TARA SHUKLA, *Capital Formation in Indian Agriculture*, Bombay, Vola & Co., Publishers Private Ltd., 1965, xiv+261 pp.

The problem of how agriculture in the underdeveloped countries should be developed is one of the central tasks in the promotion of the economic development of these countries. When we consider Asia, in particular, the experience of such countries as Japan and Taiwan, which have realized marked progress in agriculture, provides no small number of implications for this matter, and many economic studies of these countries have been made in the past. However, in order to obtain a more complete answer to this task it is necessary to make a thorough economic analysis of agriculture itself in the underdeveloped countries. Nevertheless, comprehensive economic analyses of agriculture in the underdeveloped countries are still few, apart from reports of specific cases and partial analyses. The principal reason for this is the paucity of consistent statistics regarding agricultural output and inputs which would make such analyses possible. In particular, data regarding agricultural capital may be said to be completely non-existent, and this has imposed a great restriction on developing studies of this field. This book, which contains quantitative analyses of capital formation in Indian agriculture over the period of 40 years between 1920 and 1960, in this sense, provides us with an important key, not only as a means of elucidating the agricultural question in India alone but in elucidating the functions of capital in agriculture in the underdeveloped countries.

It is a widely-held view that in general in the underdeveloped countries there is practically little or no formation of reproducible tangible capital in agriculture and that agriculture is carried on by means of land and labour alone, but is this in fact the case? That is to say, is capital formation effected or not? Assuming that it is, how does it compare with income, and in what type of forms is it carried out? As a result, how fast has the capital stock grown, what are its relations of substitution or complementarity with labour and land, and what are its relations with output?

These various questions about capital in agriculture in the underdeveloped countries are of great interest to many economists. The intention of this book, too, is that of elucidating these questions empirically in regard to the agriculture of India.

The book is composed of two parts. In Part I, comprising the first three chapters, the analytical frame of reference is treated, and in Part II, comprising the remainder of the book from chapter 6, factual analysis is carried out and several hypotheses put forward in Part I are tested.

In Part I the author frames some hypotheses regarding capital formation in agriculture in the underdeveloped countries, having first carried out a general discussion of the concept and measurement of capital, and of capital formation. The main hypotheses are as follows:

(i) Due to the low range of labour-capital substitution and a rising supply curve of savings, the capital/labour ratio would tend to remain unchanged

(p. 114). (ii) Since the potentiality for land to expand is limited, capital/land ratio might tend to increase (p. 115). (iii) If technology of production is unchanged the capital/output ratio also may tend to rise (p. 115). (iv) Savings and total investment are not very low compared to income. However, a relatively larger proportion of them is used for replacement and additions to capital in the traditional forms (p. 163). (v) With the increase in the labour supply, the supply of capital increases, if need be, raising the investment/income ratio (p. 163).

In Part II estimates of capital stock and capital formation are made, and this is followed by analyses based on these estimates. The capital which is the object of analysis in this book is the durable physical assets, consisting of the five categories of land, buildings, irrigation, work animals, and farm implements, and analysis is particularly centred on the last three of these. However, only a considerably limited range of items is included in each of these categories, and this contains the possibility of theoretical analysis not necessarily coinciding with an actual analysis. Comments will be made on this point later. Total capital stock has been aggregated with 1950–1951 fixed prices as weight. As a result, it is shown that over the 40 years between 1920 and 1960 capital stock followed a slow upward trend, and that the pace of expansion of stock has considerably quickened in the 1950's in comparison with the preceding years. This trend was similar to the trend in production.

The capital/labour ratio declined slightly up to 1945–1946 and thereafter slightly increased, but over the whole it was more or less constant. This substantiates hypothesis (i), and probably implies a high complementarity between capital and labour. Again, the capital/land ratio shows an increase of more than 40% over the whole period, which is consonant with hypothesis (ii).

The capital/output ratio slightly increased up to 1950–1951 and thereafter declined, but over the whole did not vary much. On the other hand, the output-aggregate inputs ratio, which is one of the indices of technological change, declined somewhat up to 1950–1951, and thereafter increased somewhat. This would seem to lend support to hypothesis (iii) for the period before 1950–1951, and it is held that it indicates the occurrence of technological change in the 1950's.

The gross capital formation remained at the same level in the period before 1950–1951, and thereafter gradually increased. The major contribution to the capital formation over the whole period was by bullocks, and the upward trend in the 1950's was mainly due to expanding gross investment in irrigation. Net capital formation is relatively low, compared to gross capital formation, and this implies a slow growth of capital. The gross capital formation is at 10–15% of agricultural income, and net capital formation at 1–5%, and these facts would also seem to support the hypotheses.

So far as the composition of assets is concerned, the traditional forms of capital, such as bullocks, are dominant over the whole period. However, there have been increases in non-traditional forms of capital in recent years which cannot be ignored.

