PUBLIC FINANCE
A Contemporary Application of Theory to Policy

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2. Efficiency, Markets, and Governments.
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Part 1
THE ECONOMIC BASIS FOR GOVERNMENT ACTIVITY

CHAPTER 1  Individuals and Government
CHAPTER 2  Efficiency, Markets, and Governments
CHAPTER 3  Externalities and Government Policy
CHAPTER 4  Public Goods
CHAPTER 5  Public Choice and the Political Process
LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- Use a production-possibility curve to explain the trade-off between private goods and services and government goods and services.
- Describe how the provision of government goods and services through political institutions differs from market provision of goods and services and how government affects the circular flow of income and expenditure in a mixed economy.
- Explain the difference between government purchases and transfer payments and discuss the growth of government expenditures in the United States and other nations since 1929.
- Discuss the various categories of federal, state, and local government expenditures in the United States and the way those expenditures are financed.
- Determine some of the issues that must be addressed to evaluate the costs and benefits of government activities.
The role of government in society has been and will always be controversial. Some believe government does too much while others believe it needs to do more. Many look to government to solve problems they believe to be important to them but would rather not have it engage in activities that benefit others. No matter what your view of government it is clear that its programs and scope have grown significantly from a small share of the economy in the early 1900s to between 30 and 50 percent of the economy in modern industrial nations today. Citizens give up substantial amounts of their income each year to pay the taxes necessary to finance government expenditures.

This book is about the government sector of the economy. A framework for analyzing the role of government will be developed. That framework will be used to understand why government has grown and the consequences of future growth. We will study both the economic and political aspects of government. Major government expenditure programs will be analyzed. Alternative mechanisms for financing government activity and their economic effects will be discussed, as will issues relating to the government budget deficits and debt.

Since 2000 government spending in the United States as a share of gross domestic product has increased. Federal expenditures for national defense and health care by governments have both gone up as a share of the economy. And a major recession that began in 2007 resulted in more demands for increased government spending to stabilize the financial system. The recession has adversely affected tax collections for both the federal, state, and local governments. Many state and local governments have been forced to curtail spending and raise taxes to balance budgets in 2008 and 2009. The federal government’s budget deficit and debt outstanding has been soaring.

Some of the growth in federal spending and the increase in government borrowing is due to the extraordinary circumstances resulting from the financial crisis and recession. The federal government has provided assistance to state and local governments to help them cope with the effect of the recession on their budgets and has also acquired ownership shares in struggling businesses in the banking, financial, and automotive sectors of the economy. Although these shares can be sold in the future they do pose the risk that economic losses could be borne by taxpayers. The federal government’s budget deficit in 2010 will be the largest since the end of the Second World War.

As government grows there will be consequences for all of us. A major factor influencing that growth is the expanding role of governments in financing health care. Government expenditures for health care have been rising rapidly in recent years. If current trends continue federal government spending on health care through its two major health insurance programs, Medicare and Medicaid, could account for more than 50 percent of federal government spending by 2080 as the population ages. State government expenditures for health care have also been increasing significantly. Either tax rates will increase in the future to finance growth in government spending or increased federal budget deficits could impact the economy in ways that either slow economic growth or cause inflation. Of course, another alternative would be to attempt to reduce the rate of growth of federal government spending. Given the projected importance of health care
spending in the budget, this is unlikely to be possible without some curbs on spending for health by governments and significant changes in the health care system in the United States. The government’s role in health care is likely to remain a divisive issue.

INDIVIDUALS, SOCIETY, AND GOVERNMENT

What would it be like to live in a nation without government? There would be no system of courts to administer justice. Provision of national defense and homeland security would be difficult or disorganized with no central government to maintain and supply the armed forces. You could forget about such programs as Social Security, unemployment insurance, and welfare that provide income support to the elderly, the unemployed, and the poor or disabled. How would police and fire protection be provided? Driving on roads and over bridges that we take for granted could also be a problem because virtually all the highways, streets, and other public transportation infrastructure we use every day are supplied and maintained by governments or their agencies. There would be no publicly funded elementary and secondary schools. Higher education, which is heavily subsidized by both the federal and state governments, also would be in trouble. Our system of health care depends on government programs to pay the medical bills of many of the poor, the elderly, and veterans. Institutions ranging from medical schools to public clinics and hospitals would have their operations impaired without government support.

Now that you have finished reflecting on what your life would be like without governments, you can better appreciate how much you rely on government services each day. We all benefit from government activities and expenditures. Since 1980, annual government expenditures in the United States averaged one third of gross domestic product (GDP).

In economics, we study the ways individuals make choices to use scarce resources to satisfy their desires. If you have taken an introductory economics course, you studied the role of markets as a means of establishing prices that influence individual choices to use resources. In this text, you will study the role governments play in allocating resources and how individual choices influence what governments do. You also will study how government policies affect the incentives of workers, investors, and corporations to engage in productive activities.

If you have completed an introductory economics course, one lesson you have been taught already is that nothing of value can be obtained without some sacrifice. There are costs as well as benefits associated with the activities of governments. The role of government in society is so hotly disputed because we differ in our assessments of the costs and benefits of government programs. Many people think the role of government in the economy needs to be expanded and look to government to help solve their own problems. Others think the role of government in the economy is already excessive and would like to see its scale of influence reduced.

Government expenditures are financed mainly by taxes. U.S. taxpayers give up more of their income each year to support government activities than they do
to satisfy their desires for such basic items as food, clothing, and shelter. Taxes collected by governments in the United States are nearly three times the annual expenditures on food, nearly eight times the annual expenditures on clothing, and more than three times the annual expenditures on housing. The average U.S. household devotes nearly four months of annual earnings to meet its total yearly federal, state, and local government tax obligations. Citizens benefit from the many goods and services made available by governments, but they also pay the costs of these services. We differ in our views about what governments should and should not be doing in part because our valuations of the benefits we get from government differ. We also disagree because of variation in the amount of taxes and other costs each of us pay.

GOVERNMENTS AND POLITICAL INSTITUTIONS

Public finance is the field of economics that studies government activities and the alternative means of financing government expenditures. As you study public finance, you will learn about the economic basis for government activities. A crucial objective of the analysis is to understand the impact of government expenditures, regulations, taxes, and borrowing on incentives to work, invest, and spend income. This text develops principles for understanding the role of government in the economy and its impact on resource use and the well-being of citizens.

Governments are organizations formed to exercise authority over the actions of people who live together in a society and to provide and finance essential services. Many citizens and resources are employed in the production of government services. Individuals pay taxes and, in many cases, are recipients of income financed by those taxes. For example, Social Security pensions, unemployment insurance compensation, and subsidies to the poor are financed by taxes.

The extent to which individuals have the right to participate in decisions that determine what governments do varies from society to society. What governments do, how much they spend, and how they obtain the means to finance their functions reflect political interaction of citizens. Political institutions constitute the rules and generally accepted procedures that evolve in a community for determining what government does and how government outlays are financed. Through these mediums, individual desires are translated into binding decisions concerning the extent and functions of government.

Such democratic institutions as majority rule and representative government offer citizens an opportunity to express their desires through voting and through attempts to influence the voting of others. Under majority rule, one alternative (such as a political candidate or a referendum to increase spending for education) is chosen over others if it receives more than half the votes cast in an election. Just as economic theory is usefully applied to analysis of market interaction and individual choice, so can it be applied to political interaction and choices. Modern economics bases the study of government activity on a theory of individual behavior.
THE ALLOCATION OF RESOURCES BETWEEN GOVERNMENT AND PRIVATE USE

Government provision of goods and services requires labor, equipment, buildings, and land. The real cost of government goods and services is the value of private goods and services that must be sacrificed when resources are transferred to government use. When citizens pay taxes, their capacity to purchase goods and services for their own exclusive use (such as automobiles, clothing, housing, cameras, and dining out) is reduced. Resources that are thereby diverted from private use are purchased or otherwise obtained by government. Taxes also have indirect costs because they distort choices. Taxes affect prices of goods and services and the incentive to work, save, and allocate expenditures among goods and services. Taxes impair the operation of the economy by inducing individuals to make choices based not only on the benefits and costs of their actions but also on the tax advantages or disadvantages of their decisions. The distortion in resource use and loss in output that results from the effect of taxes on incentives is also part of the cost of government activity.

The resources governments obtain are used to provide citizens with goods and services, such as roads, police and fire protection, and national defense. These government goods and services are shared by all; they cannot be used by any one citizen exclusively. Other goods and services provided by government are limited in availability to certain groups, such as the aged or children, as with Social Security pensions and public primary and secondary schooling.

The trade-off between government and private goods and services can be illustrated with the familiar production-possibility curve. As shown in Figure 1.1, this curve gives the alternative combinations of government goods and services and private goods and services that can be produced in an economy, given its productive resources and technology and assuming that resources are fully employed. Private goods and services are those items, such as food and clothing, that are usually made available for sale in markets. Government goods and services, such as roads, schooling, and fire protection, usually are not sold in markets. At point A in Figure 1.1, MX1 units of private goods and services are forgone by individuals so that government can provide 0G1 units of goods and services. Resources that would have been employed in producing private goods and services are used by the government to provide services and exercise its functions.

An increase in the amount of government goods and services provided per year from 0G1 to 0G2 requires a reduction in the amount of private goods available per year. In Figure 1.1, the annual amount of private goods available declines from 0X1 to 0X2 as the economy moves from point A to point B on the production-possibility curve. For example, suppose that individuals demand more environmental protection services. To make these services available, governments might raise taxes paid by firms that pollute the air or water or they could enact more stringent regulations that prevent pollution. The new regulations or taxes are likely to increase costs of production for business firms, causing the prices of products produced by these firms to increase and the quantities
demanded in the marketplace by consumers to decline. The new policies will result in improved environmental quality—a government-supplied good—but will also require that households sacrifice consumption of private goods and services to pay for the cleaner environment.

How Government Goods and Services Are Distributed

Government goods and services are, by and large, distributed to groups of individuals through the use of nonmarket rationing. This means that government goods and services are not made available to persons according to their willingness to pay and their use is not rationed by prices. In some cases, the services are available to all, with no direct charge and no eligibility requirements. The provision of national defense services is one strong example of a good that is freely available to all and not rationed by prices. In other cases, criteria such as income, age, family status, residence, or the payment of certain taxes, fees, or charges are used to determine eligibility to receive benefits. For example, to receive Social Security pensions in the United States, individuals must be of a certain age (or be disabled), have worked for a certain period of time (about 10 years) while covered by Social Security, and must have paid their share of Social Security taxes during that time. Similarly, a fare must be paid to use public transportation facilities in cities. If the fares paid do not cover the full cost of operating the system, the deficit is made up by taxes levied by the government. To be eligible for elementary schooling in a given school district, children must reside within the boundaries of that district.
In public finance, we study how the means of rationing the use of government goods and services and financing their resource costs affect incentives, resource use, and production possibilities.

**CHECKPOINT**

1. What are political institutions?
2. Give four examples of government goods or services and discuss how they are distributed to citizens.
3. Use a production-possibility curve to show the cost of increasing government provision of medical service.

**THE MIXED ECONOMY, MARKETS, AND POLITICS**

The United States and most other nations today have mixed economies. A mixed economy is one in which government supplies a considerable amount of goods and services and regulates private economic activity. In such an economy, government expenditures typically amount to between one-quarter and one-half of GDP. Taxes absorb at least one-quarter of national income in the typical mixed economy, and governments usually regulate private economic activities and use taxes and subsidies to affect incentives to use resources.

In a pure market economy, virtually all goods and services would be supplied by private firms for profit and all exchanges of goods and services would take place through markets, with prices determined by free interplay of supply and demand. Individuals would be able to purchase goods and services freely, according to their tastes and economic capacity (their income and wealth), given the market-determined prices. In mixed economies, provision of a significant amount of goods and services takes place through political institutions. This involves interaction among all individuals of the community, rather than just buyers and sellers—as is the case when goods and services are provided by markets.

In a market, buyers are not compelled to purchase something they do not want. Political decisions, however, often compel citizens to finance government services and programs, regardless of their personal preferences.

**Circular Flow in the Mixed Economy**

In a pure market economy, all productive resources are privately owned by individuals who decide how to use these resources. These individuals, together with others living in their households, make decisions about how to use the resources they own. Their decisions are influenced in part by market prices for goods and services. They offer their resources for sale as inputs in the marketplace.
Private business firms are organized to hire resources in input markets to produce goods and services desired by household members. The products, in turn, are sold by businesses to households in output markets.

In a perfectly competitive market economy, no seller can influence prices. Instead, prices are determined by free play of the forces of supply and demand. Given market prices, households decide to sell the resources they own, and firms decide which inputs to buy and what outputs to produce. This process is summarized as a simple circular flow diagram in Figure 1.2. Let’s first look at the relationships that would exist in the economy if there were no governments. The lower loop of the diagram represents the input markets, where households sell the resources to firms for market-determined prices. The upper loop is the output market, where an array of outputs is offered for sale to households, which, in turn, pay for them with the dollars earned from the sale of their members’ productive resources. The distribution of income depends on the distribution of ownership of productive resources and the prices and other financial returns that resource owners receive from employment of those resources in production. In a pure market economy, all goods and services would be produced by businesses.

In a mixed economy, the government participates in markets as a buyer of goods and services. Figure 1.2 depicts government activities in the central portions of the diagram. Governments purchase inputs from households and acquire ownership rights of such productive resources as land and capital. Governments use these inputs to provide goods and services that are not sold to households and business firms but are made available through nonmarket rationing. However, governments do sometimes own and operate enterprises such as the postal service, railroads, liquor stores, and state lotteries.

Governments also purchase outputs of business firms such as paper, cars, bricks, and guns. To pay for them, the government requires businesses and households to make various payments such as taxes, charges, and fees and might even require resources be made available for use by the government at rates of compensation below actual market prices (as is the case with compulsory military service). Government uses the productive resources it acquires to produce goods and services including national defense, roads, schooling, police and fire protection, and many other essential services.

With reference to Figure 1.2, the question of size of the public sector is one of allocation of total transactions between the upper and lower loops and the central loops. The central loop transactions are made through political institutions, whereas the upper and lower loop transactions are made through market institutions.

**GOVERNMENT EXPENDITURES IN THE UNITED STATES**

Let’s examine government spending in the United States so that we can get a better idea of the kinds of things governments do in mixed economies. Government spending can be divided into two basic categories: purchases and transfers.
FIGURE 1.2 Circular Flow in the Mixed Economy

The upper and lower loops represent transactions between households and business firms in markets. Households use the income they earn from the sale of productive services to purchase the outputs of business firms. The inner loop represents transactions between households and government and between business firms and government. Governments purchase productive services from households and outputs of business firms. These purchases are financed with taxes, fees, and charges levied on persons and firms, and the inputs acquired are used to provide government services and transfers.
**Government purchases** are those that require productive resources (land, labor, and capital) to be diverted from private use by individuals and corporations so that such resources can be used by the government. For example, to supply national defense services, the government must acquire steel, labor, and other inputs necessary to support the armed forces and maintain aircraft, tanks, ships, and other capital equipment. A municipal government must acquire trucks and hire labor to administer effectively the collection and disposal of garbage.

The bulk of government purchases are *consumption expenditures* that use resources to satisfy current needs. *Gross investment* by government is expenditure for new capital such as roads, equipment, and structures. In 2008, 10 percent of government purchases were for investments while the remainder were consumption.

Government expenditures that redistribute purchasing power among citizens are called *government transfer payments*. These transfer payments constitute a source of income support to recipients who are not required to provide any service in return for the income received. Transfer payments differ from earnings in that they are not payments made in exchange for productive services. You might be surprised to learn that direct transfer payments to individuals constitute more than 50 percent of federal government expenditures in the United States. Included in government transfer payments to individuals are Social Security pension benefits, unemployment insurance benefit payments, and cash payments to low-income families.

**Growth of Government Expenditures**

Table 1.1 shows government expenditures in the United States from 1929 to 2008. These data reflect outlays each year for federal expenditures, expenditures by state and local governments, and total government expenditures. Ratios of the various categories of government expenditure to GDP in each year provide a rough indication of the relative importance of the government sector’s economic activity for each year. Government expenditures are calculated as the sum of government consumption, government transfer payments, and gross government investment as reported in the National Income and Product Accounts (NIPA) for each year since 1929.

The computed ratios provide only a crude index of government activity in the United States. Ideally, an index of the relative importance of government should measure the proportion of total output produced in the public sector. However, measuring government output is virtually impossible because, in most cases, it is not sold or easily measurable in units that can be summed. Actual expenditures are an imperfect proxy for government output.

A further problem with the data is that actual expenditures do not measure the full impact of the government on economic activity. Although the regulatory activities of the public sector increase the costs of producing private goods and services in order to produce collectively enjoyed benefits (such as cleaner air), these increases are not reflected in Table 1.1.
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<td>1961</td>
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<td>101.6</td>
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<td>8.79%</td>
<td>27.45%</td>
</tr>
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<td>50.7</td>
<td>161.4</td>
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<td>27.56%</td>
</tr>
<tr>
<td>1963</td>
<td>617.7</td>
<td>114.5</td>
<td>54.5</td>
<td>169.0</td>
<td>18.54%</td>
<td>8.82%</td>
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<td>8.88%</td>
<td>26.78%</td>
</tr>
<tr>
<td>1965</td>
<td>719.7</td>
<td>124.2</td>
<td>64.7</td>
<td>188.9</td>
<td>17.26%</td>
<td>8.99%</td>
<td>26.25%</td>
</tr>
<tr>
<td>1966</td>
<td>787.8</td>
<td>144.1</td>
<td>70.5</td>
<td>214.6</td>
<td>18.29%</td>
<td>8.95%</td>
<td>27.24%</td>
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<td>832.6</td>
<td>163.9</td>
<td>78.8</td>
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<td>9.46%</td>
<td>29.15%</td>
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<td>9.69%</td>
<td>29.45%</td>
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<tr>
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<td>97.1</td>
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<td>19.23%</td>
<td>9.86%</td>
<td>29.09%</td>
</tr>
<tr>
<td>1970</td>
<td>1038.5</td>
<td>204.8</td>
<td>107.8</td>
<td>312.6</td>
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<td>10.38%</td>
<td>30.10%</td>
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<tr>
<td>1971</td>
<td>1127.1</td>
<td>220.7</td>
<td>119.4</td>
<td>340.1</td>
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<td>10.59%</td>
<td>30.17%</td>
</tr>
<tr>
<td>1972</td>
<td>1238.3</td>
<td>245.1</td>
<td>124.8</td>
<td>369.9</td>
<td>19.79%</td>
<td>10.08%</td>
<td>29.87%</td>
</tr>
<tr>
<td>YEAR</td>
<td>GDP</td>
<td>FEDERAL GOVERNMENT</td>
<td>STATE AND LOCAL GOVERNMENTS</td>
<td>TOTAL GOVERNMENT</td>
<td>PERCENTAGE OF GDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
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<td>-----------------------------</td>
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<td></td>
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<td>STATE</td>
<td>LOCAL</td>
<td>TOTAL</td>
<td>FEDERAL</td>
<td>STATE</td>
</tr>
<tr>
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<td>138.7</td>
<td>399.7</td>
<td>18.88%</td>
<td>10.03%</td>
<td>28.91%</td>
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<td>1974</td>
<td>1500.0</td>
<td>293.9</td>
<td>158.7</td>
<td>452.6</td>
<td>19.59%</td>
<td>10.58%</td>
<td>30.17%</td>
</tr>
<tr>
<td>1975</td>
<td>1638.3</td>
<td>383.7</td>
<td>177.9</td>
<td>533.1</td>
<td>21.68%</td>
<td>10.86%</td>
<td>32.54%</td>
</tr>
<tr>
<td>1976</td>
<td>1825.3</td>
<td>355.2</td>
<td>189.5</td>
<td>573.2</td>
<td>21.02%</td>
<td>10.38%</td>
<td>31.40%</td>
</tr>
<tr>
<td>1977</td>
<td>2030.9</td>
<td>418.9</td>
<td>201.0</td>
<td>619.9</td>
<td>20.63%</td>
<td>9.90%</td>
<td>30.52%</td>
</tr>
<tr>
<td>1978</td>
<td>2294.7</td>
<td>463.8</td>
<td>218.3</td>
<td>682.1</td>
<td>20.21%</td>
<td>9.51%</td>
<td>29.73%</td>
</tr>
<tr>
<td>1979</td>
<td>2563.3</td>
<td>513.7</td>
<td>245.9</td>
<td>759.9</td>
<td>20.04%</td>
<td>9.90%</td>
<td>30.52%</td>
</tr>
<tr>
<td>1980</td>
<td>2825.3</td>
<td>546.6</td>
<td>274.6</td>
<td>879.2</td>
<td>21.67%</td>
<td>9.84%</td>
<td>31.52%</td>
</tr>
<tr>
<td>1981</td>
<td>3128.4</td>
<td>691.0</td>
<td>305.4</td>
<td>996.4</td>
<td>22.09%</td>
<td>9.76%</td>
<td>31.85%</td>
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<tr>
<td>1982</td>
<td>3536.7</td>
<td>841.6</td>
<td>364.5</td>
<td>1042.1</td>
<td>23.80%</td>
<td>10.31%</td>
<td>34.10%</td>
</tr>
<tr>
<td>1983</td>
<td>3933.2</td>
<td>910.6</td>
<td>397.1</td>
<td>1307.7</td>
<td>23.15%</td>
<td>10.79%</td>
<td>33.97%</td>
</tr>
<tr>
<td>1984</td>
<td>4220.3</td>
<td>992.8</td>
<td>441.3</td>
<td>1434.1</td>
<td>23.52%</td>
<td>10.46%</td>
<td>33.98%</td>
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<tr>
<td>1985</td>
<td>4462.8</td>
<td>1051.8</td>
<td>481.7</td>
<td>1533.5</td>
<td>23.57%</td>
<td>10.79%</td>
<td>34.36%</td>
</tr>
<tr>
<td>1986</td>
<td>4739.5</td>
<td>1109.8</td>
<td>526.4</td>
<td>1617.2</td>
<td>23.02%</td>
<td>11.11%</td>
<td>34.12%</td>
</tr>
<tr>
<td>1987</td>
<td>5103.8</td>
<td>1132.8</td>
<td>562.2</td>
<td>1695.0</td>
<td>22.20%</td>
<td>11.02%</td>
<td>33.21%</td>
</tr>
<tr>
<td>1988</td>
<td>5484.4</td>
<td>1206.4</td>
<td>609.1</td>
<td>1815.5</td>
<td>22.00%</td>
<td>11.11%</td>
<td>33.10%</td>
</tr>
<tr>
<td>1989</td>
<td>5803.1</td>
<td>1301.5</td>
<td>668.1</td>
<td>1969.6</td>
<td>22.43%</td>
<td>11.51%</td>
<td>33.94%</td>
</tr>
<tr>
<td>1990</td>
<td>5995.9</td>
<td>1357.6</td>
<td>711.5</td>
<td>2069.1</td>
<td>22.64%</td>
<td>11.87%</td>
<td>34.51%</td>
</tr>
<tr>
<td>1991</td>
<td>6337.7</td>
<td>1481.3</td>
<td>743.8</td>
<td>2225.1</td>
<td>23.37%</td>
<td>11.74%</td>
<td>35.11%</td>
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<tr>
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<td>1526.1</td>
<td>766.3</td>
<td>2292.4</td>
<td>22.92%</td>
<td>11.51%</td>
<td>34.43%</td>
</tr>
<tr>
<td>1993</td>
<td>7072.2</td>
<td>1557.4</td>
<td>803.6</td>
<td>2361.0</td>
<td>22.02%</td>
<td>11.36%</td>
<td>33.38%</td>
</tr>
<tr>
<td>1994</td>
<td>7397.7</td>
<td>1620.7</td>
<td>844.2</td>
<td>2464.9</td>
<td>21.91%</td>
<td>11.41%</td>
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</tr>
<tr>
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<td>11.27%</td>
<td>32.88%</td>
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<tr>
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<td>1721.1</td>
<td>923.9</td>
<td>2645.0</td>
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<td>11.13%</td>
<td>31.85%</td>
</tr>
<tr>
<td>1997</td>
<td>8747.0</td>
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<td>967.6</td>
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<td>20.02%</td>
<td>11.06%</td>
<td>31.08%</td>
</tr>
<tr>
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<td>9268.4</td>
<td>1818.7</td>
<td>1034.0</td>
<td>2852.7</td>
<td>19.62%</td>
<td>11.16%</td>
<td>30.78%</td>
</tr>
<tr>
<td>2000</td>
<td>9817.0</td>
<td>1892.6</td>
<td>1110.0</td>
<td>3002.6</td>
<td>19.28%</td>
<td>11.31%</td>
<td>30.59%</td>
</tr>
<tr>
<td>2001</td>
<td>10128.0</td>
<td>2002.4</td>
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<td>19.77%</td>
<td>11.71%</td>
<td>31.48%</td>
</tr>
<tr>
<td>2002</td>
<td>10469.6</td>
<td>2149.1</td>
<td>1239.1</td>
<td>3388.2</td>
<td>20.53%</td>
<td>11.84%</td>
<td>32.36%</td>
</tr>
<tr>
<td>2003</td>
<td>10960.8</td>
<td>2317.5</td>
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<td>3593.4</td>
<td>21.14%</td>
<td>11.64%</td>
<td>32.78%</td>
</tr>
<tr>
<td>2004</td>
<td>11685.9</td>
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<td>3793.2</td>
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<td>11.49%</td>
<td>32.46%</td>
</tr>
<tr>
<td>2005</td>
<td>12421.9</td>
<td>2635.4</td>
<td>1419.9</td>
<td>4055.3</td>
<td>21.22%</td>
<td>11.43%</td>
<td>32.65%</td>
</tr>
<tr>
<td>2006</td>
<td>13178.4</td>
<td>2783.2</td>
<td>1508.6</td>
<td>4291.8</td>
<td>21.12%</td>
<td>11.45%</td>
<td>32.57%</td>
</tr>
<tr>
<td>2007</td>
<td>13807.5</td>
<td>2973.1</td>
<td>1635.6</td>
<td>4608.7</td>
<td>21.53%</td>
<td>11.85%</td>
<td>33.38%</td>
</tr>
<tr>
<td>2008</td>
<td>14264.6</td>
<td>3247.2</td>
<td>1747.2</td>
<td>4994.4</td>
<td>22.76%</td>
<td>12.25%</td>
<td>35.01%</td>
</tr>
</tbody>
</table>

