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THE CONCEPTUAL BACKGROUND OF SOCIAL PRODUCT

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THE CONCEPTUAL BACKGROUND OF SOCIAL PRODUCT

By Branko Horvat

THE purpose of this paper is to attempt a critical analysis of the definitions of social product currently in use. For this purpose I propose to classify all existing definitions of social product into three broad categories represented by three typical definitions. Let us call them the Russian definition, the American definition,[1] and the Kuznets' definition. In what follows these definitions will be examined from the viewpoint of how well the statistical aggregates they produce can be used as welfare indicators.

I. THE RUSSIAN DEFINITION OF SOCIAL PRODUCT

The Russian definition is taken from the last edition of *Političeskaja ekonomija*, a representative textbook written by a team of competent Soviet economists, and it reads as follows:[2]

> 'In Socialism, as in any other system, total social product is created by the labour of workers in branches of material production. Along with manual workers, brain workers (scientists, engineers, etc.), engaged in branches of material production, participate directly in the creation of material wealth.
>
> 'Total social product is not created in non-productive branches. Workers engaged in the non-productive sphere (state administration, culture, welfare, medical service), do not create material wealth. Nevertheless, the labour of workers of non-productive branches is indispensable for socialist society, for material production, it represents socially useful labour.'[3]

[1] The names are chosen for convenience and do not have historical implications. The 'Russian Definition' (more strictly, the 'Soviet Definition') had already been used before the U.S.S.R. came into existence, e.g. by von Fellner in Austro-Hungary and, in a certain sense, already by Adam Smith. The 'American Definition' can be traced back to the work of Meade and Stone (J. E. Meade and R. Stone, 'The Construction of Tables of National Income, Expenditure, Savings and Investment', *Economic Journal*, 1941, 216–233).

[2] This definition is commonly called the Marxist definition, but that is not correct. See *infra*.

[3] K. V. Ostrovitjanov and others, *Političeskaja Ekonomija* (*Political Economy*), Moskva, Gospolitizdai, 1958, p. 613.

The above definition has some advantages. It defines social product consistently in the sense that it does not depend on organizational changes within the economy. It is simple and easily manageable. It is often well suited for international comparisons.[1] It also provides a good indicator for all those purposes where interest is focused on material goods (e.g. for an assessment of 'economic strength' or of 'military strength' of an economy.[2] Thus this aggregate will satisfy a number of requirements.[3] It is relevant, however, not to general problems of social accounting, but to the specific problem of measuring changes in economic welfare. It must be assessed in terms of the success with which it measures the welfare content of the activities performed in the society.

For this purpose let us postulate three different types of economies of an increasing degree of complexity. Let them be called Az, Buki, and Vede. In Az total product consists of 50 tons of potatoes and 50 tons of wheat, altogether 100 tons of food valued 100 in money terms, say 100 dinars. The working population consists of 100 men.

[1] Cf. Barna: 'The international exchange of goods is expected to bring about certain uniformity in price relatives, subject to the qualifying influence of transport costs of monopolistic practices, but this uniformity applies only to commodities which are transportable and there is no reason to assume that a similar uniformity will cover the rest of the economy' (T. Barna, 'International Comparisons of National Accounts in Economic Analysis', *Income and Wealth, Series III*, Cambridge, Bowes & Bowes, 1953).

[2] The American definition is ill suited for this purpose. Cf. S. Lebergott commenting on Gilbert-Kravis's international comparison of national products: 'How many officials who compare those GNP totals will understand that one country will have more "economic strength" than another in proportion as it has a more complex financial system (more checks used, more services of financial intermediaries); higher interest rates (more interest paid), more barratry (more legal services); and more residents who take thought of the morrow (more expense of handling life insurance)?' And then: 'Comparisons of the economic strength of members of international organizations must reckon with that distinction (committed and uncommitted resources): resources used in making $100 worth of automobiles may be available for making $100 worth of tanks, but $100 worth of vaudeville services may be quite unusable for any other purpose' (Review Article, *American Economic Review*, 1955, p. 440).

[3] A similar definition of social product was used by the Yugoslav Federal Statistical Office. After the Statistical Office had published its 'Methodology' in 1954, an extensive discussion of the definition took place. For some of the more important contributions written from different points of view, see the following references:

Savezni zavod za statistiku, *Metodologija za obračun narodnog dohotka u 1954 godini* (*The Methodology for the Computation of National Income in 1954*), Beograd, 1955.

