say what proportion of Pensions is paid out of direct and what out of indirect taxation? The Government does not keep two cash-boxes; nor would it be very significant if it did. The Bowley aggregate, in its latest form, thus contains an element which is wholly arbitrary; not arbitrary in the sense of being a guess at something we cannot measure, but arbitrary in principle, arbitrary through and through.

I believe that the crucial step which has been responsible for leading Professor Bowley into this awkward position is to be found in his assumption that because a commodity is not charged for, therefore it ought to be valued in the social income at zero. In order for it to be appropriate to value at zero, it is not sufficient that the commodity

should not be charged for; it is also necessary for it to be given away freely *in unlimited quantities*; this further condition is necessary for it to be a "free good" in the economic sense. Otherwise its value has to be marked up, as is generally the case with rationed commodities. Now hardly any of the Public Services are such that no additional satisfaction would result from extra expenditure upon them—which is the condition for it to be appropriate to value them at zero. If we had better education services or better health services, or better police (and other things were equal) we should be better off; and the same must be taken as applying to defence, once we have decided to reckon defence as making any direct contribution to economic welfare. Consequently it seems to me that Professor Bowley has been misled by the idea of 100 per cent. subsidisation. There is no reason why we should distinguish between public services paid for out of direct and out of indirect taxation; all public services should be valued on the same principles.

The reason for the "unwarranted inflation of the National Income" (as Professor Bowley calls it) will now be clear. A precisely similar "inflation" ought to be introduced for all rationed commodities, all commodities whose prices do not fully reflect their marginal utilities.]

There is, however, one substantial reason why Mr. Clark's formula must indeed be expected to overestimate the *Social Income including public services*. Some part of the output of public services is not final output, but plays its part in production by facilitating the production of other goods (maintenance of law and order, roads used for business purposes, and so on). To reckon this as well as the goods whose output is facilitated would involve double counting. I do not see how we can hope to do anything about this in practice, for we have no reliable criterion by which to distinguish that part of the output of public services which is not final output from that which is. We must just be prepared to remind ourselves that the Clark formula has not in fact succeeded in eliminating every sort of double counting.

7. The Social Income and Productivity. If we value the public services at cost while we value private goods and services at their market prices, we are doing something which is superficially inconsistent, even though

the apparent inconsistency can be justified by regarding the cost valuation as standing for a marginal utility valuation, which is itself incapable of being estimated otherwise. Nevertheless, in spite of this justification, it is undeniably awkward to use different methods of valuation for different parts of the social output; this suggests that we ought not to leave the question without enquiring whether the awkwardness cannot be removed in some other way. One way suggests itself at once: why not value all goods at cost? If we did this we should get an aggregate which would be measured by the original Bowley formula—all private incomes *minus* pensions; for although the public services would be valued as before, private goods would now be valued before tax or subsidy, so that the item "indirect taxes *minus* subsidies" would disappear.

I cannot help suspecting that most people who have worked at this subject retain an obstinate feeling that the original Bowley formula has some real significance—that we are "inflating" it when we add in the taxes. It may be worth while to enquire what that significance can be.

It will by now be clear that the Social Income as an index of Economic Welfare cannot be adequately measured by adding together private incomes and subtracting the pensions which are double counted. The Social Income which is measured in this way must be the Social Income in some other of its functions; and since the formula is reached by valuing at cost, this function is probably to be found on the cost side, not on the utility side.

Let us be for a moment very old-fashioned; let us pretend that we still believe in a Labour Theory of Value, all industries producing under constant costs. Under this hypothesis, it would follow that the various different collections of goods which could be produced from a given quantity of resources in a given state of technique, could be connected by a linear relation—such as that represented on the two-goods diagram by a line PP (Fig. ii). Suppose that in Situation I the quantities of the two goods which could be produced were represented by the line P_1P_1 and the quantities actually produced by the point Q_1. Let P_2P_2 and Q_2 be similar data for the II situation. (The slopes of the lines are relative unit costs of production in the two positions.)