*Calendar years based on National Income and Product Accounts (NIPA) and current dollars for each year. Total government expenditure includes government consumption and government gross investment. For 1929–1959 capital transfer payments and net purchases of nonproduced assets are assumed to be zero.

*Excludes federal grants-in-aid. State and local government expenditures are calculated as the difference between total government expenditures and federal government expenditures.

Despite these limitations, the ratios computed in Table 1.1 provide a rough idea of the extent to which government in the United States has grown since 1929. In 1929, government expenditures accounted for only 9.46 percent of GDP. Interestingly, in 1929, the bulk of government expenditures was undertaken by state and local governing bodies. In that year, federal government expenditures accounted for a mere 2.51 percent of GDP, while state and local government expenditures accounted for the remaining 6.95 percent. By 1960, the federal government accounted for 17.78 percent, while state and local government expenditures were only 8.36 percent. The sharp increases in federal expenditures for the years between 1942 and 1945, to over 40 percent of GDP, reflect the influence of World War II on government activity.

Growth of government spending was rapid after 1960, when total government spending as a percentage of GDP rose from about one fourth of GDP to nearly one-third of GDP throughout much of the 1970s and 1980s. In the 1980s and 1990s, government expenditures remained at around one third percent of GDP. Total government spending as a share of GDP fell in the late 1990s to a low of 30.6 percent of GDP in 2000. Since 2000 government spending as a share of GDP as resumed its upward march and as of 2008 had risen to 35 percent of GDP. The share of GDP accounted for by federal government expenditures has averaged 22 percent of GDP since 1980. The proportion of GDP accounted for by state and local expenditures, exclusive of that portion financed by federal grants, has ranged between 9 and 12 percent of GDP since 1980.

Federal grants-in-aid are contributions made by the federal government to finance services provided by state and local governments. The importance of these grants increased somewhat in the 1970s, when federal grants rose to more than 3 percent of GDP. In the early 1980s, these grants declined, and by 1990 federal grants-in-aid to state and local governments amounted to merely 1 percent of GDP. Since 1990, grants to state and local governments have increased to nearly 3 percent of GDP. In drawing up the table, such grants are viewed as expenditures on the federal level because they are part of a federal program enacted by Congress. But the funds are actually spent by state and local governments, and their omission from such expenditures tends to underestimate state and local government services relative to federal spending.

The general conclusion that can be reached from Table 1.1, given the limitations of its data, is that the importance of the government sector in the United States has grown tremendously since 1929. Since 1929, total government expenditures rose from one-tenth to nearly one-third of GDP in 1992. From 1992 to 2000 the share of GDP accounted for by government spending declined steadily from 35.11 percent to 30.59 percent. By 2001, however, government spending started to rise as a share of GDP. Figure 1.3 plots the trend in government spending as a percentage of GDP from 1929 to 2008.

The proportion of GDP accounted for by government expenditures in the United States is low compared with that of other industrialized nations. Most European nations all devote more than 40 percent of the value of their GDPS to
government expenditures. Denmark, France, and Sweden allocate more than 50 percent of their GDPs to government expenditure.

Current government expenditure in the United States is all the more striking when put in historical perspective. Federal government expenditures from 1870 until the beginning of World War I averaged less than 3 percent of GDP. After the end of World War I, federal government expenditures still remained close to 3 percent of GDP until 1930, when federal government expenditures began to grow at a rapid rate. Federal government expenditures increased less than 1 percent per year until 1940. In contrast, federal government expenditures grew at an average of about 8 percent per year from 1948 to 1980.¹

Similar trends can be observed in other industrialized nations. The United Kingdom historically has had a large government sector. Surprisingly, the home of Adam Smith, champion of the free market economy, was among the nations with the largest government sectors in the world at the beginning of the 19th century. In 1801, Great Britain devoted 22 percent of its GDP to government expenditure. The share of GDP devoted to government expenditures in the United States has increased dramatically, from about 10 percent to 35 percent since 1929.


expenditures.

2 In 2008, government expenditures in the United Kingdom accounted for 45.4 percent of GDP.

Central government expenditures in Sweden at the beginning of the 20th century amounted to less than 7 percent of GDP. Total government spending in Sweden is now over 50 percent of GDP!

It probably is not an exaggeration to call the 20th century the century of governmental growth throughout the world.

Structure of Federal Government Expenditure

Breaking down government expenditures into a few major components will help isolate the kinds of expenditures that are most responsible for the increased importance of the government sector in the economy.
Table 1.2 shows the distribution of federal government expenditure in 2008 between transfer payments, consumption expenditures, and net interest paid on the federal debt. Transfer payments include government social benefits paid to individuals, including social security pensions, payments for government-supplied health insurance for the elderly (Medicare) and other social benefits such as cash assistance to the poor and unemployed. Also included in transfer payments are grants-in-aid to state and local governments. Many of these grants also end up financing transfer payments to individuals, including medical insurance for people with incomes low enough to qualify for the Medicaid program and income support for the poor administered by state and local governments. Transfer payments accounted for 60 percent of federal government spending in 2008. Net interest paid to holders of federal government securities such as treasury bills, notes, and bonds accounted for nearly 10 percent of federal spending in 2008. Only 30 percent of federal government expenditure is accounted for by government purchases for consumption expenditures that provide public services such as national defense, homeland security, education, and transportation services.
Figure 1.4 shows how the distribution of federal expenditure has changed since 1960. Transfers have increased from 30 percent of federal spending in 1960 to nearly 60 percent in 2008. While the share of federal spending accounted for by transfers has nearly doubled, government purchases for consumption expenditures have declined from 60 percent to 30 percent of spending over the same period. This change is of historical importance and reflects the massive shift to expanded social insurance programs in the 1960s and 1970s, including increases in social security pension benefits and indexation of those benefits for

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**TABLE 1.2** Federal Government Expenditure by Category, 2008 Calendar Year

<table>
<thead>
<tr>
<th>EXPENDITURE CATEGORY</th>
<th>AMOUNT</th>
<th>PERCENTAGE OF TOTAL FEDERAL EXPENDITURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer Payments</td>
<td>1840.6</td>
<td>59.0%</td>
</tr>
<tr>
<td>Consumption Expenditures</td>
<td>934.4</td>
<td>30.0%</td>
</tr>
<tr>
<td>Net Interest Paid</td>
<td>292.0</td>
<td>9.4%</td>
</tr>
<tr>
<td>Other</td>
<td>50.6</td>
<td>1.6%</td>
</tr>
<tr>
<td>Total</td>
<td>3117.6</td>
<td>100.0%</td>
</tr>
</tbody>
</table>


---

Since 1959, transfer payments have grown as a share of federal expenditures. (Shaded areas indicate recessions.)

inflation, the establishment and growth of the Medicare program that provides health insurance for eligible individuals at age 65, and other programs of income support. In recent years the growth of the Medicaid program that provides health insurance for the poor has also contributed to the growth of transfer payments.

Interest payments rose from about 8 percent of federal spending in 1960 to a peak of nearly 20 percent of federal spending in 1991, a period of record government deficits and borrowing at high interest rates. In recent years smaller deficits (even a few years of budget surpluses) and lower interest rates have reduced federal interest payments to around 10 percent of total federal spending.

Table 1.3 presents data on the structure of federal government expenditures by major type and function based on National Income and Product Accounts calendar year data. This table is designed to provide information on some of the types of services made available by the federal government.

As of 2008 the biggest and fastest-growing category of federal government expenditure was for health; it accounted for one out of every four dollars of expenditure. The two major federal government health insurance programs, Medicare and Medicaid, constituted the bulk of this spending. Medicare provides health insurance for eligible persons over the age of 65 (and some eligible recipients with disabilities who are below that age) while Medicaid provides medical and long-term care to persons whose incomes and assets are low enough to qualify for benefits under the program.

The second largest category of federal expenditure is national defense, accounting for one-fifth of federal spending. Defense spending by the federal government has been rising as a share of total spending since 2001 mainly because of military operations in Iraq and Afghanistan. Social Security and other retirement pensions account for 17 percent of federal spending while income security, which provides support for eligible persons with low incomes or to the unemployed accounts for 15 percent of spending.

A very large share of federal spending benefits persons over the age of 65. The sum of spending for Medicare and Social Security pensions to the elderly account for more than 25 percent of federal spending. The top four categories of federal spending: health, national defense, Social Security, and income security account for three quarters of total federal spending! Adding interest on the federal debt, which amounts to slightly less than ten percent of federal outlays to this sum, reveals that only 15 percent of federal spending is accounted for by other types of programs. For example, spending on education by the federal government accounts for only 2.5 percent of its total spending. No other category of federal spending accounts for more than 2 percent of total federal outlays.

THE STRUCTURE OF STATE AND LOCAL GOVERNMENT EXPENDITURE

In contrast to U.S. federal government spending, the 50 state governments in the United States, along with thousands of local governments, spent nearly $2 trillion in 2008, of which $388 billion was paid for by grants from the federal government.
Table 1.3: Federal Government Expenditure by Function

<table>
<thead>
<tr>
<th>FEDERAL EXPENDITURE 2008*</th>
<th>AMOUNT (BILLIONS OF DOLLARS)</th>
<th>PERCENTAGE OF TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>779.0</td>
<td>24.99%</td>
</tr>
<tr>
<td>National Defense</td>
<td>638.1</td>
<td>20.47%</td>
</tr>
<tr>
<td>Social Security and other Retirement Pensions</td>
<td>521.5</td>
<td>16.73%</td>
</tr>
<tr>
<td>Income Security</td>
<td>469.2</td>
<td>15.05%</td>
</tr>
<tr>
<td>Net Interest</td>
<td>292.0</td>
<td>9.37%</td>
</tr>
<tr>
<td>Education</td>
<td>79.2</td>
<td>2.54%</td>
</tr>
<tr>
<td>Public Order and Safety</td>
<td>53.3</td>
<td>1.71%</td>
</tr>
<tr>
<td>Housing and Community Services</td>
<td>51.4</td>
<td>1.65%</td>
</tr>
<tr>
<td>Transportation</td>
<td>35.8</td>
<td>1.15%</td>
</tr>
<tr>
<td>All Other</td>
<td>198.1</td>
<td>6.35%</td>
</tr>
<tr>
<td>Total</td>
<td>3117.6</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

*Based calendar year National Income and Product Account data


Education is the most important category of state and local government spending. In 2008, education expenditures accounted for 35 percent of state and local government outlays. Local governments are primarily responsible for providing elementary and secondary education, but state governments assist
local governments by providing significant grants-in-aid, and in some cases, financing such expenditures as teacher salaries. States also provide higher education through state colleges, universities, and community colleges.

Health care is the second most important category of spending by state and local governments, accounting for more than 20 percent of spending in 2008. Much of the spending is for Medicaid, which is partially funded by the federal government. In recent years, state governments have been assigned more responsibility for providing health care for the poor. Although much of the health care expenditure is financed by federal grants, these expenses are growing rapidly and putting some strain on state finances.

Public order and safety, which includes police and fire protection, law courts, and prisons accounted for 13 percent of spending by state and local governments in 2008. State and local governments spent nearly 7.45 percent of their budgets on income transfers and 6 percent on transportation. Both income security and transportation are partially funded by grants from the federal government, which has become an important source of finance for state and local governments.

Table 1.4 and its accompanying pie chart show the major categories of state and local government spending in 2008. The pie chart details the distribution of spending.

**FINANCING GOVERNMENT EXPENDITURE IN THE UNITED STATES**

Taxes, the principal means of financing government expenditures, are compulsory payments that do not necessarily bear any direct relationship to the benefits from government goods and services received. For example, the right to receive the benefits of national defense services or to use public roads is not contingent on payment of taxes. A citizen who pays $10,000 a year in taxes is defended equally and has no more right to use public roads than the individual who pays little or no taxes.

Determining the means of financing government functions is a public choice that is likely to be based on a number of important considerations. Because taxes are compulsory payments required under the powers of authority of government, many citizens believe that taxes should be distributed fairly. However, citizens often differ in their ideas concerning what is a fair distribution of the burden of finance.

Taxes affect economic incentives to produce and consume or to use productive resources in the most gainful way. When part of the gain from a transaction has to be surrendered to the government, the willingness to engage in that activity is naturally reduced. High taxes on interest from savings tend to reduce the incentive to save. Taxes on various consumer goods tend to reduce the amounts of these goods that will be consumed. Taxes on labor earnings can also reduce the incentive to work.
In evaluating alternative means of financing government, desires for fairness in taxation must be balanced with the possible harmful effects of taxes on incentives to produce, consume, and invest. At the extreme, very high taxes on those with high earnings and low taxes on those with low earnings can promote

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**TABLE 1.4 State and Local Government current Expenditures by Function**, 2008

<table>
<thead>
<tr>
<th>EXPENDITURE CATEGORY</th>
<th>AMOUNT</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>708.8</td>
<td>35.19%</td>
</tr>
<tr>
<td>Health</td>
<td>407.2</td>
<td>20.21%</td>
</tr>
<tr>
<td>Public Order and Safety (police, fire protection, law courts, and prisons)</td>
<td>262.4</td>
<td>13.03%</td>
</tr>
<tr>
<td>Income Security</td>
<td>150.0</td>
<td>7.45%</td>
</tr>
<tr>
<td>Transportation</td>
<td>120.8</td>
<td>6.00%</td>
</tr>
<tr>
<td>Interest Payments</td>
<td>103.9</td>
<td>5.16%</td>
</tr>
<tr>
<td>Recreational and Cultural activities</td>
<td>28.3</td>
<td>1.40%</td>
</tr>
<tr>
<td>Housing and Community Services</td>
<td>11.7</td>
<td>0.58%</td>
</tr>
<tr>
<td>Other</td>
<td>221.3</td>
<td>10.99%</td>
</tr>
<tr>
<td>Total</td>
<td>2014.4</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

*Includes expenditure financed by Federal Grants-in-Aid

economic equality of income. However, this goal is likely to be achieved at the
cost of reduction in incentives for producers to use their resources in activities for
which the social returns to production are the highest.

Table 1.5 and its accompanying pie charts provide data on government fi-
nances. In 2008, the two major sources of revenue for the federal government
were income and payroll taxes, which together accounted for 81.6 percent of
government receipts. (Payroll taxes are paid by workers and their employers to
finance social insurance programs including Social Security.) Corporate profits
taxes accounted for 11.31 percent of federal receipts in 2008. Excise taxes, such
as those levied on fuels, telephone service, tires, cigarettes, and alcoholic bev-
erages, accounted for 2.6 percent of federal revenues in 2008. Because of major
cuts in federal income tax rates enacted by Congress in 2001 and 2003, the share
of revenue coming from income taxes has fallen since 2001.

State and local government receipts were $1,935.1 billion in 2008. Table 1.5
shows the sources of funds for these governments. The most important source of
tax revenue for state and local governments is the sales tax, which accounted for
22.55 percent of receipts in 2008. Personal income taxes accounted for nearly 16
percent, and taxes on property for 20.92 percent of receipts in 2008. Federal
grants accounted for 20 percent of state and local receipts in 2008.

1. What is a mixed economy? How does an increase in government taxation
and purchases affect the circular flow of income and expenditures in a
mixed economy?
2. What is the difference between government purchases and government
transfer payments?
3. List the major categories of federal government expenditure and revenue
in the United States.

MARKET FAILURE AND THE FUNCTIONS OF
GOVERNMENT: HOW MUCH GOVERNMENT
IS ENOUGH?

Why do we demand government services? How much government is enough? As
citizens, each of us has opinions about what governments should or should not
be doing. An economic analysis of government seeks to evaluate the costs and
benefits of government activities and also to explain the way government spend-
ing, regulations, and finance affect resource use and the distribution of well-
being in a society.

One reason we demand government services is that, in many cases, the gov-
ernment can provide us with items that we cannot easily make available for our-
selves or purchase from others in markets. For example, governments establish
property rights to the use of resources and enforce contracts by providing a
### Table 1.5: Government Receipts, 2008

#### Federal Government Receipts 2008

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Amount (Billions of Dollars)</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Income Taxes</td>
<td>1127.2</td>
<td>43.81%</td>
</tr>
<tr>
<td>Payroll Taxes</td>
<td>972.2</td>
<td>37.79%</td>
</tr>
<tr>
<td>Corporate Profit Taxes</td>
<td>291.1</td>
<td>11.31%</td>
</tr>
<tr>
<td>Excise Taxes</td>
<td>67.2</td>
<td>2.61%</td>
</tr>
<tr>
<td>Custom Duties</td>
<td>29</td>
<td>1.13%</td>
</tr>
<tr>
<td>Other</td>
<td>86.2</td>
<td>3.35%</td>
</tr>
<tr>
<td>Total</td>
<td>2572.9</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

#### State and Local Governments, 2008

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Amount (Billions of Dollars)</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales Taxes</td>
<td>436.3</td>
<td>22.55%</td>
</tr>
<tr>
<td>Federal Grants</td>
<td>388.3</td>
<td>20.07%</td>
</tr>
<tr>
<td>Income Taxes</td>
<td>305.9</td>
<td>15.81%</td>
</tr>
<tr>
<td>Payroll Taxes</td>
<td>23.7</td>
<td>1.22%</td>
</tr>
<tr>
<td>Corporate Profits Taxes</td>
<td>47.6</td>
<td>2.46%</td>
</tr>
<tr>
<td>Property Taxes</td>
<td>404.6</td>
<td>20.91%</td>
</tr>
<tr>
<td>Other</td>
<td>328.7</td>
<td>16.99%</td>
</tr>
<tr>
<td>Total</td>
<td>1935.1</td>
<td>100.00%</td>
</tr>
</tbody>
</table>
system of law enforcement and courts. Government power is exerted through these functions to establish rules that regulate the social interaction among individuals and to settle disputes among citizens. It is almost inconceivable to imagine a society functioning without these rules—and without a government.

Political theorists of the 19th century called the willing submission of individuals to the authority of government the social compact. The existence of government gives rise to further demands for its powers to be used to supply various services to its citizens. Governments also use their power to redistribute income and economic opportunity among citizens. For example, the federal government uses tax revenues to provide income support for elderly, unemployed, and poor citizens. Another function is to stabilize economic fluctuations to prevent the waste associated with unemployment of productive resources and the undesirable consequences of inflation. Finally, governments regulate production and consumption to achieve such goals as improved health and the elimination of excessive monopolistic control over prices.