G. Grdjić, *Narodni dohodak* (*National Income*), Beograd, Ekonomski institut NR Srbije, 1955.

A. Bajt, 'Marxove sheme reprodukcije društvenoga kapitala i društveni bruto proizvod' (Marxian Shemata of Reproduction of Social Capital and Social Gross Product'), *Ekonomist*, 1956, 474–490.

B. Horvat, 'Društveni proizvod' ('Social Product'), *Ekonomist*, 1957, 69–78.

Total product of Buki also consists of 100 tons of food, the population is the same, but due to some innovation labour productivity (in the technical sense) is greater in Buki than in Az. Therefore Buki society can afford to spare two men, and these two men specialize in teaching and in medicine. How are we to compare Az and Buki in terms of economic welfare?

The Russian definition is usually derived from the Marxian concept of productive labour in terms of value productivity. Value is determined by the labour time expended. In Buki fewer workers are engaged in the production of food; the value of product in Buki must be less. From the social accounting point of view the result is meaningless. The Marxian concept implies a social relation, the use of the labour power bought on the market, and has nothing to do with the physical quantity of the product. The social accounting concept, on the contrary, has meaning only in so far as it measures exactly this physical quantity of the product, because what is consumed is product and not value. It follows that the two concepts must not be confused and that the Russian definition cannot be derived from the Marxian theory of value.

The Russian definition would indicate that the product of Buki is the same as of Az. But the population of Buki is obviously better off than the population of Az (granting that income distribution is no worse), because in addition to 100 tons of food they are able to enjoy medical and school services. Moreover, in otherwise identical conditions, but equipped with a teacher and a doctor, Buki economy is likely to grow at a faster rate, thus providing the population with *more food also*. The differential advantage of Buki may be expressed as: 100 tons of food valued 100 dinars plus services of one doctor and one teacher. Once we have decided to aggregate wheat and potatoes in value terms, there is no reason to leave out the services of the teacher and doctor.

Thus the Russian definition does not pass our test. It appears to be arbitrary. As such it is likely to be misleading, as the following statement by a group of Soviet authors shows:[1]

> 'Systematic increase of the share of labour engaged in the sphere of material production . . . promotes the growth of social wealth, the creation of the abundance of products needed for the building of communist society.'

[1] Ostrovitjanov and others, *op. cit.*, 2nd edition, 1955.

As it stands, the statement is definitely wrong. The transition from Az to Buki involved a *decrease* of the proportion of labour engaged in the sphere of material production, and yet it was a positive move both in terms of present welfare and in terms of the future rate of growth.

As we have just seen, according to the Russian definition, social product represents the value of material goods produced in a specified period; services are declared unproductive, and as such are excluded. It is commonly held, by both Marxist and non-Marxist economists, that this is a Marxist definition of social product. This belief is wrong.

Marx was not concerned with the theory of productive labour *in general*. Nowhere does he attempt to formulate such an eternally valid theory. He was interested in the problem of productive labour only in connection with the epoch he was studying and for which he tried to formulate a comprehensive political economy. It was the epoch of *capitalist* production. His starting-point was that of a typical capitalist-entrepreneur. A capitalist is interested in the *profitability* of his business, he tries to maximize the difference between price and cost. If this is the typical *behaviour* of the typical productive agent in the capitalist system, this must be taken as a criterion for the productivity of labour in this system. Labour is productive when it produces surplus value.

What from the point of view of society is income is *gross* income from the point of view of the capitalist. What the latter considers as net income corresponds to income minus wages. However, even the income of the society, gross income 'is an abstraction to the extent that the entire society, on the basis of capitalist production, places itself upon the capitalist standpoint and considers only the income divided into profit and rent as the net income'.[1]

II. THE AMERICAN DEFINITION OF SOCIAL PRODUCT

We now pass to consider the American definition as formulated by the authors of the official American post-war computations of social product:[2]

[1] K. Marx, *Capital*, Vol. III, Calcutta, Saraswaty Library, 1946, p. 668.

[2] M. Gilbert, G. Jaszi, E. F. Denison, and G. F. Schwartz, 'Objections to National Income Measurement, A Reply to Professor Kuznets', *Review of Economics and Statistics*, 1948, p. 182. This definition was first applied in the

'We start with the obvious fact that individuals, non-profit institutions serving individuals, and general government are ultimate buyers in the sense that they do not buy for resale in the market. Accordingly, their purchases are not elements of cost in the value of other output produced for the market. Hence there is a presumption that their purchases should be regarded as final products in any measure which purports to give a complete accounting of the entire output of the nation.'

