SOME ASPECTS OF CAPITAL AND ECONOMIC EFFICIENCY

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In this note we try to explore certain aspects of the concept of productive capital, and some of their implications on the problems of economic efficiency. In the first section the concept is examined and some of its practical implications are pointed out. In the second, a special aspect of the problem, viz., working capital requirement for household-based economic operations, is discussed in the context of agriculture in the underdeveloped economies. In the final section, the concept of economic efficiency as affected by the nature of productive capital is studied.

I

The factors of production, as we are told in any textbook, belong to three groups: land, labour, and capital.\(^1\) (Alfred Marshall's somewhat dubious "organization" seems to have been quietly dropped in recent years.) What is included in the last category is not always

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quite clear. It is not unpopular to identify capital with capital goods, even with just machinery, and this view is reflected in the measurement of the degree of capital intensity in terms of per capita availability of "horsepower," or of "tons of steel." If, however, capital stands only for machinery, then the three-fold classification of factors of production into land, labour, and capital, is obviously incomplete. What about raw materials, and intermediate goods, other than machinery. The horsepower-steel view is, of course, not the only one used in this level of analysis, and another quite common definition of capital seems to be "all man-made productive assets, from buildings and machinery to materials and fuel." But, then, what about labour in the pipeline of production? If there is a time-lag between the application of operating labour and the consequent output flow, some amount of labour will be locked up in the production process, forming a part of the working capital. One can avoid this problem by treating "semi-finished goods" as constituting another factor of production and including the value of labour in the pipeline in the price of these semi-finished goods. But treating semi-finished goods as factors of production, does not go very happily with the usual concepts of factors of production. Of course, one can say that labour in the pipeline can be put under "labour" of the trinity of land-labour-capital, but there


is no doubt that in one sense, the value of the working capital (including labour in the pipe-line) is a part of the capital.

The whole problem, it seems to me, arises because we seem to use the term capital in two completely different senses. In the three-fold classification of factors of production, "capital" covers all man-made means of production, thereby providing a residuary category for all agents of production other than those provided by nature, and other than human labour. When, however, we refer to "capital" in the context of investment, or in the context of the stock of value that is to be maintained in a production unit, we are referring to quite a different thing. In this sense, "capital" is best looked at as a stock of factors of production that must be maintained to keep production going. The stock of labour, of materials, of machines, etc., that the entrepreneur has paid for and has not yet received full return from, make up this category. If we are using capital in this sense, we do not treat it at par with labour and land, and we must use a more specific term, e.g., capital goods, for the residuary category of factors of production referred to above.

Why, we could be asked, are we being so particular about these distinctions? The answer is that the concept of capital as a particular factor of production comparable with land and labour has been responsible for considerable confusion of thought and policy, since the term capital is also used in the other sense. The confusion between capital as a necessary stock and capital as a type of productive factors, leads on the one hand to theories that make the expansion of the productive capacity
of an economy dependent entirely on the production of capital goods, and on the other, to a concept of investment that concentrates on machinery and not on other things, e.g., a surplus of consumer goods for the labour in the working capital, necessary for a successful expansion of productive capacity. For example, we find that the Indian Planning Commission defines investment as "expenditure on certain physical assets (e.g., buildings and plants and equipment), including expenditure on personnel required for putting up these assets." This underestimates the investment requirement of Indian Plans fairly considerably. A rough estimate that the present writer tried to make from the available Indian statistical information indicated that the additional working capital requirement tended to be more than a quarter of the net fixed investment in India. The reason why this investment, which is undertaken, can escape being counted in the investment statistics, is not merely that there is a confusion about what capital means, but also that this capital formation is financed largely by borrowing from short-run sources of finance, which, of course, does not affect the fact

5. Even Mr. N. Kaldor seems to define "the value of the stock of capital" as "the values of the capital goods produced in the past" "less accrued depreciation." ("A Model of Economic Growth," Economic Journal, December 1957, pp. 598-9.)


7. In this unpublished paper the sectoral ratios of additional working capital to additional net income were taken to be 0.90 for mining and manufacture, 1.50 for small industries and construction, 1.17 for trade and commerce, 0.06 for agriculture, and 0.11 for railways and communication. The weighted average ratio of working capital to net fixed investment worked out as 27 per cent. In the Third Plan Draft, rather contrary to their own definition there is some provision for "inventories" in investment without elaboration of what it contains (p. 26). The ratio of this "inventories" to net fixed investment, however, seems to be only 8.5 per cent, as opposed to our over-all working capital requirement ratio of 27 per cent.
that they do demand a surplus of real income over real consumption in
the same way as any other type of investment does.