The growth in government spending since 1929 reflects increased demands for government services that markets fail to provide. Demands for social insurance, such as Social Security old-age pensions, unemployment insurance, and government-financed health insurance to the aged and the poor, are responsible for much of the growth of government spending since 1970. National defense is also a service that we cannot purchase for ourselves in markets and has accounted for many billions of dollars in federal government outlays.

But has government grown too much, too rapidly? Do the costs outweigh the benefits of some government functions and services? Could some government...
Virtually all state governments in the United States are required by their constitutions to balance their budgets each fiscal year. When revenues fall short of planned expenditure, states have two choices: cut government spending or raise more revenue. Inevitably, state legislators must choose a combination of spending cuts and tax or fee increases to fill the gap. Sometimes they use elaborate accounting maneuvers that pull spending authority from trust funds or defer scheduled payments. During the booming 1990s, many state governments reduced tax rates across the board, and since 2000 many politicians have been reluctant to raise tax rates. Some states raised fees and taxes on cigarettes during the hard times between 2001 and 2004. In addition, many states have cut back on all spending except for education. The demands for state government spending, particularly in the areas of health care and education, are growing. Also, many state governments have pension plans for state employees that are likely to require significantly more outlays in the future as the population ages and more state employees retire and live longer.

In 2008 and 2009 the fiscal impact of a major recession on state budgets has been significant. As unemployment rates soared and incomes fell, state tax collections were sharply reduced. Tax collections also fell as a result of declines in property values and declines in consumer spending that adversely affected sales tax revenue. Deficits forced governors and state legislatures to consider spending cuts or tax increases. After dipping into emergency “rainy day” funds and transferring funds between accounts, many state governments were forced to cut services. Some states reduced state employee wages and salaries or put state employees on non-paid involuntary furloughs. Most states with deficits imposed hiring freezes for state agencies. States also cut spending for public schools, colleges, and universities. Even funding for law enforcement and police had to be cut to eliminate deficits. Across the board cuts for all state agencies were common with cuts ranging anywhere from 3 to 5 percent and even more. State employees in some states actually lost their jobs as positions were eliminated from the budget. It is clear that the recession severely impacted the quantity and quality of state government services supplied to citizens as states chose to cut expenditures to balance their budgets.

The poor fiscal situation for state governments was expected to continue into fiscal year 2010 and possibly beyond. Revenues from personal and corporate income taxes and sales taxes declined during 2009 for state governments. Corporate income tax collections fell 15.6 percent in fiscal year 2009 as corporate profits plummeted in response to the recession. Personal income taxes, which account for about 35 percent of state government tax revenues, fell by 6.6 percent compared to the previous year and sales tax collections were down 3.2 percent.

services be dispensed with entirely, allowing the resources they absorb to be used elsewhere and allowing a reduction in taxes paid? Should government assets and enterprises, such as the postal service, be sold to private firms to be operated for profit? Have tax-financed Social Security pensions become more generous than initially intended?

Have government programs failed to accomplish their goals? Do government programs have unintended effects—for example, do grants to rejuvenate decaying cities decrease the availability of housing to low-income city dwellers? Do waste and mismanagement in government result in unnecessarily high costs for defense projects? Do government regulations prevent useful products from being sold or increase prices of market goods and services?

How much should governments do, and how much should be left to private enterprise and initiative through market sale of goods and services? This is the
core question that occupies much of the first part of this textbook. Once we have established the basis for government activity, we can examine the impact of government finance on private incentives and resource use.

AGING POPULATIONS: IMPLICATIONS FOR PUBLIC FINANCE

The world is getting older. Not just physically—the average age of the population is rising. The aging of populations varies among nations with the effects being most pronounced in the more developed nations including the European
Union, the United States, Japan, and China. In less developed nations, populations are still relatively young, and in the least developed nations, aging is imperceptible.

World population quadrupled in the 20th century. In the 21st century, world population is projected to increase by only 50 percent and is likely to stabilize by the end of the century. Declining population growth is a by-product of economic development. As incomes rise, total fertility rates (measured by births per woman) decline while improved access to health care increases life expectancy at birth. For example, total fertility rates in the United States fell from about 3.5 in 1950 to about 2 in 2006. Declines in fertility rates are even more pronounced in China where the rate has fallen from more than 6 in 1950 to about 2 in 2006. These rates are not projected to increase through 2050. Life expectancy at birth in the United States was 69 in 1950 but is projected to be more than 80 by 2050. In China life expectancy at birth was 40 in 1950 but is projected to be more than 75 by 2050. In short, over the next 50 years we can expect to see more old people around, living longer, and higher percentages of the elderly as a share of total population. Table 1.6 shows observed and forecasted percentages of the population 60 years of age and older for the years 2009 and 2050. Notice that Japan, Italy, Spain, and Germany are all expected to have more than one-third of their population at age 60 and above by 2050. The aging of the population is less pronounced in the United States, where only 27.4 percent of the population is projected be age 60 or older by 2050. Japan is the nation where aging of the population will be most extreme with 44 percent of total population expected to be age 60 or older by 2050. Japan is actually projected to have one-sixth of its population aged 80 or more by 2050!

Aging of the population has a profound impact on public finance and government budgets. Most of these effects stem from increased old-age dependency ratios, measured by the percentage of the population 65 years of age and older to the population ages 15–64. This is an indicator of the proportion of retired workers to active workers in a nation or region. Because younger people under the age of 65 are likely to be in the labor force and their income generates taxes to pay for government programs (including Social Security pensions) as the old-age dependency ratio rises, a smaller percentage of the population is likely to be productive, taxpaying citizens whose efforts generate taxes to finance government programs. For example, an old-age dependency ratio of 50 percent indicates that on average, there are 2 people of working age for each retiree (assuming workers on average retire at age 65). The working population must generate enough tax revenue to pay for all government programs including Social Security pensions to avoid government deficits unless some taxes are paid by the elderly. Government expenditure for health care also rises as the population ages because the prevalence of chronic diseases and disability increases with

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old age. Most European Union nations and Japan, for example, are projected to have old-age dependency ratios of 50 percent by 2050. Old-age dependency ratios are projected to be in the range of 35 percent for the U.S. and 40 percent for China by 2050. Table 1.7 shows dependency ratios based on United Nations data and projections for major world regions.

The impact of aging of the population in the United States will have significant effects on Social Security expenditures and expenditure for health care under the Medicare and Medicaid programs. The Social Security Administration projects, based on current pension formulas, that Social Security outlays will rise from 4.3 percent of GDP in 2004 to 5.8 percent of GDP in 2050 while revenue for Social Security will amount to only 4.7 percent of GDP at that time. This means that the government will either have to cut pensions at that time, increase tax rates, or borrow to finance the deficit. If current trends continue, spending on Medicare and Medicaid could reach 20 percent of GDP. This implies that government spending on pensions and health care would be more than 25 percent of GDP and could leave little funds available to spend on other government programs such as defense and highways unless taxes are increased or the budget deficit balloons. Such a burden of finance could result in soaring interest rates and declines in private investment that would adversely affect economic growth in the United States.5


<table>
<thead>
<tr>
<th>REGION OR COUNTRY</th>
<th>2009</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>10.8</td>
<td>21.9</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>10.0</td>
<td>26.0</td>
</tr>
<tr>
<td>Africa</td>
<td>5.0</td>
<td>11.0</td>
</tr>
<tr>
<td>China</td>
<td>11.9</td>
<td>31.1</td>
</tr>
<tr>
<td>India</td>
<td>7.4</td>
<td>19.6</td>
</tr>
<tr>
<td>Japan</td>
<td>29.7</td>
<td>44.2</td>
</tr>
<tr>
<td>United States</td>
<td>17.9</td>
<td>27.4</td>
</tr>
<tr>
<td>Europe</td>
<td>22.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Italy</td>
<td>26.4</td>
<td>39.1</td>
</tr>
<tr>
<td>Spain</td>
<td>22.2</td>
<td>37.4</td>
</tr>
<tr>
<td>Germany</td>
<td>25.7</td>
<td>39.5</td>
</tr>
<tr>
<td>Sweden</td>
<td>24.7</td>
<td>30.2</td>
</tr>
</tbody>
</table>

It is difficult to predict the effects of the aging population on the economy and the federal government’s budget. Some forecasts suggest that one-third of GDP could be absorbed by health care by the year 2030, mainly as a result of the aging population and consequent demands on the health-care system. Other experts suggest that the elderly in the future will be healthier and more productive than their counterparts today. This could lead to higher growth rates for the economy as the elderly retire later. The resulting increase in productivity and tax revenues for the government could offset the demands that retiring baby boomers place on the health-care system and government expenditures for pensions. Others suggest that the percentage of the elderly in the future requiring long-term care will actually decline as the health of older people improves.\(^6\)

Tax rates for Social Security pensions are likely to rise as a result of the aging of the population. The extent of the increases depends on the rate of

improvement of life expectancy through the year 2070. The current payroll tax rate used to finance Social Security pensions is 12.4 percent. If life expectancy were to remain as currently projected, the tax rate in the year 2070 to finance the pensions would have to increase to 20 percent solely as a result of the aging of the population. If, however, life expectancy were to significantly improve, the tax rate necessary to finance Social Security pensions without incurring any deficit would have to rise to a whopping 32 percent.\(^7\) However, uncertainties about future mortality, fertility, and immigration rates for the nation make it difficult to project exactly the impact of aging on pensions and tax rates required to finance those pensions. This uncertainty combined with problems in forecasting the health and productivity status of the elderly could mean that the situation is not as grave as forecast or it could actually be worse than the most pessimistic projections! Health is crucial because increased spending for government programs that provide health care for the elderly could absorb as much as 10 percent of GDP.

Another factor is the overall rate of growth of the U.S. economy. Programs to aid an aging population could be financed with lower-than-projected tax rates if real GDP grows faster.

The major programs that provide transfers to the elderly, Social Security and Medicare, remain likely to be under fiscal stress in the future. Despite difficulty in making projections, there is a high probability that large federal budget deficits will result if reforms are not enacted soon. Either tax rates to finance these programs will have to be increased or benefits per recipient will have to decline. One estimate indicates that a four percent increase in the payroll tax today might still be insufficient to prevent the Social Security System from spending more per year than it receives in revenues late in the 21st century.\(^8\)

If benefits promised to the elderly are actually paid in the future, it is inevitable that federal government expenditures will grow faster than tax revenues. Excluding interest on the federal debt and expenditures for national defense, more than half of government spending is already allocated to programs that benefit the elderly, and projections indicate that by 2050 these expenditures will account for more than 70 percent of such federal spending. Future deficits will grow after the second half of the 21st century unless tax rates are increased or government expenditures are cut, especially expenditures on programs for the elderly. Reducing the generosity of the programs on average, while maintaining a floor on benefits to those with low incomes, is one alternative. Future deficits could absorb savings, raise interest rates, and cut private investments. The issue in the future may very well be: How much of a share of our GDP should we devote to the elderly?

What if nothing is done? The economic implications involving this approach could be devastating because tax rates on a workforce that is a smaller share of the population could soar, and interest rates could increase as government borrowing to cover growing deficits accelerates. The higher tax rates on a shrinking

\(^7\)See Lee and Skinner, p. 127.
\(^8\)See Lee and Skinner, p. 135.
workforce and higher interest rates would likely cause economic growth and real GDP per capita to fall as private investment and work effort are choked off. The situation will be even more dire in other developed nations where old-age dependency ratios will exceed those of the United States. Nations such as Spain, Italy, Germany, Japan, and China will face more severe fiscal pressure because of dependency ratios between 40 and 50 percent and because in some of these nations it has been traditional for workers to retire between the ages of 55 and 65. Unless some of these nations allow more immigration to permit the workforce to expand or convince the elderly to delay retirement, the fiscal consequences of aging of their populations and the impact on their economies could be catastrophic.

There is, therefore, some urgency that something be done within the next few years to halt the scenario of growing expenditures and federal deficits that could cripple the U.S. economy. In later chapters of this text, we will examine options to keep both Social Security pensions and Medicare from growing so rapidly as the U.S. population ages.

SUMMARY

Public finance is the field of economics that studies government activities and alternative means of financing government expenditures. Modern public finance emphasizes the relationships between citizens and governments. Government goods and services are supplied through political institutions, which employ rules and procedures that have evolved in different societies for arriving at collective choices. Increases in government goods and services require decreased private use of resources. Government goods and services are usually made available without charge for their use, and they are financed by compulsory payments (mainly taxes) levied on citizens and their activities. The distribution of the tax burden itself is determined through the political interaction of citizens.

In modern mixed economies, the size of the government sector ranges between one-quarter and one-half of gross domestic product. A major goal in the study of public finance is to analyze the economic role of government and the costs and benefits of allocating resources to government use as opposed to allowing private enterprise and households to use those resources.

LOOKING AHEAD

The following chapter develops a theoretical basis for understanding and evaluating resource allocation. We introduce the concept of efficiency that appears throughout this textbook. Students who wish to review the basic economic theory that serves as a foundation for much of this textbook will find the following appendix useful.

KEY CONCEPTS

Government Goods and Services
Government Purchases
Government Transfer Payments
Governments Mixed Economy
Nonmarket Rationing

Political Institutions
Private Goods and Services
Public Finance
Pure Market Economy
REVIEW QUESTIONS

1. List four government services and the benefits they provide to you and your family. Try to put a monetary value on these benefits by thinking about what you would be willing to give up to receive them if they were not available.

2. Make a rough estimate of how much you and your family pay in taxes each year. Compare this estimate with the value of services received from the government. Do you think government provides you with benefits that are worth what you give up in taxes?

3. How does the mechanism for distributing and rationing most government services differ from that for distributing goods through markets?

4. List some major political institutions and indicate how they translate desires into collective agreements.

5. What is a production-possibility curve? Show how such a curve can be used to explain how private goods and services must be sacrificed to obtain government goods and services.

6. What is the real cost of government expenditures? Think about your estimate of the taxes you pay and what you could have purchased with that money.

7. Discuss the trends in government expenditures and outlays as a percentage of GDP.

8. What are the characteristics of the U.S. economy that make it a “mixed economy” instead of a pure market economy?

9. What is the distinction between government purchases and transfer payments? What is the relative importance of these two types of expenditures in total government expenditures expressed as a percent of GDP? Why are some government purchases necessary to administer transfer payments by government?

10. List the major sources of tax revenue for the federal government. In what ways do the taxes used by state and local governments differ from those used by the federal government? What are other sources of government finance in addition to taxation?

11. What major characteristics will distinguish a transfer payment from a government service? The level of state and federal transfer payments increases during recessions. Why does this spending increase occur?

12. Why is Social Security expected to have financial difficulties in the coming decades? How might the program be changed to fix the future problem?

PROBLEMS

1. As productive resources and technological know-how increase, a nation’s production-possibility curve shifts outward. Use a production-possibility curve to show how resource growth and improvements in technology can allow a nation to increase its production of government goods and services while also increasing its output of private goods and services.

2. Suppose federal, state, and local governments in the United States were to engage in a massive campaign to deal with AIDS, drug abuse, and other health-related problems. The increase in government medical spending would require a massive tax increase. Assuming that resources and technology are fixed, use a production-possibility curve to show the cost of increased government health services.

3. Suppose governments increase spending for Social Security pensions. Explain why the increased government spending for pensions will not appreciably increase government purchases of productive resources or the products of business firms.

4. Explain why interest payments by the federal government would still be a large share of federal expenditures even if the federal government does not run a deficit again for several years.

5. As of 2009, many state governments were experiencing fiscal problems, and tax revenues were falling short of planned expenditures. What factors can influence state revenue collections and expenditures? Explain why state governments must cut spending or increase taxes when revenues fall short of expenditures. Give examples of the types of taxes used by state governments.

6. The proportion of the population over 65 has been increasing, and is expected to increase further. How does an aging population affect a state government’s expenditures? Which state programs are expected to cost more? How does an aging population affect a state government’s tax revenues? Which types of state taxes are likely to see revenue declines?
7. Opinions differ about the appropriate level of total government spending. State if you think that the total size of government (federal, state or local) should increase or decrease. Use figure 1.1 to show the direction of change that you prefer. If you think that the total size of government should increase, what program would you like to see increased? If instead, you would prefer a decrease, what program should be cut? What type of tax should correspond with this spending reduction?

ADDITIONAL READINGS

Buchanan, James M. Public Finance in Democratic Process. Chapel Hill: University of North Carolina Press, 1967. Provides a classic economic analysis of the processes through which individual choices are related to collective actions and government policy with respect to both expenditures and finance.


INTERNET RESOURCES

A wealth of current information on government spending and government programs is available on the Internet. In each of the chapters of this book, we will supply useful Internet addresses for obtaining data and information on government programs and taxation. Here are several Internet sources of information useful for research along with some hints for surfing these sites.

http://www.whitehouse.gov
The home pages of the president and vice-president of the United States provide information about the current administration’s policies as well as numerous links to government agencies. You can go to the Web sites of agencies in the Executive Office of the President, including the Council of Economic Advisers and the Office of Management and Budget. Links are provided to Web sites of all the president’s cabinet secretaries. This site can serve as an excellent first source when searching for information on government expenditures and finance and current federal government policies.

http://www.firstgov.gov
At this site you will find a “gateway to government” for citizens. There are interactive services for citizens and businesses at the site. There are also links to help find information about government programs, such as Social Security, laws and regulations, government publications, and federal statistics. There are also links to state and local government sites. This is a good first stop if you are looking for statistics on government and the economy.

http://www.senate.gov
This is the home page of the U.S. Senate. Click on Committees to obtain information about ongoing work and committee publications on the federal budget. The following committees provide useful information on government spending and taxation: Appropriations, Budget, Finance, The Joint Economic Committee, and The Joint Committee on Taxation.
http://www.house.gov
This is the home page of the U.S. House of Representatives. Click on Committees. A wealth of information on government spending programs can be obtained by accessing the “Green Book” of the Ways and Means Committee. This book can be searched to obtain details on all federal transfer and entitlement programs. Other useful committees to access include Appropriations and Budget.

http://www.stat-usa.gov
This is a service provided by the U.S. Department of Commerce for subscribers who pay a fee. Many colleges and universities subscribe to this service, and it might very well be on your school’s network Internet resource. Accessing this site provides up-to-date information on NIPA, which includes data on GDP, government spending, and government revenues. Also available are data on the current performance of the U.S. economy, including labor markets, inflation, and international trade reports.

http://www.state.xx.us
To find information about government spending and taxes in your home state, just replace the xx in the address above with your state’s postal abbreviation to access your state’s home page. Here you can examine your state’s budget and its tax system. For example, to access information about North Carolina, simply type: www.state.nc.us.

http://www.oecd.org
The OECD has 30 member nations. You can obtain information about taxation, government spending, and government programs as well as other economic statistics about the member nations (including the United States) at this site. This is a good place to obtain information on international comparisons among industrialized nations.
Appendix 1

TOOLS OF MICROECONOMIC ANALYSIS

This appendix briefly reviews the tools of microeconomic analysis that are used in this textbook. It outlines the uses of these tools and the insights they can provide. The theories are only briefly described. Students who desire a more intensive review and derivation of relationships should consult a textbook in microeconomic theory.

INDIFFERENCE CURVE ANALYSIS

*Indifference curve analysis* is a useful tool for understanding choices that people make regarding the purchase and use of goods and services. In this text, indifference curve analysis is also applied to understand choices to give up leisure time to obtain income through work, and to give up consumption today for more consumption in the future.

A combination of various goods and services available for consumption over a certain period, say a month, is called a *market basket*. In this text, the market baskets discussed are combinations of one particular good and the expenditures on all other goods. For example, in discussing a person’s monthly purchases of gasoline, the market baskets consist of a certain number of gallons per month and a certain amount of money to spend on all other goods and services.

Assumptions about Preferences

The basic assumptions underlying indifference curve analysis are as follows:

1. People can rank market baskets in terms of most desired and least desired. For any two market baskets, $A$ and $B$, the consumer must prefer $A$ to $B$, $B$ to $A$, or be indifferent between the two.
2. If basket $A$ is preferred to basket $B$ and basket $B$ is preferred to basket $C$, then basket $A$ also must be preferred to basket $C$. Similarly, if a person is indifferent between $A$ and $B$ and also between $B$ and $C$, the person also must be indifferent between $A$ and $C$. This is called *transitivity*.
3. People always prefer more of a good to less of it, all other things being equal.
4. The amount of money people will give up to obtain additional units of a given good per time period, while being made neither worse nor better off by the exchange, will decrease as more of the good is acquired. This is the
assumption of declining marginal rate of substitution of a particular good for expenditures on other goods. It is also called the principle of declining marginal benefit of a good.

Throughout this text, assume that these assumptions will hold.

Indifference Curves and Indifference Maps

An indifference curve is a graph of all combinations of market baskets among which a person is indifferent. All points on an indifference curve give the person the same level of satisfaction, or utility, per month. The preceding assumptions assure that the indifference curves between monthly consumption of a particular good, \( X \) (such as gasoline), and monthly expenditures on other goods will be downward sloping and convex to the origin. Figure 1A.1 graphs an indifference curve, labeled \( U \), for monthly consumption of gasoline and monthly expenditure on all other goods. The market basket corresponding to point \( B_1 \) on the graph has 40 gallons of gasoline per month and $60 expenditures on all other goods per month. Point \( B_2 \) must correspond to more gasoline but less expenditure on other goods if it is to be a point on the indifference curve \( U \). This has to follow from the assumption that people prefer more to less. If the market basket corresponding to \( B_2 \) had more gasoline and more expenditure on other goods than

![Figure 1A.1: Indifference Curves](image-url)

Indifference curves are downward sloping. Curves farther out from the origin correspond to higher levels of satisfaction for a person.
basket $B_1$, the people would be better off. This means that $B_2$ would be on an indifference curve, such as $U_2$, that corresponds to a higher level of satisfaction. The assumption that people prefer more of goods and services to less of them implies that indifference curves must slope downward.

The amount of expenditure on goods other than gasoline that a person will give up to obtain another unit of a good $X$, such as a gallon of gasoline, while not becoming better or worse off, is called the **marginal rate of substitution** of good $X$ for expenditure on other goods, or the **marginal benefit** of a good. It is equal to the slope of the indifference curve multiplied by 21. The assumption that the marginal benefit of a good declines implies that indifference curves become flatter as good $X$ (in this case, gasoline) is substituted for expenditure on other goods in the person’s market basket each month.