It is evident that this definition passes the Buki test, so we move on to a more complex Vede economy.

Suppose Vede is in every respect equal to Buki, except that the two non-industrial workers are now one politician and one policeman. If everything else remains the same it is clear that the Vede community is no better off than the Az community, while according to the American Definition they would be better off. Moreover, the politician and policeman are not likely to remain idle, and to justify their existence they may persuade members of the Vede community to divert some resources from the production of food to the production of guns. At best, guns will be used as a demonstration of force, as a means to instil the necessary respect for the State inside and outside the community. In this case they represent an addition to social capital. But they may also be used and destroyed in war in the current year – which I assume here for the sake of simplicity – and then they represent current consumption. If the technical substitutability of output is perfect the aggregate value of potatoes, wheat, and guns will again be 100 dinars. According to the Russian definition, social products of Az and Vede economies are the same. According to the American definition, Vede social product is even greater than that of Az. Actually, the Vede community is worse off because the production of armaments is a social waste,

U.S. Department of Commerce national income statistics published in 1947. A lively discussion followed.

See also the following contributions to this discussion:

R. T. Bowman and R. A. Easterlin, 'An Interpretation of the Kuznets and Department of Commerce Income Concepts', *Review of Economics and Statistics*, 1953, pp. 41–50.

J. Mayer, 'Proposals for Improving Income and Product Concepts', *ibid.*, 1954, pp. 191–201.

National Bureau of Economic Research, *A Critique of the United States Income and Product Accounts*, Studies in Income and Wealth, Vol. 22, Princeton University Press, Princeton, 1958.

or cost, it contributes neither to the present consumption nor to the future consumption of the members of the community.

Suppose, further, that food growers had a number of private agricultural institutes maintained from the proceeds of the sales of the produce. The politician and policeman may persuade producers to abandon small and inefficient institutes and to form a large and well-equipped central agricultural institute financed out of direct or indirect taxes. According to the American definition, this automatically increases social product by the amount of taxation (in addition to the real increment of product due to greater efficiency after the change and assuming that there are no material costs). The same fictitious changes in product, but in the opposite direction, will occur if the policeman and politician are hired by private firms to perform the jobs of night-watchmen and legal advisers. Then their services represent *cost to the firms*, while as members of government they are supposed to create *product for the nation*. Our pair of government functionaries may become even so constructive-minded as to retire from the 'public life' into the privacy of their own estates and engage in a leisurely food growing. Taxes being abolished, the American definition may record a drop in output while there is a clear increase in economic welfare. Finally, fictitious changes in social product result from one characteristic of the American definition which is of a somewhat different nature, and may be cured, at least in principle. Private and government products are treated differently: the latter, on the grounds of expediency, does not include depreciation and interest on capital. Thus, changes in the sphere of government activity will automatically change the value of social product.

It appears that mere organizational changes, although leaving the total amount of goods and services supplied to the members of the community unchanged, may lead to changes in social product if the American definition is used. These distortions may not be great from the statistical point of view, but they render the American definition inconsistent. Also, according to both definitions, war production is likely to increase social product instead of being treated as a social waste. On the other hand, the American definition has clearly some very useful properties. It reflects the social division of labour. Since it records *all institutional* incomes, it is well suited for many purposes of practical analysis. It is also capable of an interesting reinterpretation.

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Assuming full employment and a relatively stable economic organization, the American concept may be interpreted as a measure of the *maximum potential* output in a certain period. In this case war output indicates the approximate volume of an alternatively possible economic output. Similarly, earnings of government officials and kindred categories of employees show the approximate value of product they would create if they were engaged in producing final goods and services to the consumer. Here even the assumption of full employment may be dropped and the appropriate income may be *imputed* to persons who do not exchange their work for money income whether voluntarily or involuntarily unemployed. Similarly, the non-wage income may be imputed to idle productive capacities. In this way – with some other corrections which would require a more extensive discussion – we get a convenient concept for economic analysis which may be termed Potential Social Product. It represents an absolute maximum of what can be produced assuming that *costs of communal life are non-existent*. The difference between potential and actual product may, with proper adjustments for organizational changes, be used as a measure of the efficiency of social organization.

However, whatever the accounting virtues of the original or enlarged American definition, theoretically it is as arbitrary as the Russian definition.

