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Excerpt

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Part I

Market microstructure and the intermediation theory of the firm

1 Market microstructure and intermediation

Firms create and manage markets by acting as intermediaries between buyers and sellers. An *intermediary* is an economic agent who purchases from suppliers for resale to buyers or who helps buyers and sellers meet and transact. Intermediaries seek out suppliers, find and encourage buyers, select buy and sell prices, define the terms of transactions, manage the payments and record keeping for transactions, and hold inventories to provide liquidity or availability of goods and services.

This book is concerned with the economic role of firms and the functioning of markets in general. In finance, the study of intermediation and the institutions of exchange is called *market microstructure*.¹ I apply the term market microstructure generically to refer to the operation of markets for all types of goods and services. I show that there are basic similarities between a broad range of intermediation models in economics and finance. Throughout the book, the main results are derived within a common framework, with similar notation and related economic reasoning.

Just as producing goods and services consumes resources, so does the establishment and operation of markets to allocate those goods and services. Companies incur costs in adjusting prices and communicating price information to buyers and sellers. The types of information imperfections that are present determine the intermediation activities of firms. When there is demand and supply randomness, intermediaries provide liquidity or immediacy by standing ready to buy and sell. Given uncertainty about the willingness to pay or opportunity costs of trading partners, intermediaries coordinate transactions by matchmaking and brokering activities. When the characteristics of buyers or sellers are unobservable, intermediaries generate market information and provide

¹ I do not address finance theory and financial institutions specifically. I focus on general economic applications involving such issues as uncertainty, adverse selection, and moral hazard. Moreover, I do not address issues covered in the literature on market microstructure that deal with the details of double auction markets, including discrete units for price quotes, margin requirements, frequency of order clearing, and so on.

guaranties for product quality to address adverse selection. When the actions of buyers or sellers are costly to observe, intermediaries provide monitoring and contracting services.

The main function of market intermediaries is to figure out ways of clearing the market, that is, pricing to match purchases to sales. This crucial price-setting activity provides an explanation for a main puzzle of neoclassical economics: how are market-equilibrium prices attained? The market institutions that provide intermediation have not been given the attention that they deserve.

In this chapter, I consider some of the elements of market microstructure. I begin by emphasizing the important economic role played by firms as intermediaries. I then integrate the notion of firms as market makers in the traditional circular flow of economic activity. Next, I compare the intermediation theory of the firm with other economic theories of the firm. Finally, I highlight the importance of market microstructure: it seems likely that the value added by specialized intermediaries represents approximately a quarter of the U.S. economy!

1.1 Who decides?

Paul Samuelson (1980, p. 16), in an often-quoted summary of economic analysis, asserted that any society must solve three classical economic problems: what goods to produce and in what quantities, how to produce them, and for whom particular goods are produced. In economic models, these three problems are solved through markets that coordinate the actions of individual consumers and firms. In the neoclassical framework, for example, the market is a description of an exogenous mechanism for selecting prices that equalize aggregate supply and demand. Individual consumers, taking prices as given, choose their most preferred bundle of goods subject to their budget constraint. Firms, also taking prices as given, choose a bundle of inputs and outputs that maximizes profit, given their production technology.

Economists thus offer a standard representation of the market that is at variance with what is observed in most market economies. In practice, the problems of what to produce, how to produce, and for whom are solved directly by the actions of individual firms, through their production, technology, and marketing decisions. Firms perform the activities associated with the market mechanism, most importantly, they select prices and coordinate exchange. Moreover, firms establish organizations, interact strategically with customers, suppliers and competitors, and negotiate the legal and political constraints of the society in which they operate. Economic analysis, by overemphasizing an idealized view

of the market mechanism, has downplayed the important role played by the firm.

Joseph E. Stiglitz (1993) observes that in addition to the three questions – what, how, and for whom? – one should add a fourth: “How should these decisions be made, and who should make them?” His central point is that economic analysis must address the incentives to acquire and process information. He states,

In the economy of Joan Robinson, or Arrow and Debreu, decision makers and the structure of decision making play no role. Robinson described the job of the manager of a firm as simply looking up in the book of blueprints the appropriate page corresponding to current (and future) factor prices. Were life so simple! Of course, if life were so simple, being a manager would be a truly boring job, worthy of the disdain cast by the traditional British academic. Further, the lack of concern of Lange, Lerner, and Taylor for managerial incentives would be of little moment: managers could essentially be replaced by automata.

Stiglitz further decries the neoclassical market model:

The view of economics encapsulated in the Arrow–Debreu framework (and reflected in contemporaneously written textbooks, such as Samuelson’s) is what I call “engineering economics,” intending no slur on the engineering profession. Economics consisted of solving maximization problems.

