

# *Managerial Economics & Business Strategy*

## Chapter 1

### The Fundamentals of Managerial Economics



# **Business Life is full of Surprises**

- Airbus vs. Boeing: Aircraft fights
- Resolving China's Power and Oil Shortage
- YouTube: A Billion Dollar Company
- Direct Marketing and Dell
- Merck, AIDS and Africa
- Call Centers: Outsourcing to India
- Google vs. Yahoo
- Is bigger better? Citigroup

# Overview

## I. Introduction

## II. The Economics of Effective Management

- Identify Goals and Constraints
- Recognize the Role of Profits
- Understand Incentives
- Five Forces Model
- Understand Markets
- Recognize the Time Value of Money
- Use Marginal Analysis

# Managerial Economics

- Manager
  - A person who directs resources to achieve a stated goal.
- Economics
  - The science of making decisions in the presence of scarce resources.
- Managerial Economics
  - The study of how to direct scarce resources in the way that most efficiently achieves a managerial goal.

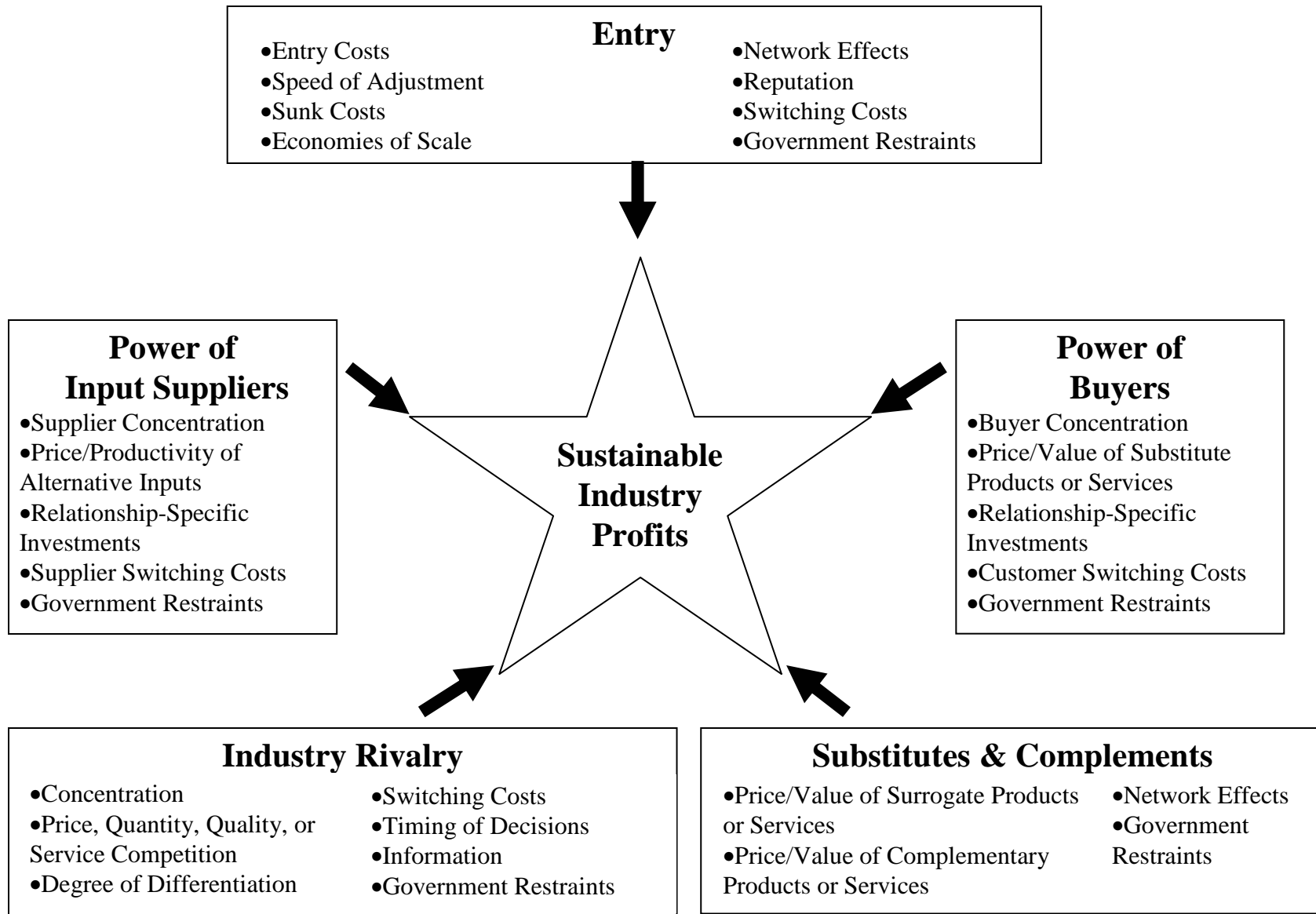
# Economic vs. Accounting Profits

- Accounting Profits
  - Total revenue (sales) minus dollar cost of producing goods or services.
  - Reported on the firm's income statement.
- Economic Profits
  - Total revenue minus total opportunity cost.