III. THE KUZNETS DEFINITION OF SOCIAL PRODUCT

The two definitions discussed so far have not passed our test, but the discussion has contributed something to our knowledge of the essential characteristics of the problem. It remains to see whether the third, Kuznets's definition, may serve as a basis for generalizations. Kuznets says:

> 'We assume that the final goal of economic activity is provision of goods to consumers, that the final products are those turned out during the year to flow either to consumers or to capital stock (for the ultimate benefit of future consumers), and that everything else, by the nature of the case, is intermediate[1] product whose inclusion in the output total would constitute duplication.'[1]

[1] In another paper Kuznets elaborates his idea of intermediate product: 'That society as a whole, *via* the government, decides to devote resources to these intermediate products is no indication that they themselves are used to satisfy ultimate consumers' wants or represent new additions to real capital. The decision indicates only that these products are needed either by business firms or by society at large – that they are necessary for the continuance and improvement of society, including its economic mechanism. It is particularly true of such activities as are directed at domestic peace and the international position of the country that they provide the precondition of economic activity; but they themselves cannot be conceived as yielding a final economic product, as if economic product could be imagined without the basic social framework of the economy. (For this reason it seems absurd to speak of the economic value of political liberty or of protection from aggression.)' (S. Kuznets, 'On the Valuation of Social Income – Reflections on Professor Hicks's Article', *Economica*, 1948, p. 8.) Social product, according to this definition, is an aggregate of *final* products, not of *intermediate* products. The relation between the former and the latter is one of dependency, the output of final products depends on the input of intermediate products; if the former were completely independent from the latter the latter would be final products too.

Here the emphasis is on the concept of intermediate product. It is generally accepted that raw materials and semi-finished goods (unless exported or added to stocks) should be treated as intermediate products. But Kuznets extends the concept to include services of courts, government administration, and other similar categories. For many economists this would seem a debatable procedure.

It is often suggested that all government services should be considered as final product which is consumed collectively. Expenditure on defence or on courts and police is made on behalf of the electors to preserve peace, and to ensure internal security and order. Peace and security are therefore the commodities which result from government activity and are collectively supplied and consumed. This sounds suggestive enough until one starts asking concrete questions. How much peace and security do we buy, for instance? As Reddaway points out, 'The periods with large armies were usually those in which the feeling of security was at its lowest.'[2] Also, if two countries are equal in every respect, except that one of them has a much larger army, does the latter country enjoy more peace?

[1] S. Kuznets, 'National Income: A New Version', *Review of Economics and Statistics*, 1948, p. 156. In still another paper Kuznets writes: 'National income is a measure of net output of economic activity *within* the given social framework, not what it would be in a hypothetical absence of the latter. In other words, the flow of services to individuals from the economy is a flow of economic goods produced and secured under conditions of internal peace, external safety, and legal protection of specific rights, and cannot include these very conditions as services' S. Kuznets, 'Government Product and National Income', in *Income and Wealth, Series I*, Cambridge, Bowes and Bowes, 1951, p. 193.

[2] W. B. Reddaway, 'Some Problems in the Measurement of Changes in the Real Geographical Product', in *Income and Wealth, Series I*, Cambridge, Bowes and Bowes, 1951, p. 286.

Similarly, do great police expenditures indicate that the population enjoys a high degree of personal security and freedom? Clearly, this sort of argument will not take us very far. Further, if you buy a concert ticket you will probably enjoy a commodity called singing; thus you feel better off than if you missed the concert. It you *must* go to the court, you will not enjoy security, and after you have paid the lawyer you will most definitely feel worse off.[1] This is not to say that lawyers are useless; but it is to say that they are desirable only in so far as they create certain conditions. The questions and examples can be multiplied at will, and they all point at one fact, namely that government services, like business services, are not at all homogeneous. Some of them are in the nature of product, but others are *social costs*, necessary, it is true, but nevertheless costs. Education and medical services belong to the first category, defence and justice to the second.

The criticism of the traditional argument may be restated more systematically in the following two points:

(1) Social product is not a collection of physical goods as such, neither does it measure human activities as such; it represents an aggregate of consumers' valuations. In order to treat government expenditures which do not directly benefit individual consumers as collective consumption, one would have to assume that the Government represents the majority of the population, that it is a 'democratic' government. The activities of a Fascist government will not represent a contribution to social product, but a robbery of the population. From this it follows that social products of democratic and non-democratic countries would not be comparable. Next, as there is no precise criterion for what is 'democratic', it cannot be said with certainty where the concept is applicable and where it is not. And finally, since government and state bureaucracy, politicians[2] and army officers, etc., have normally been recruited from

[1] Even if the case is settled in your favour, judicial service is not productive: 'Creation and destruction of rights is not in itself production of final goods, even though such rights may have market value for individuals and firms' (Kuznets, *Income and Wealth, Series I, op. cit.*, p. 195).

