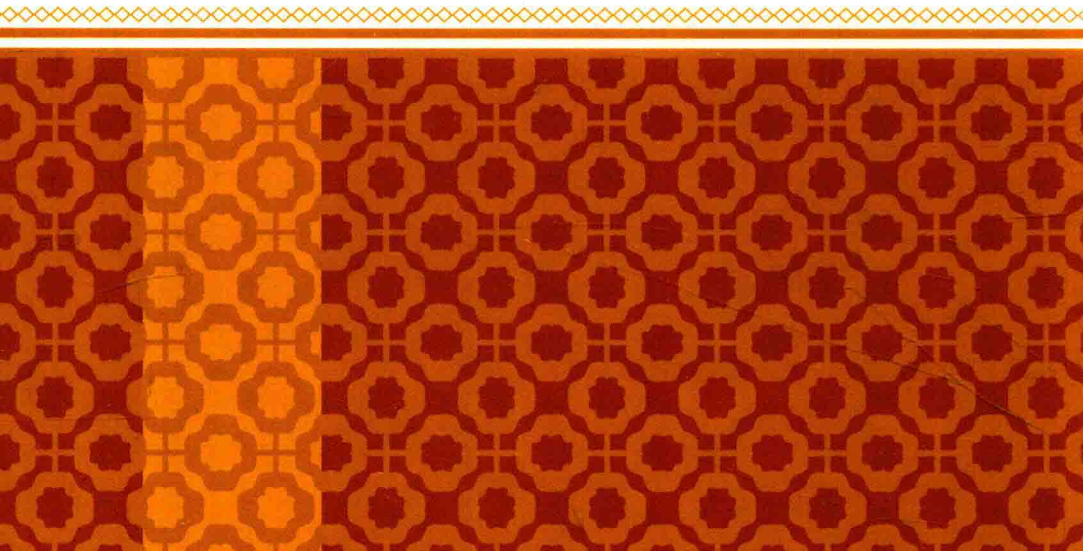




MANAGERIAL ECONOMICS

Tools for Analyzing Business Strategy

THOMAS J. WEBSTER



Managerial Economics

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Thomas J. Webster

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Managerial Economics

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Chapter 1

Managerial Economics and Strategy

For many of you reading these words, it is probably safe to say that life after university is just around the corner. If responsibility and leadership is what you are after, perhaps a corporate management position is in the cards—maybe even a business of your own. While being a successful manager or business owner depends on many factors, both tangible and intangible, the tools and techniques of analysis developed in these pages will help you along the way.

In an important study about the future of MBA programs, Srikant Datar, David Garvin and Patrick Cullen (2010) conducted interviews with dozens of deans from highly ranked business schools in the United States and Europe, and current and former senior business executives from the financial services, consulting, multinational organizations, and high technology industries. Several important insights emerged from these discussions.

According to these business leaders, business schools should train future managers “to reassess facts, frameworks, and theories” taught in the classroom. There are things that every business leader should know, such as the difference between assets and liabilities, the determinants of an industry’s structure, the return on investment, and the four P’s (product, price, place and promotion). Datar, Garvin and Cullen refer to this as the “knowing” component.

Business leaders also expressed the belief that business schools should also pay more attention “to developing the skills, capabilities, and techniques that lie at the heart of the practice of management”—what Datar, Garvin and Cullen refer to as the “doing” component. Finally, business schools should endeavor to instill in its students the values, attitudes, and beliefs that form manager’s world views and professional identities—the “being” component.

The purpose of this text is to contribute to the “knowing” component. The analytical tools discussed in the pages that follow will help managers understand the limits of models and markets to effectively respond to a rapidly changing business environment to produce optimal “bottom line” results. By the time you turn the last page of this text, you should have a better understanding of how to effectively respond to the competitive challenges of the marketplace.