An **indifference map** is a way of describing a person’s preferences. It shows a group of indifference curves, as displayed in Figure 1A.1. Because indifference curves farther from the origin include market baskets with more of good $X$ and more expenditures on other goods than those closer to the origin, they correspond to more satisfaction. People prefer points on higher curves to those on lower curves. An indifference map describes a person’s preferences by indicating how a person would rank alternative market baskets of goods. Market baskets are ranked according to the level of satisfaction, or utility, that they provide the consumer.

**The Budget Constraint**

The **budget constraint** indicates the monthly market baskets that the person can afford, given monthly income and the prices of good $X$ and all other goods. Figure 1A.2 shows a person’s monthly budget constraint between gasoline and expenditures on other goods. Assume that the price of gasoline is $1 per gallon and that the person’s monthly income is $100. A market basket corresponding to 100 gallons of gasoline per month would exhaust the person’s monthly income, allowing no expenditures on other goods. This corresponds to point $B$ in Figure 1A.2. Similarly, if the person spent all available monthly income on goods other than gasoline, there would be no gasoline in the monthly market basket. This corresponds to point $A$ on the graph. The budget constraint is a straight line connecting these two points. Market baskets corresponding to points on or below the line are affordable. Those above the line, such as $C$, cannot be purchased with available monthly income. This equation of the budget line is

$$I = P_x Q_x + \sum P_i Q_i$$

(1A.1)

where $P_x$ is the price of good $X$ and $Q_x$ is its monthly consumption. The second term represents the sum of expenditure on goods other than gasoline. The market basket that corresponds to point $D$ in Figure 1A.2 is on the budget line. It represents 40 gallons of gasoline per month and $60 expenditures on other goods. The distance $OF$ on the vertical axis is expenditures on other goods corresponding to point $D$. The distance $AF$ represents the amount of the person’s total income given up to buy gasoline that month. This is $40 when the price of gasoline is $1 per gallon.
Consumer Equilibrium

The consumer is assumed to behave so as to obtain the most satisfaction (or utility) possible, given the budget constraint. The consumer substitutes expenditures on goods other than X for purchases of good X, up to the point at which the highest possible satisfaction is obtained. Because indifference curves are convex, this occurs at a point of tangency between the budget line and an indifference curve. In Figure 1A.3, the consumer equilibrium is represented by point E. The corresponding monthly consumption of gasoline is 60 gallons. The person therefore spends $40 on goods other than X each month when the price of gasoline is $1 per gallon.

The equilibrium condition is a tangency between the indifference curve and the budget line, implying that the slopes of these two curves are equal. The slope of the budget line is the extra dollars that must be surrendered to obtain each extra gallon of gasoline, which is the price of gasoline multiplied by −1. The slope of the indifference curve is the marginal rate of substitution of gasoline for expenditures on goods other than gasoline per month multiplied by −1. The marginal rate of substitution can be thought of as the marginal benefit of good X.

The equilibrium condition can be written as

\[-P_x = -MB_x\]

or

\[P_x = MB_x\] (1A.2)
The consumer purchases a good up to the point at which its price equals its marginal benefit.

Changes in Income and Prices

A change in income shifts the budget constraint line in or out parallel to itself without changing its slope. This is illustrated in Figure 1A.4. An increase in income shifts the budget line outward, expanding the number of affordable market baskets. Similarly, a decrease in income diminishes the number of affordable market baskets.

A change in the price of good X changes the slope of the budget line. As illustrated in Figure 1A.5, a decrease in the price of X swivels the budget line outward to a new intercept, $B'$, on the X axis. The budget line becomes flatter, reflecting the lower price of X. Similarly, an increase in the price of good X makes the budget line steeper as it rotates to point $B''$.

Income and Substitution Effects of Price Changes

Useful insights are often obtained by dividing the effect of the price change of a good on the amount purchased per month into two separate effects: income effect and substitution effect. The income effect is the change in the monthly (or other period) consumption of a good due to the variation in purchasing power.
of income caused by its price change. The substitution effect is the change in the monthly (or other period) consumption of the good due to the change in its price relative to other goods. This is the change that would be observed if the income effect of the price change were removed. Income and substitution effects can only

FIGURE 1A.4  Changes in Income

An increase in income shifts the budget constraint line out of parallel to itself. A decrease in income shifts it inward.

FIGURE 1A.5  Changes in the Price of Good X

Changes in the price of good X rotate the budget constraint line to a new intercept on the X axis.
rarely be observed separately. However, it is useful to show how a person’s well-being is affected by each of these effects.

Figure 1A.6 shows how the substitution effect can be isolated from the income effect. The person whose indifference curves are shown is initially in equilibrium at $E_1$. Consuming 60 gallons of gasoline per month and spending $40 per month on other goods, this person’s monthly income is $100. If the price of gasoline goes up to $2 per gallon as a result of a tax, the budget line would swivel inward. The consumer is now worse off, in a shift from point $E_1$ to point $E_2$. At $E_2$, monthly gasoline consumption falls to 40 gallons per month. The consumer spends $80 per month on gasoline at the higher price and uses $20 of the remaining income to buy other goods. Suppose the consumer were offered a monthly subsidy (say, by helpful parents) to help buy

![Figure 1A.6: Income and Substitution Effects](image)

The substitution effect could be observed if the consumer were given an increase in income to offset the decline in satisfaction caused by the price increase of gasoline.
gasoline after the price increase. If this monthly increase in income were sufficient enough to return the consumer to indifference curve $U_2$, where the level of satisfaction is the same as before the price increase, the substitution effect could be isolated.

In Figure 1A.6, a $50 monthly increase in income returns the consumer to the level of well-being represented by points on the indifference curve $U_2$. The consumer’s total monthly income would now be $150. The consumer then would be in equilibrium at point $E'$, consuming 45 gallons of gasoline per month at a price of $2 per gallon ($90 per month) and spending the remaining $60 income on other goods. The 15-gallon monthly decrease in gasoline consumption from the initial 60-gallon monthly consumption level is the substitution effect. The remainder of the decrease that would be observed in the absence of the monthly compensating variation in income is an additional 5 gallons per month. This is the income effect. These two effects are labeled separately in Figure 1A.6.

Income and substitution effects are often used in analyzing taxes. For example, taxes that do not affect relative prices but reduce income only have income effects. These taxes are used as benchmarks against which to compare the impact of taxes that have both income effects and substitution effects. The substitution effects stem from the distorting effects that taxes (such as the gasoline tax in this example) have on the relative price of goods and services.

The Law of Demand

For most goods, both the income effects and the substitution effects of price increases tend to decrease the consumption of a good. The opposite is true for price decreases. Goods for which the income effect of a price increase acts to decrease consumption (and for which price decreases have the opposite effect) are called normal goods. Throughout this text, the assumption is that all goods and services discussed are normal goods.

The inverse relationship between price and the quantity of a good purchased per time period is the law of demand, which holds that demand curves slope downward, other things being equal. Figure 1A.7 shows a demand curve for a good. Movements along that curve in response to price changes are called changes in quantity demanded. A shifting in or out of the curve is called a change in demand, which can be caused by changes in income, tastes, or the prices of substitutes or complements for the good.

The demand curve also gives information on the maximum price that a consumer will pay for a good. This maximum price represents the marginal benefit of the good to a consumer. Accordingly, the demand curve in Figure 1A.7 is also labeled MB. Points on demand curves throughout this text are interpreted as the marginal benefit (MB) of the corresponding quantity. Market demand curves are derived from individual demand curves simply by adding the quantities consumed by all purchasers at each possible price.
Price Elasticity of Demand

A useful measure of the responsiveness of quantity demanded to price changes is **price elasticity of demand**, which measures the percentage change in quantity demanded due to a given percentage change in price:

\[
E_D = \frac{\% \text{ Change in Quantity Demanded}}{\% \text{ Change in Price}} = \frac{\Delta Q_D}{Q_D} \frac{\Delta P}{P} \tag{1A.3}
\]

The price elasticity of demand is negative because an inverse relationship exists between price and quantity demanded. The numerator and denominator of Equation 1A.3 always will be of opposite sign. Demand is elastic with respect to price (relatively responsive) when its value is less than \(-1\). Demand is inelastic (relatively unresponsive) when its value is greater (that is, closer to zero) than \(-1\). Demand is said to be of unitary elasticity when its value is just equal to \(-1\).

**Consumer Surplus**

Market demand curves can be used to give an approximation of the benefits that consumers obtain from a good. This is found by simply adding up the marginal benefit of each unit consumed to obtain the total benefit of the total consumption per time period. Assuming that the scale of measurement is compact enough along the quantity axis of the market demand curve, this total benefit can be approximated by the area under the market demand curve. Throughout this text,
areas under market demand curves are used as measures of the benefits that consumers receive from a good. In Figure 1A.8, the total benefit of $Q_1$ units of gasoline consumed per month would be interpreted as the area $0ABQ_1$. This is a dollar approximation of the benefits that consumers obtain from the $Q_1$ units of monthly consumption.

In most cases, a measure of the **net benefit** that consumers obtain from a good is required. **Consumer surplus** is the total benefit of a given amount of a good less the value of money given up to obtain that monthly quantity. In Figure 1A.8, the amount of money that would have to be given up to purchase $Q_1$ units of gasoline per month, when its price is $P$ per gallon, is represented by the area $0PBQ_1$. Subtracting this from the total benefit of the gasoline gives the triangular area $PAB$, which measures the consumer surplus earned on $Q_1$ gallons per month.

**Using Indifference Curves to Explain the Allocation of Time**

If leisure is viewed as a good that persons can retain for their own use or supply to others as work, indifference curve analysis can be used to analyze the work-leisure choice. Of the 24 hours available each day, the more leisure hours a person consumes, the fewer hours there are available for paid work. Figure 1A.9 draws a person’s indifference curves for leisure hours per day and income per day.

The person’s opportunities to earn income by trading leisure hours to employers in a labor market depend on the wage rate. The income-leisure budget
constraint shows the opportunities to earn income by trading leisure in the market. If a person can earn \( w \) per hour, then the equation of this budget line is

\[
I = w(24 - L),
\]

where \( I \) is daily money income and \( L \) is leisure hours per day. Leisure is defined simply as using time for any activity other than work for pay. This equation is represented by the line \( AB \) in Figure 1A.9. For example, if the hourly wage is $5, a person who takes 16 hours per day as leisure will work 8 hours and earn a daily income of $40. This person is in equilibrium at point \( E \) in Figure 1A.9. The diagram assumes that the only way that the person can earn money income is by giving up leisure. The slope of the indifference curve is the marginal rate of substitution of leisure for income (\( MRS_{LI} \)) multiplied by \(-1\). The slope of the budget line in Figure 1A.9 is the wage multiplied by \(-1\). The equilibrium condition at point \( E \) is

\[
MRS_{LI} = w.
\]

In the text, applications of this analysis show how the equilibrium is affected by taxes and subsidies that affect wages and provide income independent of work.
ANALYSIS OF PRODUCTION AND COST

The amount of goods or services that can be produced depends on the physical resources employed and technical knowledge available. The production function is a way of describing the maximum output obtainable from any given combination of inputs, given technology. Inputs are the productive services of land, labor, capital (such as equipment, machines, and structures), and materials. Improvements in technology allow more output to be produced with any given combination of inputs.

Production is usually divided into two periods. The short run is that period of production when some inputs cannot be varied. The long run is the period when all inputs are variable.

The marginal product of an input is the change in the total output produced by that input when one more unit of the input is employed while all other inputs are held constant. The theory of production presumes that the marginal product of an input will eventually decline in the short run. This implies a limit to the extra output that can be produced in the short run when at least some inputs are fixed.

Isoquant Analysis

Isoquants are curves that show alternative combinations of variable inputs that can be used to produce a given amount of output. Figure 1A.10 shows an isoquant curve for combinations of capital services (measured in machine hours) and labor services (measured in labor hours) that can be used to produce $Q_i$ units of output.

![Figure 1A.10: Isoquant Analysis](image)

The monthly input combination corresponding to point $E$ represents the minimum cost method of producing a monthly output of $Q_i$ units.
per month. The curve is downward sloping. This is because reducing the amount of labor used decreases output unless more capital is used, provided that the marginal product of both inputs is positive. It is usually assumed that producers will never employ inputs in amounts for which the marginal products are negative.

The marginal rate of technical substitution of one input, capital, for another, labor (MRTS<sub>KL</sub>), is a measure of the amount of labor services that can be substituted for capital services without increasing or decreasing production. MRTS<sub>KL</sub> is the slope of the isoquant ∆L/∆K multiplied by −1. The marginal rates of substitution of capital for labor are presumed to decline along a given isoquant, because labor and capital tend to complement one another. Labor can only imperfectly accomplish the tasks of machines and vice versa. As labor is actually substituted for capital, it takes more and more labor hours to make up for each successive reduction in machine hours. The declining MRTS<sub>KL</sub> gives isoquants their convex shape.

It is assumed that producers seek to produce any given output at minimum cost. Isocost lines show combinations of variable input services per month that are of equal cost. Figure 1A.10 also shows a family of isocost lines. The equation of any given isocost line is

\[ C = P_L \cdot L + P_K \cdot K, \]  

(1A.6)

where \( L \) is labor hours used per month, \( K \) is machine hours used per month, \( P_L \) is the price per hour of labor, and \( P_K \) is the price per machine hour. \( C \) is the cost of the variable inputs, labor, and capital. Isocost lines farther from the origin correspond to higher cost. The slope of any isocost line is \(-P_K/P_L\).

Figure 1A.10 shows that the minimum cost combination of labor services and capital services (\( L^*, K^* \)) to produce \( Q_i \) units of output per month corresponds to point \( E \). At that point, the isoquant is tangent to an isocost line. Because the slope of the isoquant is \(-MRTS_{KL}\) and the slope of the isocost line is \(-P_K/P_L\), the condition for minimizing the cost of producing any given output can be written as

\[ MRTS_{KL} = P_K/P_L. \]  

(1A.7)

**Cost**

*Cost* is the monetary value of inputs used to produce goods and services. The opportunity cost of using inputs is their value in their next best use. Assuming that all producers generate any given output at the lowest possible cost, it is possible to derive a cost function from isoquants. A cost function gives the minimum cost of producing any given output, given current technology. Cost curves describe the way this minimum cost varies with the amount of output produced per year (or any other period). Producers are assumed to use the combination of variable inputs for producing any given output that satisfies Equation 1A.7. Cost curves can be derived for both the short run and the long run.

In the short run, the producer can be thought of as being confined to a productive plant or factory of fixed size that cannot easily be altered because of
leases and other fixed commitments. In the long run, all inputs can be varied, resulting in more flexibility in production and cost.

**Total cost** \((TC)\) is the value of all inputs used to produce a given output. In the short run, total cost can be divided into two components: **variable cost** \((VC)\), the cost of variable inputs such as labor, machines, and materials; and **fixed cost** \((FC)\), the cost of inputs that do not vary with output. Monthly rent for a one-year lease on a structure is an example of a fixed cost.

**Average cost** \((AC)\) is equal to total cost of production divided by the number of units produced. **Average variable cost** \((AVC)\) is variable cost divided by the number of units produced. The difference between average cost and average variable cost is the **average fixed cost** \((AFC)\) of output in the short run.

In the short run, average cost curves are assumed to be U-shaped, because the marginal product of variable inputs tends to decline in the short run. After a point, more and more variable inputs are required to produce more output when some inputs are fixed. This increases average variable cost (and therefore average cost) of production after a point. Given input prices, average cost tends to decline at first in the short run and then increase. Short-run average cost curves have the characteristic U-shape drawn in Figure 1A.11.

In deciding how much to produce in the short run, the firm’s operators need to estimate the marginal cost of production. This is the extra cost associated with producing one more unit of output. Marginal cost tends to rise at low levels of output and continues to rise as output is increased in the plant. The marginal cost curve always intersects the average cost curve at average cost’s minimum level. The marginal cost curve, as well as its relation to average costs, is also drawn in Figure 1A.11.

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**FIGURE 1A.11** Short-Run Cost Curves and Profit Maximization under Perfect Competition

The competitive firm maximizes profits in the short run by adjusting output to \(Q^*\), which corresponds to the point at which \(P = MC\). The portion of the marginal cost curve for which \(MC\) exceeds minimum possible average variable costs is the short-run supply curve under perfect competition.
In the long run, firms can build additional plants and expand their capability to produce in various ways not available in the short run. Average costs can vary in three ways, depending on the nature of the production function for a particular good in the long run, assuming that input prices are given. **Increasing returns to scale** exist when long-run average cost declines as output is expanded. **Constant returns to scale** occur when long-run average cost remains constant as the industry expands. **Decreasing returns to scale** mean that long-run average costs rise as the firm expands. The actual cost curve in the long run can reflect all three of these possibilities in sequence. In that case, it will be U-shaped like the short-run average cost curve.

**PROFIT MAXIMIZATION, COMPETITION, AND SUPPLY**

**Perfect Competition**

Economists usually assume that a firm seeks to maximize profits. The firm’s choice of output depends on the extent to which it can influence the price of its product by its own actions. When the firm is only one of many firms producing a small market share of a standardized product, the quality of which does not differ among firms, **perfect competition** is said to exist. A **competitive firm** is one that sells its output in a perfectly competitive market. The distinguishing feature of perfect competition is that no one firm alone in an industry can influence the selling price of its product in any way. The competitive firm is said to be a **price taker** because it takes the price of its product as given.

The competitive firm will maximize profits by producing that output for which price is equal to marginal cost:

\[ P = MC. \]  

(1A.8)

Think of the firm as sequentially increasing output and asking itself whether each increment in output adds or subtracts from profits. It will continue to expand output until the point at which producing another unit will decrease profits. The extra revenue that the firm gets from each extra unit of output is called the marginal revenue \( (MR) \). Under perfect competition, the firm cannot influence the price, so it follows that the marginal revenue of an extra unit of output is the price at which that output can be sold. This means that the firm can sell any amount of output at the going market price. From its point of view, the demand curve that it faces is a horizontal line, \( D = MR \), as shown in Figure 1A.11.

The firm will add to its profits as long as the price at which it sells one more unit exceeds the marginal cost of producing that unit. When price is exactly equal to marginal cost, the last unit produced will bring in as much revenue as the cost involved in producing it, and the net addition to profits will be zero. If the firm produces beyond that point, profits will decline because the marginal cost of producing that extra unit will exceed the marginal revenue it brings in.
It follows that firms maximize profits by producing that output for which price is equal to marginal cost of production.

**The Short-Run Supply Curve**

The marginal cost curve gives a relation between price and the quantity the firm will produce and supply in the short run. It represents the firm’s short-run supply curve when price exceeds minimum possible average variable costs \( (AVC_{\text{min}}) \) of production. When price is below average variable costs, the firm shuts down immediately, because when price \( (P) \) is less than minimum possible \( AVC \), the firm will lose more than its fixed costs by continuing to operate in the short run.

The entire market supply curve for a perfectly competitive industry is the sum of the amounts each firm in the industry will produce and offer for sale at all possible output. For any output, points on that supply curve represent the marginal cost to firms of producing that output.

**Producer Surplus**

Analogous to the concept of consumer surplus is that of producer surplus, which is the difference between the market price of an output or input and the minimum price necessary to induce suppliers to make it available for sale on the market. The market supply curve tells how much output or input would be offered for sale at alternative prices. In Figure 1A.11, producer surplus is the area \( PEF \), where \( F \) corresponds to minimum possible average variable cost \( (AVC_{\text{min}}) \). The minimum price at which any producer is willing to supply any given amount of output per month (or year) in a competitive market represents marginal cost. Producer surplus is the difference between price and marginal cost for each quantity. For the total quantity, \( Q^* \), the area represents the sum of producer surplus at each level of output.

**Long-Run Supply**

Perfect competition also requires free entry and exit into the industry. In the long run, firms can enter or leave an industry. The incentives they have to do so depend on the level of profits realizable in an industry. Normal profits represent the opportunity costs of resources of owner-supplied (nonpurchased) inputs invested in a firm. Normal profits are, in economic terms, part of a firm’s costs. Economic profits are those in excess of normal profits. When it is possible to earn economic profits in a competitive industry, new firms will enter. This will increase industry supply and reduce market price. Conversely, when economic profits are negative, firms will leave the industry because they will be unable to cover their opportunity costs (including the normal profit). This will decrease supply and increase the price of the product. The industry is said to be in long-run competitive equilibrium when economic profits are zero, so that no incentive exists for firms either to enter or leave.
Under perfect competition, a long-run industry supply curve is a relationship between price and quantity supplied for points at which the industry is in equilibrium. Points on such a curve correspond to outputs for which each firm in the industry is maximizing profits. Therefore, price must equal long-run marginal cost (LRMC). However, price must also equal long-run average cost (LRAC) at the point of equilibrium, because economic profits must be zero in long-run equilibrium. When $P = LRAC$, profit per unit is $P - LRAC = 0$, implying that economic profits, $(P - LRAC)/Q$, are zero. The normal profit is included in costs. If $P > LRAC$, new firms would enter the industry until the price fell to make economic profits zero. If $P < LRAC$, firms would incur losses and leave the industry until economic profits were zero.

Figure 1A.12 shows the equilibrium of a typical firm in a perfectly competitive industry when the industry is also in equilibrium. That firm is maximizing profits in the long run because $P = LRMC$. At the maximum profit output, economic profits are zero because $P = LRAC$. Also, at that output, $Q^*$, LRAC is at its minimum possible level, $LRAC_{\text{min}}$. Points on an industry supply curve satisfy the following conditions:

$$P = LRMC = LRAC_{\text{min}}.$$  \hfill (1A.9)

Long-run competitive supply curves can be upward sloping, horizontal, or even downward sloping, depending on how the prices of specialized inputs used by an industry change as a result of the industry’s expansion or contraction. If the prices of inputs used by the industry do not change as a direct result of expansion or contraction of the industry, then $LRAC_{\text{min}}$ for firms in the industry will be independent of the size of the industry. This is the case of a constant-costs industry. In other words, other things being equal, any deviation in price from

**FIGURE 1A.12** Long-Run Competitive Equilibrium

![Diagram of LRAC and LRMC curves](https://example.com/diagram.png)

In the long-run competitive equilibrium, $P = LRMC = LRAC$. Points on the long-run supply curve correspond to outputs at which firms in the industry earn zero economic profits.
the original $LRAC_{min}$ can be only temporary. Because input prices are independent of the number of firms in the industry, the $LRAC$ curves will not shift up or down as the industry expands or contracts. Price must always return to the original $LRAC_{min}$ in the long run. This implies that the long-run supply curve is a horizontal line, as shown in Figure 1A.13.

