Chapter 6
Economic Efficiency

CHAPTER SUMMARY

The central idea in this chapter is Adam Smith's invisible hand. Free-market competition will ensure that the allocation of resources is economically efficient. Although the buyers and sellers act selfishly, the net outcome is at least as good as the best efforts of the most enlightened and well-informed central planner. This applies to markets for goods and services as well as capital.

The same general principle applies within an organization. Through decentralization, management can achieve efficient use of scarce resources. This means charging a transfer price for items produced and consumed within the organization.

Government policies such as price ceilings, price floors, and taxes cause deadweight losses and impede economic efficiency. The extent of these deadweight losses depends on the price elasticities of demand and supply. There will be no deadweight loss if either the demand or the supply is extremely inelastic.

KEY CONCEPTS

economic efficiency	transfer price	price ceiling
technical efficiency	outsourcing	deadweight loss
invisible hand	capital market	price floor
market or price system	bankruptcy	tax incidence

GENERAL CHAPTER OBJECTIVES

1. Define three sufficient conditions for economic efficiency.
2. Discuss how Adam Smith's invisible hand, i.e., the market price, achieves economic efficiency in a perfectly competitive market.
3. Apply the three conditions for economic efficiency to a single organization and discuss the efficiency of de-centralization.
4. Discuss the role of capital markets and bankruptcy.
5. Analyze the economic consequences of price ceilings and price floors.

6. Analyze the economic consequences of taxes.

NOTES

1. **Concept of economic efficiency**.
   (a) An allocation of resources (quantity) is economically efficient where no reallocation can make one person (human being or business) better off without making another worse off.
       i. A guide to managing resources within an organization and across entire economies.
       ii. Identifies opportunities for profit (there is a way to make money by resolving an economic inefficiency).
       iii. A way to assess government intervention.
       iv. It assesses resource allocations in terms of each *individual* user's evaluation of the benefit.
   (b) Three sufficient **conditions** for economic efficiency:
       i. All users achieve same marginal benefit;
       ii. All suppliers operate at same marginal cost; and
       iii. Every user's marginal benefit = every supplier's marginal cost. When marginal benefit is less than marginal cost, society overall could gain by reducing provision of that item, and vice versa.
   (c) An economically efficient allocation is equivalent to maximum (sum of) **buyer surplus and seller surplus**.
   (d) Internal organization.
       i. Moonlight Paper (business: production and delivery of wood) example:
           (1). Users: paper mills.
           (2). Suppliers: forests.
       ii. Three conditions.
           (1). Same marginal benefit. If one paper mill gets more profit than another, the company should switch some wood supplies to the higher profit mill. Buyer surplus will increase. The company's overall profit will be higher.
           (2). Same marginal cost. If one forest can produce wood at a lower marginal cost than another, then the company should direct the lower cost forest to produce more and the higher cost forest to produce less. Seller surplus will increase. The company's overall profit will be higher.
           (3). Marginal benefit = marginal cost. If the marginal benefit of wood to the paper mills is less than the marginal cost of production wood, the company should cut back production. The reduction in benefit would be less than the reduction of

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cost. The company's overall profit will be higher. The sum of buyer and seller surplus will increase.

   (e) Economic efficiency distinguished from technical efficiency.
- i. Technical efficiency: the provision of an item at the minimum possible cost; does not imply scarce resources are being well used.
- ii. Economic efficiency extends beyond technical efficiency.

2. **Adam Smith's Invisible Hand**.
   (a) **Perfect competition** achieves economic efficiency.
- i. In a competitive market, buyers and sellers acting *independently* and *selfishly*, channel scarce resources into economically efficient uses (satisfying all three conditions). The invisible hand that guides buyers and sellers is the market price.
- ii. **Market prices** allocate scarce resources in an economically efficient way. Prices lead to an efficient allocation of resources by providing *information* and *incentives*:
  - (1). Users buy until marginal benefit equals price (to maximize benefit);
  - (2). Producers supply until marginal cost equals price (to maximize profit);
  - (3). Users and producers face same price.

   (b) **Market or price system**: the economic system in which resources are allocated through the independent decisions of buyers and sellers, guided by freely moving prices. The market system is more efficient than **central planning**. Under central planning:
- (1). The government or company headquarters collects information about costs and revenues and decides on production.
- (2). Work incentives are generally very weak.

   (c) **The invisible hand in an individual organization**.
- i. Decentralized management: Achieving economic efficiency within an organization.
  - (1). If there is a competitive market for an item, the *transfer price* (i.e., a price charged for the sale of an item within an organization) should be set equal to the *market price*.
  - (2). Right of outsourcing: consuming units within an organization should be allowed to *outsource* (i.e., purchase services or supplies from external sources).
  - (3). Producing unit should be able to sell the product to outside buyers.
  - (4). The 3 conditions for economic efficiency are satisfied. The internal market will be integrated with the external market.
- ii. Moonlight Paper (business: production and delivery of wood) example:
  - (1). Users: paper mills. Every mill maximizes profit and is permitted to buy wood at the market price (up to the point

where marginal benefit balances market price) from any supplier, whether Moonlight's forests or an outside source. Since all mills face the same market price, their marginal benefits will be equal.