Stiglitz concludes that “the failure of market socialism serves as much as a refutation of the Arrow–Debreu model of market economy as it does of the market–socialist ideal.” It is apparently a good time to review the underpinnings of economic theory.

In my view, the solution to the quandary of “who decides?” is the firm. By shifting the locus of economic decision making to the firm, a realization of the role of its managers as decision makers and strategists inevitably follows.

Firms address what goods and services to produce and in what quantity. The variety of goods that a firm supplies is one determinant of the scope of the firm. The characteristics of the goods that the firm supplies include the physical characteristics of goods as well as their location and the date that the goods are made available. The properties of the goods also include the brand name, advertising, and contract terms. Also, the firm must decide on the quantity of goods to supply, which determines the scale of the firm.

Second, the firm's managers determine how to produce the goods and provide the services. Here the decision is much more complicated than the choice of productive technology, although such a choice is often significant. The firm's organization is a hierarchy of positions filled by individual decision makers. The managers must decide how best to structure the organization to achieve the firm's objectives. The actions of managers include the design of incentives, lines of authority, communication channels, and organizational rules. The managers must decide what accounting conventions to follow and what measures of performance to emphasize. The managers determine the method of financing (debt and equity), the skill levels of personnel who will be employed, and the types of capital equipment and other productive inputs that will be needed. The firm decides on whether to make or buy specific inputs, depending on whether it can achieve economies of sequence² from vertical integration.

Finally, the question for whom to produce becomes the more general question for individual firms of what markets to enter, both as a seller and a buyer. Entering a market as a seller consists of identifying customers and entering into transactions with them. The firm defines its product markets in a wide variety of ways based on the characteristics of its intended customers and the types of goods and services that the firm wishes to provide. The important characteristics of consumers can include tastes, risk aversion, rate of time preference, income, location, age, occupation, knowledge, and other factors that affect consumer demand for specific goods and services. Customers are identified through market research, marketing channels (wholesale and distribution), and customer self-selection in response to marketing efforts.

The firm addresses specific market segments through advertising, sales expenditures, distribution channels, pricing policies, contract terms, and product design. Deciding on what goods and services to produce and how to produce them depends fundamentally on the customers for whom the goods and services are intended. Similarly, as a buyer, the firm can enter a range of markets. The firm enters into capital markets to obtain funds for investment, labor markets to hire personnel, and other factor markets to purchase technology, equipment, manufactured inputs, services, land, and raw materials. Here also, the firm defines its input markets in terms of the characteristics of the suppliers of the types of inputs that the firm demands.

² Economies of sequence are formally defined in Spulber (1989b). Economies of sequence refer to economies achieved by the vertical integration of steps in a production sequence.

Models of the firm can address any subset of these questions and many others besides. However, these three types of questions can provide useful benchmarks to evaluate the applicability of economic models to the many problems that firms attempt to solve. The answers to the three questions that I have just outlined determine the range of the firm's activities and thus define the attributes of the firm: its scope, scale, organization, and market actions. There are many determinants of the firm's attributes, including the characteristics of the firm's customers and suppliers, relative prices; the capabilities, knowledge and preferences of the firm's managers; the degree of competition; and the regulatory, legal, and political environment of the firm.³

Acting as intermediaries, firms answer the three classical questions by making decisions about the mix of products they will purchase from suppliers, the types of suppliers that they will contract with, and the allocation of goods and services to be offered to their customers. The distinction between merchants and manufacturers need not be clear-cut. In combination with managing transactions, intermediaries often transform products to add value: transporting, storing, repackaging, assembling, preparing for final use, and adding information and guaranties. Conversely, manufacturers carry out many market-making activities, intermediating between sellers of raw materials or product components and buyers of manufactured goods.

1.2 The circular flow of economic activity

Firms create and operate markets: setting prices, carrying out transactions, producing and distributing information, and forming and monitoring contracts. When the role of firms as intermediaries is understood, it is possible to take a unified view of diverse theories of the firm. The intermediation theory of the firm suggests that some markets are guided by the visible hand of firms, as observed by Alfred D. Chandler (1977), while in others firms are guided by the invisible hand of the market, as emphasized by Adam Smith.

In his classic response to the mercantilist opponents of free trade, Adam Smith, in *The Wealth of Nations* (1776), emphasized the virtues of the market competition that guides the entrepreneur so that "[b]y pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it."⁴ Entrepreneurs, seeking to maximize their profits by producing goods and services, act

³ Of course, alternative models of the firm will emphasize different characteristics of the firm, depending on the questions the researcher seeks to address.

