Agricultural Production Functions, Costs and Returns in India by C H Hanumantha Rao; Asia Publishing House, 1965; pp xi+99, Rs 12.

In the first essay of this book, Hanumantha Rao has fitted Cobb-Douglas productive functions with land and labour as the inputs to a set of data, derived from A M Khusro's study "Economic and Social Effects of Jagirdari Abolition in Hyderabad State" (1958). He omits capital from the list of the inputs entering the production functions, "as the estimated elasticities relating to this input when included were found to be non-significant, due to certain gaps in the data relating to this item" (p A).

Rao derives certain conclusions from this study which are obviously important: (a) "the marginal product of labour is positive and significant" (p 24); (b) "as between different regions and types Of farms, wherever the functional significance of labour is greater and the per acre labour inputs relatively lower over a considerable area comprising large-sized farms, the elasticity of output with respect to labour input is higher relatively to that for land" (p 25); (c) "... apart from the regional differences in soil fertilities, the regional disparities in the pattern of land holdings are an important factor in explaining the regional disparities in productivity" (p 25); (d) "... with the labour-intensive technique, productivity of land and total output can be raised best under a more even distribution of the ownership of land which would work for a greater identity between these three factors" (viz, ownership, management and work) (p 26)

Rao also draws contrasts between the elasticities of output with respect to land and capital in irrigated or partially irrigated and unirrigated areas. Briefly, it is contended that the elasticity of output with respect to land is lower in the former and higher in the latter (i.e. unirrigated) areas than the elasticity of output with respect to labour.

Some of these seem to be quite sensible conclusions and the last one is very important and not at all obvious. The trouble is, however, that these conclusions are erroneously arrived at. Rao's analysis suffers from two basic defects: first, he fails to specify in any detail the set of economic relations and institutions from which the data are generated; secondly, he fails to realise that long-term policy prescriptions cannot be based on a static model mirroring some aspects of the working of a farm economy within a short period of time. The total indifference to technological and agronomic considerations that the book displays is related to this second defect.

What Does a Good Fit Mean?

Even in advanced industrial economies with malleable capital and mobile factors of production, it is not very clear what precisely a good fit of a set of data by the Cobb-Douglas function implies. Furthermore, there is a dilemma involved in the specification of the competitive conditions under which the Cobb-Douglas production function can be estimated from observed experimental data. On the one hand, it is well-known that a set of data relating to inputs and outputs at a moment of time can represent points on a production function only if the firms generating those data can be supposed to be maximizing profit under purely competitive conditions. On the other hand, in long-period equilibrium if all factors and products are bought and sold under conditions of long-period equilibrium, then all the firms will have the same endowments of factors and the data relating to all the different firms will be the same, so that no estimate can be made. In these circumstances, it has been concluded that the only data on the basis of which unbiased estimates of production functions can be made are engineering or experimental data.

If this is the prospect of estimation of Cobb-Douglas production functions on the basis of data relating to firms in advanced economies, the prospects of estimating production functions of a simple nature in Indian agriculture on the basis of non-experimental data are even more bleak. It is well known that the mobility of land among different cultivators is extremely restricted. Then there is the phenomenon of joint family and the running of the farm on the basis of family labour. There is the season-bound character of farming operations: the distribution of labour, rainfall and other inputs among the different phases of cultivation can be a critical factor in determining the productivity and profitability of farming operation. Associated with this season-bound nature of cultivation is the high degree of uncertainty surrounding all the calculations of the farmers. And finally the vast differences between the farmers as regards wealth, income and the prospects of employment influence their choice of inputs, can be summarised in the two exponents of labour and land in the Cobb-Douglas production function.

When one tries to interpret these exponents as the elasticities of output with respect to the two inputs, as Rao has tried to do, one gets into even greater trouble. Rao's estimates would imply that independently of the extension of acreage or the increase of capital, an increase in labour alone should increase agricultural output in India by a substantial proportion. Anyone who has studied the history of agriculture in Eastern India during the period 1900-1940, or anyone who passes to consider the poor level of productivity in the lateritic regions of West Bengal suffering from soil erosion will find it hard to credit this message of hope.

The fact of the matter is that even without any basic innovation in the methods of cultivation a growing pressure of population on the soil will dictate new patterns of land use, new crop rotation systems, different ways of using water and other scarce plant nutrients. When we add the effect of increase in the factor that is missing from Rao's scheme - viz, capital, the effects are even more far-reaching. When the amount of fertilisers applied grows, when dry areas are irrigated, when improved seeds and strains of cattle are introduced, or when fodder is raised on cultivated grasslands instead of natural ones, the changes can rarely be considered as just a change in the quantity of capital; they will involve the introduction of new types of capital, new techniques, new crop-
An intensification of cultivation will also necessitate a higher level of education for the farmers. It is clear, as the Ladejinsky report and other studies show, that in many cases new techniques can be fully exploited only if the system of absentee landlordism in its various forms can be abolished in India. But Rao does scant service to the cause of effective agrarian reforms by badly prescribing a more egalitarian distribution of land on the basis of a study which assumes the techniques of cultivation to remain unchanged.

