Partial Equilibrium and Marshall

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With the publication of the first edition of his *Principles of Economics* in 1890, Alfred Marshall developed partial equilibrium analysis as a method for turning economic theory into a form that could be used to formulate policy and aid in the analysis of actual problems. He wanted economics to be "an engine for the discovery of concrete truth" (quoted in Hausman 1992, p. 152). In partial equilibrium each market or section of the economy is considered as a separate entity, and so its interdependence with other markets is not considered. This often is described as ceteris paribus; that is, other things being equal. To bring some order and understanding to an extremely complex world in which everything affects everything else, partial equilibrium concentrates on key relations, holding the rest constant (Hausman 1992). It is not that these factors are believed to be unchanging but that they are held in the ceteris paribus "pound." As Marshall stated in 1922:

> The forces to be dealt with are however so numerous, that it is best to take a few at a time: and to work out a number of partial solutions.... Thus we begin by isolating the primary relations of supply, demand and price in regards to a particular commodity. We reduce to inaction all other forces by the phrase "other things being equal": we do not suppose that they are inert, but for the time being we ignore their activity.... In the second stage more forces are released from the hypothetical slumber that had been imposed on them. (Marshall 1922, pp. xiv–xv)

Marshall suggested that, in each stage of the analysis, more factors could be allowed to vary

> The element of time is a chief cause of those difficulties in economic investigations which make it necessary for a man with   limited powers to go step by step;

breaking up a complex question, studying one bit at a time, and at last combining his

partial solutions into a more or less complete solution of the whole riddle. In breaking it

up, he segregates those disturbing causes, whose wanderings happen to be inconvenient,

for the time in a pound called *Cæteris Paribus.* The study of some groups of tendencies

is isolated by the assumption *other things being equal....* With each step more things can

be let out of the pound. (Marshall 1922, p. 366, emphasis in original)

Interdependence in Prices and Markets

Marshall was fully aware of the interdependence between most markets and prices in the economy,

as is apparent from notes xiv and xxi of the mathematical appendix to his *Principles*, where he

outlined the basis of a general equilibrium system. However, he realized that attempting to analyze

that interdependence would render the economic problem so complex that the main causal factors

could not be isolated. Hence, he regarded partial equilibrium analysis and the use of ceteris paribus

as important approximations that allow casual inferences to be made and real-world problems to be

studied.

In particular, Marshall concentrated on the role of price in individual markets as the main

determinant of the quantities supplied and demanded. To illustrate this, one can examine the

demand for oranges (D_0), which will depend on their price (P_0), all other prices in the economy (P_1

.... P_n), the income of all individuals in the economy (Y_1 .... Y_m), the weather, people's tastes,

international factors, and so forth:

$D_0 = \mathbf{f}(P_0, P_1 .... P_n, Y_1 .... Y_m,$ weather, tastes, etc.)

Some of these factors, such as weather and tastes, are not economic variables, and so they

normally are considered exogenous. This does not mean that it is assumed that they do not change

but that their changes cannot be explained   within economics, and so they are unlikely to

be influenced significantly by economic variables. What is left is the general equilibrium demand function for oranges in terms of all prices and incomes in the economy. Clearly, this is extremely complex because in general equilibrium everything affects everything else. Therefore, it is difficult to use the theory to make meaningful statements about causality or policy.

In partial equilibrium analysis each market is considered in isolation. When each market is concentrated on individually and when part of the economy is broken off and relations within that part are considered, causal inferences can be made. In addition, it is assumed that demand and supply are separable and can be represented as independent curves, with price determined as the balance of those forces. To calculate the partial equilibrium demand function for oranges, the price of oranges is considered as the main determinant, other things being equal. In other words, all variables that are not determined within that market, particularly all other prices and incomes, are assumed for the analysis to be given and constant. This leaves the partial equilibrium demand curve for oranges:

$$D_0 = f(P_0)$$

Marshall's Four Time Periods

According to Marshall, the question of which factors are left in the ceteris paribus pound depends on the time allowed for those factors to respond to changes in the market. In particular, the length of time that is allowed for supply to respond to changed conditions will exert an important influence on the operation of the market. Accordingly, Marshall distinguished four time periods that are appropriate for economic analysis, determined on the basis of which factors are held constant in each situation. The first is the very short run, or the market period in which it is assumed that goods are already at market and must be sold, so that supply cannot vary and price is determined mainly by demand. In the short period, quantity supplied is allowed to vary as a result of variations in production through changes in the variable factors, but the quantity and structure of fixed capital goods cannot be varied. As plants are fixed, firms can neither enter or exit the market, and

so a supernormal profit can be made even in competitive industries. In the long period, plants can be varied and firms can enter or exit from the market, and so all factors are variable. In this case no supernormal profit can be sustained in a competitive market. Finally, in what Marshall referred to as the "secular long period" knowledge, population, technology, and tastes all can vary.

Applications and Problems

Clearly, in evaluating partial equilibrium it is not relevant to consider the question of whether the underlying assumptions are realistic. As approximations, they are intended to focus on key relations, intentionally abstracting from secondary ones, which are held constant in the ceteris paribus pound. Demand and supply are determined by more than just the price of a commodity. However, in evaluating assumptions it is necessary to look at whether they capture the key aspects of any relationship, whether what is assumed away is as important as what is included, whether the variables that are assumed to be constant vary systematically with the variables included in the analysis, and whether the variables that are assumed to be independent, in this case supply and demand, are in fact interdependent.

As a result of these considerations, partial equilibrium can be applicable only to commodities that are relatively unimportant in terms of household budgets and that have neither close substitutes nor complements. If a commodity has close complements or substitutes, changes in its price will lead to changes in demand conditions in other markets, which will lead to changes in prices in those markets. This means that the variables that are being held constant will change as a result of changes in the endogenous variables. This contradicts the ceteris paribus clause because ceteris are not paribus. Any change in price will lead, through its effect on other markets, to a shift in the demand curves in the market that is being considered. The things that are being held constant vary systematically with the ones being looked at, and this undermines the basis of partial equilibrium. In addition, if the commodity was an important part of the household budget, changes in its price would lead to changes in the   household's real income, thus changing

another of the variables that have been held constant. In other words, for partial equilibrium it must be assumed that the income effect of a price change is very small. This means that the partial equilibrium framework is relevant only for goods on which only a relatively small proportion of the household budget is spent and for which there are no close substitutes or compliments.

Further problems arise when the partial equilibrium framework is utilized to determine prices and outputs in competitive industries. A competitive industry will produce at that price for which aggregate demand for its output is equal to aggregate supply. In a partial equilibrium framework supply and demand must be independent of each other. The individual firm is assumed to face a U-shaped cost curve, and in perfect competition it faces an infinitely elastic demand curve. In long run equilibrium price will cover costs exactly so that there are no economic profits.

In 1926 Piero Sraffa published an article that showed that there are severe logical problems in the use of the partial equilibrium framework for the analysis of perfectly competitive industries. He demonstrated that some elements of the analysis are inconsistent with partial equilibrium analysis and other elements are inconsistent with perfect competition.

Also, there are the standard problems associated with partial equilibrium analysis, specifically, the fact that demand and supply are often interdependent rather than independent and that the analysis is relevant only for unimportant markets. In other words, it is rare that one can break away part of the economy and assume that the interdependencies between it and the rest of the economy are negligible. Nevertheless, partial equilibrium analysis remains important in macroeconomics, particularly the distinctions between the short period, the long period, and the secular long period.

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