In an increasing-costs industry, prices of some specialized inputs increase as the industry expands and decrease as the industry contracts. This will occur if the firms buy a large portion of the total available supply of these specialized inputs. As the number of firms in the industry increases, the demands for these inputs increase substantially, causing their prices to rise. Consequently, as input prices rise, the $LRAC$ curve for all firms in the industry shifts up as the industry expands. This is because the height of the $LRAC$ curve for any given output depends on input prices and technology. An increase in input prices drives up the average cost of producing any given output; therefore, an increase in industry output in the long run results in an increase in $LRAC_{min}$. Price must increase in the long run to result in an increase in quantity supplied. If price did not increase, firms could not cover their opportunity costs of production at the higher input prices, and output would not increase.

An increasing-costs industry has an upward-sloping supply curve. For example, if the oil-refining industry purchased a large portion of the total available supply of the services of chemical engineers per year, the wages of the engineers

![Figure 1A.13](image)

**Figure 1A.13** Long-Run Supply: The Case of a Constant-Costs Competitive Industry

If input prices are independent of the size of an industry, the long-run supply curve is indefinitely elastic at a price corresponding to $LRAC_{min}$, which remains constant as the industry increases or decreases in size in the long run. The supply curve is infinitely elastic at $P = LRAC_{min}$ in the long run.
would rise when the industry expanded and fall as it contracted. This would imply that the oil-refining industry is one of increasing costs.

A third possibility is a decreasing-costs industry, in which input prices would decline as a direct result of the industry’s expansion. This is an extremely rare case. If it were to prevail, $LRAC_{min}$ would actually decline as industry output increased in the long run. This would imply that the long-run supply curve was actually downward sloping!

**Price Elasticity of Supply**

Price elasticity of supply is the percentage change in quantity supplied in response to any given percentage change in price:

$$E_s = \frac{\% \text{ Change in Quantity supplied}}{\% \text{ Change in Price}} = \frac{\Delta Q_s/Q_s}{\Delta P/P}$$  \hspace{1cm} (1A.10)

$E_s$ is elastic when greater than one in value and inelastic when less than one.

For an industry of constant costs, for which the long-run supply curve is horizontal, the price elasticity of supply is infinite. If the available amount of an input is fixed, as is the case of land, the price elasticity of supply is zero. A perfectly inelastic supply curve is a vertical line at the available quantity. Figure 1A.14 shows the case of a perfectly inelastic supply of a good.

*Figure 1A.14*  
A Perfectly Inelastic Supply Curve

If annual output is fixed and does not vary with market price, supply is perfectly inelastic.
# Learning Objectives

After reading this chapter, you should be able to:

- Discuss the difference between positive and normative economics.
- Define the efficiency criterion and show how the marginal conditions for efficiency can be used to identify the efficient output of a good or service.
- Explain how a system of perfectly competitive markets can achieve efficiency.
- Show how the exercise of monopoly power can prevent markets from achieving efficient levels of output.
- Demonstrate how taxes and subsidies affect incentives and how they can prevent competitive markets from achieving efficient outcomes.
- Use a utility-possibility curve to illustrate the trade-off between efficiency and equity.
Decades of central planning in the former Soviet republics and formerly communist nations of central and eastern Europe resulted in living standards that were, on average, well below those of industrialized nations in which private ownership of productive resources and free markets have prevailed. What is it about free and competitive markets that work to squeeze more out of productive resources than has been possible in centrally planned economies? Can we rely on markets to satisfy all the desires of individuals? When do markets fail to supply useful goods and services, and when does the profit motive, which is necessary to keep a market system going, result in undesirable side effects? To answer such questions, we must first develop some norms for evaluating resource use. We must then examine how well markets achieve results that satisfy the criteria we set up to evaluate resource use. After we evaluate free market performance, we can then discuss possible defects of markets and examine how these defects give rise to demands for government goods and services.

A useful starting point for analyzing government activities is the study of the role of markets in allocating resources. Markets facilitate exchanges of goods and services and inputs. Free exchange between buyers and sellers in unregulated, competitive markets often achieves outcomes that rate high in terms of the standards of economic performance used by many economists. However, markets cannot be relied upon to supply all useful goods and services, and sometimes market transactions have undesirable side effects, such as pollution. In those circumstances, government supply of goods and services through political institutions can result in net gains to citizens’ well-being.

In public finance, we study both the virtues and defects of the marketplace. In this chapter, we begin by defining the concept of efficiency. We then discuss conditions under which markets operate efficiently and examine some instances in which they fail to do so. We also show how government subsidies and taxes can distort resource allocation and cause losses in output and efficiency in markets.

In the next two chapters, we show how government programs can result in improvements in resource use and provide additional benefits to individuals that outweigh any additional costs.

POSITIVE AND NORMATIVE ECONOMICS

Positive economics is a scientific approach to analysis that establishes cause-and-effect relationships among economic variables. Positive theory attempts to be objective, making no presuppositions about what is good or bad or what should be accomplished. It merely formulates hypotheses of the “If ... then” variety that can be checked against facts. For example, a positive analysis of the impact of a proposal to widen a road can be used to predict how the road will benefit users by reducing the time and money costs involved in getting

between two locations. A positive analysis of the impact of a food subsidy to low-income persons can be utilized to estimate the effect of the subsidy on the price of food and the quantity available to the recipients. The predictions can then be checked against the facts to determine how well the positive theory has worked.

The normative approach is based on value judgments about what is desirable or what should be done to achieve the desired outcome. Normative theory begins with predetermined criteria and is used to prescribe policies that best achieve those criteria. Normative economics is designed to formulate recommendations as to what should be accomplished. Because it is based on underlying values, this approach, unlike the positive approach, is not objective. It can evaluate alternative policies and actions only on the basis of the underlying value judgments. If you were to disagree with the values on which a normative theory was based, the resulting prescription would be of little use to you. The normative approach used in public finance theory is based on value judgments embodying an individualistic ethic.²

Both the positive and the normative approaches are useful. In fact there is a certain dependence between the two approaches. Normative theory cannot make recommendations to achieve certain outcomes without an underlying theory of human behavior. If normative criteria are used to recommend that government authorities undertake a particular policy to increase the incomes of certain individuals, the impact of such actions on incentives to produce and consume must be predicted. Well-intentioned policies can have results opposite to those desired when no account is taken of their effects on economic incentives.

For example, suppose you support government-supplied housing with very heavily subsidized rents for poor families because you believe that such policies will enable them to enjoy better and larger apartments. If positive analysis can show that some persons might actually be induced to move into small, publicly provided housing units from larger apartments, you might reconsider your support of the public-housing program. Similarly, you might favor rent-control legislation to keep rents low enough so that the poor can afford to house their families. If, however, positive analysis predicts that such controls result in housing shortages and reductions in the quality of rental units available on the market, some poor families will be made worse off. If these predictions are borne out by the evidence, you might reconsider your support of rent control as a means of aiding the poor.

Positive theory by itself merely embodies techniques of analysis and so can benefit from the work of normative theorists by using normative guidelines to choose which areas of human interaction to analyze. Therefore, the normative approach is useful to the positive approach in that it defines relevant issues.

NORMATIVE EVALUATION OF RESOURCE USE: THE EFFICIENCY CRITERION

Efficiency is a normative criterion for evaluating the effects of resource use on the well-being of individuals. The efficiency criterion is satisfied when resources are used over any given period of time in such a way as to make it impossible to increase the well-being of any one person without reducing the well-being of any other person. Developed by the Italian economist Vilfredo Pareto (1848–1923), it is often referred to as the criterion of Pareto optimality. The criterion represents a precise definition of the concept of efficiency.

The word efficiency is part of everyone's vocabulary. To most, efficiency means producing a desired result with a minimum of effort or expense. Synonymous with this is the minimization of wasted effort—that which produces no useful result. The economist's criterion of efficiency is somewhat more precise than the standard dictionary definition. It does, however, embody the same idea.

Let's begin using the efficiency criterion. First, assume that the well-being of any individual increases with the amount of goods and services that he or she consumes per year. It is easy to show how avoiding waste in production will help achieve efficiency. Given available amounts of productive resources and the existing state of technical knowledge in an economy, elimination of wasted effort will allow more production from available resources. The extra production will make it possible for some persons to consume more without reducing the amounts consumed by others. As a result, it would be possible to make some individuals better off without harming anyone else by avoiding waste in production.

Another important aspect of efficiency is freedom to engage in mutually advantageous exchanges. If you are free to engage in transactions for gain, you can obtain more satisfaction out of your income. For example, suppose you have a collection of heavy-metal-rock compact discs you no longer enjoy. By exchanging those discs for a collection of classic rock-and-roll discs that you value more, you can become more content. If you find a person who really wants your heavy-metal-rock discs and has a set of classic rock-and-roll discs you highly value, then both you and your friend can gain by trading. Freedom to trade is an important aspect of efficiency. Both buyers and sellers can gain in markets when the value a buyer places on an item exceeds the cost the seller incurs by making it available for sale. Constraints that prevent resources being used and traded in such a way as to allow mutual gains will prevent achievement of efficiency. When efficiency is attained, mutual gains from reallocating resources in productive use or through further exchange of goods and services among individuals are no longer possible.

Many citizens argue that not all mutually gainful trades should be allowed. Such individuals demand that the powers of government be used to prevent exchanges they find morally objectionable. They argue that government should exercise paternalistic powers over the choices of its citizens. Thus, it is common to observe laws banning the sale of certain drugs, gambling services, prostitution, and other activities in which some persons might wish to engage but which others find morally objectionable.
The criterion of efficiency is based on an underlying value judgment that individuals should be allowed to pursue their self-interest as they see fit, provided that no one is harmed in the process. Those who wish to intervene to prevent others from pursuing their self-interests disagree with this underlying value judgment. The individualistic ethic underlying the efficiency criterion, therefore, is not acceptable to all persons.

**Marginal Conditions for Efficiency**

The conditions required for the efficient output of a particular good over a period of time can be derived easily. Analysis of the benefits and costs of making additional amounts of a good available is required to determine whether the existing allocation of resources to its production is efficient. Any given quantity of an economic good available, say per month, will provide a certain amount of satisfaction to those who consume it. This is the total social benefit of the monthly quantity. The marginal social benefit of a good is the extra benefit obtained by making one more unit of that good available per month (or over any other period). The marginal social benefit can be measured as the maximum amount of money given up by people to obtain the extra unit of the good. For example, if the marginal social benefit of bread is $2 per loaf, some consumers would give up $2 worth of expenditure on other goods to obtain that loaf and be neither worse nor better off by doing so. If these consumers could obtain the bread for less than $2 per loaf, they would be made better off. The marginal social benefit of a good is assumed to decline as more of that good is made available each month.

The total social cost of a good is the value of all resources necessary to make a given amount of the good available per month. The marginal social cost of a good is the minimum sum of money required to compensate the owners of inputs used in producing the good for making an extra unit of the good available. In computing marginal social costs, it is assumed that output is produced at minimum possible cost, given available technology. If the marginal social cost of bread is $1 per loaf, this is the minimum dollar amount necessary to compensate input owners for the use of their inputs without making them worse off. If they were to receive more than $1 per loaf, they would be made better off. If they were to receive less than $1 per loaf, they would be made worse off by making that extra unit available. The following analysis assumes that the marginal social cost of making more bread available per month does not decrease as the monthly output of bread is increased.

Figure 2.1A graphs the marginal social benefit (MSB) and marginal social cost (MSC) of making various quantities of bread available per month in a nation. Figure 2.1B shows the total social benefit (TSB) and the total social cost (TSC) of producing the bread. The marginal social benefit is $\Delta TSB/\Delta Q$, where $\Delta TSB$ is the change in the social benefit of the good and $\Delta Q$ is a one-unit increase in the output of bread per month. The marginal social benefit is measured by the slope of the total social benefit curve at any point. Similarly, the marginal social cost, $\Delta TSC/\Delta Q$, is measured by the slope of the total social cost curve at any point.
The efficient output of bread can be determined by comparing its marginal social benefit and marginal social cost at various levels of monthly output. Look at the output corresponding to $Q_1 = 10,000$ loaves of bread per month in Figure 2.1A. This monthly output level is inefficient because the marginal social benefit of bread exceeds its marginal social cost. The maximum amount of money consumers would be willing to pay for the last loaf of bread is $P^* = 1.50$. Extension of monthly output to the level corresponding to equality of $TSB$ and $TSC$ would involve losses in net benefits. Similarly, output levels $Q_1$ and $Q_2$ are inefficient.

The efficient level of output, $Q^*$, occurs at point $E$. At that monthly output, $MSB = MSC$. The monthly output $Q^*$ maximizes the difference between $TSB$ and $TSC$, as shown in B. Extension of monthly output to the level corresponding to equality of $TSB$ and $TSC$ would involve losses in net benefits. Similarly, output levels $Q_1$ and $Q_2$ are inefficient.

The efficient output of bread can be determined by comparing its marginal social benefit and marginal social cost at various levels of monthly output. Look at the output corresponding to $Q_1 = 10,000$ loaves of bread per month in Figure 2.1A. This monthly output level is inefficient because the marginal social benefit of bread exceeds its marginal social cost. The maximum amount of money consumers would be willing to pay for the last loaf of bread is $P^* = 1.50$.
give up to obtain an additional loaf of bread exceeds the minimum amount of money necessary to make input owners, whose resources are used to produce bread, no worse off.

For example, suppose that at $Q_1$ the $MSB = $2 while $MSC = $1. The consumer who gives up $2 for the bread is no worse off because the marginal benefit is $2. If the input owners making the bread available were to receive $2 from each buyer, they would be made better off because $2 exceeds the minimum amount they require in compensation for the use of their inputs to produce that bread. This demonstrates that the monthly output of 10,000 loaves is inefficient, because suppliers of bread can be made better off without harming any consumer by making more bread available.

Similarly, the consumer who obtains the loaf of bread for $1 when 10,000 loaves per month are available is better off, because that is less than the maximum amount the consumer would be willing to sacrifice for the bread. If suppliers of bread were to receive $1 for that loaf, they would be no worse off because their marginal costs would be covered. Therefore, at least one buyer can be made better off without making the suppliers of bread worse off when the marginal social benefit exceeds the marginal social cost.

The marginal net benefit of a good is the difference between its marginal social benefit and its marginal social cost. When marginal net benefits are positive, additional gains from allocating more resources to the production of a good are possible.

Whenever the marginal social benefit of a good exceeds its marginal social cost, it will be possible to make at least one person better off without harming another by producing more of the good. Net gains from allocating resources to additional production of the good continue just up to the point at which the marginal social benefit of the good falls to equal its marginal social cost. If additional resources were allocated to produce more of the good per month beyond that point, marginal social costs would exceed marginal social benefits. The marginal net benefit of such additional resource use would be negative. In other words, if output were increased beyond the $Q^* = 15,000$ loaves of bread per month, consumers would be unwilling to sacrifice enough to compensate input owners for all the costs involved in making the extra units of bread available. The result is that consumers cannot be made better off without harming producers when more than $Q^*$ units of output are produced per month.

The marginal conditions for efficient resource allocation require that resources be allocated to the production of each good over each period so that

\[ MSB = MSC. \]  

In Figure 2.1A, the efficient output corresponds to the point at which the $MSB$ and $MSC$ curves intersect. This efficient output is $Q^* = 15,000$ loaves of bread per month. If $MSB > MSC$, additional net gains from allocating more resources to monthly production of the good will be possible. The extra net gains possible from increasing output from $Q_1$ to $Q^*$ are represented by the area $ABE$. When $MSC > MSB$, at least one person can be made better off without harming anyone else by reducing monthly output. The output $Q_2 = 20,000$ loaves per month
is inefficient. The additional net gains that would be possible by reducing output from $Q_2$ to $Q^*$ loaves per month is the area of the triangle $CED$.

At the monthly output $Q^*$ at which $MSB = MSC$, the total net satisfaction (benefits less costs) from using resources to produce the item is maximized. As shown in Figure 2.1B, at monthly output $Q^*$, the slope of the $TSC$ curve equals the slope of the $TSB$ curve. At the output $Q^*$, the difference between the two curves in Figure 2.1B is at a maximum. This difference represents $TSB - TSC$ per month; that is, the surplus of the total social benefit of the good over its total social cost. This is the net total monthly benefit of the good. Producing more of the good each month until $TSB$ equals $TSC$ (at point $Z$ in Figure 2.1B) would decrease the total net monthly satisfaction. This is because the monthly difference between total social benefits and total social costs declines as more than $Q^*$ units per month are produced. At the point where $TSB = TSC$, the total net benefit of the good is actually zero!

Maximizing the total social benefit of a good would require that monthly production and sales be extended indefinitely. This follows from the assumption that more of a good per month always makes persons better off. The efficiency criterion considers both the total social cost and the total social benefit of a good. It strikes a balance between the two by recommending maximization of the difference between total social benefit and total social cost.

**CHECKPOINT**

1. Under what circumstances will a resource allocation be efficient?
2. What are the marginal conditions for efficiency?
3. If the efficient output of mystery books is currently being produced, what is the marginal net benefit of mystery books?

**MARKETS, PRICES, AND EFFICIENCY CONDITIONS**

Now let’s examine the workings of a system of perfectly competitive markets. An efficient economic system allocates resources so as to set the marginal social benefit of each good or service equal to its marginal social cost. Markets are organized for the purpose of allowing mutually gainful trades between buyers and sellers. A system of perfectly competitive markets can result in efficient resource use in an economy. A *perfectly competitive market system* exists if

1. All productive resources are privately owned.
2. All transactions take place in markets, and in each separate market many competing sellers offer a standardized product to many competing buyers.
3. Economic power is dispersed in the sense that no buyers or sellers alone can influence prices.
4. All relevant information is freely available to buyers and sellers.
5. Resources are mobile and may be freely employed in any enterprise.

Assume that both buyers and sellers seek to maximize their gains from trading in such a system. Accordingly, buyers maximize the satisfaction they obtain from exchanging their money for goods and services in markets and sellers maximize the profits they earn from making goods and services available to consumers.

The market prices that emerge reflect the free interplay of supply and demand. Neither businesses nor buyers can control prices; they can only react to them. When deciding how much of a good to purchase, buyers consider their own marginal private benefit (MPB), which is the dollar value placed on additional units of the good by individual consumers. When confronted with market prices, consumers trade until they adjust the marginal private benefit received from consuming a good per month to what they must forgo to purchase one more unit of the good per month. What they forgo is measured by the price of one more unit; that is, the amount of money they give up that could have been spent on other items. If the value of the money they give up (the price) exceeds the marginal private benefit of that last unit, they would be made worse off by trading those dollars for the good. Therefore, they maximize their gains from trading by adjusting the amount of any good they consume per month (or any other period of time) until the marginal private benefit, \(MPB\), received is just equal to the price, \(P\):

\[
P = MPB = MSB.\tag{2.2}
\]

The marginal private benefit received by consumers purchasing the good is also equal to the marginal social benefit of the good, provided that no one except the buyer receives any satisfaction when the good is consumed.

Producers maximize their gains from trading each month when they maximize profits. When it is no longer possible to add any gain by selling one more unit, profits are maximized. The firm will increase profits whenever the revenue obtained from selling an additional unit exceeds the cost of producing and selling that extra unit. The marginal private cost (MPC) of output is the cost incurred by sellers to make an additional unit of output available for sale. The extra revenue obtained from selling one more unit is its price, assuming that the firm can sell as much as it likes at the going market price. The firm will maximize profits when it adjusts its output sold per month (or any other time period) to the point at which price is equal to the marginal private cost of output. If marginal private cost exceeds price, the gains from trade (profit) would decline. It follows that producers maximize gains from trade at the point for which

\[
P = MPC = MSC.\tag{2.3}
\]

The marginal private cost of output incurred by sellers is the marginal social cost, provided that opportunity cost of all resources used in making the product available is included in the sellers’ total costs.
Combining Equations 2.2 and 2.3 into one equation gives the following result:

\[ P = MPB_i = MPC = MSB = MSC, \]  

(2.4)

where \( MPB_i \) is the marginal private benefit received by any given consumer.

A perfectly competitive market, in which both buyers and sellers maximize their net gains from trade, will result in a level of output for which marginal private benefit equals marginal private cost. If consumers are the only recipients of benefits when a good is sold, and sellers bear all the cost of making that good available, Equation 2.4 implies that \( MSB = MSC \) for the good. The market equilibrium will achieve the efficient output. If this condition is met in all markets and all goods are tradable in markets, the overall allocation of resources in the economy will satisfy the efficiency criterion. When the prices of all goods and services equal the marginal social benefits and marginal social costs of these items, the market system achieves an efficient outcome.

Returning to Figure 2.1A, the \( MSB \) curve is the market demand curve. It corresponds to the maximum price that would be offered for various quantities of bread available per month. Under perfect competition, the \( MSC \) curve is the market supply curve. It represents the minimum price that sellers will accept to make any given monthly quantity of bread available. The market equilibrium is at point \( E \). At that point, the price of a loaf of bread is \( P^* = $1.50 \) and the quantity sold is \( Q^* = 15,000 \) loaves per month. \( P^* \) is the efficient price because it reflects both the marginal social benefit and the marginal social cost of the good. This equilibrium output, \( Q^* \), is efficient because at monthly output

\[ P^* = $1.50 = MPB_i = MSB = MSC. \]  

(2.5)

A system of competitive markets achieves an efficient allocation of resources when Equation 2.4 is satisfied in each market and all goods and services are sold in markets.

When Does Market Interaction Fail to Achieve Efficiency?

It is not surprising that markets operating under conditions of perfect competition produce efficient outcomes. After all, competitive markets are economic institutions that have evolved to allow maximum gains from the exchange of goods and services, and that is what efficiency is all about.

