Book Reviews

Public Investment Criteria: Benefit-Cost Analysis for Planned Economic Growth by Stephen A. Marglin. London: George Allen & Unwin Ltd., 1967. Pp. 103. 22s. 6d.

Investments for Capacity Expansion: Size, Location and Time-Phasing edited by Alan S. Manne. London: George Allen & Unwin Ltd., 1967. Pp. 239. 45s.

These books are numbers 4 and 5, respectively, in the series "Studies in the Economic Development of India". The two books are interesting complements to one another, both being concerned with the analysis of projects within national plan formulation. However, they treat different sorts of problems and do so on very different levels.

Marglin's *Public Investment Criteria* is a short treatise on the problems of cost-benefit analysis in an Indian type economy, *i.e.*, a mixed economy in which the government accepts a large planning responsibility. The book, which is wholely theoretical, explains the many criteria needed for evaluation of projects. The work is aimed at beginning students and government officials with some training in economics. It is a clear and interesting "introduction to the special branch of economics that concerns itself with systematic analysis of investment alternatives from the point of view of a government".

Manne's *Investment for Capacity Expansion* deals with a particular problem of project analysis: how does the existence of economies of scale affect the optimal size, location and time phasing of projects? The answer to this question is, of course, an empirical one, but to investigate the empirical question requires certain theoretical tools. In Section I of the book Manne lays out the tools he needs and applies them to the analysis of four important industries in India. In Sections II and III he and his collaborators* give more thorough attention to some of the theoretical problems. The overall result is to leave the reader with a good understanding of the problems and some of the solutions to the problems of developing industries when economies of scale are important.

---

* The book consists of fourteen chapters, nine of which are authored solely by Manne ; two are authored jointly by Manne and one or two others; three are contributions of other authors. Manne's editorship is, in any case, evident throughout.

The underlying lesson of both books is that in plan formulation goals are not necessarily compatible, and it is, therefore, only by careful analysis of the trade-offs implied by alternative development programmes that the best programme can be 'found'.

Marglin's first concern is with the multiplicity of planning goals and with the formal methods by which plans and projects can be evaluated in terms of their contribution to the many goals. The discussion here and throughout the book is based on the assumption of convex feasibility spaces (thereby, the particular problems of increasing returns to scale which Manne is concerned with are eliminated). The principal contributions of Chapter I are first, to stress the importance of considering multiple goals, and, second, to show the pragmatic equivalence of the alternative formal methods of dealing with multiple objectives. In a formal optimizing model the contributions of a project to alternative goals may be given separate weights in an objective function, or all but one goal may be specified as constraints of the model while the objective function contains a single, unambiguous goal. For any set of weights there is a set of constraints which will yield the same results, and *vice versa.* Indeed, the constraints will not only yield the same results, but will yield the same weights as shadow prices. Any optimizing problem can be formulated in either way. Of the two approaches the one to be preferred in a particular case will depend upon the particular nature of the problem and the way in which planners' preferences can best be simulated.

One difficulty arises in understanding Marglin's analysis with respect to multiple goals. It is not clear just when he is writing about a general planning strategy and when he is writing about the evaluation of a particular project. There is no doubt that an overall planning strategy must be formulated to meet multiple objectives. However, some individual projects may serve one goal to the exclusion of all others. This is no reason to reject the project, so long as it is part of an overall scheme which is well designed. A conclusion reached by Manne is especially relevant as an example: there is no reason to disperse a particular industry in order to achieve regional distribution goals when these goals can be attained without giving up economies of scale by dispersion of the economy in general.

The second and major portion of Marglin's essay is taken up with discussion of specific aspects of investment criteria. After an explanation of precisely what is meant by" benefits" and "costs", the author turns his attention to the conceptual problems of measuring these benefits and costs. Most thorough treatment is given to the problem of Time and Interest. The problem of choosing an interest rate for the appraisal of public sector projects is a complex and controversial

topic with a long literature. Marglin's discussion does not offer new contributions at least it sets forth clearly some important points: that in making intertemporal choices there seems to be no way to escape the necessity of making value judgements; that the private-sector interest rate is of little use to the planners of the public sector since it is a reflection of different sorts of forces and decisions than those relevant to the public sector; that the divergence between the private-sector and the public-sector interest rates requires the use of shadow-price accounting in evaluating present benefits and costs as well as in discounting the future; that the reinvestment rate of a project can play a very important role in determination of its worth.