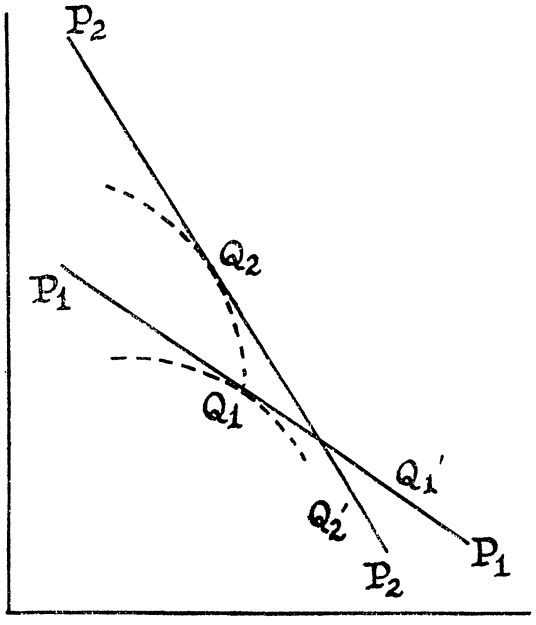

Fig. ii

If Q_2 lies to the right of the line P_1P_1 (in terms of index-numbers $E>P$), this means that the quantities Q_2 are greater than what could have been produced in the I situation from the factors then used; while if Q_1 also lies to the left of P_2P_2 ($E>L$), the quantities Q_1 could have been produced in the II situation, when they would have required a smaller amount of factors than were then used. Thus if E is greater than both of the price-indices,[1] there is an increase in productivity between the two situations; for the goods actually produced in II are more than what could have been produced in I from the resources then employed, and the goods produced in I are less than what could be produced in II under the technical conditions of II. Similarly if E is less than both price-indices, there is a fall in productivity in the same sense.

If E lies between the two price-indices, the change in productivity is of course indeterminate. Once again we have two cases. If $L>E>P$, the two positions are related in the way shown by Q_2 and Q_1' in Fig. ii. Neither position is then attainable in the other situation; Q_2 cannot be reached in I, nor Q_1' in II. If $P>E>L$, each position is

[1] The prices now represent unit costs, so they are taken before tax.

attainable in the other situation (compare Q_1 and Q_2'). In neither of these cases can we say that there is a definite rise or fall in productivity. The condition for that to happen is for E to lie above or below both the price-indices.

This is all very pretty; there can be no doubt that it would be extremely convenient if we could use it with a clear conscience to give us a theory of the social income as an index of production. Of course people do use it in that way; it is on this sort of structure that actual index-numbers of production are based; but it has to be recognised that it is extremely shaky from a theoretical point of view. Returns are not always constant; prices (ex tax) are not always equal to marginal cost; once these assumptions are dropped the whole argument loses its validity.

The argument begins to break down as soon as we take the first step on the road towards modern theories of the relation between value and cost. It is not necessarily valid even in a world of perfect competition and universal diminishing returns. For in such a world the substitution curves have already ceased to be straight lines; they are curves concave to the axes (the dotted curves in Fig. ii represent substitution curves on which Q_1 and Q_2 are chosen positions). Now if $E > P$, this does indeed tell us that Q_2 cannot be reached in the I situation (since the substitution curve through Q_1 lies wholly to the left of P_1P_1); however, $E > L$ does not tell us that Q_1 can be reached in the II situation, for it only informs us that Q_1 lies to the left of P_2P_2 and that is consistent with Q_1 being either to the right or to the left of the II substitution curve.[1] Thus even if E is greater than both the price-indices, we cannot be certain that there has been a *definite* increase in productivity.

The collapse is much worse when we allow for increasing returns and imperfect competition. Prices (before taxation) cease to represent marginal costs; we have no reliable information about the convexity or concavity of the substitution curves. Some people may be tempted to rush in with the suggestion that a constant degree of market imperfection and constant marginal costs would mend the situation, and is not too bad a hypothesis; but there seem to be crushing objections against this. While there may

[1] The reason why we get a determinate result from similar analysis applied to economic welfare and do not get a determinate result here, is because the assumption of *constant wants* carries with it the assumption that the various indifference curves belong to the same system, so that they cannot intersect. The two production substitution curves do not belong to the same system,

be some sense in which it is normal for marginal costs to be constant under imperfect competition, that sense can hardly be relevant here, where we are thinking about a whole economy, not a single firm, so that the specificity of factors is of first-rate importance to us. Further, unless we have some way of measuring marginal costs directly, we need to assume not only a constant degree of market imperfection, but the same degree of market imperfection in all industries—and that assumption is hardly tolerable. It does not seem as if the collapse can be prevented.