A second result of ignoring the working capital, and one that in
the opinion of the present writer is very important, is the lack of any
organized attempt to save the requirements of working capital. One cannot
consciously save something that one does not know one uses, and this can
be quite serious in economies suffering from capital shortage. The
possibility of saving working capital depends on the extent to which the
various time lags between current inputs and current outputs can be
reduced, not merely (a) within particular industries, but (b) in the
process of transfer from one industry to another. Not much work has gone
into this problem, which probably indicates the extent to which this
aspect of investment policy has been inadequately appreciated. Poland
seems to provide one of the few exceptions to this rule, and it is claimed
by Professor Włodzimierz Brus that in the Polish economy the share of
net fixed investment in the national income will be considerably raised
between 1958 and 1965 with a constant share of total investment in the
national income, this being achieved by a reduction in the ratio of
additional working capital to total investment from more than a third in
1958 to less than a fourth in 1965. If this is, in fact, achieved, it
will indicate that the cost of ignoring the economics of working capital
may be very considerable for a developing economy.

II

One special aspect of working capital in underdeveloped economies deserves attention. In a very big part of most underdeveloped economies, the household provides the basis for economic operations, and wage labour is relatively rare. This means that the remuneration to labour, in this sector, need not increase with additional labour until the fruits of that labour are reaped, so that the working capital requirement in terms of consumer goods fund is to that extent reduced. Take the case of fertilizers being supplied to a group of peasants cultivating land on a family basis. The additional labour they will now put in along with fertilizers will receive no additional remuneration until the additional products resulting from this are reaped. If, on the other hand, a wage-based farm employed additional labour to apply fertilizers, the wage-bill would have gone up immediately, and the existence of unemployed labour would not have prevented the requirement of a surplus stock of consumer goods for the employment of additional labour.\(^9\) This means that the household economy achieves a certain saving of working capital that is not possible for the wage-based economy, and since the process of development is also partly a process of conversion of the household-based

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9. In so far as some additional saving is now done by (a) those who were supporting the unemployed people before they found new employment, and/or (b) by the newly employed people themselves, the requirement of the surplus stock will be smaller. The prospects of this providing much voluntary savings is not, however, very great in a poor economy, so that some taxes will be required if a substantial part of the additional working capital requirement is to be met by additional savings from these sources. There might, however, be some voluntary shift in the commodity pattern of consumption which might, to some extent, ease the process of capital accumulation through a change in the relative prices. For a discussion of this problem, see "Unemployment, Relative Prices, and the Savings Potential," by the present writer, *Indian Economic Review*, August 1957.
economies into wage-based ones, the requirement of working capital is likely to grow, to that extent, more than proportionately to income. This makes the necessity of discussing this aspect of capital all the more important.

We must, in this context, examine the view of Professor C. P. Kindleberger about the relative decline of the requirement of capital represented in "inventories" with the growth of an economy, resulting from a fall in the ratio of agricultural output to total output. He says (in his chapter on "Capital"), "since agricultural output is produced at one time of the year and consumed evenly over the year as a whole, half of output on the average is in inventories at a given time. This is a higher ratio than industry or services. In consequence, since the proportion of agricultural output in total output declines as income grows, the ratio of inventories to output declines." Now, this argument is certainly valid in so far as "inventory" is defined as any stock of goods, but it does not tell us much about "inventory" viewed as capital necessary for production. The crucial difference between a wage and a non-wage economy is relevant here. In a non-wage economy this stock is in the nature of purely a consumption stock without representing a necessity for production, at the margin. The size of this stock does not have to be increased prior to expanding production through the employment of more labour; on the contrary, the expansion of this stock is only a result of a larger rise of output.

One should emphasize, in this connection, the distinction between stocks arising due (a) to the temporal discontinuity (or the seasonal

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nature) of output in agriculture, and (b) the working capital that may be needed due to the time lag between input and output in this sector. The former does not demand any productive investment. Think of an economy where agriculture is permitted only on January 1, i.e., the output is extremely seasonal, but the seeds sown in the morning are harvested in the afternoon of January 1, out of which the workers are paid, i.e., the time lag is negligible. There is no need here for any working capital for labour in the pipe-line, and more labour can be employed without the necessity of the prior presence of an additional stock of wage goods. The stock of output will be gradually spent between one January 1 and another, but this need not be expanded to employ more people on any January 1. So this does not serve as working capital necessary for expansion.