Wrong Emphasis

In the second essay the author compares farm costs and returns of different states. He takes "net income" per acre which is arrived at by deducting from the gross value of output the input values of seeds, manures, fertilizers, irrigation charges, feed of bullocks and the depreciation on fixed equipment, e.g., bullocks, implements, machinery and farm constructions", (p 29) as the index of efficiency of farms. It is not clear why the wages of hired labour are not deducted from this measure of net income. Rao arrives at the interesting conclusion from this study that "farms which lease in some area invariably show lower costs on bullocks and implements. Indeed, it is not without significance that regions where area leased is relatively large, e.g., Punjab, Andhra, West Bengal and Madhya Pradesh show relatively lower costs on bullocks and implements" (p 61-62).

The data used for this study are derived from Farm Management Studies sponsored by the Research Programmes Committee. Rao does not indicate the tremendous (and often, unknown) margins of error involved in these data. If he had taken account of errors involved in the data, he would probably have paid less attention to a subtle analysis of the differences between 'net incomes' between different size-groups, and more attention to such blatant facts as the differences between the average sizes of farms in Punjab or Bombay and West Bengal, and the differences between the states of water supply and land use between Madhya Pradesh and Madras. That the study would have benefited from such a shift of emphasis is abundantly dear from the many illuminating comments Rao offers as disdainful asides at the end of each of his essays.

The third essay analyses the relative profitabilities of different crops measured by net income per acre in different regions, again on the basis of the Farm Management Data. His conclusion is, in his own words, "the present inquiry reveals a remarkable correspondence between the net income per acre (after deducting variable costs excluding family labour from gross output) from different crops and the area under them" (p 90). What is this "correspondence" supposed to reveal? That the farmers are "rational"? Would the lack of such a correspondence have revealed them as being "irrational"? If farmers were free to choose their crops entirely on the basis of the net income they would derive from them, and soils were homogeneous within regions then only the crops yielding the highest marginal returns per acre would be selected. Even then the figures of average profitability correlated with the figures of distribution of land among the crops would not reveal anything. As it is, farmers are limited by their subsistence needs, by their debt positions, by the cycle of the seasons, and by the nature of the soils in the choice of crops to be cultivated. In such a situation a bald analysis of the data relating to average profitability for different crops will reveal nothing about the rationality or irrationality of farmers, if no other background information is provided to support such an analysis. As it is, the conclusion of the author might mislead the unwary into thinking that, by and large, all is well with our crop pattern and land use in different States, whereas nothing can be further from the truth.

The above comments are by no means a critique of econometric analysis in Indian agriculture in general; nor are they to be interpreted as a criticism of all production function studies. Production function studies based on experimental data or on a proper specification of the institutional and technological background can still serve a valuable purpose in bringing out certain implications which are not obvious from unprocessed data. But if Indian agricultural economists continue to ignore the findings of soil chemists, agronomists and geographers bearing on Indian agriculture, their policy recommendations can only be considered irresponsible or irrelevant. It is sad that with all the detailed knowledge of Indian agriculture that Rao obviously possesses, he should be tempted to play up to the conventions of a professional coterie which may have little bearing on the problems of the real world.

Notes

1 See in this connection, the review by Zvi Griliches of Heady and Dillon: "Agricultural Production Functions" (Ames, Iowa, 1961), a book to which Rao repeatedly refers for guidance.


5 There may be a conflict between an immediate increase in productivity per acre through redistribution of land on a more egalitarian basis and the long-term increase in productivity if the richer farmers do tend to 'save and invest a much greater proportion of their incomes than smaller farmers. But this conflict will in effect vanish if the State provides most of the scarce inputs and the growth of output is limited by the demand for new techniques and new inputs by farmers.

Lakshmiritan Engg

Forges Ahead

A N all-round increase was record-ed by Lakshmiritan Engineering in production of ring frames. Lister diesel engines, Freedom range engines, sealed compressors, spindles and high drafting equipment in the year ended September 1964. Value of sales and job work done was higher by 20 per cent to Rs 1.95 crores. But the net result was a loss of Rs 10.04 lakhs, as against a profit of Rs 1.09 lakhs earned a year ago. This is attributed by the management to the higher cost of production which, it says, could not be compensated by a corresponding increase in the sale prices of products, as a major part of the production had been sold in advance. Both equity and preferential di-vidends are, therefore, again skipped.