# Opportunity Cost

- Accounting Costs
  - The explicit costs of the resources needed to produce goods or services.
  - Reported on the firm's income statement.
- Opportunity Cost
  - The cost of the explicit *and* implicit resources that are foregone when a decision is made.
- Economic Profits
  - Total revenue minus total opportunity cost.

# The Five Forces Framework



# Market Interactions

- Consumer-Producer Rivalry
  - Consumers attempt to locate low prices, while producers attempt to charge high prices.
- Consumer-Consumer Rivalry
  - Scarcity of goods reduces the negotiating power of consumers as they compete for the right to those goods.
- Producer-Producer Rivalry
  - Scarcity of consumers causes producers to compete with one another for the right to service customers.
- The Role of Government
  - Disciplines the market process.

# The Time Value of Money

- Present value ( $PV$ ) of a lump-sum amount ( $FV$ ) to be received at the end of “ $n$ ” periods when the per-period interest rate is “ $i$ ”:

$$PV = \frac{FV}{(1 + i)^n}$$

- Examples:
  - Lotto winner choosing between a single lump-sum payout of \$104 million or \$198 million over 25 years.
  - Determining damages in a patent infringement case.

# Present Value of a Series

- Present value of a stream of future amounts ( $FV_t$ ) received at the end of each period for “ $n$ ” periods:

$$PV = \frac{FV_1}{(1+i)^1} + \frac{FV_2}{(1+i)^2} + \dots + \frac{FV_n}{(1+i)^n}$$

# Pricing An Asset

- What is the maximum amount you would pay for an asset that generates an income of \$150,000 at the end of each of five years if the opportunity cost of using fund is 9 percent?

$$PV = \frac{150,000}{(1+0.09)} + \frac{150,000}{(1+0.09)^2} + \frac{150,000}{(1+0.09)^3} + \frac{150,000}{(1+0.09)^4} + \frac{150,000}{(1+0.09)^5}$$
$$= \$583,447.69.$$

# Net Present Value

- Suppose a manager can purchase a stream of future receipts ( $FV_t$ ) by spending “ $C_0$ ” dollars today. The *NPV* of such a decision is

$$NPV = \frac{FV_1}{(1+i)^1} + \frac{FV_2}{(1+i)^2} + \dots + \frac{FV_n}{(1+i)^n} - C_0$$

## Decision Rule:

- If  $NPV < 0$ : Reject project  
 $NPV > 0$ : Accept project

# Present Value of a Perpetuity

- An asset that perpetually generates a stream of cash flows ( $CF$ ) at the end of each period is called a perpetuity.
- The present value ( $PV$ ) of a perpetuity of cash flows paying the same amount at the end of each period is

$$\begin{aligned} PV_{\text{Perpetuity}} &= \frac{CF}{(1+i)} + \frac{CF}{(1+i)^2} + \frac{CF}{(1+i)^3} + \dots \\ &= \frac{CF}{i} \end{aligned}$$

# Firm Valuation

- The value of a firm equals the present value of current and future profits.
  - $PV = \sum \pi_t / (1 + i)^t$
- If profits grow at a constant rate ( $g < i$ ) and current period profits are  $\pi_0$ :

$$PV_{Firm} = \pi_0 \frac{1+i}{i-g} \text{ before current profits have been paid out as dividends;}$$

$$PV_{Firm}^{Ex-Dividend} = \pi_0 \frac{1+g}{i-g} \text{ immediately after current profits are paid out as dividends.}$$

- If the growth rate in profits  $<$  interest rate and both remain constant, maximizing the present value of all future profits is the same as maximizing current profits.

# Firm Valuation

- A firm's current profits are \$550,000. These profits are expected to grow indefinitely at an annual rate of 5 percent. If the interest rate is 8 percent, determine the value of the firm before and after it pays out current profit as dividends.

$$\begin{aligned} PV_{firm} &= \$550,000 \left( \frac{1 + 0.08}{0.08 - 0.05} \right) \\ &= \$19.8 \text{ million} \end{aligned}$$

$$\begin{aligned} PV_{firm}^{Ex-Dividend} &= \$550,000 \left( \frac{1 + 0.05}{0.08 - 0.05} \right) \\ &= \$19.25 \text{ million} \end{aligned}$$

# Marginal (Incremental) Analysis

- Control Variables
  - Output
  - Price
  - Product Quality
  - Advertising
  - R&D
- Basic Managerial Question: How much of the control variable should be used to maximize net benefits?

# Net Benefits

- Net Benefits = Total Benefits - Total Costs
- Profits = Revenue - Costs

# Marginal Benefit (MB)

- Change in total benefits arising from a change in the control variable,  $Q$ :

$$MB = \frac{\Delta B}{\Delta Q}$$

- Slope (calculus derivative) of the total benefit curve.

# Marginal Cost (MC)

- Change in total costs arising from a change in the control variable,  $Q$ :

$$MC = \frac{\Delta C}{\Delta Q}$$

- Slope (calculus derivative) of the total cost curve

# Marginal Principle

- To maximize net benefits, the managerial control variable should be increased up to the point where  $MB = MC$  (or  $MNB=0$ ).
- $MB > MC$  means the last unit of the control variable increased benefits more than it increased costs.
- $MB < MC$  means the last unit of the control variable increased costs more than it increased benefits.