⁴ Adam Smith, *The Wealth of Nations* (New York: The Modern Library, 1937), p. 423.

for the benefit of society as if guided by the external forces of the market. This story has been embellished through over two centuries of economic analysis to such an extent that the activities of individual firms are downplayed and the market is taken to be an explicit coordination mechanism. The market, or the mythical Walrasian auctioneer, establishes prices that equilibrate supply and demand, steering the production activities of price-taking firms and directing the choices of price-taking consumers. The market is said to adjust prices upward or downward in response to shortages or gluts and to summarize information about rapidly changing buying and selling behavior.

In neoclassical economics, market prices are the outcome of seller competition and buyer bidding; yet, what is missing is an explicit mechanism for translating those bids into market prices. To be useful, the economic model of the market mechanism must satisfy two criteria. First, it must specify the actions taken by market participants, so that the equilibrium is chosen endogenously. Second, the market model should correspond to those of the observed characteristics of actual price-setting institutions. In particular, it should recognize the importance of firms in setting prices and clearing markets.

Intermediation models potentially satisfy these criteria. In these models, the firm sets prices and carries out other market-making activities. These price activities correspond in a realistic way to the complex pricing decisions of retailers, wholesalers, manufacturers, and financial intermediaries. The firm carries out a variety of intermediation activities as outlined in the Introduction, including market making, reducing transaction costs, producing and distributing information, and delegated monitoring.

As a market maker, the firm creates and operates markets. First and foremost, the firm is a price setter, establishing prices based on the willingness to pay of its customers and the price responsiveness of suppliers. It is essential to recognize the significant administrative effort involved in price setting. For example, a typical supermarket chain sets prices on well over 50,000 to 70,000 items. Moreover, these prices often vary regionally or across stores and are changed weekly or sometimes more frequently in response to competition, supply fluctuations, changes in demand, or inventory considerations. Price setting by firms provides a valuable service that should be viewed as a central economic activity rather than as an exogenous phenomenon. Thus, in addition to producing goods and services, firms generate transactions that yield economic rents.

Price setting by firms implies a different market equilibrium than the auctioneer model. In particular, the law of one price need not hold, since companies choose a positive bid–ask spread, earning profits from the

markup of selling prices over their buying prices. In a simple monopoly–monopsony framework, where the firm has market power on both the demand and supply sides of the market, the bid–ask spread will straddle the Walrasian price and output will fall below the standard supply and demand equilibrium level. Competition will narrow the bid–ask spread. With costly search and heterogeneous consumers, suppliers, and intermediaries, there will be nondegenerate distributions of bid–ask spreads across firms. Moreover, the spreads will depend on the costs of search to customers and suppliers.

Firms coordinate transactions in a variety of ways. By centralizing exchange, they reduce the costs of search to their suppliers and customers, providing an address to which buyers and sellers may direct their communication. Retailers, wholesalers, and other distributors substantially reduce the number of contracts needed to link their many trading partners. Similarly, manufacturers coordinate networks of parts suppliers and output distributors. Firms stand ready to purchase from their various suppliers and hold inventory for the convenience of their customers. Thus firms are market makers, providing immediacy in a manner that is analogous to specialists on organized exchanges for financial assets.

Firms perform a variety of other tasks often attributed to an unspecified market mechanism. They allocate goods and services across locations and over time through marketing and sales activities, purchasing decisions, and inventory adjustment. Firms engage in quantity rationing of their customers through priority service contracts, order delays, and unintentional stockouts. These supplement price adjustment as a means of balancing supply and demand in markets.

By coordinating exchange, firms reduce transaction costs for their customers and suppliers. Transaction costs include direct costs incurred in carrying out purchases and sales, as well as the time and the inconvenience of search. It is often noted that money, in addition to being a unit of account and a store of value, avoids the double coincidence of wants, which hampers a barter economy. Yet the problem remains; a buyer must locate a supplier that wants to sell what the customer wants to purchase at the desired time and place. Firms address this problem by standing ready to buy and sell and by marketing and purchasing efforts. By dealing through an intermediary rather than entering a decentralized matching market, buyers and sellers reduce the risk that they will fail to find a compatible trading partner. The prices posted by the intermediary avoid the repeated bargaining of decentralized exchange, which entails the possibility that negotiations will break down. The effectiveness of competitive markets as a mechanism for processing vast amounts of information has often been noted. Usually economists point

to the information content of prices and the advantages of decentralized decision making. As Stiglitz observes, however, “prices do *more* – and less – than is envisaged in the traditional paradigm.” They do more in that quality may be signaled by price and quality can depend on the price paid (Stiglitz, 1987b). Prices do far less in that companies and their customers and suppliers communicate in many complex ways in addition to price signals, including negotiation of contract terms.