In the study of government, it is more interesting to discuss the conditions under which markets and prices fail to result in the efficient outputs of goods and services. The possibility that political interaction might allow further net benefits to be squeezed from available resources then can be explored. However, political action will not always result in net benefits. Government activity itself can cause inefficiency. For example, the taxes necessary to finance government programs can, as you will soon see, impair the ability of markets to achieve efficiency. The marginal social benefits of a government program must exceed its marginal social costs to result in net benefits.
The basic problem that causes inefficiency in competitive markets is that prices do not always fully reflect the marginal social benefits or marginal social costs of output. This often occurs because of the nature of certain goods, which makes them difficult to package and trade easily in markets. For example, the services of such environmental resources as air and water are often used for disposal of wastes without adequate consideration of the benefits these resources have in alternative uses. This happens because rights to the use of environmental resources are in dispute. Because no one owns these environmental resources, market exchange of the ownership right to use these resources is unlikely. This means that sellers using environmental resources to make goods available do not pay for the right to use those resources. This leads to situations in which the marginal private cost of output incurred falls short of the marginal social cost.

Similarly, for services with collective or shared benefits, it might be difficult to package the benefit flowing from output into units that can be sold to individuals. When packaging into salable units is difficult, so is pricing. A means other than markets must be found to make the social benefits of these goods available. The failure of markets to price and make available certain goods, such as national defense and environmental protection, gives rise to demands for government production and regulation.

**Monopolistic Power**

Markets will also fail to result in efficient levels of output when monopolistic power is exercised. A firm exercises monopolistic power when it influences the price of the product it sells by reducing output to a level at which the price it sets exceeds marginal cost of production. A monopolist maximizes profits at a level of output per month (or year) at which marginal revenue \( MR \) equals its marginal private cost. This is illustrated in Figure 2.2.

The demand curve for the monopolist’s product reflects the marginal social benefit of possible levels of output. Assume that the monopolist’s marginal private costs reflect the value of all inputs used to produce additional output and therefore reflect marginal social costs. The monopoly firm will produce output \( Q_M \) per month. This is the monthly output corresponding to point \( A \), at which \( MR = MSC \). When that much output is available per month, its price will be \( P_M \). This is the marginal social benefit of that monthly output, \( MSB_M \). Because a monopolist’s marginal revenue is less than the price of the product, marginal social cost of production also will be less than the price. Thus, at a monthly output level of \( Q_M \), \( P = MSB > MSC \), as shown in Figure 2.2. Efficiency is not attained because \( MSB > MSC \) at \( Q_M \).

Efficiency could be attained by forcing the monopolist to increase output until prices fell to a level equal to marginal social cost. The additional net benefits possible from increasing output from \( Q_M \) to \( Q^* \) units per month are shown by the triangular area \( ABE \) in Figure 2.2. This represents the extra social benefits over the extra social costs involved in increasing monthly output up to the point at which \( MSB = MSC \). Government intervention in the market to increase output would be prescribed by normative economists seeking to attain efficiency.
How Taxes Can Cause Losses in Efficiency in Competitive Markets

In Chapter 1, we discussed how taxes are used to reallocate resources from private to government use. Now that we know the marginal conditions for efficiency, we can begin to show how taxes impair the ability of competitive markets to achieve efficient outcomes.

When a product or a service is taxed, the amount that is traded is influenced by the tax paid per unit, as well as by the marginal social benefit and marginal social cost of the item. The tax *distorts* the decisions of market participants. For example, income taxes influence the decision workers make about the allocation of their time between work and leisure. Workers consider not only the amount of extra income they can get from more work, but also the extra taxes they must pay on that income when deciding how many hours per week or year to devote to work. When you work more hours, you receive less than the gross amount of wages paid to you. In deciding whether to work more when you have the opportunity to do so, you weigh the extra income *after taxes* against the value of the

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*FIGURE 2.2* Loss in Net Benefits Due to Monopolistic Power

The monopolistic firm maximizes profits by producing $Q_M$ units per month. At that output level, the marginal social benefit of the good exceeds its marginal social cost. Additional net benefits equal to the area $ABE$ are possible if output were increased to $Q^*$ units per month.
leisure time you give up. Taxes influence your decision to work by reducing the net gain from working.

A simple example shows how a tax can prevent a competitive market from achieving the efficient output. Suppose that the market for long-distance telephone service is perfectly competitive. Figure 2.3 shows the demand and supply curves for long-distance telephone service. We assume that points on the demand curve reflect the marginal social benefit of any given number of message units and points on the supply curve reflect the marginal social cost of the service. The equilibrium output in the market, corresponding to point $E$, is 4 billion message units per month and the equilibrium price is 5 cents per message unit. The market output is efficient because it corresponds to the point at which the marginal social cost of long-distance telephone service is equal to its marginal social benefit.

Now suppose the government levies a 2-cent-per-message unit tax on sellers of long-distance services. Sellers must now consider the fact that each time they supply a message unit, they must not only cover the marginal social cost of that unit, but also the 2-cent tax. The effect of the tax is to decrease the supply of the service, as the price required by producers to expand service by one unit must decrease from 5 to 6 cents. There is a loss in net benefits from telephone service because the marginal social cost of the new equilibrium output (corresponding to point $E'$) is less than its marginal social benefit. The loss in net benefits is represented by the triangular area $E'EB$. The tax costs more than the $0.06 billion in revenue collected when the loss in net benefits is added to the amount of revenue collected.
equal the sum of the marginal private cost of the service and the tax per unit of service, \( T \). In Figure 2.3, points on the new supply curve after the tax is imposed correspond to \( MPC + T \) for any given quantity.

As a result of the tax-induced decrease in supply, the point of equilibrium now corresponds to \( E' \). At that point, the price of telephone services has increased to 6 cents per message unit and the equilibrium output has fallen to 3 billion units per month.

It is now easy to show how the tax has prevented the market from achieving efficiency and resulted in a loss in net benefits from telephone service. At an output level of 3 billion message units per month, the marginal social benefit of the service is 6 cents per message unit. However, the marginal social cost of that output is only 4 cents! As a result of the change in behavior caused by the tax, the marginal social benefit of telephone service now exceeds its marginal social cost. The loss in net benefits from telephone service is equal to the shaded area \( EEB \) in Figure 2.3. The government will collect a total of $0.06 billion per month in tax revenue, which is equal to the 2-cent-per-unit tax multiplied by the 3 billion message units sold per month after the tax is imposed. The cost of the tax is not only the $0.06 billion per month paid by taxpayers. In addition, there is the loss in net benefits, called the excess burden of the tax, equal to the area \( EE'B \) from telephone service that results from the distortion in the choices after the tax is imposed.

When evaluating the marginal cost of a new government program, we must add any loss in net benefits from distortions in market behavior to the dollar amount of additional tax revenue required to finance the program. Government spending programs can provide net benefits to citizens in the aggregate only when the marginal social benefits of additional spending exceed both the tax revenue collected and the dollar value of the loss in efficiency (the excess burden) in markets that occurs as a result of the distortions in choices caused by the tax.

**How Government Subsidies Can Cause Losses in Efficiency**

Governments often subsidize private enterprises or operate their own enterprises at a loss, using taxpayer funds to make up the difference. Taxes can impair market efficiency, and so can subsidies. Let’s examine the effects of agricultural subsidies and the operation of agricultural markets. Suppose the government guarantees farmers a certain price for their crops. When the market price falls below the “target” price guaranteed by the government, the government will pay eligible farmers a subsidy equal to the difference between the market price of the product and the target price.

Figure 2.4 illustrates how the target price program works and how it results in more than the efficient output of the subsidized grains when the target price is above the market equilibrium price. The graph shows the supply and demand curves for wheat in a competitive market for this product. We assume that the points on the demand curve reflect the marginal social benefit of any given quantity. Similarly, points on the supply curve reflect the marginal social cost of any given quantity. In the absence of any government subsidies, suppose that the
The equilibrium price of wheat is $4 per bushel. At that price, farmers produce \( Q^* \) bushels of wheat per year because that is the level of output at which price equals their marginal cost. This would be the efficient output level because it corresponds to the point \( E \) at which the marginal social benefit of wheat equals its marginal social cost.

Now let's see how the availability of the subsidy will affect farmers' decisions. Farmers know that they will receive a minimum of $5 per bushel of wheat. In deciding how much to plant, they will base their decision on the target price rather than the market price when they believe that the target price will exceed the market price. In Figure 2.4, they will produce \( Q_s \) bushels of wheat per year because that quantity corresponds to point \( A \) on the supply curve for wheat, where the marginal cost of wheat is equal to $5. The output level \( Q_s \) is greater than the efficient amount because the marginal social cost of wheat exceeds its marginal social benefit at point \( A \). As a result of the target price program, more than the efficient amount of resources are devoted to the production of wheat. Therefore, the loss in net benefits from resource use is equal to the area \( EAC \) in the graph. In addition to this loss in net benefits that results from the subsidy-induced distortion in resource use, the target price program costs the government $2 per bushel of wheat multiplied by the \( Q_s \) bushels of wheat produced per year. The overproduction of wheat relative to the efficient level that results from the
program depresses the market price of wheat to $3 per bushel, corresponding to point C on the demand curve for wheat. The overproduction of wheat makes it seem cheaper than it would be without any subsidies. In fact, consumers end up paying only $3 per bushel of wheat, while the marginal cost of producing that wheat is $5. The $2 difference between the marginal cost to producers and the price to consumers is paid by the government.

CHECKPOINT

1. Explain how a system of perfectly competitive markets can achieve efficiency.
2. How does the exercise of monopolistic power prevent efficiency from being attained?
3. Describe how taxes can affect incentives and cause losses in net benefits.

MARKET FAILURE: A PREVIEW OF THE BASIS FOR GOVERNMENT ACTIVITY

We cannot rely on markets to provide all goods in efficient amounts. Market failure to make goods and services available in cases for which the marginal social benefits of the goods outweigh the marginal social costs of those goods or services often results in demands for government action. The following forms of market failure to achieve efficient outcomes are commonly used as a basis for recommending government intervention in markets or government provision of services:

1. **Exercise of Monopoly Power in Markets.** When markets are dominated by only a few firms or by a single firm, the potential exists for the exercise of monopoly power. Firms exercising monopoly power can add to their profits by adjusting prices to the point at which marginal revenue equals their marginal private costs without fear of new entrants into the market. To prevent monopoly control over price, governments typically monitor markets to ensure that barriers to entry do not encourage the exercise of monopoly power. Governments also often regulate the pricing policies of monopoly producers of such services as electric power, natural gas, and water.

2. **Effects of Market Transactions on Third Parties Other Than Buyers and Sellers.** When market transactions result in damaging or beneficial effects on third parties who do not participate in the decision, the result will be inefficiency. When the effects are negative, people demand government policies to reduce the damaging or beneficial effects of market transactions on third parties who do not participate in such decisions. For example, exhaust fumes from cars, trucks, buses, heating systems, factories, and power plants decrease air quality and impair public health. In the following chapter, the
third-party effects resulting from market transactions are discussed, and
government policies to deal with these problems are considered. When the
effects are beneficial, government policies are often used to encourage pro-
duction of the item benefiting third parties. This is often the case for educa-
tion, fire protection, and inoculations for contagious diseases.

3. **Lack of a Market for a Good with a Marginal Social Benefit That Exceeds Its Marginal Social Cost.** In many cases, useful goods and services cannot be pro-
vided efficiently through markets because it is impossible or difficult to sell the
good by the unit. Benefits of such goods can be shared only. These goods are
called “public” goods to distinguish them from private goods, which are con-
sumed by individuals and whose benefits are not shared with others who do
not make the purchase. A distinguishing characteristic of public goods is that a
given quantity of such goods can be enjoyed by additional consumers at no
reduction in benefits to existing consumers. National defense is an example
of a public good having this property. Increases in U.S. population occur daily,
and the additional population can be defended without any reduction in ben-
efits to the existing population. Another characteristic of public goods is that
their benefits cannot be easily withheld from people who choose not to con-
tribute to their finance. Even if you refuse to pay the costs of national defense,
you still will be defended. This means that firms selling public goods, like na-
tional defense, will have great difficulty collecting revenue necessary to finance
costs to produce such goods. Chapter 4 discusses the characteristics of public
goods in detail and explains why it is likely that such goods will be supplied in
less than efficient amounts if markets are used to make them available.

In many cases, government provision of goods is justified because of a con-
viction that the marginal social benefit of the good exceeds the marginal so-
cial cost at quantities that would result if the good were supplied through
markets. For example, government provision of health insurance, deposit in-
surance, and flood insurance are common because many persons believe that
these are useful services that cannot be provided profitably in efficient
amounts by profit-maximizing firms selling in competitive markets. Simi-
larly, direct payments or subsidized loans to students attending institutions
of higher education are often justified by arguing that government should
encourage education because the marginal social benefits of its consumption
exceed the marginal private benefits received by individual students.

4. **Incomplete Information.** We often demand that government intervene in
markets because we have incomplete information about the risks of purchas-
ing certain products or working in certain occupations. For example, we rely
on government to test new drugs and to prevent hazardous products from
being sold. We also rely on government to establish standards for safety in
the workplace.

5. **Economic Stabilization.** Market imperfections, such as downwardly rigid
wages, give rise to excessive unemployment in response to decreases in ag-
gregate demand. Governments engage in monetary and fiscal policies in an
effort to stabilize the economy to correct for these market failures to ensure
full employment. Governments also seek to avoid excessive and erratic inflation that can erode purchasing power and can impair the functioning of financial markets. Although the stabilization activities of government do not absorb significant amounts of economic resources, they do represent an important complement to the efficient functioning of markets. Economic stabilization programs are not discussed in this text. Modern public finance concentrates on the microeconomic aspects of government activity and finance rather than the macroeconomic aspects.

EQUITY VERSUS EFFICIENCY

Efficiency is not the only criterion used to evaluate resource allocation. Many citizens argue that outcomes should also be evaluated in terms of equity; that is, in terms of the perceived fairness of an outcome. The problem involved with applying criteria of equity is that persons differ in their ideas about fairness.

Economists usually confine their analyses of questions of equity to determinations of the impact of alternative policies on the distribution of well-being among citizens. For example, many people are concerned about the impact of government policies on such groups as the poor, the aged, or children. Positive economic analysis of the outcomes of market and political interaction is useful in providing information about the effects of policies on income distribution. In the field of public finance, analysts usually try to determine the effects of government actions on both resource allocation and the distribution of well-being, thus providing useful information that citizens can use to judge the equity of alternative policies in terms of their own notions of fairness.

The Trade-off between Efficiency and Equity: A Graphic Analysis

The trade-off between improvements in efficiency and changes in the distribution of welfare can be illustrated with a utility-possibility curve. This curve presents the maximum attainable level of well-being (or utility) for any one individual, given the utility level of other individuals in the economy, their tastes, resource availability, and technology. Figure 2.5 gives all the efficient combinations of well-being between two individuals, A and B, per year.

If, for example, resources are allocated in such a way that the distribution of well-being between A and B is given at point $E_2$, then $E_1$ is efficient because, at that point, it is impossible to increase either A’s or B’s utility without reducing the other’s. Similarly, $E_2$ is also an efficient point. Points $E_1$ and $E_2$ differ in the distribution of well-being between A and B over a given period, such as a year. Both, however, are efficient. Points above the utility frontier, such as Z, are

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unattainable. Given available resources and technology, the economy is simply incapable of producing enough goods and services to achieve the combinations of well-being represented by points outside the frontier. Points within the frontier are inefficient in the sense that it is possible to reallocate resources to improve one person’s well-being without decreasing another’s.

At point X there would be incentives for either A or B to increase their individual utility by attempting to change resource allocation so as to arrive at some point on the section of the frontier \( E_1E_2 \). Whichever one makes the attempt, the other will not oppose it because that person would not be made worse off as a result of the change. The only reason a move from X to a point on \( E_1E_2 \) might be opposed would be if one individual were ill-informed about the impact of such a move.

Suppose, however, that B wants to move to point \( E_3 \). This will be opposed by A because that move would reduce A’s well-being. A move from an inefficient resource allocation, such as that represented by point X, to an efficient one, represented by \( E_3 \), results in losses to certain groups. The movement from X to \( E_3 \) will make B better off at the expense of making A worse off.

Improvements in efficiency represented by the movement from point X to point \( E_3 \) are vigorously opposed. Often the losing groups are effectively organized and work tirelessly through political institutions to block the change. It is no surprise that the policy recommendations of many normative economists for elimination of minimum-wage laws and international trade restrictions, on
grounds that such elimination would improve efficiency, are continuously defeated in the political arena. These restrictions provide significant benefits to certain groups that prefer to resist losses in income. To understand why inefficient government policies and functions persist, it is necessary to investigate the opportunities that exist for both gainers and losers to protect their interests through political action.

The Trade-off between Equity and Efficiency in a System of Competitive Markets

A perfectly competitive market system can be given high marks because it is capable of achieving efficiency. The efficient outcome in a market system is a point on the utility-possibility curve. In a market system, each person’s money income

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**Public Policy Perspective**

**The Tax System and the Birthrate—An Example of Positive Economic Analysis**

What does the tax system have to do with babies? The answer is quite a bit, according to positive economic analysis of the effect of the U.S. system of income taxation on the decision to have children. The U.S. birthrate increased by 3 percent in the early 1990s and it will soon increase more, according to economists Leslie Whittington, James Aim, and H. Elizabeth Peters. These economists have examined how the U.S. tax system has indirectly subsidized the cost of raising children since 1917. They have set up a positive economic model of the choice to have children and then used the model to isolate the effect of the personal exemption of the U.S. income tax on the fertility rate in the United States from 1913 to 1984. The fertility rate measures the number of births per 1,000 women of childbearing age.

The personal exemption is a feature of the federal income tax that, as of 2009, allowed most families to exclude $3650 of income from taxation for each family dependent. For a family subject to a 33 percent tax rate, each additional child reduces the family’s annual federal income tax bill by $1204.50 = 0.33($3650). The $1204.50 annual tax reduction really amounts to a subsidy that varies with the number of children. Other factors considered equal, the greater the personal exemption, the greater the subsidy for having children. The value of that subsidy also depends on a family’s tax bracket. For example, for a family in the 15 percent tax bracket, the annual reduction in taxes (or subsidy) resulting from a $3650 personal exemption is merely $547.50. Finally, a low-income family that does not earn enough income to be subject to income taxation gets little benefit from the personal exemption. The benefit of personal exemptions also is phased out for very high-income individuals under current law.

For a middle-income family, the subsidy from the personal exemption ranges from four to nine percent of annual child-rearing costs. For additional children, the subsidy amounts to as much as 14 percent of annual costs. And the subsidy continues until a child reaches age 18, or even longer if that child attends college. By reducing the cost of child rearing, the tax system encourages families to have children. Thus, the positive economic analysis suggests that fertility rates, other factors remaining equal, vary directly with the value of the personal exemption.

Using actual data from 1913 to 1984, the researchers tested their hypothesis by conducting a statistical analysis of the relationship between the fertility rate in the United States, the personal...
will depend on the amount of productive resources owned and the returns obtained from selling productive services to others in markets. The distribution of income will determine the willingness and ability to pay for various goods and services that the economy can produce with available resources and technology.

Many critics of the market system argue that it cannot be given high marks on the basis of equity criteria. They complain that many participants in the system cannot satisfy their most basic needs because low incomes provide them with little capacity to pay for market goods and services. Poverty in the midst of wealth is regarded as inequitable by many people. The market system caters to those with the ability to pay, which depends on earnings. This, in turn, depends on the marginal social benefit of resources that a person owns. The poor lack resources. Often they are unskilled and undereducated, and, as a result, the quality of their labor service is low. In many cases, the poor are unemployable or

exemption, and a set of other variables that influence the choice to have children. By statistically controlling for all other influences of the fertility rate, the researchers could isolate the relationship between fertility rates and the real tax reduction value of personal exemptions on average for all taxpayers.

The researchers concluded that an increase in the real tax value of the personal exemption will be associated with an increase in the number of births per 1,000 women. They then used their analysis to estimate the possible effect of recent increases in the personal exemption on fertility rates. The personal exemption increased from $1,080 in 1986 to $3650 in 2009, and is adjusted each year for inflation. Using the historical relationship between the real tax value of the personal exemption and the birthrate, the researchers conclude that an 11 percent increase in the U.S. birthrate will result from this increase in the personal exemption. Their analysis suggests that middle-income families will get the greatest increase in the subsidy and their fertility rates will increase accordingly. On the other hand, the law actually decreases the incentive of very low- and very high-income families to have children because many low-income families do not now pay any income tax and because the personal exemption is phased out for many families with very high incomes.

Some nations directly subsidize children through special family allowances. For example, the Japanese government gives families with more than one preschool child a monthly allowance. Many European nations also have family allowance systems that encourage families to have children. Although the U.S. government does not directly subsidize families with children, the federal tax system provides benefits that vary with family size, and these benefits have been increasing in recent years. The latest innovation is a child tax credit for families that will reduce taxes directly with the number of children per family each year. A family that increases the number of dependent children in its household can reduce its tax burden by as much as $1,000 per year for each year the child remains a dependent. A four-child household would pay as much as $4,000 less per year in taxes than a household with the same taxable income but without any dependent children. This is likely to further increase the incentive to have children. It could also create future taxpayers, which will help relieve the per-person tax burden by the middle of the century, when the proportion of retirees in the population will increase dramatically.


2Whittington, et al., 546.
employable only at low wages. In addition, they usually own no land or capital, meaning that their nonlabor income is also low.

Critics of the market system also argue that these poor people should receive transfers financed by taxes on more fortunate members of society. The incomes of the poor, and therefore their level of annual well-being, would be kept from falling below minimum standards. This, however, creates a dilemma. Often, as is shown throughout this text, taxes and subsidies used to alter the distribution of income distort incentives to produce in ways that prevent achievement of efficiency. Policy makers are confronted with the inevitable conflict between the quests for both efficiency and equity.

**POSITIVE ANALYSIS TRADE-OFF BETWEEN EQUITY AND EFFICIENCY**

Positive analysis can be used to evaluate the effectiveness of alternative policies in achieving any given change in the distribution of income. The positive approach attempts to explain why efficient outcomes are, or are not, achieved. It can

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**GLOBAL PERSPECTIVE**

**Agricultural Subsidies, International Trade Restrictions, and Global Efficiency**

Farmers are a potent political force not only in the United States but also in Japan, South Korea, and nations in Western Europe. Governments have responded to the political power of agricultural interests by imposing barriers that prevent or limit imports of agricultural commodities. Price supports and subsidies to farmers cause global losses in efficiency by distorting the world prices of agricultural commodities and the global pattern of resource use. Subsidies waste resources when they protect high-cost domestic producers at the expense of domestic consumers and low-cost producers in other nations.