The effects of a time lag between the application of labour and the arrival of the fruits of that labour are, however, quite different. In agriculture this lag is long, and in one of the Ricardian models of agricultural production, working capital arising from this constitutes the whole of agricultural investment. As we have already mentioned, however, in underdeveloped economies with family-based, non-wage cultivation, this type of working capital is not necessary from the point of view of application of incremental labour. The underemployed peasant can work a little harder to apply, say, fertilizers, or water from irrigational

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11. This provides the basis for the Ricardian position, in contradistinction to Robert Malthus, that the profit rate in agriculture determines the profit rate for the whole economy, since it is independent of the relative prices; the output, input, and capital for agriculture being all made of corn. (Essay on the Influence of a Low Price of Corn on the Profits of Stock, 1815.)
projects, and they receive their return only when the additional output is harvested.\textsuperscript{12} With the growth of an economy, there are, therefore, two different trends. As a result of a fall in the share of agricultural output, the ratio of "inventories" to output may well fall in the Kindlebergerian manner. But this will not imply a relative fall in the investment requirement under this heading. In fact, the decline of family-based production will tend to lead, other things being equal, to a larger requirement of working capital. This prospect of working capital rising more than proportionately to output poses interesting problems for planning, which development authorities must take into account.

III

We now move on to the concept of economic efficiency in so far as it is affected by the existence of capital. Since capital is not just one type of factor input, but a stock of inputs that must be maintained for the production flow to take place, we cannot get a concept of economic efficiency based only on the maximization of the ratio of output to input. Unfortunately, however, the idea that capital is just one type of input has led to a fairly widespread presumption that economic efficiency is precisely this type of output-input-ratio maximization. Professor P. Sargent Florence writes\textsuperscript{13}, "...by efficiency I refer to a relation between

\textsuperscript{12} However, in so far as harder work requires more consumption of food, there will be a certain requirement of incremental working capital in the shape of a stock of food.

\textsuperscript{13} The Logic of British and American Industry (London, 1955), p. 49. Any suggestion that costs should include an interest flow on the capital stock is excluded by the definition of cost as "input."
return (or output) and cost (or input). Efficiency is indicated by the amount of return obtained at any given cost...." Similarly, in a recent contribution to the concept of economic efficiency Lady Hall and Mr. C. B. Winsten write11, "As an example, to introduce the main ideas, suppose we are comparing mines, each with a similar labour force producing the same sort of coal with the same type and quantities of equipment. Then at the simplest level of efficiency analysis we can suppose that we are concerned with deciding where to produce coal, at mine A or at mine B. The answer would be, other things being equal, at the mine producing more coal." More coal per unit of time, or more coal over the life of the mines and equipment? Clearly efficiency is not necessarily greater for a mine if it gives more coal in one sense and not in the other. To quote another example, Mr. N. H. Leyland defines efficiency as "the ratio of useful output to total input." "If one country or firm uses less of all the factors of production than another to produce a given output, then it is more efficient."15 Here again maximizing the ratio of output to input provides the concept of efficiency, with no reference to the stocks of these factors that need be maintained. It could be argued that we are quarrelling about a definition, and any one has the right to define a term in whatever way one likes. In fact, however, the term "efficiency" has certain accepted implications, and the question is a real one disguised in a definitional form. This is clear, for example, from Mr. Leyland's state-

11. "The Ambiguous Notion of Efficiency," Economic Journal, March 1959, p. 70. It should be noted that the ambiguity referred to in the title is not the one we are discussing.

ment that "efficiency is always desirable."16

The best way of viewing the process is to imagine a continuous flow of production with regular flows of inputs of different types with different replacement patterns. A particular machine might flow in once in ten years, that being its life; raw materials, on the other hand, require replacement every time a new unit is produced; same with labour. There is an essential similarity between these flows, but the time lags between these different types of inputs and the outputs corresponding to them are different, and depending on these, different quantities of these inputs are in the pipeline. If the average lag between the application of labour and raw materials is one month, then one month's labour and raw materials are in the pipeline. Depending on the life of the machinery, the quantities of machinery in the pipeline at different points of time can be found out, and from this the average value of the machines in the pipeline can also be calculated. Now, let us assume that an organizational, or technical, change reduces the length (so to say) of the pipeline, keeping the input-output ratio constant. Say, double-shift working is introduced as a result of which output per machine per day is doubled, but the life of the machines is halved. So the ratio of outputs to machine-inputs remain the same, but the average value (per unit of output flow per day) of machines kept in stock at any point of time goes down, thereby achieving an economy that the standard measures of economic efficiency, quoted above, fail to note. The same thing can happen with a reduction in the lag between raw material inputs (or labour) and output, resulting in increased economic efficiency.

16. Op. cit., p. 383. I should mention that the object of quoting these authors in particular is not to suggest that they hold a particular view not shared by others. On the contrary, the view is sufficiently widespread to be confirmed by these random selections.
without being noted by the standard efficiency detector.

The preoccupation of efficiency analysis with input requirement ratios irrespective of the speed of economic operations, reveals that the misunderstanding of the nature of capital can have more serious practical consequences than is obvious at the first sight.