[2] Just to provide an empirical illustration from a pre-Fascist period of comparative *laissez-faire*. W. Miller finds that in the decade 1901–10 about 88 per cent of the leading American politicians came from families of businessmen, politicians, and professionals. Only 2 per cent of them were of working-class origin (W. Miller, 'American Historians and the Business Elite', *Journal of Economic History*, 1949, pp. 204–206). Similar percentages are, of course, found in all other countries.

social classes which represent a relatively small minority of population, the original assumption of an identity of government's and subjects' valuations becomes rather dubious, to say the least.

(2) It is fallacious to deduce from the *physical* fact that government does not buy for resale the *economic* fact that government is final consumer. For only individuals are final consumers in an economic sense. The administrative expenses of a firm do not represent product but cost, and the same applies to the nation as a whole. Some of the government activities add directly to the economic welfare of the population, the others add indirectly as intermediate products which are fed into the system, the final product being produced elsewhere. It appears that we can approach our problem in two ways but with identical results. In so far as administrative activities of government resemble those performed by a firm, they do not increase final product and represent costs. If, however, one prefers to say that government produces security, order, etc., then, as Kuznets points out, one must take into account that these 'commodities' are not final, because they are pre-conditions of social production and as such are intermediate products. Thus in the case of government (as in the case of any other economic agent) the character of the service rendered is the most meaningful criterion of productivity. In this way the problem under (1) disappears as irrelevant and we are able to provide a solution which is conceptually more satisfactory.

If we extend the notion of intermediate products to government services we are also able to avoid other inconsistences of the American definition. So, for instance, it does not matter whether the agricultural institute in Vede is financed privately or out of taxation. In the first case the cost of the institute is treated as such by private accountants, in the second case by social product statisticians, and in both cases the value of social product remains unaffected.[1]

Let us now define the criteria of the Kuznets definition somewhat more precisely. Its key concept is the concept of social intermediate products or, as I called it, social cost. What is social cost? Or, what is not social cost?

[1] Another way of achieving consistency is to treat services of research institutes as accumulation of intellectual capital. However, there seems to be a general agreement that the concept of intangible capital is not very useful in quantitative economics.

Usefulness cannot provide a general criterion, because raw materials and fuel are also useful and still remain cost in producing final output. Neither is physical finality (no resale) a reliable criterion, since, as we have seen, in the American definition all government services are considered as final. In fact, upon a closer scrutiny the distinction between cost and income, although so commonly made in everyday life, turns out to be extremely difficult to define precisely and consistently. We must, however, refrain from discussing all the philosophical difficulties and try to provide a simple and workable – if not perfectly satisfactory – solution. The simplest and the most general definition seems to be the following: *All those government services which do not enter directly into the consumption of individual consumers represent intermediate products or social costs.*[1] Social costs are in fact costs of social relations and of the social organization. Hence services 'not entering directly into the consumption of individuals' are not desired as such, but only as inputs in producing further output. The approach may be generalized to include all economic goods and services, whether governmental or not. Services of physicians are desired for most obvious reasons; services of bureaucracy are a necessary nuisance. Teachers help to develop mental and physical faculties of individuals, and so their services undoubtedly have a welfare content; the activity of lawyers is far from desirable. Good music, an ably written book, a fine picture – are things with which we would be most reluctant to dispense. But if we could

[1] Kuznets suggests three criteria for identifying government services to ultimate consumers:

'(1) rendering the services for no price or for merely a token price – to distinguish them from others in which the government acts as a business enterprise;
'(2) the availability of the service only upon direct request or some overt initiative by the individual – to exclude such intangible benefits as government may confer upon society as a whole and upon an individual member who may be quite unconscious of such benefits;
'(3) the existence of an analogue to the services, on a fairly substantial scale, on the private markets of the economy – to exclude government acts resulting from an individual's initiative that do not in fact constitute an economic service (balloting, securing services of a court etc.)' (Kuznets, *Economica*, 1948, *op. cit.*, p. 6; cf. also *idem*, *Series I*, *op. cit.*, pp. 192–200).