THE ROLE OF ECONOMICS IN BUSINESS MANAGEMENT

Unlike courses in accounting, finance, marketing, and management, some business students view courses in economics as too abstract to be of any practical value. Yet, each year, thousands of businesses file for bankruptcy protection because managers failed to efficiently organize the company’s operations, misread market trends, allowed product quality to slip, or misinterpreted the activities and intentions of rival companies. Perhaps they failed to formulate optimal advertising or financing strategies, did not procure raw materials and components at least cost, or failed to provide adequate incentives to motivate workers to put forth their best efforts. These are just a few of the topics that will be discussed in this text. A course in managerial economics will not transform a budding entrepreneur into another Warren Buffet (Berkshire Hathaway), Bill Gates (Microsoft), or Mark Zuckerberg (Facebook), but it will help nascent managers identify optimal solutions to common business problems.

What is Economics?

Economics is the study of how individuals, institutions, commercial enterprises, countries, and governments allocate scarce resources amongst competing uses. By **scarcity** we mean that the output of goods and services is limited because the supply of productive inputs and other resources needed for their production is finite. The ability of managers to maximize shareholder value, for example, may be handicapped by insufficient operating budgets, limited access to finance capital, restrictive government regulations, labor shortages, high interest rates, and a host of other operating constraints.

Understanding the role of scarcity and the need to make choices is central to an understanding of economics and business. Because of scarcity, the decision to undertake a particular course of action is a simultaneous decision to forego alternative opportunities. Since resources are finite, every decision involves sacrifice. Scarcity necessitates trade-offs. The highest-valued alternative foregone whenever a choice is made called **opportunity cost**. In the marketplace, opportunity costs are reflected in the prices of goods

and services. An understanding of economics is useful in business precisely because it helps managers identify profit opportunities in situations involving scarcity and tradeoffs.

What is Managerial Economics?

Managerial economics is the application of economic principles to topics of concern to managers. Managerial economics combines the various business disciplines (such as accounting, finance, marketing, and management) with quantitative methods (such as optimization analysis, game theory, statistics, and forecasting) to find optimal solutions to business problems. The manner in which a manager organizes the firm's operations depends on what the firm is trying to accomplish. We typically assumed that the goal of a firm is to maximize profit. The principles and tools of analysis developed in this book will help future managers optimally achieve a firm's organizational objectives, whatever they may be.

Managerial economics is concerned with developing a framework for predicting managerial responses to changes in the business environment. Many economists earn a living by advising businesses and government agencies on how best to reach its goals by bringing the "real world" closer to the ideal outcome hypothesized by economic theory.

Strategic Behavior

Economists assume that decision makers attempt to achieve the best possible outcome subject to scarce resources. Consumers to maximize their material and spiritual well-being given limited incomes and wealth. Firms maximize shareholder value subject to a fixed operating budget and finite human and non-human resources. Analyzing consumer and producer behavior is often simplified by assuming their actions have no effect on the behavior of others. In the real world, however, decisions are often mutually interdependent.

In business, decisions are rarely, if ever, made in a competitive vacuum. For this reason, an analysis of **strategic behavior** in which decisions made by an individual or group affect, and are affected by, the decisions of other individuals or groups, is central to the study of managerial economics. **Game theory** is the study of strategic behavior. Managers who are able to put themselves in the shoes of rival are more likely to successfully achieve the firm's objectives. Managers must be open to the idea that success does not always involve conflict, but may entail cooperation. Game theory is not a cookbook of recipes on how to deal with every strategic contingency. It is a tool kit for analyzing situations involving move and countermove.

Quantitative Methods

Quantitative methods include the mathematical tools and techniques of analysis, including optimization analysis, statistical methods, forecasting, and game theory. Managerial economics attempts to bring economic theory into the real world by quantifying business relationships by analyzing historical data to find optimal solutions to managerial decision-making problems. To see how this is done, suppose that a manager believes that the demand for a firm's good or service is given by the general expression

$$Q^d = f(P, M, P_y, A). \quad (1.1)$$

Eq. (1.1) says that the demand for a good or service (Q^d) is systematically related to variables such as price (P), per capita money income (M), the price of a competitor's good (P_y), and the advertising expenditures (A). If this relationship is linear, Eq. (1.1) may be written

$$Q^d = \beta_0 + \beta_1 P + \beta_2 M + \beta_3 P_y + \beta_4 A. \quad (1.2)$$

After collecting data on Q , P , M , and P_y , it should be possible to estimate the parameter values (β_i) using standard statistical techniques.¹ The resulting estimated equations can be used by managers to identify optimal pricing, advertising, and other strategies to achieve the firm's objectives.