In this way the author fully substantiates in Part II the hypotheses which she had framed in Part I. These hypotheses are along the same lines as the arguments presented in T.W. Schultz's *Transforming Traditional Agriculture* and *Economic Crises in World Agriculture,* and in this sense they support the contentions put forward by Schultz.

Since the reviewer's position in this matter is one which in principle recognizes the correctness of Schultz's contentions, he also appreciates this book highly. He agrees in principle with hypotheses substantiated here.

In this review the reviewer's criticism is principally directed to the methods of estimating capital and other factors used as the basis for substantiating the hypotheses. Capital as subjected to analysis in this book is limited to durable physical assets, but for the purposes of elucidating the structure of agricultural production analysis should also have been carried out in regard to fertilizers and other forms of working capital, even if the author were subject to restrictions from the availability of data. Further, even when capital is limited to durable assets, the range covered should be extended as far as possible, and although the author has indeed chosen the major items in the various categories which go to make up capital, it seems to us that these are insufficient. Let us point out some problems in regard to these categories. "Land" comprises "fallow" and "net sown area," but since there is reason to believe that there will be a fair difference between the productivities of these two kinds of land the two should be weighted separately where the data make this possible. The author considers only bullocks among the working animals, and although data for working cows and buffaloes have been available since 1935 she disregards them. Nevertheless, one would naturally expect that these also should be added. As regards "irrigation" it is not clear what manner of things are included in the actual content of the term, and it is necessary that this should be clarified. These will be divided into traditional or modern, according to whether they are simple contrivances near to the utilization of natural rainfall or modern irrigation installations, and their roles in relation to production will differ accordingly. Up to 1930–1931 only "carts" and "ploughs" are given under the head of "implements and machinery," but was the author unable to evaluate the neglected part of this category with the help of supplementary data of some kind? Since we may assume that over the whole the items in the neglected part would be almost entirely traditional in character, the evaluation of the traditional forms of capital would seem to be too low to this extent. The estimates for "houses" are based on simple figures, but was it not possible for the author to separate out from these figures by some means or other the figures for "cattle sheds and other houses used for storing"?

There is a problem which cannot be neglected regarding the calculation of the weights of the aggregation of stock in 1935–1936, granting that the weakness in the determination of the estimated prices is rendered inevitable by the data. Since the values for "total stock" in 1935–1936 in Table IV–1 (p. 81) are the quantities of individual assets we would naturally expect that they would correspond to the indexes for 1935–36 in the Quantity Indexes of Individual Assets in Appendix I. A. (p. 234). However, whatever kind of assets we take there is no correspondence. If we compare the values of Table IV–1 with Appendix I. A., taking 1950–51 as 100, we will find, for example, that whereas the value for irrigation in the former is 108.2, in the latter it is 89.0, that the values for sugar-cane crushers (bullocks) are 86.5 and 109.4, and for tractors 91.4 and 36.3 respectively, and that all the figures differ to a fair degree. The most extreme case is that of bullocks, where the figure given in the former, 783.0, contrasts with that given in the latter, 91.0. This is clearly due to a mistake in the figures, but it cannot be disposed of as being due to a simple misprint. The number of bullocks in 1935–36 in Table IV–1 is 457,407,817, but in the actual calculations for arriving at total value these are calculated at 45,740,781 in the case of a value per unit of Rs 85, and at 45,747,817 in the case of a value per unit of Rs 75. This would seem to be an obvious mistake in calculation, but carelessness of this kind detracts much from the reliability of the estimates as a whole. At all events, these discrepancies in the Quantity Index figures render meaningless all the index figures based on 1935–36.

There are problems in connexion with the indices of labour and production compared with capital. The author constructs an index of labour supply with base of rural population data (p. 71). However, small towns and large villages described as urban centres by the Population Census have large areas of cultivated land (p. 68), and since this is so the labour appertaining to this part should not be ignored. Again, the supposition that the percentage of farm labour in the rural population was constant lies in the background of the estimates, but no backing for this supposition is given.

The production indices are for crops alone, but since it is probable that crop activity and livestock and other activity will not be separated in actual agricultural management, it would seem that when possible one should estimate a production index which would include the other branch of agriculture.

As we have seen above, there is no small number of problems connected with the calculation of the indices which have been employed as the basis for the analyses, and we would also seem to be obliged to attach some reservations to the results of the analyses based on them.

But however that may be, considering the extraordinary paucity of statistics and surveys relating to economic matters in the underdeveloped countries in general, the author's carrying out estimations of agricultural capital under these conditions and making analyses of them should be highly appreciated. This book may be expected to provide us with many implications for studies of the development of agriculture in the underdeveloped countries, particularly with regard to the role performed by capital.

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