

# Chapter 2

## The Firm and Costs

This chapter first explains why firms exist, why they enter or exit markets, and why they merge horizontally or vertically. It describes the institutional, legal and financial contexts in which firms operate. Few if any intermediate microeconomics courses cover this material, so it is not a review chapter. We believe that it is important to cover this material early in the course, in order to give students a relevant framework in which to apply the concepts of subsequent chapters.

The effects of mergers on market power is discussed in detail in Chapter 5 on cartels, Chapter 6 on oligopoly, Chapter 12 on vertical integration, Chapter 19 on antitrust laws, and briefly in several other chapters. It is especially important to cover Chapter 2 if you are not going to use Chapter 12 on vertical integration. This chapter also introduces transaction cost theory and analysis of entry (potential and realized). Empirical evidence on mergers is also presented, and the emphasis is on how mergers and acquisitions may (or may not) increase efficiency. Distinctions are made between benefits and costs that accrue to shareholders, workers, and consumers.

Cost functions succinctly characterize the production processes of efficient firms. The second half of this chapter reviews basic cost concepts, and stresses the fundamental role of opportunity cost. It covers material not contained in most intermediate courses, such as:

- the distinction between fixed costs that are sunk and those that are avoidable;
- expensing versus amortizing;
- empirical evidence such as studies of survivorship and scale economies; and
- cost concepts for multi-product firms.

Significant attention should be paid to short-run versus long-run perspectives, fixed costs, and economies of scale because of the key role these concepts play in later chapters. The technical appendices are appropriate for advanced students.

Note that chapters 2 (“Theory of the Firm”) and 3 (“Costs”) from the second edition have been merged into the present chapter.

### ■ Answers to Even-Numbered Problems

2. If sole proprietors and partners issue debt, they are personally liable for those debts if their business fails. Because *all* their assets, not just those invested in the business, are at risk, they naturally want to closely monitor the management of the business. From the 1920s onward, however, many firms grew to a size for which such close monitoring by all owners was no longer feasible. The corporate form of organization provided an efficient alternative way of financing such large firms.

4. Purchasing Firm B diversifies the business of Firm A if a boom in Firm A's market is likely to be accompanied by a bust in Firm B's market, and vice-versa (the business cycles for the two are negatively correlated). Output and employment in the two firms combined are then steadier, so that, provided that labor can be shunted between them at low cost, labor turnover costs are lower. If the savings on these costs are significant, the merger may benefit Firm A's shareholders more than if they simply buy some of Firm B's stock.
6. Whether or not economies of scope exist has no bearing on whether or not a price equal to marginal cost can cover all the firm's costs.  
If the firm's average cost of production declines the more it produces (there are economies of scale), a price equal to marginal cost can never cover all the firm's costs, because marginal cost—and hence price—lies below average cost at any level of output.
8. See Appendix 2A, footnote 4 of the text.

## ■ Additional Problems

1. Why is it not in the shareholders' interests to give managers a fixed salary that does not at all depend on firm performance?
2. Why would environmentalists prefer oil companies to be sole proprietorships with extremely rich owners, instead of corporations?
3. In countries where it is very difficult to enforce contracts when unforeseen circumstances arise, are you more or less likely to see vertical mergers of firms?
4. Franchises—such as hamburger chains—often have outlets spread over a wide geographical area. Typically the franchise owns some of these outlets outright, in which case the outlet's manager is just a salaried employee. The remainder of the outlets are owned by franchisees, who pay a fixed percentage of revenue in return for the privilege of using the franchise's name. To which category would you expect the more remote outlets to belong, given that they are more difficult to monitor by the franchise's headquarters?
5. A franchiser's contract with a new franchisee specifies that the latter has to buy a huge neon sign with the logo of the franchise. The neon sign is so expensive that it significantly reduces the fee that the franchiser can demand of the franchisee. Explain why making this demand on the franchisee may nevertheless be optimal for the franchiser, referring to the discussion in the text of opportunistic behavior and specific assets. (*Hint*: Once the contract has been signed, the reputation of the franchise is, in a sense, "hostage" to good behavior by the new franchisee.)
6. Few people would disagree that market economies, such as those of the U.S. or Western Europe, are generally more efficient than centrally controlled economies, such as those of the former U.S.S.R. or Eastern Europe before the late eighties. Why, then, do factories usually operate by central control? Wouldn't it be more efficient to have assembly-line workers trade the unfinished product with each other before and after their work on it, and earn a competitive margin on those trades rather than a fixed salary?
7. Why would expected returns to equity holders of firms that are highly leveraged be larger than for firms that are not highly leveraged, all other things equal?