THE ROLE OF A MANAGER

A manager is responsible for making the day-to-day, operational and long-run strategic decisions that determine a company's success or failure. Managers direct and coordinate the activities of workers, organize production processes, acquire raw materials and other inputs to produce goods and services for sale in the market. Managers make the non-routine decisions that move the firm closer to achieving its objectives, including identifying and exploiting emerging market opportunities, determining the optimal level of expenditures in research and development, product design and quality, formulating effective pricing and advertising strategies, and so on.

THE ROLE OF PROFIT

We generally assume that the objective of a firm is to maximize total profit (π), which may be defined as

$$\pi = TR - TC, \quad (1.3)$$

where TR is the total quantity produced (Q) times the market price (P) and TC is the total cost of producing Q units of output. The importance of profit in market economies cannot be understated. In a competitive business environment, profit is the engine of maximum production and the efficient allocation of scarce productive resources. Increasing prices in some industries and falling prices in others reflect changes in societal preferences for goods and services. Above-normal profits attract investment into the production of those goods and services that are most demanded by the society. Declining or negative profits signal producers that society wants less of other goods and services. In the process, factors of production are reallocated from their lowest to their highest valued use. It is "invisible hand" of decentralized decision making in pursuit of profit that promotes economic growth and raises living standards. These benefits tend to be greatest in competitive market economies with minimum government interference.

The Objective of the Firm

A firm is an activity that transforms scarce factors of production into outputs of goods and services that are demanded by society. The manner in which productive resources are combined and organized depends of the objectives of the firm's owners, managers, or both. In some cases, the owner and manager are one and the same. In the case of publicly-owned companies, decisions are made by managers who are the designated agents of shareholders.

Although there are many possible organizational objectives, economists usually assume that the objective of the firm is to maximize profit. This behavioral assumption is central to the neoclassical theory of the firm, which posits that the firm is a profit maximizing "black box" that transforms inputs into outputs for sale in the market. While the precise contents are unknown, it contains the "secret formula" that gives the firm its competitive advantage. Neoclassical theory makes no attempt to explain what actually goes on inside this "black box," although the underlying **production function** is assumed to exhibit certain desirable mathematical properties, such as the **law of diminishing returns**, **returns to scale**, and substitutability between and among productive inputs. The appeal of the neoclassical model is its application to a wide range of profit-maximizing firms and market situations.

As intuitively appealing as the assumption of profit maximization may be, this simple behavioral assertion is too vague to be of any practical value. In fact, the objective of most publicly-held corporations is not to maximize profit, but to maximize shareholder value. If profits are received at the end

of each period, this is equivalent to saying that the objective of the firm is to maximize the net present value (NPV) of the stream future net earnings, which is given by the equation

$$NPV(\pi) = \frac{\pi_1}{(1+i)} + \frac{\pi_2}{(1+i)^2} + \cdots + \frac{\pi_n}{(1+i)^n}, \quad (1.4)$$

where π is per period profit (net, after-tax, earnings), t is a time index, and i is the **interest rate** used to discount future cash flows.² The interest rate is the price paid for the use of borrowed funds.

The **discount rate**, which is given by the term $1/(1+i)$, is used to determine the **present value** of some future amount. In Eq. (1.4), π_0 is the firm's current profit; π_1 is the expected profit at the end of year 1, and so on. Discounting is necessary a dollar received in the future is worth less than a dollar received today. The reason it is worth less is that a dollar received today can be reinvested at some interest rate to yield an even greater amount tomorrow. In fact, the market value of any asset is equal to its **net present value**, which is the difference between the present value of cash inflows and cash outflows.

Eqs. (1.3) and (1.4) explicitly recognize the importance of diverse managerial decisions to achieve the firm's organization objectives. The marketing department, for example, has primary responsibility for sales, which are reflected in the firm's **total revenue** (TR), which is equal to price times the number of units sold. The production department monitoring the production costs (TC), while finance is responsible for acquiring financing to support the firm's capital investment activities, for which the interest rate (i) is of critical importance. This more complete model of firm behavior also explicitly recognizes the difficulty of making decisions in which future outcomes are uncertain.