What should be stressed is that individual firms incur the costs and earn the returns from producing and supplying information. Firms, acting as intermediaries, gather information about the patterns of consumer demand and the characteristics of suppliers. This information is used for pricing, product design, and production decisions. Companies inform their customers about product quality and availability through their product selection, catalogs, sales personnel, and advertising. Retailers, wholesalers, and manufacturers pass along market-demand information to their suppliers. Advances in computers and telecommunications and the development of computer networks have spurred the use of electronic data interchange and Internet communication between companies as a means of increasing the speed and the accuracy of transactions and lowering costs.

A simple modification of the circular flow diagram represents the economic function of intermediaries (see Figure 1.1). Figure 1.1 recognizes three types of agents in the economy: consumers, market-taking firms, and market-making firms. Market-taking firms take price signals and market institutions as givens. In contrast, market-making firms are intermediaries that create and operate markets. Market makers include not only price-making firms but also other market institutions such as organized exchanges for securities, options, futures, and other financial assets. They coordinate transactions between consumers, between market-taking firms, between consumers and market-taking firms, and between other intermediaries. The consumers send expenditures to market-taking firms in return for goods demanded and receive incomes from intermediaries in return for inputs supplied. Similarly, market-taking firms receive revenues from intermediaries in return for goods supplied and make factor payments to intermediaries in return for goods received.

How do prices adjust to clear markets? In the perfectly competitive market model, of course, firms simply react to prices. But in practice, many companies have at least some power over prices because of a variety of factors such as product differentiation, transportation costs, consumer switching costs, transaction costs, barriers to entry, and incomplete information about prices.

However, setting prices can be a costly activity. Companies need to gather demand or supply information and monitor competitors’ prices.

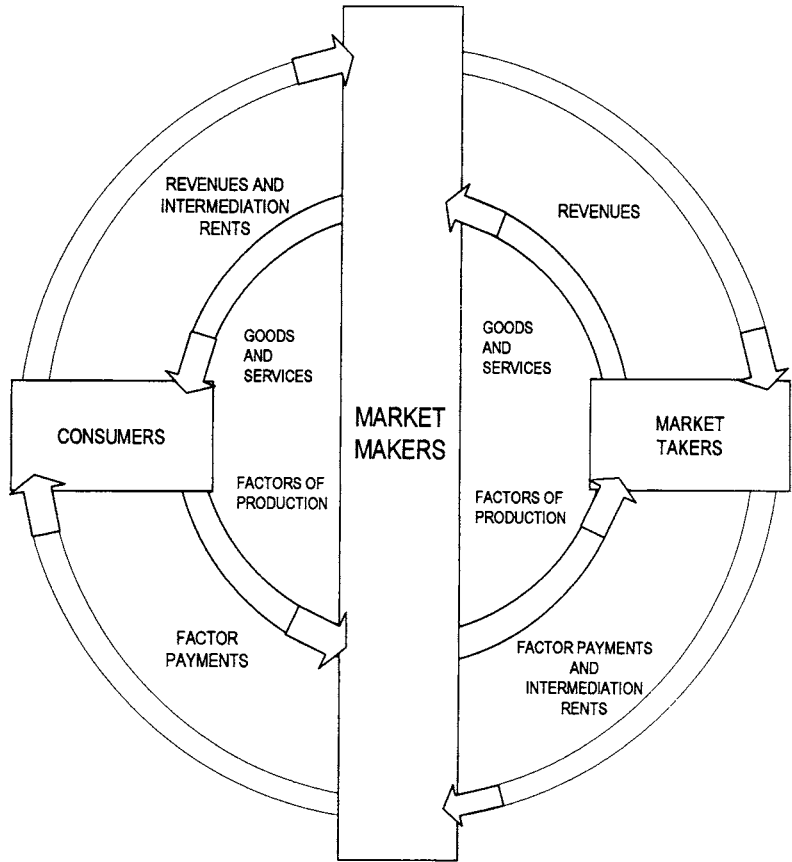


Figure 1.1. The circular flow of economic activity with market intermediaries.

They need to perform computations to determine the profit-maximizing prices. They need to communicate prices to their customers and suppliers. In many industries, companies may incur menu costs in changing prices by printing new catalogs or issuing price lists. Price rigidities are observed in a wide range of industries (Carlton, 1986), which also suggests that changing prices is costly (Barro, 1972).

When companies act as intermediaries, they not only arbitrage between buyers and sellers, but they also coordinate their transactions through price signals. The traditional supply and demand model can be applied to understanding the market-clearing actions of intermediaries.

Consider a retail or wholesale intermediary that has market power in both its customer and supplier markets. For example, the firm could be the primary purchaser and reseller of a differentiated product. Thus the intermediary has some power to set both bid and ask prices for its product and to make profits from the markup between the two.