(2). Suppliers: forests. Managers of every forest maximize profit and sell wood at the market price (up to the point where marginal cost balances the market price) to either Moonlight's own paper mills or outside buyers. Since all forests face the same market price, their marginal costs will be equal.

(3). Since the mills and the forests face the same market price, marginal benefit equals marginal cost.

(d) **Capital market**.

i. Comprising buyers and sellers of investment funds in communication with one another for voluntary exchange.

ii. Allocates investment funds (resources) more effectively than central planners. Central planners may:

(1). not have all the necessary information;

(2). not be able to persuade all individuals to comply with directives; or

(3). deliberately direct resources inefficiently.

iii. Bankruptcy.

(1). Definition: a set of legal provisions that take effect when an entity cannot meet its obligations to lenders.

(2). Ensures an efficient allocation of resources.

(3). Does not destroy productive resources.

3. **Government controls on prices**.

(a) **Price ceiling**: a legal upper limit that sellers can charge and buyers can pay.

i. **Rent control**: a price ceiling in the market for housing. It bites when the limit falls *below* the free market equilibrium rent.

(1). Stimulates demand and discourages supply, hence, may result in excess demand. The more elastic the demand or supply, the greater the shortage.

(2). Increases buyer surplus for some, while reducing it for others. Net result uncertain.

(3). Reduces seller surplus.

(4). Reduces seller surplus by more than the gain in buyer surplus. Results in *inefficient* allocation of resources and **deadweight loss**.

ii. **Deadweight loss:** a loss of buyer or sellers surplus that is not transferred to another party.

(1). The deadweight loss from a price ceiling depends on the price elasticities of demand and supply.

(2). Arises whenever sellers are wiling to provide an item that buyers are willing to pay and that provision does not occur. (At the free market equilibrium rent, landlords are willing to rent certain units at a marginal cost lower than the corresponding marginal benefit to rentals.)

(3). Equals to the sum of the *differences* between the buyers' marginal benefits and the sellers' marginal costs for all units not provided.

(b) **Price floor**: a legal minimum limit that sellers can charge and buyers can pay.

    i. **Minimum wage**: a price floor in the labor market. It bites when the limit *exceeds* the free market equilibrium. The buyers are businesses and the sellers are people.

        (1). May result in excess supply.

        (2). Reduces buyer surplus.

        (3). Increases seller surplus for some, while reducing it for others.

        (4). Reduces buyer surplus by more than the gain in seller surplus. Results in *inefficient* allocation of resources and **deadweight loss**.

    ii. **Deadweight loss and impact on total earnings**.

        (1). The deadweight loss from a price ceiling depends on the price (wage) elasticities of demand and supply of labor.

            a. Compared with free market equilibrium, the wage is higher but employment is lower.

            b. The more elastic the demand for labor, the more likely a minimum wage will reduce total earnings. If demand for labor is inelastic, a minimum wage will increase total earnings.

        (2). Equals to the sum of the *differences* between the buyers' marginal benefits and the sellers' marginal costs for all the work that is not provided.

    iii. Encourages employers to substitute away from low skilled labor to:

        (1). Automation.

        (2). Skilled labor (hence skilled labor unions support minimum wage provisions).

(c) **Taxes**.

    i. A tax can be graphically represented by either:

        (1). Shifting up the supply curve (increasing the marginal cost for sellers at all quantities); or

        (2). Shifting down the demand curve (reducing the marginal benefit for buyers at all quantities).

    ii. The tax

        (1). Will:

             a. Reduce the buyer's price.

             b. Raise the seller's price.

(2). Generate revenue for the government.
(3). Reduce buyer surplus (as she pays more and makes fewer trips) and seller surplus (as it receives less and sells fewer tickets).
(4). Reduce buyer and seller surplus by more than the gain in government revenue, and hence results in deadweight loss.

iii. Tax **incidence**: the actual burden of a tax in terms of the price or buyer/seller surplus. Who pays a tax does not determine who bears the tax.

(1). The deadweight loss and incidence from a tax depend on the price elasticities of demand and supply.

a. With moderate demand and supply elasticities, the buyer's price will rise by less than the amount of the tax and the seller's price drop by less than the amount of the tax, and quantity will fall by some amount.

b. When demand is extremely inelastic, the tax: reduces buyer's surplus, does not affect seller's surplus, results in no deadweight loss. The tax incidence falls completely on the buyer.

c. When supply is extremely inelastic, the tax: reduces seller's surplus, does not affect buyer's surplus, results in no deadweight loss. The tax incidence falls completely on the seller.

iv. Tax collection. The new buyer's price, new seller's price and quantity provided are the same whether the tax is collected from the buyer or the seller. Tax incidence depends on price elasticities of demand and supply. Who pays a tax does not determine who bears the tax.