In the above discussion, it was assumed that profits and the discount rate in period t are known with certainty. In fact, this is never the case. On the other hand, suppose that management believes that the current discount rate remains unchanged and that profits are expected to grow at a constant rate of g percent per year. If $g < i$, the net present value of profits in perpetuity is

$$NPV(\pi) = \pi_0 + \frac{\pi_0(1+g)}{(1+i)} + \frac{\pi_0(1+g)^2}{(1+i)^2} + \cdots = \pi_0 \left(\frac{1+i}{i-g} \right). \quad (1.5)$$

For given values of i and g , the term $(1+i)/(i-g)$ is a constant. Thus, maximizing the net present value of profits in perpetuity is equivalent to maximizing the firm's current profits.

SOLVED EXERCISE

Suppose that a firm's current profits are \$25 million. Management believes that the firm's profits are likely to grow at an annual rate of 5 percent. Calculate the net present value of the firm's stream of profits at a discount rate of 8 percent.

Solution

Substituting the above information into Eq. (1.5), the net present value of the stream of future profits is

$$NPV(\pi) = \pi_0 \left(\frac{1+i}{i-g} \right) = \$25 \left(\frac{1.08}{0.03} \right) = \$900. \quad (1.6)$$

The net present value of the firm's stream of future profits is \$900 million.

What's a Company Worth?

Economists generally assume that the objective of the firm is to maximize shareholder value. But, how do we define a company's worth? Is it the market value of the company's outstanding shares? The problem is that share prices are volatile as the stock market and mirror swings in the business cycle and changes in the mood of investors, which may have nothing whatsoever with the performance and value of individual companies.

Should we use a company's net worth as reported in its balance sheet? The problem here is that accounting standards differ from country to country. What is more, net worth does not fully reflect the value of such intangibles as brand-name recognition, goodwill, patents, and the talents and expertise of its human resources, which is the life's blood of any commercial enterprise, but especially high-technology companies.

In terms of Eq. (1.4), can we use a company's net income as an approximation of its expected future cash flows? This comes closer to our definition of a company's net worth, but even this might be improved upon. An alternative to this is a company's operating profit lesser than the rate of return on debt and equity capital. The data used to make these calculations, which includes operating cost, total revenue, and capital expenditure, are readily available from a firm's income statement. Not only is this a good way to measure changes in a company's value, it is an excellent benchmark against which to measure executive perks and bonuses.

Types of Profit

To say that goods and services that can be produced profitably will be, and those that cannot be produced profitably will not begs the question: What

do we mean by the term profit? What is commonly thought of as profit to the business or lay person may not have the same meaning to an economist. Eq. (1.3) defines total profit as total revenue earned from the sale of a good or service sold minus the total cost incurred from its production. While there is little debate over the meaning of the term total revenue, the conventional notion of total cost differs from the meaning assigned to it by economists.

Accounting Profit versus Economic Profit

Most people think of the cost of doing business as consisting of only direct payments made to productive resources. **Explicit costs**, also called **accounting costs** and *out-of-pocket expenses*, include wages paid to workers and raw materials suppliers. By contrast, an economist's interpretation of costs goes back to the fundamental idea that resources are scarce and have alternative uses. All resources used in the production process involve foregone opportunities, including those for which no direct payment is made. These implicit sacrifices are just as important as out-of-pocket costs and must be considered whenever decisions are made that affect the value of the firm.

Total economic cost (TC) includes all relevant opportunity costs, which is the market value of all resources used in the production process—both explicit and implicit. An **implicit cost** represents the value of resources used in the production process for which no direct payment is made. An engineer who writes computer code for a large software company writer sacrifices his salary when he opens his own consulting firm. The engineer's salary is an example of an implicit cost. A landlord loses rental income if she opens a hobby shop in her own commercial building. The lost rental income is an implicit cost. A housewife who redeems a certificate of deposit and uses the proceeds to open a day-care center forgoes interest income. This lost interest income is an example of an implicit cost. A restaurant owner employs her teenage girls, but does not pay them a wage. The income they could have earned is an implicit cost.