The value of *Public Investment Criteria* lies in the very simple manner in which these and other aspects of the cost-benefit problem are explained. Some might say that the book is simple to the point of being superficial. As the author himself points out "the discussion of most of the individual criteria has been a summary". However, to call the book superficial would be to misread its purpose. Marglin has made his original contributions to this field elsewhere. The present book is a clear exposition of the basic problems in public investment analysis, and it is useful to anyone wishing to obtain a clear introduction to this important field.

Manne in his *Investment for Capacity Expansion* is concerned with a particular type of trade-off: the trade-off between the aggregate income contribution of a project and its contribution to affecting a desirable regional income distribution. The contributions of the book are three. First, it develops a method by which to examine projects when economies of scale are important. Secondly, by examining particular industries in India, particular lessons for Indian planning (and perhaps some general lessons as well) are derived and the methodology is clarified. Thirdly, the author makes the simple but important point mentioned above: there is no reason to sacrifice economies of scale in a particular industry since regional income-distribution goals can be attained by proper distribution of the overall plan.

The problem of size, time-phasing and location of plants is viewed as that of minimizing the costs of production, imports, and interregional transportation subject to the constraint of meeting a given growth of demand. It is shown that it is possible to formulate the problems so that the size question is eliminated. Once the timing of the supply process for each region is determined, the plant size is also determined.

The analysis revolves around the concepts of a "regeneration point" and a "constant cycle time". At a regeneration point excess capacity drops to exactly

zero. At each such point a new plant will be built. Under certain reasonable assumptions about the growth of demand it can be shown that the optimal time between "regeneration points" is constant and what is done in each "constant cycle time" is the same. This simplifies the problem to one of figuring out what is the best programme to be followed in a single cycle.

Once the model and the optimizing procedure are established, it is relatively simple to apply them to any industry for which the relevant data are available. (Incidentally, it is one of the merits of the method that its data requirements are not terribly stringent; a few simplifying assumptions, all easy to accept, go a long way.) Manne has applied the analysis to four Indian industries: aluminum, caustic soda, cement and nitrogenous fertilizer. Only in the nitrogenous fertilizer industry does Manne find that the present licensing practices of the Indian Government result in plant sizes which correspond to those recommended by his analysis. In aluminum, caustic soda and cement, the analysis indicates that significantly larger units than those typically being sanctioned would be optimal. The calculations show that in these three cases the cost reductions obtained by building the larger plants would be 20 per cent, 18 per cent and 15 per cent, respectively.

What makes all the calculations so impressive is the author's careful consideration of what biases may result from his simplifying assumptions. In general, when a choice must be made, Manne has chosen to err in the direction of giving his optimal plant-size results a downward bias. It would be difficult, therefore, to refute his general criticisms of Indian planning practices. Furthermore, some of the calculations have been made under alternative assumptions about key parameters. In one of the primarily theoretical chapters, contributed by D. Erlenkotter, the results of numerous computations are presented to show the effects upon optimal plant size of variation of important parameters. One is left with the impression that the results are not sensitive to some arbitrary assumptions.

An area which might have deserved more investigation and comment is the effect of using shadow prices for certain large elements of cost. For the aluminum industry, the only one of the four industries where imports are not eliminated *a priori*, calculations are undertaken for various shadow prices of foreign exchange. However, the change in the shadow price of foreign exchange is allowed to affect only the price of imported aluminum. No account is taken of the costs of imported inputs or imported capital. These costs may or may not be substantial in any of the four industries, but some comment, at least, seems warranted. Also, there are the questions of the proper shadow prices for all sorts of non-imported inputs. In any case, this is a relatively minor criticism. The work is in general very thorough.

While *Public Investment Criteria* and *Investment for Capacity Expansion* are written with an Indian frame of reference, they are not at all limited in their relevance to the Indian scene. Wherever planners are interested in attempting rational calculations of development alternatives, these two studies will be useful.

ARTHUR MACEWAN

Pakistan Institute of Development Economics
Karachi