ANSWERS TO PROGRESS CHECKS

6A. Technical efficiency means providing oil at the minimum possible cost, while economic efficiency requires providing the quantities such that all users have the same marginal benefit, all producers operate at the same marginal cost, and the marginal benefit equals the marginal cost.

6B. The invisible hand will drive up the price of grain, which will encourage consumers to conserve and producers to grow more.

6C. With decentralization, the bank should set the transfer price equal to the market price of funds. Then, both divisions will use funds up to the point where marginal benefit equals the transfer price. This will ensure economic efficiency.

6D. Not necessarily. If the marginal cost of steel exceeded the marginal benefit, then the high production rate was not efficient.

6E. See Figure 6E on page 536 of the text. The new deadweight loss is area *mnb*.

6F. The deadweight loss is increased by area *mnhe*. See Figure 6F on page 537 of the text.

6G. See Figure 6G on page 537 of the text. The buyer's price increases relatively more. Hence, the incidence of the tax on travelers will be relatively higher.

ANSWERS TO REVIEW QUESTIONS

1. Children were using bread (in sport) up to the point that the marginal benefit equaled the very low price. This price was less than the marginal cost. Hence, the marginal benefit of use was less than the marginal cost and not economically efficient.

2. The condition that all users receive the same marginal benefit.

3. In a competitive labor market, all buyers (employers) purchase up to the quantity where the marginal benefit equals the wage, and all sellers (workers) supply up to the quantity where the marginal cost equals the wage. Buyers and sellers face the same wage; hence, the allocation of labor is economically efficient.

4. If no resources were scarce (resources were unlimited), there would be no need to allocate them and their market prices would be zero. In this case, central planning would be as effective as a market system.

5. [omitted].

6. The transfer price should be set equal to the market price for apples.

7. Country B has higher barriers to exit.

8. In a competitive capital market, all buyers (borrowers) purchase up to the quantity where the marginal benefit equals the price of capital, and all sellers (lenders) supply up to the quantity where the marginal cost equals the price. Buyers and sellers face the same price; hence, the allocation of capital is economically efficient.

9. [omitted].

10. (a) If demand is more inelastic, renters are less sensitive to price. So, a given reduction in the quantity will cause larger reduction in the buyer surplus among

those who cannot get apartments. (b) If supply is more elastic, landlords are more sensitive to price. So, a given reduction in rent will induce a larger reduction in the quantity supplied.

11. The effect will be greater among janitors.

12. (a) If demand is more elastic, the increase in the wage from the market equilibrium to the minimum level will cause a relatively larger reduction in the quantity of labor employed. This implies that the gain in seller surplus will be smaller and the deadweight loss larger.   (b) If supply is more inelastic, the increase in the wage from the market equilibrium to the minimum level will cause a relatively larger reduction of seller surplus among those who wish to work but cannot gain employment. This implies that the deadweight loss will be larger.

13. Paying a gasoline tax means transferring the required amount of money to the government. Incidence is the actual burden of a tax in terms of the price or buyer/seller surplus. The incidence remains the same, regardless of who pays the tax.

14. Employers buy labor up to the quantity where the marginal benefit equals the buyer's wage. Workers supply up to the quantity where the marginal cost equals the seller's wage. With an income tax, the buyer's wage exceeds the seller's wage; hence, the allocation is not economically efficient.

15. Since demand is inelastic and supply is very elastic, the tax will be incident mostly on the demand side. Manufacturers would not be much affected.

WORKED ANSWER TO SAMPLE DISCUSSION QUESTION

Pluto Airport has capacity for 60 takeoffs and landings per hour. All the peak-hour takeoff and landing rights were allocated many years ago. Some airlines use these rights to operate small commuter flights. New airlines, even those planning to offer wide-body cross-country service, can only secure rights at the less popular off-peak hours. Pluto Airport Authority is considering a proposal that would allow airlines to re-sell rights to other airlines.

   a. Which condition of economic efficiency is probably being violated with the current allocation of peak-hour takeoff and landing rights?
   b. How would the resale proposal resolve the economic inefficiency?
   c. Graphically illustrate the market equilibrium with resale of peak-hour takeoff and landing rights.

Answer:

(a) The condition that all users achieve the same marginal benefit. Airlines operating small commuter services are probably getting lower marginal benefit from the takeoff and landing rights than airlines that would operate wide-body cross-country service.

(b) Airlines with relatively low marginal benefit would re-sell their rights to other airlines with higher marginal benefit, until all achieve the same marginal benefit.

(c) The market demand for peak-hour takeoff and landing rights would be the horizontal summation of the demands of the various airlines for those rights. The supply is fixed at 60 rights per hour. At the equilibrium price p, the quantity demanded equals 60 rights per hour.