When filing corporate tax returns, managers will report the firm's **accounting profit** (π_A), which is the difference between total revenue and total explicit (accounting) cost. But, when it comes to making decisions on behalf of potential investors, managers should consider the firm's **economic profit** (π), which is the difference between total revenue and total economic cost, which is the sum of total explicit costs (TC_{explicit}) and total implicit costs (TC_{implicit}).

$$\pi_A = TR - TC_{\text{explicit}} \quad (1.7)$$

$$\pi = TR - TC_{\text{explicit}} - TC_{\text{implicit}} = TR - TC_{\text{economic}} \quad (1.8)$$

SOLVED EXERCISE

Adam operates a small shop specializing in party favors. He owns the building and supplies all of his own labor and money capital. Adam incurs no explicit rental or wage costs. Before starting his own business Adam earned \$1,000 per month by renting out the store and earned \$2,500 per month as a store manager for a large department store chain. Because Adam uses his own money capital, he also sacrificed \$1,000 per month in interest earned on U.S. government treasury bonds. Adam's monthly revenues from operating his shop are \$10,000 and his total monthly expenses for labor and supplies amounted to \$6,000. Calculate Adam's monthly accounting and economic profits.

Solution

Adam's accounting profit appears to be a healthy of $\$10,000 - \$6,000 = \$4,000$ per month. However, if we take into account Adam's implicit costs of \$4,500, which consists of foregone rent, foregone salary, and foregone interest income, Adam's total economic profit is $\$10,000 - \$6,000 - \$4,500 = -\500 per month.

It is, of course, a simple matter to make accounting profit equivalent to economic profit by making explicit all relevant implicit costs. Suppose that a restaurant manager quits a \$40,000 per year job to open her own restaurant. Since this is a sacrifice incurred by the budding restaurateur, the foregone salary is an implicit cost. On the other hand, this implicit cost can easily be made explicit by putting the restaurant owner "on the books" for a salary of \$40,000. The distinction between explicit and implicit costs is further illustrated in the following problem.

Normal Profit

Perhaps the most important opportunity cost to consider when evaluating a company's performance is the implicit cost of capital. One way to capture this is to include **normal profit** as a component of the firm's total economic cost. Normal profit is the minimum rate of return necessary to keep shareholders from pulling their investment in search of a higher rate of return elsewhere. Also known as a **normal rate of return**, it is the next best alternative investment of equivalent **risk**. At any lower risk-adjusted rate of return, managers will find it difficult, if not impossible, to raise finance for capital investment.

Managers should view a normal rate of return normal as an implicit cost of doing business. A manager who does not earn at least a normal rate of return

runs the risk of being replaced by shareholders with someone who can. The yield on short-term U.S. Treasury securities is typically used as a proxy for risk-free investments. A risk premium should be added to this interest rate to make investors indifferent between a risky and a risk-free investment. Alternatively, it could also be argued that the rate of return for an industry may also be used as an approximation of a representative firm's normal rate of return.

Operating Profit

A firm's **total operating cost** (TC_o) includes expenditures relating to a firm's ongoing operations. Total operating cost, which is also referred to as **total variable cost** (TVC), represents that portion of the firm's total cost that vary with the level of output. **Operating profit** (π_o), which is the difference between total revenue and total operating (variable) cost, is the firm's net income from its ongoing operations. Formally,

$$\pi_o = TR - TC_o = TR - TVC. \quad (1.9)$$

The important thing to note about Eq. (1.9) is that a firm that breaks even in an economic sense, it is still earning a positive operating profit that is equal to its normal rate of return. Alternatively, a firm earning zero economic profit is earning a rate of return that is equal to best alternative investment of equivalent risk, which is an amount just sufficient to keep shareholders happy. When economic profits are positive, the firm's profits exceed its normal rate of return. When this happens, new investment will be attracted into the industry. When economic profits are negative, investors will exit the industry in search of more attractive returns.

CONSTRAINTS ON THE OPERATIONS OF THE FIRM

Whatever the firm's goals, day-to-day managerial decisions are hamstrung by a myriad of operational constraints that make it difficult to achieve the best possible outcome. All firms, regardless of size, have a finite operating budget that makes it difficult to maximize shareholder value. Market constraints may include a shortage of skilled labor, a disruption in the flow of critical raw materials due to foreign social or political unrest, limited production capacity or warehouse space, or a shortage of finance capital. Minimum wage laws, pollution emission standards, government regulation, and proscriptions on certain types of business activities, and antitrust legislation may also inhibit the manager's ability to achieve the firm's goals.