For example, farmers in the nations of the European Union (EU) have been protected by a complex set of import restrictions and government subsidies that insulates farmers from international competition. As a result, domestic food prices in Western Europe are higher than they would be if the borders of these European nations were open to competition. Japan has protected rice growers by restricting imports of rice. The restriction on imports of rice into Japan deprives the United States and other low-cost rice producers of a market for exports while making Japanese consumers pay very high prices for this staple of their diet.

EU governments set high prices for a variety of agricultural products. These high prices have resulted in huge agricultural surpluses that have been exported, with government subsidies making up the difference between the world price and the higher price guaranteed to European farmers. The export of surplus agricultural commodities by EU nations also results in low incomes to more efficient agricultural producers elsewhere in the world by depressing the world price of the commodities sold by these nations.

As a result of agricultural protection policies, global efficiency in the use of resources is reduced. More than the efficient amount of resources is devoted to agriculture in high-cost areas while less land is devoted to agriculture in relatively efficient
low-cost areas. If protectionist policies were eliminated, more resources would be devoted to manufacturing and other industries in Western Europe. In low-cost agricultural nations, there would be an increase in resources devoted to agriculture and an increase in the exports of agricultural products.

Member nations of the World Trade Organization have reduced the volume of subsidized agricultural exports. Bans on rice imports in Japan and South Korea have also been lifted. Other reductions in agricultural subsidies and quotas in coming years could result in a substantial fall in the price of food in nations that support the prices of agricultural commodities. As price supports are eliminated, huge agricultural surpluses would be eliminated, and crop exports from high-cost nations would decline, causing the world market prices to rise. These higher world prices could increase the income-earning potential for farmers in many impoverished nations.

The Doha round of the World Trade Organization (WTO) negotiations (which began in Doha, Qatar in 2001) has concentrated on removing various barriers to free international trade, especially those that reduce the potential for improving living standards in developing nations. This has proved to be a difficult task. In 2003 the negotiations collapsed when member nations failed to agree on reductions in farm subsidies and improved access to markets. Finally in 2005 at the WTO conference in Hong Kong, Trade Ministers negotiated an agreement that sets a deadline for eliminating subsidies for agricultural exports by 2013. The deal requires industrialized nations not only to reduce agricultural subsidies but to open their domestic markets to goods produced in the world’s least-developed nations. A lot of work remains to be done to implement these agreements. However, nations such as Burkina Faso, one of the poorest in the world, are hopeful that the elimination of subsidies can improve living standards. Burkina Faso is Africa’s largest producer of cotton and their representatives have long argued that subsidies to U.S. cotton producers allow the sale of U.S. cotton on the world market at prices significantly below costs of production. This has pushed world prices down for the commodity and decreased incomes of poor cotton farmers in Africa and other less developed nations.

also be used to predict how government intervention in private affairs affects the likelihood of achieving efficiency while avoiding any direct judgments on the desirability of efficiency as an outcome.

Rather than recommending changes that will result in efficient outcomes, the positive approach attempts to predict whether changes in government policy or spending will be agreed upon through existing political institutions. The analysis is firmly based on models of maximization of personal gains from exchange. For example, it is entirely reasonable to expect individuals to support and vote for inefficient policies if their income shares will be larger under such policies. In effect, these individuals are content with a larger share of a smaller pie. Achievement of efficiency would allow the given amount of resources in the economy to produce more net benefits, but the total shares of this larger pie accruing to groups opposing the change would be less than what they would have with the smaller pie.

Referring to Figure 2.5, person A is better off at point X compared with point E₃, even though point X provides less aggregate net social benefit in the economy. Individuals are not concerned with net social benefit. Rather, they maximize their net personal benefits. The trick in devising efficient policies is to
make maximization of net personal benefits coincide with maximization of net social benefit.

In evaluating public policy, it is important to understand both the efficiency and the distributive consequences of alternatives. Improvements in efficiency are often opposed vigorously by special-interest groups that would suffer losses if the improvements were enacted. These groups are concerned with protecting their income shares at the expense of reduced output and well-being in the economy as a whole. The actual policies and institutions that emerge reflect the conflict between groups of individuals seeking to protect and enlarge their income shares and the benefits of efficient resource use that accrue to individuals comprising the entire community. A further factor affecting the outcome is the effectiveness of economic institutions in allowing those who receive benefits from policy change to bargain with those who bear costs so as to reach a compromise agreement.

One problem in using the efficiency criterion as a normative tool is that the actual number of allocative changes that will satisfy the criterion might be few and quickly exhausted. Most debates concerning resource allocation (for example, how to allocate scarce resources between expenditures on defense and other uses) involve benefits to some groups and losses to others.

In such cases, no one can easily predict whether the change in resource allocation will be made, inasmuch as there will be both gainers and losers. The efficiency criterion, strictly speaking, can only recommend changes when there are gainers only (and no losers) or when the gainers can compensate the losers at transaction costs that do not exceed the gains. Some normative theorists try to overcome this problem by using compensation criteria, which attempt to measure the value of the gains to gainers in dollar terms and compare these with the dollar value of the losses to losers. If the value of gains outweighs the value of losses, normative theorists argue that it is efficient to make the change, regardless of whether the losers are compensated for their losses. Such a change, however, still will be opposed by the losers. Although some might argue that the change will improve efficiency, its approval cannot be predicted because it involves losses in income to some individuals. Most public policy issues involve trade-offs between gains in efficiency obtained at the expense of losses by certain groups.

The positive approach can make a genuine contribution by generating information on the gains, losses, and transaction costs associated with particular policy changes and on the distribution of such benefits and costs among citizens. Without such information, it would be impossible for the normative economist to make prescriptions for achieving efficiency in resource allocation and for attaining equity goals. Such information is indispensable to voters themselves when they are deciding how to vote on questions concerning the functions of government and the extent of its powers and expenditures.

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4This is known as the Kaldor-Hicks criterion. See Nicholas Kaldor’s classic discussion of this subject in, “Welfare Propositions of Economics and Interpersonal Comparisons of Utility,” Economic Journal 49 (September 1939): 549–552.
SUMMARY

Resources are efficiently allocated when the well-being of any one person cannot be increased without harming another. This condition is attained when all goods are consumed over any period up to the point at which the marginal social benefit of each good equals its marginal social cost.

When prices in competitive markets reflect marginal social costs and benefits, market exchange achieves efficiency. In cases for which interaction between buyers and sellers in competitive markets does not result in an efficient outcome, government intervention can be prescribed to help achieve efficiency.

Changes in policy that move the economy toward efficiency are often opposed because they result in a change in income distribution. Individuals opposing actions that improve efficiency act rationally. They are simply better off with a larger share of a smaller pie. To predict outcomes in any political process, it is necessary to know the benefits of any changes proposed, to whom they accrue, and what changes in the distribution of income result.

LOOKING AHEAD

The appendix to this chapter develops a more rigorous model of efficient resource use. The following chapter further explores the implications of market failure to achieve efficiency. The causes, implications, and remedies for the failure of an unregulated system of markets to achieve efficiency are extensively discussed. The framework developed in Chapter 3 is further applied in the discussion of public goods in Chapter 4.

KEY CONCEPTS

Compensation criteria
Efficiency criterion
Equity
Marginal conditions for efficient resource Allocation
Marginal net benefit
Marginal social benefit
Marginal social cost
Normative economics
Positive economics
Total social benefit
Total social cost
Utility-possibility curve

REVIEW QUESTIONS

1. How are normative statements distinguished from positive statements? Look through a daily newspaper for articles on politics and make a list of statements regarding current issues; indicate which are positive and which are normative.

2. How does trading improve efficiency? Why are trades that apparently provide mutual gains to those involved not undertaken? Show how equating the total social benefit of a good with its total social cost will result in more than the efficient output of the good.

3. Suppose you have more books than you want but would like to have more sporting goods. Explain how your well-being would be affected if a law existed preventing the trading of books for sporting goods. How would such a law affect efficiency in the use of resources? Show how a law banning the sale of books will cause a loss in efficiency. How can these losses be measured?

4. Why might individuals support the status quo over policies that can be shown to improve efficiency? Examine your own views on issues relating to social policy and ask yourself whether you would support such policies as the elimination of tariffs and other barriers to international trade, which might improve efficiency in the use of productive resources. How would quotas on imports of Japanese cars affect you personally? If you owned stock in General Motors or worked in an automobile factory, would that affect your support for the quotas?

5. Relate the concept of efficiency to points on a utility-possibility curve.
6. Suppose a politician asks consultants to calculate the total social cost and the social benefit of the activities in a government agency. The politician discovers that total social benefits exceed total social costs. Does this imply that the activities of the agency should be increased to achieve efficiency?

7. Suppose the marginal social cost of fighter aircraft each year exceeds their marginal social benefit. Are fighter aircraft being produced at an efficient level?

8. The marginal social benefit of college enrollments currently exceeds its marginal social cost. Use a graph to demonstrate the gain in efficiency that would result from an increase in college enrollment.

9. The price of automobiles currently equals both the marginal social benefit and the marginal social cost at existing annual output. A tax is levied on the sale of cars. Assuming that the tax increases the marginal private cost of sellers, show how it will cause a loss in efficiency in the automobile market.

10. Efficiency can correspond to more than one distribution of well-being. Can the efficiency criterion be used to rank one distribution over another?

11. Explain the compensation criterion of Kaldor and Hicks. How do they justify income redistribution? Use different points on figure 2.5 to explain their conclusion.

12. Jury duty is compulsory service, and in most states pays jurors less than the minimum wage. Low pay for jurors leads to lower court costs charged to parties in a lawsuit. How does the use of compulsory jury service affect the economic efficiency of the court system vs. other public and private goods and services? Use the concepts of marginal benefit and marginal cost in your answer.

PROBLEMS

1. The following table shows how the total social benefit and total social cost of summer outdoor concerts in Central City vary with the number of performances.

<table>
<thead>
<tr>
<th>NUMBER OF CONCERTS</th>
<th>TOTAL SOCIAL BENEFIT</th>
<th>TOTAL SOCIAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$10,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>2</td>
<td>$15,000</td>
<td>$11,000</td>
</tr>
<tr>
<td>3</td>
<td>$18,000</td>
<td>$18,000</td>
</tr>
<tr>
<td>4</td>
<td>$20,000</td>
<td>$26,000</td>
</tr>
<tr>
<td>5</td>
<td>$21,000</td>
<td>$36,000</td>
</tr>
</tbody>
</table>

What is the efficient number of concerts?

2. a. Suppose the marginal social cost of television sets is $100. This is constant and equal to the average cost of television sets. The annual demand for television sets is given by the following equation: \( Q = 200,000 - 500P \), where \( Q \) is the quantity sold per year and \( P \) is the price of television sets. If television sets are sold in a perfectly competitive market, calculate the annual number sold. Under what circumstances will the market equilibrium be efficient?

b. Show the losses in well-being each year that would result from a law limiting sales of television sets to 100,000 per year. Show the effect on the price, marginal social benefit, and marginal social cost of television sets. Show the net loss in well-being that will result from a complete ban on the sales of television sets.

3. A prominent senator has calculated the total social benefit of the current amount of space exploration at $3 billion per year. The total social cost of space exploration is currently only $2 billion. The senator argues that a net gain to society would result by increasing the amount of space exploration until total costs rise enough to equal total benefits. Is the senator’s logic correct?

4. The market equilibrium price for rice in Japan would be $3 per pound in the absence of government subsidies to rice production. However, the government sets the price of rice at $5 per pound and agrees to buy all the rice produced by farmers at that price. Assume that points on the demand curve for rice equal the marginal social benefit of alternative quantities, while points on an upward-sloping supply curve equal the marginal social cost of various quantities. Show how the subsidy program will result in losses in efficiency.

5. Suppose perfect competition prevails in the market for hotel rooms. The current market equilibrium price of a standard hotel room is $100 per night. Show that the current market equilibrium is efficient, assuming that both the marginal cost incurred by sellers and the
marginal benefit perceived by buyers reflect all costs and benefits associated with production and use of hotel rooms. Suppose a $10 per night tax is levied on hotel occupancy. Show how this tax will prevent the market from achieving efficient output. Show the loss in net benefits from hotel use resulting from the tax.

6. Define Pareto optimality. Use the definition of Pareto optimality to demonstrate that the market for buying and selling owner occupied housing follows the requirements for Pareto optimality. As an exception, the government’s use of eminent domain violates Pareto optimality. The government does pay the homeowner fair market value. Nevertheless, use the definition of Pareto optimality to show that the use of eminent domain violates Pareto’s guidelines for efficient exchange.

7. In 1991 the federal government imposed a 10% “luxury tax” on sales of new recreational boats, and on certain other high priced consumer goods. Sales of new recreational boats plummeted, causing unemployment among boat building workers. In 1996, this federal tax was repealed. What would have been the equity based justification for this “luxury tax.” Draw a diagram similar to figure 2.3. Show the efficiency consequences of a federal tax on recreational boats.

ADDITIONAL READINGS


INTERNET RESOURCES

http://www.cbo.gov
This is the home page of the Congressional Budget Office—the “think tank” of Congress. You can access studies analyzing issues of public policy as well as other information about government programs at this site.

http://www.cato.org
http://www.brookings.org
http://www.urban.org
These three private think tanks, the CATO Institute, the Brookings Institution, and the Urban Institute, study economic policy and the public sector. Access these sites to find studies on various public policy issues and on allocation of resources between the government and the private sectors of the economy.

http://www.taxfoundation.org
The Tax Foundation provides information and analysis of the nation’s tax system. You can find current data on federal, state, and local taxation at this site along with analysis of the effects of taxes on resource use and income distribution.
Welfare economics is the normative analysis of economic interaction that seeks to determine the conditions for efficient resource use. This appendix develops a basic model to investigate how people’s economic well-being is related to economic variables. Extensive use is made of graphic analysis. Efficiency conditions are derived from the analysis. A good background in microeconomics is necessary for understanding the material in this appendix. For those who skip the appendix, the basic notions of efficiency and the efficiency conditions derived in Chapter 2 are sufficient for understanding the analysis to follow in the rest of this text.

A MODEL OF EFFICIENT RESOURCE USE

Suppose two individuals annually produce and consume two goods produced with two inputs, given technology. The consumption or production of each good is at costs that reflect the full social value of all resources used. The two inputs are labor and capital. These are used to produce food and clothing. The problem is to allocate inputs to the alternative outputs and to allocate outputs among individuals (A and B) that satisfy the efficiency conditions.

Production and Technology

Consider first the technological relationships within this economy. The two production functions are one for food and another for clothing. Such functions, by definition, give the maximum attainable output from any input combination. Call the annual output of food $F$ and the annual output of clothing $C$. If $L_F$ is the amount of labor used in the production of food and $K_F$ is the amount of capital used in the production of food each year, then

$$F = F(L_F, K_F)$$

(2A.1)

is the production function for food.

Similarly, if $C$ is the annual output of clothing, $L_C$ is the amount of labor used in the production of clothing, and $K_C$ is the amount of capital used in the production of clothing each year, then

$$C = C(L_C, K_C)$$

(2A.2)

is the production function for clothing.

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5The model can easily be expanded to include many goods, inputs, and persons. A multidimensional model requires the use of calculus to derive the efficiency conditions.
The output of food depends only on the inputs used in producing food and not on those used in producing clothing. Similarly, the output of clothing depends only on the amounts of labor and capital used in the process of producing clothing.

In addition, all available labor and capital will be fully employed in the production of food and clothing. If \( L \) is the total annual available labor services and \( K \) is the annual available capital services, then this condition can be written as

\[
L = L_F + L_C \quad (2A.3)
\]
\[
K = K_F + K_C \quad (2A.4)
\]

\( L_F, L_C, K_F, \) and \( K_C \) are variables with values to be solved in the model. \( L \) and \( K \) are assumed to be fixed in supply.

**PRODUCTIVE EFFICIENCY**

Productive efficiency exists if it is not possible to reallocate inputs to alternative uses in such a manner as to increase the output of any one good without reducing the output of some alternative good. For a two-goods world, this criterion will be met when, for any specified output level of one good, the maximum possible amount of the alternative good is being produced, given the community’s endowment of inputs and technology.

The next step is to determine the condition that will lead to productive efficiency in the use of inputs. This may be accomplished by employing an *Edgeworth box*. The length of the horizontal side of the rectangle illustrated in Figure 2A.1 equals the total available labor services per year, \( L \). The length of the vertical side of the box represents the total available capital services per year, \( K \). Measure the amount of capital used in the production of food upward along the vertical side of the box, \( 0K \), and measure the amount of labor used in production of food along the horizontal side of the box, \( 0L \). If productive resources are presumed to be always fully employed, then it must follow that any labor or capital not used in the production of food must be used in the production of clothing. This can be seen by simply rearranging terms in Equations 2.3 and 2.4 as follows:

\[
L_C = L - L_F \quad (2A.5)
\]
\[
K_C = K - K_F \quad (2A.6)
\]

The diagram accounts for Equations 2A.5 and 2A.6 by measuring the amounts of labor and capital used in the production of clothing from the origin \( 0' \). Any point within the Edgeworth box will correspond to certain values of the four variables \( L_F, K_F, L_C, \) and \( K_C \). For example, at point \( Z^* \), the four values are

\[
L_C = 0L_F^*, L_C = 0'L_C^*
\]
\[
K_F = 0K_F^*, K_C = 0'K_C^*.
\]
It is a simple matter to plot the isoquants corresponding to the production functions for food and clothing within the box. Use 0 as the origin for plotting the food isoquants labeled $F_1$ to $F_6$. The marginal rate of technical substitution of labor for capital diminishes as more labor is substituted for capital in the production of food. Through any point within the box will be, of course, an isoquant corresponding to some level of production of food. Isoquants farther away from the origin 0 represent higher production levels for food.

In the same fashion, isoquants corresponding to different levels of production for clothing can be plotted. Now, however, 0’ is used as the origin. The isoquants for clothing, labeled $C_1$ to $C_6$, are convex to 0’, and those farther from 0’ correspond to higher levels of production of clothing. It easily can be seen that each point within the box corresponds to values for six variables. Referring again to point $Z^*$, it has already been shown that it corresponds to values of $L_F$, $K_F$, $L_C$, and $K_C$. As soon as the input mix is specified, so are the production levels of the two outputs (see Equations 2A.1 and 2A.2). Therefore, at point $Z^*$, the use of $L_F^*$ labor and $0K_F^*$ capital in the production of food implies an annual output level of $F_4$ of food, where $F_4$ is the level of production of the good corresponding to the isoquant through $Z^*$. The annual output of clothing at $Z^*$ is $C_3$.

At point $Z_1$ in Figure 2A.1, the input combination used results in an annual output $F_4$ of food and $C_2$ of clothing. The input mix at $Z_1$ is not efficient. Why? Because it is possible to increase the production of clothing to $C_3$, which represents a higher level of production for clothing, without decreasing the production of food. This is accomplished by moving along the isoquant $F_4$ until the highest clothing isoquant is reached. (Remember that even though they have not been drawn in Figure 2A.1, there is a clothing isoquant through every point on $F_4$.)
The highest that can be reached is clearly $C_3$, where $C_3$ is tangent to $F_4$. To move from $Z_1$ to $Z^*$, simply reallocate labor away from the production of food while replacing it with capital. Once point $Z^*$ is reached, it is no longer possible to increase the production of clothing while the production of food is held at $F_4$.

Similarly, it can be shown easily that, at $Z_2$, the production of food could be increased without decreasing the production of clothing if the production of clothing is held at $C_2$. This is accomplished by moving along the isoquant corresponding to $C_2$ until point $E^*$ is reached.

Similar exercises can be performed for any point within the box. Only those points corresponding to tangencies between food and clothing isoquants will fulfill the requirements of productive efficiency. The line $00'$ has been drawn to connect all the points of tangency. Along $00'$, it is impossible to increase the production of any one good without decreasing the production of the other. Accordingly, $00'$ defines all values for $F, C, L_F, K_F$, and $K_C$ that satisfy the requirement of productive efficiency. All the points of $00'$ correspond to tangencies between some food isoquant and some clothing isoquant.

The slope of the food isoquant is its marginal rate of technical substitution of labor for capital multiplied by $-1$ in the production of food. Writing this slope as $MRTS_{LK}^F$, it follows that all points on the efficiency locus $00'$ are defined by

$$MRTS_{LK}^F = MRTS_{LK}^C \tag{2A.7}$$

where $MRTS_{LK}^C$ is the slope of any clothing isoquant multiplied by $-1$.

The Production-Possibility Curve

The economic information displayed in the efficiency locus may be summarized in an alternative fashion. To do this, consider what the efficiency locus implies. Given the economy’s resources ($L$ and $K$), any point on $00'$ gives the maximum amount of food that can be produced for any given level of production of clothing each year and the maximum amount of clothing that can be produced given any level of production for food each year. This is precisely the definition of an economy’s production-possibility curve. Plotting the annual quantity of food on the vertical axis of Figure 2A.2, and the annual quantity of clothing on the horizontal axis, the curve $TT'$ gives the economy’s potential for producing combinations of food and clothing efficiently, given its endowment of resources ($L$ and $K$). The production-possibility curve has the usual shape. It is concave to the origin, implying an increasing marginal rate of transformation of food into clothing as more resources are devoted to clothing production in a year.

Each point on $TT'$ gives a different annual output allocation for the economy; that is, a different combination of $F$ and $C$. This serves to emphasize that an infinity of output allocations satisfies the criterion of productive efficiency. However, no basis exists to decide whether a move from a point which is not efficient (a point within $00'TT'$) to a point which is efficient (one on $TT'$) is desirable in all cases. Referring to Figure 2A.2, a movement from point $A$ to any point on arc $E_1E_2$ can be said to be desirable because it increases the output of
both food and clothing. However, no basis exists for saying that a movement from point \( A \) to a point off the arc \( E_1E_2 \), like \( D \), is desirable. A movement from \( A \) to \( D \) increases the output of one good while reducing the output of the other. The same will hold for any movement from \( A \) to a point on \( TT' \) off the arc \( E_1E_2 \). Only movements to points on \( E_1E_2 \) from \( A \) will be costless in terms of efficiency.