These criteria are not entirely satisfactory. As to (1) every service rendered for less than is needed to cover cost may be treated as a subsidized business service. Compulsory education, compulsory vaccination, etc., will be found to contradict (2). And with respect to (3), the fairly substantial practice of hiring and paying private lawyers does not transform their services into positive contributions to social product.

dispense with politicians, policemen, and gunmen in general we would be only too glad to do so. Similarly, while cars and fireworks may add to the welfare of the individuals, tanks and hydrogen bombs do not and, moreover, threaten to reduce it disastrously.

Together with the cost of the social organization in the narrow sense, this concept of social cost also includes intermediate product or cost of economic organization. For instance, the development of industry requires concentration of population, which in turn requires the development of towns and municipal services. In so far as short-distance walking to the place of work is replaced by bus journeys, the services of the local bus company should be considered as a social cost and not as a contribution to social product. The services of banks and other financial intermediaries provide another example. The upkeep of roads, in so far as they serve business, is also an example of an intermediate product adding nothing to the value of already computed social product. Finally, product lost because of underutilization of existing capacity and because of unemployment also represents an item of social cost. In sum, social cost is the cost of the entire social and economic organization of a particular society, the cost of a social system.

The way towards a definition of social product has now been paved. *Social product is conceptually and statistically derived from potential product by subtracting the cost of the social system.* A statistical estimate[1] of this aggregate will be more difficult than that for either the Russian or American aggregates. However, Kuznets shows that statistical difficulties are not insuperable.

But even if statistical difficulties were so great that statisticians could not adapt their measurements fully to the requirements of the definition, some sort of second best approximation would have to be found. Without this little meaning can be attached to comparisons between social products (i.e. economically useful production) or between levels of living (individual consumption and socialized services taken together) of various countries or, for that matter, of the same country in a longer period.

[1] Evidently the basic statistical estimate is that of potential product. This *statistical* aggregate must be comprehensive enough and detailed enough to allow the construction of various other aggregates necessary for economic analysis.

IV. NET SOCIAL PRODUCT

Social product, however defined, always includes an item of duplication: capital consumption. We need to subtract this item to get Net Product. The following definition of Net Product will probably command wide agreement: Net Product is that part of Social Product which may be consumed without diminishing the productive capacity (i.e. the ability to produce the same Social Product again) of the economy within a specified period. The difference between Gross Product and Net Product so defined represents capital consumption. Alternatively, capital consumption may be defined as the capital expenditure necessary to maintain a given level of output. It has been universally accepted in social accounting practice that this capital consumption is more or less well measured by depreciation charges. But this seems to be a serious mistake, both theoretically and practically; particularly when the rates of growth are high.

The problem is not new in the economic literature, but the starting-point of the analysis has always been the depreciation and its multiplying effects.[1] Since the depreciation of capital is a controversial concept, social product statisticians have continued to record what the firms do and have ignored the existence of the problem. But we may forget about depreciation completely and restate the problem of capital consumption – for the purpose of social accounting – in the following simple way.

Assume that technology and prices do not change, that the productive capacity of a fixed asset remains constant until it is scrapped, that its scrap value is zero, and that there is no gestation period of investment. These assumptions are only intended to simplify the arithmetic and will be abandoned later. Let I stand for an annual portion of gross investment, R for replacement, K for gross capital stock, r for the rate of growth of gross investment, and n for the average service life of the assets. Then the process of capital accumulation, starting with a unit investment at the beginning of the year 1, will develop as follows:

[1] Cf. my article on the 'Depreciation Multiplier' and a short history of the problem and a bibliography compiled there. B. Horvat, 'The Depreciation Multiplier and a Generalized Theory of Fixed Capital Costs', *Manchester School*, 1958, pp. 136–159.

Year	I	R
1	e^{r}	—
2	e^{2r}	—
. . . . .		
n	e^{nr}	
$n+1$	$e^{(n+1)r}$	$e^{(n+1-n)r}$
. . . . .		
t	e^{tr}	$e^{(t-n)r}$

At the end of the year t the gross value of the capital stock will be equal to the sum of all investments reduced for the sum of all scrappings.

$$\int_1^t I\,d\tau - \int_1^t R\,d\tau \quad . \quad . \quad . \quad . \quad . \quad (1)$$

and as scrapped assets are gross investments made n years earlier, K_t will be equal to the sum of gross investments made since that date

$$\int_{t-n}^{t} e^{r\tau}\,d\tau \quad . \quad . \quad . \quad (2)$$

Replacement cost per unit of capacity at time t will be equal to

$$\frac{R_t}{K_t} = \frac{r}{e^{nr} - 1} \quad . \quad . \quad . \quad . \quad . \quad (3)$$

If the capital coefficient is assumed to be equal to one (in order to avoid introducing a proportionality constant), then K_t represents output capacity at time t and R_t/K_t means *capital consumption per unit of output* (granted that the capacity is fully utilized).

