The Relation of

COST TO OUTPUT FOR A LEATHER BELT SHOP

Joel Dean

THE intimate relation between cost and exchange value directed attention to the theory of cost as soon as value theory became a subject of serious discussion. Because of economists' pre-occupation with the problem of value, cost has occupied a central position in theoretical economics. Although a great deal of subtle analysis has been devoted to cost, the notion is still attended with some ambiguity. Therefore, it is necessary to be certain that the meaning of 'cost' in any given instance is clear. In this investigation 'cost' is taken to mean the 'expenses of production' an entrepreneur incurs in operating an enterprise.[1] The cost theory developed from this point of view is concerned with the magnitude of the cost associated with different levels of operation of a given enterprise. The simplicity of this relation should not be over-emphasized,[2] nor its importance underestimated. This cost behavior has a crucial role in determining the most profitable adjustment of the individual enterprise to its economic environment. Consequently, the business executive is also vitally concerned with the response of cost to changes in output.

In this study an attempt was made to build upon the existing theoretical foundation by determining the empirical counterpart of the static cost-output functions for enterprises with immobile plant and equipment. This procedure is desirable as a means of comparing theoretical with statistically determined relations. Furthermore, since cost prediction requires a knowledge of the basic relation between cost and output, the estimation of future cost is much simplified by this approach. Such statistical analysis may also afford information that is not immediately available from the firm's cost accounts: e.g., (1) the expected total

1 Cf. Alfred Marshall, "The sums of money that have to be paid for . . . [the] efforts and sacrifices will be called either its *money cost of production*, or, for shortness, its *expenses of production;* they are the prices which have to be paid in order to call forth an adequate supply of the efforts and waitings that are required for making it [a commodity] . . ." *Principles of Economics* (8th ed.; London: Macmillan, 1920), p. 339.

2 Cf. F. Y. Edgeworth, "The relations between cost of production and quantity produced present such a variety of aspects as almost to defy the subtlety of speech, even when rendered precise by mathematical conceptions." 'On Some Theories Due to Professor Pigou,' *Papers Relating to Political Economy* (London: Macmillan, 1925), II, 429-30.

and average cost under a given set of operating conditions (adjustable budgets), (2) the additional cost that must be incurred if output is increased by a small amount. Nor is managerial interest in a statistical analysis of cost behavior confined to its immediate usefulness for forecasting purposes; the techniques used here have a wide applicability in the control of costs and in price policy.

Rigorous empirical investigations of cost designed to compare statistical results with the cost behavior prescribed by economic theory have not been numerous. This is to be attributed to the difficulties of obtaining confidential cost data and of finding firms that meet the requirements specified in the underlying cost theory, i.e., single product, unchanging technical methods, unchanging equipment, etc. Although each industry and enterprise offers its own peculiar problems, the case study reported in this paper illustrates the results that can be obtained by statistical analysis of accounting records as well as the problems encountered in determining these results. It is hoped that this description and illustration of analytical methods that have proved valuable in several similar investigations will stimulate research in an area that has both scientific and practical importance.

1 Theories concerning Static Short-Run Cost Functions

In the hope that this paper may reach some non-economist readers, we first summarize the fundamentals of short-run cost theory to clarify the basis of later discussion. Underlying the whole discussion of cost theory is the notion of a cost function — a function that shows the relation between the magnitude of cost and of output. The existence of such a function is postulated upon the following assumptions: (1) there is a fixed body of plant and equipment; (2) the prices of input factors such as wage rates and raw material prices remain constant; (3) no changes occur in the skill of the workers, managerial efficiency, or in the technical methods of production. It is the shape of this cost function that is of primary interest in both the theoretical and statistical parts of this paper.

Money expenses of production depend upon the prices and quantities of the factors of production used. Since prices are assumed to remain unchanged, the shape of the cost function will be determined by the physical quantities of the factors used up at different levels of operation. And since these quantities are functionally related to output, their relation to cost can be represented by a cost-output function. Thus the underlying determinant of cost behavior is the pattern of change in the factor ingredients as output varies.

This pattern of change will be determined by the technical conditions of production. In general, when there exist fixed productive facilities to which variable resources are applied, the law of diminishing returns