# Cost Benefit Analysis

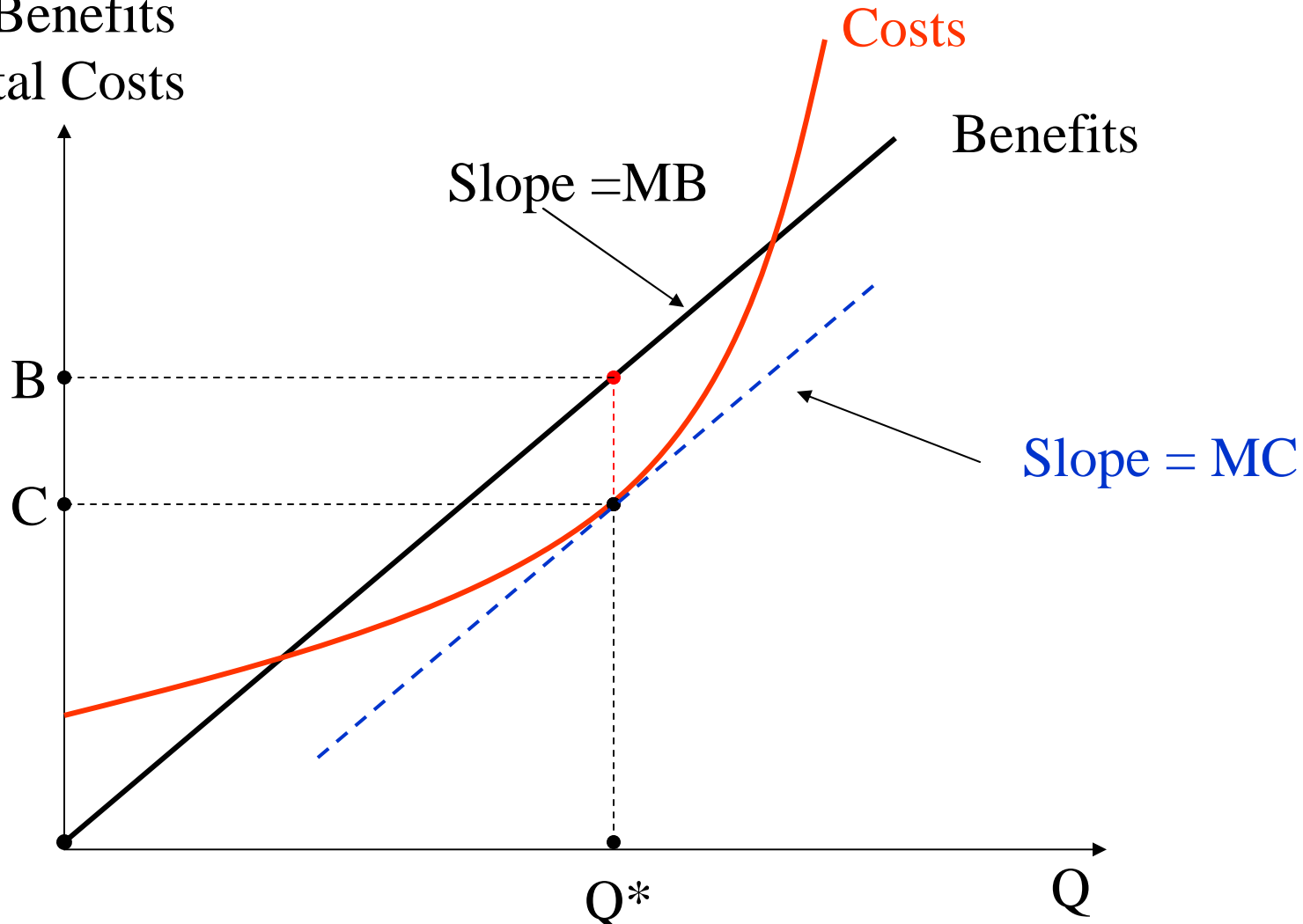
- $B(Q)=150+28Q-5Q^2$  and  $C(Q)= 100+8Q$

Write Out the equation of

1. Net Benefits.
2. Marginal Benefits and Marginal Cost.
3. Marginal Net Benefits
4. What Level of  $Q$  maximizes net benefits?
5. Find the value of marginal net benefits for the maximizing  $Q$ .

# The Geometry of Optimization

Total Benefits  
& Total Costs



# Conclusion

- Make sure you include all costs and benefits when making decisions (opportunity cost).
- When decisions span time, make sure you are comparing apples to apples (PV analysis).
- Optimal economic decisions are made at the margin (marginal analysis).

# Additional Review

- Baye's Text, pages 27-32  
Question #5, 6, 8, 9, 12, 14, 16, 18, 19
- Appendix, page 33  
Demonstration Problem 1- 4
- Math Review  
How to find derivative of a polynomial?