8. A firm raises \$1 million through both debt and equity issues to pay for a single project. The total payoff of the project if it succeeds is  $\$S$  million (where  $S > 1$ ) and the payoff if it fails is  $\$F$  million ( $F < 1$ ). Before actually investing the money, however, the firm learns of several other possible projects which also cost \$1 million and have the same probabilities of success or failure, but have different values of  $S$  and  $F$ . If it asked the debt holders for their opinion, at what rate would they be willing to trade lower  $S$  against higher  $F$ ? What about equity owners? Assume that the success or failure of the project does not affect the firm's future profits or chances of going bankrupt.
9. A firm requires  $\$L$  to pay for a single project that it wants to invest in. It raises  $\alpha L$  by issuing bonds and the remainder by issuing shares. The total payoff of the project if it succeeds is  $\$SL$  (where  $S > 1$ ) and the payoff if it fails is  $\$FL$  ( $F < 1$ ). The rate of interest is  $r$ . How does the expected return to bondholders,  $r_B$ , vary with  $\alpha$ , and why? How about the expected return to equity owners,  $r_E$ ? How does the risk of their respective returns vary with  $\alpha$ ?
10. Why might a company that makes chocolate bars want to merge with a company that makes caramels?
11. After a competitive bidding process, Firm G wins a contract to collect and dispose of Firm H's hazardous waste for \$1,000 per year. Firm G's labor costs are \$200 per year, and because of the unique nature of the waste, it has to invest \$8,000 in a special made-to-order furnace—money that it could otherwise have put in the bank at 10 percent interest. Thus, the annualized cost of the investment is \$800. So specialized is the furnace that, were the contract canceled, Firm G could only scrap it and receive \$1,500 for the metal.
  - (i) By how much could Firm H threaten to cut the fee if subsequently some dispute arises over the terms of the contract, or if the contract comes up for renewal?
  - (ii) By how much could Firm H threaten to cut the fee if the furnace can be adjusted, at a cost of \$3,000, to handle the waste of Firm J, which is willing to pay \$700 per year for that service?
12. A manufacturer has paid an engineering firm \$200,000 to design a new plant, and it will cost another \$2 million to build the plant. In the meantime, however, the manufacturer has learned of a foreign company that offers to build an equivalent plant for \$2,100,000. What should the manufacturer do?
13. Why might a firm that may soon go out of business and that uses a highly specialized machine that no other firm can use, prefer to rent the machine on a monthly basis instead of buying the machine?
14. Suppose the relationship between the cost of new equipment and its capacity  $K$  is

$$\text{Cost of new equipment} = F + aK^b,$$

implying that there is a fixed cost  $F$  of acquiring new equipment, regardless of capacity. If  $b = 1$ , do economies of scale in new equipment purchases exist? Would your answer differ if you knew that  $K$  were typically very large relative to  $F$ ?

15. A firm with a U-shaped average cost curve finds that its revenues exceed its costs when it sets price equal to marginal cost. On which part of its average cost curve is the firm operating?
16. A bakery has fixed costs of \$10 per day and variable costs of \$1 per loaf. Its oven can handle up to 50 loaves a day and it is impossible to obtain additional capacity. Sketch the bakery's average cost curve, average variable cost curve, average fixed cost curve and marginal cost curve, all on the same graph.

17. A firm can choose between two production technologies for a new product line. If it installs technology 1, its yearly costs will be  $C_1(q) = 3600 + 65q + 36q^2$ . If it installs technology 2, they will be  $C_2(q) = 900 + 900q + q^2$ .
- What is the minimum efficient scale with both technologies?
  - Which technology would the firm prefer (purely from a cost standpoint) if it expected to sell 30 units in summer and 10 units in winter each year?
  - What if it were more optimistic about summer sales?
18. A firm incurs production costs  $C(q) = F + mq$ , and transportation costs  $T(q) = aq + bq^2$ , where  $q$  is the output of each of its plants. What is the optimal plant size, and how does it vary with the parameters  $F$ ,  $m$ ,  $a$  and  $b$ ?
19. The costs of running a university are  $C = F + m_1q_1 + d_1q_1^2 + m_2q_2 + d_2q_2^2$ , where  $q_1$  is the number of students taking regular courses during the academic year, and  $q_2$  is the number of students taking summer courses. How large are the economies of scope that result from offering courses throughout the year, and how do they vary with the number of either type of students?
20. A firm produces both pencils and erasers in a ratio of 2:3. Its costs are  $C(q_1, q_2) = 3,200 + 0.1q_1 + 2q_1^2 + 0.2q_2$ , where  $q_1$  is the output of pencils and  $q_2$  the output of erasers. What are its ray average costs, and what scale of production minimizes these? What would the minimum efficient scale be if the firm produced only pencils? What if it produced only erasers?