**PARETO EFFICIENCY**

**Tastes and Utility**

The welfare and tastes of individuals \( A \) and \( B \) are described by the following two utility functions:

\[
U_A = U(F_A, C_A) \quad (2A.8)
\]

\[
U_B = U(F_B, C_B) \quad (2A.9)
\]

where \( U_A \) is \( A \)'s utility level taken as a function of the amount of food and clothing that \( A \) alone consumes each year. Similarly, \( U_B \) is \( B \)'s utility level that is taken to depend on the food and clothing that \( B \) alone consumes each year. To derive the conditions for Pareto efficiency, it is again necessary to construct an Edgeworth box similar to that used for the case of production. However, a number of differences exist between the box to be drawn now and Figure 2A.2. The first difference concerns what goes inside the box. Instead of production functions for food and clothing, utility functions are plotted. Second, whereas the
sides of the production box were taken to be fixed, the sides of the consumption box are variable; that is, the assumption was a fixed annual amount of labor and capital available to produce food and clothing. The side of the Edgeworth box for consumption represents the total amount of food and clothing available for consumption each year. It is clear that these are variables. One such box corresponding to the output of F and C, represented by point D in Figure 2A.2, is drawn as Figure 2A.3. An infinite number of boxes can be drawn—one for each point on TT'. A’s utility is measured from the origin 0; B’s utility is measured from the origin D. Moving northeast from 0, A is successively better off as he moves to higher indifference curves. Similarly, B is placed on higher utility curves as she moves from D to 0. Any point within the box corresponds to values for the allocation of the total available supplies of food and clothing.

**Figure 2A.3** Efficient Allocation of a Given Amount of Food and Clothing per Year for Two Consumers

An efficient allocation of the two goods requires that the marginal rate of substitution of food for clothing be the same for both consumers.
between A and B—$F_A$, $F_B$, $C_A$, $C_B$—such that the total available supply of food and clothing produced are consumed; that is,

$$F = F_A + F_B \quad (2A.10)$$

$$C = C_A + C_B. \quad (2A.11)$$

In addition, each such point within the box implies some level of utility for both A and B (this follows from Equations 2A.8 and 2A.9). It is not necessary to compare the utility levels of A and B; it is required only that A and B know when they are better or worse off.

**Attainment of Efficiency**

When it is no longer possible to make either A or B better off without making one of them worse off, Pareto efficiency is attained. Assume that the output of food and clothing is fixed at $F$ and $C$ units per year.

Look at point E in Figure 2A.3. Is this point Pareto efficient? The answer is clearly no. Why? Because it is possible to make B better off without harming A by moving along the indifference curve labeled $U_{A4}$ to point $E^*$. Moving from E to $E^*$, A receives more food at the expense of giving up some clothing each year while B gains clothing and loses food each year. At $E^*$, where the indifference curve corresponding to $U_{A4}$ is tangent to that corresponding to $U_{B4}$, it is no longer possible to reallocate clothing and food between A and B so as to make one better off without making the other worse off. At point $E^*$, A consumes $0C_A$ of clothing and $0F_A$ of food while B consumes $DC_B$ of clothing and $DF_B$ of food. Point $E^{**}$ is also a Pareto-efficient allocation of the fixed amount of food and clothing between A and B.

Points $E^*$ and $E^{**}$ are not the only positions of Pareto efficiency. There are many such points—one for each possible tangency between the two sets of indifference curves. Each tangency represents a different annual distribution of goods and well-being between A and B.

Multiplying the slope of any indifference curve in the box by $-1$ gives the marginal rate of substitution of clothing for food. $MRS^A_{CF}$ measures A’s willingness to exchange food for a unit of clothing. $MRS^B_{CF}$ measures B’s willingness to exchange food for a unit of clothing. All points of efficiency within the box must satisfy the following criterion:

$$MRS^A_{CF} = MRS^B_{CF}. \quad (2A.12)$$

Equation 2A.12 merely states that, for an allocation of the fixed amount of goods to be efficient, the two relevant indifference curves must be tangent, implying that their slopes are equal.

Suppose that the annual outputs of food and clothing can be varied. It is now necessary to determine the efficient production levels of the two outputs, as well as the efficient allocation of goods among A and B. It is possible to
“transform” food into clothing according to the terms implied by the slope of the transformation curve of Figure 2A.3 (the marginal rate of transformation of food into clothing). Not all the points on the locus of tangencies between the two sets of indifference curves in Figure 2A.3 are really efficient when the annual production of the two goods is variable. To understand this, suppose that at point $E^*$ in Figure 2A.3, the marginal rate of substitution of clothing for food is 1 for both $A$ and $B$. Thus,

$$\text{MRS}^{A}_{CF} = \text{MRS}^{B}_{CF} = 1.$$  \hfill (2A.13)

Call the marginal rate of transformation of food into clothing $\text{MRT}_{CF}$, and suppose its value is 2 at point $D$ in Figure 2A.3. This implies that, at that particular point on the transformation curve, two units of food can be produced by diverting into food production the labor and capital used to produce one unit of clothing. But, by assumption, only one unit of food is necessary to replace one unit of clothing to keep $A$ and $B$ at the same level of utility at point $E^*$ in Figure 2A.3.

Therefore, if one unit of food is taken from $A$ and replaced with one unit of clothing, he will not be made any worse off by this exchange. A unit of clothing taken from $A$ has no effect on $B$’s utility. Now, the resources that were previously employed to produce this unit of clothing for $A$ can be diverted to food production, and, by assumption, two units of food can be produced. One of these must be given to $A$ to compensate for the loss of a unit of clothing. But, this leaves one extra unit of food. The extra food can be given to either $A$ or $B$ or divided between them. In any event, either both of them will be better off than they were previously or one can be made better off without making the other worse off. It follows that no allocation of resources can be efficient until all gains from an exchange of this kind have been exhausted. This will occur only for those points where the rates at which $A$ and $B$ are willing to substitute food and clothing while retaining the same level of utility are precisely equal to the rate at which clothing may be transformed into food at the margin by diverting resources (labor and capital) from the production of one commodity to the other. That is, the following must hold:

$$\text{MRS}^{A}_{CF} = \text{MRS}^{B}_{CF} = \text{MRT}_{CF}. \hfill (2A.14)$$

### An Interpretation of Efficiency Conditions

A more intuitive interpretation of the efficiency conditions is made possible by allowing one of the two goods to be “money.” Efficient substitution of money for clothing in Equation 2A.14 requires that $A$’s willingness to substitute clothing for money be equal to $B$’s willingness to substitute clothing for money, which, in turn, must equal the capability of the economy to transform money into clothing. The willingness to substitute clothing for money for both $A$ and $B$ is a measure of the marginal benefits they obtain from clothing. Assume as well that the marginal benefits obtained by each consumer reflect the marginal social benefit of
the good. The capability to transform money into clothing is a measure of the value of alternative goods that must be forgone to produce another unit of clothing. This is the marginal social cost of clothing. Rewriting Equation 2A.14,

$$MSB = MB^A_C = MB^B_C = MSC.$$

(2A.15)

At least one output combination will satisfy the efficiency condition. The actual number of efficient output solutions depends on the differences in tastes among households. If \( A \) and \( B \) have different tastes, then any change in income distribution would alter relative demands and cause a change in the efficient output mix (that is, lead the economy to a new efficient point on the production-possibility curve).

Therefore, many allocations are likely to satisfy the efficiency criteria when tastes differ among households. Each one still differs in terms of the distribution of welfare. Insofar as \( A \) and \( B \) have different tastes, changes in income distribution alter the efficient-resource-use pattern. Thus, for any income distribution, the model specifies from the utility functions (Equations 2A.8 and 2A.9) the output demands of \( A \) and \( B \). Given the income distribution, some efficient output mix \((F, C)\) exists where \( F = F_A + F_B \) and \( C = C_A + C_B \), allowing both \( A \) and \( B \) to maximize their welfare within their income. The production functions (Equations 2A.1 and 2A.2) give the efficient allocation of inputs \( L_F, L_C, K_F, \) and \( K_C \) that are necessary to produce that mix. Thus, for any income distribution, the model produces a solution for the variables \( F, C, L_F, L_C, K_F, K_C, U_A, U_B, F_A, F_B, C_A, \) and \( C_B \). All points satisfying the efficiency criterion of Equation 2A.14 are represented by the utility-possibility frontier (Figure 2A.5).

### Ranking Efficient Outcomes: Social-Welfare Functions

Some normative economists attempt to do more than simply specify the efficient outcomes. They try to develop criteria to rank alternative income distributions. No objective way exists to do this. Positive economists have been extremely critical of attempts to rank alternative income distributions.\(^6\)

The technique used by the normative economists is to postulate the existence of a social-welfare function. Social welfare, \( W \), is taken as a function of individual welfare. Social welfare depends on the utility levels of \( A \) and \( B \):

$$W = W(U_A, U_B).$$

(2A.16)

This function embodies ethical evaluation of the importance of \( A \)’s and \( B \)’s relative welfare in determining social welfare. The actual form of the function depends on the weights, or coefficients, applied to individual utilities. The

---

\(^6\)James Buchanan has argued, quite convincingly, that resorting to the social-welfare function is inconsistent with the basic value judgments of Paretian welfare economics precisely because it is based on a nonindividualistic ethic. See his classic discussion of this topic in *Demand and Supply of Public Goods* (Chicago: Rand McNally Chicago, 1968), 193–197.
function then can be used to choose among alternative efficient welfare distributions. Thus, the welfare distribution that maximizes social welfare is chosen as “best.” Once the social-welfare maximizing values of $U_A$ and $U_B$ are known, the values of the other variables are determined easily from the utility and production functions.

**EFFICIENCY AND ECONOMIC INSTITUTIONS**

**Pure Market Economy and Productive Efficiency**

The efficiency criterion can be used to evaluate resource allocation in a pure market economy operating under conditions of perfect competition in all markets. Assume that productive resources are privately owned and that no individual market participant has any power whatsoever to affect prices of the commodities or inputs that are bought or sold. The price of any given commodity must be assumed to be identical for all buyers and sellers of that particular commodity. This implies no distortions in the marketplace, such as taxes, cause the price received by sellers to differ from the price paid by buyers.

In a perfectly competitive market, producers take the prices of labor and capital as fixed. Under these constraints, firms minimize the cost of producing any output. If the price of labor is $P_L$ and the price of capital is $P_K$, then the total cost of producing any given annual output is

$$C = P_KK + P_LL.$$  

(2A.17)

As more labor and capital are used, the cost of production becomes greater. If cost is held constant at $C$, Equation 2A.17 can be plotted on a set of axes, with capital measured on the vertical axis and labor on the horizontal axis. The resultant relationship is an isocost line, defining all those combinations of labor and capital that cost $C$ dollars. This is illustrated in Figure 2A.4. There will be one isocost line through every point within the set of axes. Each isocost line corresponds to a different value of $C$. Lines farther from the origin imply greater purchases of both $L$ and $K$ and therefore greater total cost.

Now, consider the combinations of labor and capital that might be used to produce a particular amount of food, say $F = F_1$. The slope of the isoquant is the marginal rate of technical substitution of labor for capital in the production of food, say $F = F_1$. This information is summarized in the isoquant corresponding to $F = F_1$ and is illustrated in Figure 2A.4. To produce this particular output of food at minimum cost, the input combination corresponding to the tangency of the isoquant with some isocost line is chosen. At that point, the slope of the isocost line equals the slope of the isoquant corresponding to $F = F_1$. The slope of the isoquant is the marginal rate of technical substitution of labor for capital in the production of food multiplied by $-1$, while the slope of the isocost line is the ratio of the price of labor to the price of capital multiplied by $-1$. The cost of producing any output of food will be minimized when the isoquant
corresponding to that level of production is tangent to an isocost line. Thus, the condition for minimizing the cost of production of any output of food is

$$\text{MRTS}_{FL} = \frac{P_L}{P_K}.$$  

(2A.18)

A similar argument can be advanced for the production of clothing. The only necessary alteration is to draw the isoquant corresponding to a particular level of clothing production in Figure 2A.4. The conclusion is similar. To minimize costs of production for any output level, the clothing producer must set the marginal rate of technical substitution of labor for capital in the production of clothing equal to the ratio of the price of labor to the price of capital:

$$\text{MRTS}_{CL} = \frac{P_L}{P_K}.$$  

(2A.19)

Now, assuming no distortions in the market, such as taxes, ratio of the price of labor with respect to capital ($P_L/P_K$) will be the same for producers of food and clothing. Because both producers adjust to equate their marginal rates of technical substitution to the same ratio of prices, it follows that they also adjust to set these rates of substitution equal to one another. Therefore, combining Equations 2A.18 and Figure 2A.19 yields

$$\text{MRTS}_{FL}^F = \text{MRTS}_{CL}^C = \frac{P_L}{P_K}.$$  

(2A.20)

Equation 2A.20 is the condition for efficiency in production. It follows that perfect competition in the markets for labor and capital implies that the criterion of
productive efficiency will be satisfied. That is, the economy automatically will be led to a point on, as opposed to within, its production-possibility frontier.

A Pure Market Economy and Pareto Efficiency

Next, consider the decisions concerning the level of production for food and clothing. If \( P_F \) is the price of food and \( P_C \) is the price of clothing, the producers can maximize profits by selecting that level of output for which the price of each commodity is equal to the marginal cost of producing that output. Accordingly, profits are maximum for both food and clothing producers when they have adjusted their output to satisfy the following conditions:

\[
\begin{align*}
P_F &= MC_F, \quad (2A.21) \\
P_C &= MC_C. \quad (2A.22)
\end{align*}
\]

where \( MC_F \) and \( MC_C \) are the marginal costs of food and clothing, respectively. The information represented in these two equations may be combined into one equation by dividing Equation 2A.22 by Equation 2A.21:

\[
\frac{P_C}{P_F} = \frac{MC_C}{MC_F}. \quad (2A.23)
\]

It easily can be shown that the ratio of marginal costs in Equation 2A.23 represents the marginal rate of transformation of food into clothing.

The slope of the production-possibility curve can be interpreted as the amount of one commodity that must be forgone in order to produce one more unit of the other commodity. The value of the extra resources necessary to produce this one more unit is the marginal cost of producing that unit, as measured by the forgone alternative commodity output that could have been produced by them. In symbolic form, if \( \Delta F \) is a change in food output and \( \Delta C \) is a change in clothing output, then

\[
\begin{align*}
MC_F &= \Delta C, \quad (2A.24) \\
MC_C &= \Delta F. \quad (2A.25)
\end{align*}
\]

Dividing Equation 2A.25 by Equation 2A.24 gives

\[
\frac{\Delta F}{\Delta C} = \frac{MC_C}{MC_F} = MRT_{CF} = \frac{P_C}{P_F}. \quad (2A.26)
\]

The bowed-out shape of the curve shows that marginal costs of production increase as the production of any good increases. To see the shape, move along the production-possibility curve from \( T \) to \( T' \) in Figure 2A.2, thereby increasing the output of clothing at the expense of decreasing the output of food. When this is done, the marginal cost of food will decrease because less is produced. The ratio of the marginal cost of clothing to food therefore increases, causing the slope of \( TT' \) to increase as point \( T' \) is approached.

Prices of food and clothing are given to persons \( A \) and \( B \). Both \( A \) and \( B \) have a certain income level dependent both on the amount of labor and capital they own and on prices. This income level, together with the prices of food and clothing, determines their budget constraint. The tangency between their budget
constraint line and an indifference curve in their indifference map defines the market basket of goods they choose in order to maximize their utility. This is illustrated in Figure 2A.5.

Given the budget line and indifference curves for $A$, point $E$ represents $A$’s equilibrium position, implying that he consumes $F_A$ units of food and $C_A$ units of clothing in order to maximize his utility. At $E$, the slope of an indifference curve is equal to the slope of the budget line. It follows that

$$\frac{P_C}{P_F} = \frac{MRS_A^{CF}}{MRT_{CF}}.$$  \hfill (2A.27)

Similarly, for $B$ at equilibrium, given $B$’s indifference curve and budget constraint,

$$\frac{P_C}{P_F} = \frac{MRS_B^{CF}}{MRT_{CF}}.$$  \hfill (2A.28)

If both producers and consumers react to the same price ratio, they will behave in a manner that will satisfy the condition for efficiency. To understand this, refer to Equations 2A.26, 2A.27, and 2A.28; the relevant slopes are equal to the same price ratio. It follows that these slopes must be equal to each other; that is,

$$MRS_A^{CF} = MRS_B^{CF} = MRT_{CF} = \frac{P_C}{P_F}.$$  \hfill (2A.29)
which is the condition for efficiency. From a normative point of view, therefore, a perfectly competitive economy is desirable because it leads to efficiency.

**Income Distribution**

But many possible efficient resource allocations are likely if tastes differ between A and B. Which one will the market economy achieve? This depends on the initial income distribution between A and B, which, in turn, depends in part on the amount of productive resources owned by each individual. Their annual income is the sum of payments received by them in return for the services of the productive resources they own. Call the amount of labor and capital that A owns $L_A$ and $K_A$, respectively. B’s labor supply is $L_B$ while $K_B$ is B’s capital. All the available capital and labor is distributed between A and B, so that

$$L = L_A + L_B \tag{2A.30}$$

and

$$K = K_A + K_B. \tag{2A.31}$$

Given the prices of labor and capital services, A’s and B’s annual income levels are $I_A$ and $I_B$, respectively, and can be expressed as

$$I_A = P_L L_A + P_K K_A \tag{2A.32}$$

and

$$I_B = P_L L_B + P_K K_B. \tag{2A.33}$$

If A and B have differing preferences, any change in the distribution of annual income will shift the relative demand for food and clothing, thereby resulting in a change to a new efficient annual output mix.

Under certain circumstances, A and B might agree to an alteration in the distribution of income. For example, A’s welfare might be interdependent with that of B’s. In this case, A might be able to improve his own welfare by making B better off. It would be in his interest to give some of his income to B without asking for any service to be given in return. While such mutually beneficial transfers are easy to administer in a two-person world, they might require a more sophisticated administrative mechanism when many individuals are involved, each with different ideas about what constitutes a desirable distribution. Under these circumstances, a government might emerge from the community’s political institutions to act as an agent for redistributing income according to an agreed plan that allows mutual gains (due to interdependent utility functions) to be realized through income redistribution. This implies that some households will pay taxes while others will receive transfer payments.

The kind of taxes that the government uses must be of a special type, and the government must be careful not to destroy the identity of relative prices, as seen
by producers and consumers. That is, the taxes must not be reflected in any of the relative prices of outputs or inputs so as to distort them in such a way as to make the attainment of efficiency impossible.

**Alternative Economic Institutions and Efficiency**

Alternative economic institutions could conceivably satisfy the efficiency criteria. Productive resources might be owned by the state and could be allocated according to a central plan devised by a managerial agency. In such a Socialist economy, resource allocation would be efficient if the planners succeeded in setting prices of resources and commodities to equal their marginal social benefits and marginal social costs. Given the prices, households and plant managers would then proceed to maximize their returns from trade. In the same way as described in the market economy, this would lead to an efficient outcome and would satisfy Equation 2A.14. The actual efficient resource allocation that would emerge under such a set of institutions would depend again on the income distribution. Because resources are not privately owned, the planners would have to determine the income distribution, and stipends would have to be paid to all citizens to achieve both that distribution and its implied resource allocation.

However, it’s reasonable to believe that such a planned Socialist economy would not attain efficiency in a dynamic or rapidly changing environment. In such a world, knowledge about productive relations and consumption possibilities is likely to be a scarce good. Prices represent an avenue for communication of such knowledge. If a natural disaster occurs that destroys half of the world’s oil supply, information on the economic consequences gets to the citizen through an increase in the price of oil products. The market economy, with its allowance for rapid price changes, provides a mechanism for economizing on such scarce knowledge. The complex interrelationships between and among markets, however, permit rapid communication of occurrences in other markets.

In a planned economy, the managerial committee would require knowledge of changes in all markets simultaneously to achieve the same result and likewise the ability to change prices rapidly. If knowledge is costly to acquire, then it can be difficult for planners both to acquire it and to use it to adjust prices in a way that would accommodate shifts in supply and demand. Thus, when knowledge is a scarce “good,” a market economy then, in fact, might be preferable to a planned one, on the basis of the efficiency criteria.

**MARKET IMPERFECTIONS**

A number of conclusions can be reached concerning the desirable market structure in terms of the efficiency criteria. When producers possess a degree of monopoly power, they might influence the price of their output by manipulating

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their production. Prices can no longer be taken as given for these producers. To maximize their profits, producers no longer set prices equal to marginal costs. Instead, they produce that amount of output that corresponds to a point where marginal cost of output is less than price.

Because the demand curve slopes downward, the marginal revenue is always less than the price of the product. To reach the output level that maximizes profits, the monopolist must restrict the amount of production per time period to a level below that which would prevail if the monopoly were organized as a perfectly competitive industry. When the monopolist firm equates marginal revenues with marginal costs, it finds that marginal revenues are less than prices because the demand curve is not infinitely elastic (as is the case for firms operating under conditions of perfect competition).

If the producer of, say, food has a monopoly, it produces that output corresponding to

\[ MR_F = MC_F, \tag{2A.34} \]

where \( MR_F \) is the marginal revenue of food \( (P_F > MR_F) \) and \( MC_F \) is the marginal cost of producing food. If perfect competition remains in the production of clothing, the following will be true for the profit-maximizing output of clothing:

\[ P_C = MC_C. \tag{2A.35} \]

Dividing Equation 2A.35 by Equation 2A.34 gives

\[ \frac{P_C}{MR_F} = \frac{MC_C}{MC_F} = MRT_{CF}. \tag{2A.36} \]

Because consumers set their \( MRS_{CF} \) equal to the ratio of prices \( P_C/P_F \), it follows that, for any consumer,

\[ MRS_{CF} > MR_{CF}, \tag{2A.37} \]

that is, the independent maximizing behavior of producers and consumers no longer acts to achieve efficiency automatically. For this reason, monopoly is considered undesirable by normative economists. To maximize profits, a monopolist produces less than a perfectly competitive industry producing the same good would produce. In doing so, the monopolist prevents the market from attaining an efficient resource allocation.

Similarly, monopolistic power in input markets results in less of the input, say labor, being offered for sale, so that sellers of the input might maximize their return. Monopolistic power in input markets prevents the attainment of efficiency in production. The normative economist therefore often recommends governmental regulation of competition insofar as this is necessary to attain an efficient resource allocation.