It will become apparent that, *in spite of the fact that no technological changes occur, a given output will entail widely different capital consumption*, depending on the length of the service life of assets, n, and the rate of growth, r. In a stationary economy the unit capital cost will be equal to

$$\lim_{r \to 0} \frac{r}{e^{nr} - 1} = \frac{1}{n} \quad . \quad . \quad . \quad . \quad . \quad (4)$$

In an economy of the Yugoslav type, where the average service life of productive assets is about thirty years and the rate of

growth about 8 per cent, capital cost per unit of output will amount to only

$$\frac{r}{e^{nr}-1} : \frac{1}{n} = \frac{nr}{e^{nr}-1} \quad . \quad . \quad . \quad . \quad (5)$$

or, in figures, to about $\frac{1}{4}$ of the unit capital cost in a stationary economy. This difference is far too great to be neglected in the social accounting work.

Having derived the required result, we may discard the restricting assumptions made above. Consider the logic of expressions (3) and (5): capital costs per unit of output decrease the longer the service life of assets and the higher the rate of growth. This suggests that the phenomenon of the variability of unit capital costs is due to the fact that *fixed assets are durable*. Thus whether technology changes or not, whether output capacity increases or diminishes in time, this cannot affect the fundamental property that fixed assets have of rendering services throughout more than one cycle of production, and can only lead to various mathematical complications of the above formulae.

For instance, assume that the output capacity of an asset decreases uniformly through time until at the end of its service life it is reduced to zero. Then every year a part of the lost capacity will have to be replaced out of gross investment. But it is again obvious that this part will be the smaller the longer the service life of the asset, and – relative to the total output of the economy – the higher the rate of growth. This is because the higher the rate of growth, the higher is the level of output at any one time, while the inherited replacement requirements are fixed and given. The same applies, of course, to an increase of output capacity through time. And if there are technological improvements, economic service life may be shortened and unit capital costs probably lowered below the level that our formulae suggest. And that is all.

Finally, let us look more closely at the expression (4). We recognize, of course, our old friend the depreciation charge. Thus the orthodox depreciation concept is merely a very special type of capital consumption, namely capital consumption in a *stationary economy*, and has been mistakenly generalized to measure capital consumption in *any* economy.

Theoretically, then, depreciation charges have no place in the modern macro-economic world. But this does not mean that social product statisticians should abandon them. In so far as social accounting is designed to register transactions as they occur, it ought to register the depreciation as it is actually charged. But this should not mislead us into believing that it measures the capital consumption of the economy. Indeed, it would be a very serious mistake – not just theoretical but a very practical one – if a Planning Bureau failed to realize that three-quarters of depreciation, which is usually charged, is used for capital accumulation.

V. SOME CONCLUSIONS

Summarizing the preceding argument, we come to the following conclusions:

(*a*) The Russian definition of social product produces statistical aggregates which are useful whenever we deal with commodity flows as distinct from services. But it has no theoretical foundation. In particular, the Russian definition cannot be derived from the Marxist economic and social theory, which is something entirely different.[1]

(*b*) The American definition reflects the social division of labour, and as such can be usefully employed when considering institutionally determined incomes for the purpose of analysing employment determinants, or factors making for inflation and deflation, or any economic problems for which the particular institutional set-up has great importance. But this definition is also theoretically inconsistent.

(*c*) The Kuznets definition, perhaps with modifications, yields statistical aggregates which may be treated as having welfare implications. It distinguishes intermediate and final products not only within the business sector but also within the government sector. The intermediate products of government are in the nature of social cost. Various social, economic, and political systems entail widely different social costs in running them, and these costs must be deducted from gross output in order to arrive

[1] See, e.g., K. Marx, *Theories of Surplus Value*, London, Lawrence and Wishart, 1951. But compare D. Seers, 'A Note on Current Marxist Definitions of the National Income', *Oxford Economic Papers*, 1949, pp. 280–288. Also E. F. Jackson, 'Social Accounting in Eastern Europe', *Income and Wealth, Series IV*, London, Bowes and Bowes, 1955, pp. 242–261.

at the net value of goods and services contributing to the economic welfare of the members of a particular community.