8. PRODUCTIVITY AND ECONOMIC WELFARE. The idea that the Social Income as a measure of productivity may be something different from the Social Income as a measure of Economic Welfare comes as rather a shock; at least I must admit that it gave me a shock when I began to realise it. For the identity of these two things is really implied in so much of our thinking; several familiar uses of National Income calculations, and several of the difficulties raised by those calculations proceed from our failure to distinguish. How did we come to embrace this delusion?

It is fairly easy to see how it was when we reflect on the conditions which are necessary in order to make the two measures coincide. If competition were perfect, and if state activities were so designed as not to disturb the *optimum* organisation of production,[1] 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 would also give us the social income as a measure of productivity. (It would not be very reliable as a measure of productivity, but it might usually satisfy the productivity tests for small displacements, over which the substitution curves might not differ very much from straight lines.) 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. Delusions which arise from the habit of treating the organisation of an economy as optimum when it is not optimum form a fairly familiar type; it would seem that this is one of them.

The measurement of economic welfare and the measurement of productivity are in fact quite different things;

[1] Cf. my article, "The Foundations of Welfare Economics" (*Economic Journal*, December, 1939, p. 701).

their coincidence under optimum conditions is a special property of that particular state of affairs. In practice, nearly every doubtful point about the Social Income is clarified by separating out these two distinct aspects. In the sphere of international economic relations, the National Income and the National Product are already well contrasted. The same kind of contrast needs to be carried into the field of capital maintenance and accumulation, where it is exceedingly helpful.

Irving Fisher's definition of the Social Income (to exclude investment) is far more plausible as a measure of current Economic Welfare alone, than it seemed to be when we expected a measure of Economic Welfare to be a measure of productivity as well. It is only consumption which contributes directly to current welfare—the contribution made by saving is at least of doubtful comparability. However, if we do decide to include saving in our Welfare index, the appropriate concept of individual income can be nothing else but what the individual *thinks* he can consume without making himself worse off.[1] This is purely subjective, incapable of objective measurement; so that in order to get a statistical measurement of this sort of income we can only proceed by taking some conventional rule about what the individual *ought* to reckon as his income. Probably it is worth while to do this; but we should be clear what we are doing.

When it comes to the measurement of productivity (so far as we can measure it), consumption and investment goods are all on a par; there is no significant difference between them from this point of view. If we are content to measure *gross* productivity, the problems of capital maintenance and accumulation simply do not arise; even if we desire a measure of *net* productivity (deducting wear and tear) it would seem that the right method theoretically is to regard the using-up of equipment as negative production, to be weighted by the cost of replacement. I do not suppose that much can be done on these lines, but merely state what seems to be the most defensible procedure.

9. Other Applications. The distinction between welfare and productivity measurements seems to be the most important line of division between different valuations of the Social Income. If we want to compare economic welfare

[1] Cf. my *Value and Capital*, ch. XIV.

over time, we must weight by those prices which best represent marginal utilities; this gives us the Clark formula, subject to the above qualifications. If we want to compare productivity over time, we must weight by those prices which best represent marginal costs; for this purpose the original Bowley formula (declared incomes *minus* pensions) may be the best that can be provided. For other applications of National Income work, one or other of these formulæ is generally more or less appropriate.

For example, let us consider the distribution question—the question of determining what income could be secured by each family if all income were divided equally. This was the problem which chiefly interested Professor Bowley in his earlier calculations of the National Income; for this purpose the formula he used seems as appropriate as any. The question is one which belongs to the productivity, rather than to the welfare, side. We are assuming given productive resources and asking how far they would go if their product was divided equally. Professor Bowley's calculations[1] give the answer to this question on the assumption of constant supply price in all industries. In practical application, it needs to be adjusted by allowance for loss of productivity on transferring specific factors (diminishing returns) and for the economies of large scale (increasing returns).

Exactly the same thing applies to the use of National Income calculations for the study of war potential. This is again a productivity problem, and here again the crude arithmetic, in which it is so easy to indulge, conceals the assumption of constant supply price. In the short period, marginal costs are more likely to be increasing than diminishing, so that we may be fairly sure that £1 spent by the government generally takes away less than £1's worth of resources from civilian uses.[2] This is not to deny the usefulness of the statistical arithmetic, nor to deny the seriousness of the situation it discloses; I am only concerned here, as elsewhere in this paper, to put in a plea for theoretical analysis as a ground for maintaining some caution in the application of such statistical results.

[1] Bowley, *Division of the Product of Industry*; Bowley and Stamp, *The National Income.*

[2] The more weight one gives to this consideration the more weight one must also give to the question of profiteering (including wage-profiteering).