Conflicts of Interest

Maximizing shareholder value profit is also complicated when responsibility for the day-to-day operations of the firm is delegated to managers (agents) who act on behalf of absentee owners (principals). Frequently, the self-interests of managers are in conflict with the self-interests of the shareholders. Even if a system of incentives is implemented that synchronize the self-interests of owners and managers, additional problems may arise if workers are not adequately motivated to put forth their best efforts on behalf of managers. It is not possible to maximize shareholder value if the company's stakeholders are not pulling in the same direction.

In addition to the intra-firm rivalries that limit the firm's earnings potential, managers must devise strategies to deal with conflicts of interest that inherent in all market transactions. To begin with, there is the obvious tension between buyers and sellers. The objective of consumers is to acquire goods and services at the lowest possible prices. The objective of producers is to supply these products at the highest possible price. Since market transactions are voluntary, the forces of supply and demand should result in mutually beneficial outcomes.

Managers must also devise strategies to effectively cope with inter-firm rivalries. In industries consisting of multiple firms competing for the right to sell their products, a gain in market share by one firm means a decrease in market share of rival firms. The discipline of the market guarantees that the winners in this competition are those firms that are able to provide the highest possible product at the lowest possible price. Unfortunately, the social welfare gains arising from market transactions are lessened when an industry is dominated by one or a few sellers that enjoy **market power**.

The manager must also develop strategies to effectively exploit inter-buyer rivalries in which consumers compete for the right to acquire available goods and services. When shortages develop for goods and services, buyers who are willing and able to pay a higher price will outbid rivals for the right to consume these products. This conflict highlights the **rationing function of prices**, and the roles of bargaining and auctions.

Other Players

A firm's operations and performance is closely linked to activities of other players in the marketplace. Investments in plant and equipment depends on the firm's access to external financing in financial markets. Government regulation and the legal system dictate the types of goods and services that may be produced and the activities that are legally permissible. In this section we will briefly review the roles of financial markets and government.

Financial Markets

Financial markets (stock, bond, and foreign-exchange markets) and financial intermediaries (commercial banks, savings banks, and insurance companies) perform the essential economic function of channeling funds from households, firms, and governments that have surplus funds and no productive uses for those funds, to those with a shortage of funds and productive investment opportunities. A breakdown in financial markets can lead to a sharp downturn in the economy and severe economic hardships, which could result in social and political instability.

Financial instruments are traded in financial markets. A **financial instrument** is a tradable claim on the issuer's future income or assets, such as common stock and bonds. **Common stock** represents a share of equity (ownership) in a publicly-owned corporation. It is a claim on the future earnings and assets of a corporation. A **bond** is a debt instrument that promises periodic interest payments for a specific period of time and principal repayment upon maturity. There are several ways of calculating interest rates. The most important of these is the **yield to maturity (YTM)**, which is the interest rate that equates future payments received from a debt instrument with its value today. The *YTM* consists of the current market interest rate, which is determined by the supply and demand for savings, plus a risk premium. A **risk premium** is the additional return required to make an investor indifferent between a risky and a risk-free investment. The risk premium is the difference between the interest paid on bonds with default risk and default-free bonds. As a general rule, a manager will invest in plant equipment when the expected rate of return is greater than the cost of financing the investment. Unfettered access to capital markets is essential if a firm is to achieve its objective of maximizing shareholder value.

Government

Government participation in market economies can occur at both the micro and the macro levels. The goal of **macroeconomic policy** is to promote full employment, price stability, and economic growth. Macroeconomic policy consists of monetary, fiscal, and commercial policies. Monetary policy, which is conducted by the Federal Reserve System in the United States, is concerned with the regulation of the money supply and the availability of credit. Fiscal policy deals with regulating aggregate demand through government spending and taxation. In the United States, fiscal policy may be initiated by the President or the Congress, but only enacted by Congress. Commercial policy refers to the use of tariffs and other trade restrictions to improve a country's international competitiveness. **Microeconomic policy** involves government regulation to alter the composition of the output of