(*d*) However we define gross product, the universally accepted theory and practice of deriving net product by subtracting depreciation (calculated according to the usual accounting rules) seems extremely misleading. In a dynamic world depreciation charges differ from the actual physical capital consumption, and as the rate of growth of the economy increases, these differences become very great. It has been suggested that in order to arrive at net product one should subtract replacement expenditures from gross product.

(*e*) The foregoing discussion should not be interpreted as implying that from now on the Russian and American aggregates should be discarded and replaced by that of Kuznets.[1] The three aggregates serve different purposes. A real-world situation has two equally important aspects which should be considered and measured. On the one hand, we have a certain quantity of economic activities being performed in a particular society. This bundle of activities is well measured by Russian and American aggregates. But the same bundle of activities may produce a widely different end-result, depending on the technical characteristics and the general efficiency of the social framework of the society in question. The 'urban civilization' has different, and generally greater, social costs than an 'agricultural civilization'. The capital used and the hours worked may remain exactly the same when the industry is switched from the production of cars to the production of tanks. But no one can doubt that the welfare of the population will diminish. To cope with these effects we need the Kuznets aggregate.

In a society in which immediate and ultimate purposes of production coincide, i.e. where production is organized not in order to earn profits or accumulate capital but to satisfy human needs, labour is productive when it increases the welfare of the community. It is irrelevant, as it was for Marx, whether the product is a commodity or a service – labour expended on tanks is unproductive while teacher's labour is productive; what is important is the social motivation behind the labour done. But

[1] If one takes into account that the main preoccupation of Soviet planners is the speeding up of the accumulation of productive wealth while their American colleagues are absorbed by the problem of maintaining full employment – then the two definitions appear to have much sense and seem adapted to the different tasks they are implicitly intended to serve.

the work which is intended to increase society's welfare produces what we have termed the Kuznets aggregate. It appears that the Kuznets definition implies a social theory to which Marx could have subscribed, and, if we wish, we can legitimately describe it as a 'Marxist' definition. But what about its applicability to pre-socialist societies? In so far as a socialist economy represents the last *known* phase of social development, its categories can be used – within a Marxian theoretical framework – as a standard by which to judge the efficiency of the earlier systems. And upon a reflection it becomes clear that this is not 'just dialectics' but a very useful proposition. For instance, a free capitalist and a planned economy imply different amounts of social costs given the same amount of economic activities. Which is more efficient? The comparison of Kuznets aggregates will provide an answer.

In order to keep the analysis as simple as possible and confined to the essential issues only, this paper has ignored many important statistical problems (e.g. the problem of imputing interest on government capital, of imputing government capital consumption, of calculating services of housewives, of working out criteria for statistical identification and measurement of social costs, etc.). This is because I believe that a discussion of – and perhaps an agreement on? – essentials must precede a discussion of details. As to essentials, it seems futile to insist on calculating only one 'standard' aggregate. The present statistical practice and analytical requirements suggest that at least three aggregates ought to be computed. Of these only one, the Kuznets aggregate, is theoretically consistent. Nevertheless, the two others are significant.

As an economist I would very much like to see the future 'standard' statistical work done in roughly the following way. First, to make a most comprehensive estimate of all institutionally final goods and services, actual and potential; this may be called Aggregate Potential Product. Second, to subtract the potential services of unused capacity and unemployed labour to get something which may be called Institutional Product; this aggregate essentially corresponds to the American definition, and I do not think that substantial modifications would be useful. Next, the elimination of services would leave us with the aggregate value of material goods, a Material Product, which essentially corresponds to the requirements of the Russian

definition. On the other hand, Potential Product reduced by th amount of social cost would leave us with Welfare Produc which corresponds to the Kuznets' aggregate.[1] Finally, in eac case the net product is obtainable by subtracting replacemer expenditures, or depreciation charges, when the recording o the latter seems institutionally important, as in the case of th American definition.

A very crude attempt to estimate the order of magnitudes of various aggr gates for Yugoslavia in 1953 revealed the following differences. Taking soci product according to the Russian definition as 100, the American aggregate wa 114, Potential Product was 116 (including services of the Government, capit included, but neglecting non-utilization of resources) and the Welfare aggrega was 95. When labour of housewives and services of consumer durables wer included Potential Product stood at 139 and Welfare Product at 118.