

3

The Market Mechanism and the Impact of Regulation and Taxation

Introduction

In the previous chapter we examined the workings of the price system primarily in the context of markets for the output of final goods and services, and also in situations where there were no natural or artificial impediments to the functioning of the market mechanism. In the present chapter, we note that economists tend to apply the same logic in most other economic contexts — for example, to markets for the inputs to the productive process, usually known as **factor markets**, and to markets for **financial assets** and other assets.

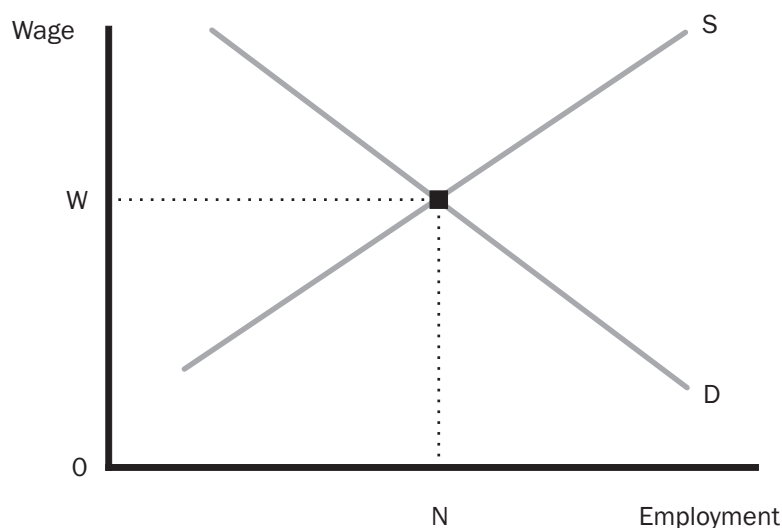
It should also be recognized that in reality, there often will be impediments or obstacles to the smooth functioning of markets. These may be either inherent in the situation, in cases of so-called **market failure** (discussed in Chapter 6), or deliberately imposed from outside, for example by public policy. Governments at all levels frequently pass legislation of one sort or another designed to regulate the operation of particular markets. These may be instituted simply to correct for existing market failures, but they may also be deliberately designed to modify the operation of the market mechanism in different ways in the pursuit of public policy goals. For example, there may be price controls legislating maximum or minimum prices in certain situations. Governments also impose taxes of various types, the purpose of which may be simply to raise revenue for the public finances, to pursue other macroeconomic goals, or deliberately to affect behavior in the particular market under consideration in pursuit of social goals. Either way, intentionally or otherwise, the taxes imposed will affect behavior in individual markets, and it is important to be able to understand in what ways they do so. In this chapter, we therefore also consider some examples of different types of market regulation and the ways in which they will likely alter the results of the demand and supply analysis.

Note that we will later examine the impact of other government intervention elsewhere throughout this book. Governments intervene when the market fails in cases of third-party externalities, such as environmental pollution, or because of the accumulation of monopoly powers by business. Also, governments frequently intervene because the market-based outcome is not deemed to be socially or politically desirable — because of the impact on income distribution, for example.

Factor Markets

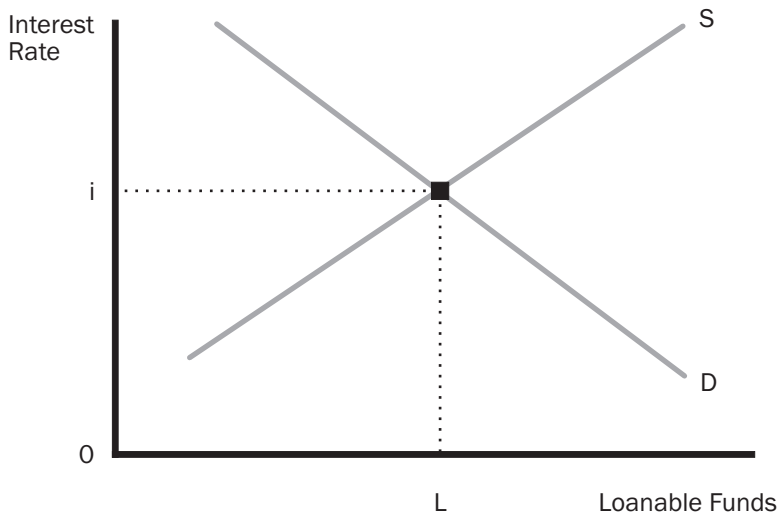
The markets for inputs to the productive process, such as the market for labor or for raw materials, are usually known as factor markets. They provide classic examples of the situation of **derived demand**. That is to say, the good or service under consideration is only demanded because of its

Figure 3.1: The Labor Market



contribution to the ultimate bottom line. For example, although it may be ethically objectionable to many people, neoclassical economists think of the labor market as “just another market” precisely in those terms. As in Figure 3.1, there will be a downward-sloping demand-for-labor curve and an upward-sloping supply-of-labor curve. The intersection of the two will determine the wage rate for this particular type of labor, and the level of employment in the industry. Both variables are determined by market forces, rather than by any notions of what a “fair” wage rate might be.

The demand for labor is thought to arise from the **marginal productivity of labor** in producing a particular final good or service that will yield profit to the employer. It slopes downward because the marginal productivity of labor is believed to decline with increases in employment. Therefore, lower real wages are required to justify further employment from the employer’s point of view. The supply of labor, meanwhile, is supposed to arise from the **labor/leisure choice** made by individual workers. It slopes up because higher real wages are needed to persuade workers to give up “leisure”. Changes in labor market conditions will then lead to changes in both wages and employment in the labor market. For example, a technical change causes an overall increase in labor productivity and will shift the demand curve for labor to the right, and increase both the wage rate and the level of employment.

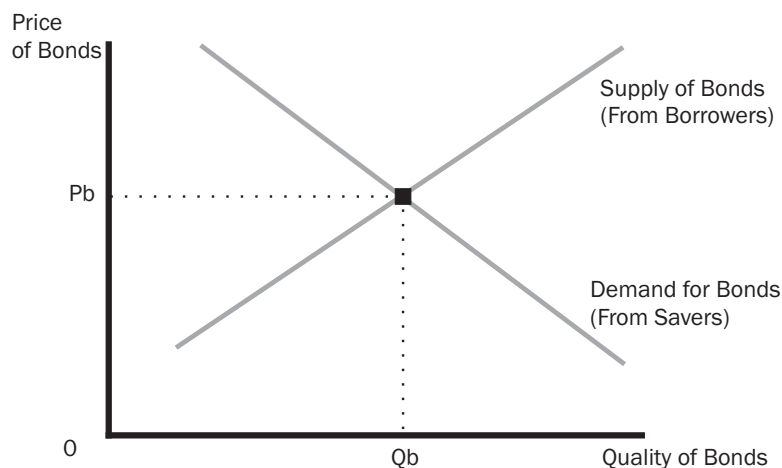
Figure 3.2: The Market for “Loanable Funds”

Financial and Asset Markets

Economists also apply the demand and supply logic to the financial markets that bring together borrowers and lenders of money. We illustrate with the standard analysis of the market for “loanable funds” in Figure 3.2. In this case note that it is not the price of a financial asset per se that appears on the vertical axis, but rather the yield or interest rate on the asset. The relation between asset prices and yields is explored in more detail in the appendix following this chapter, as borrowing and lending in particular markets is in fact often organized by the issue of **financial securities**, such as **bonds**. In Figure 3.2, however, the borrowers (for example, firms who want to finance capital investment) simply have a demand for loanable funds that is downward sloping with respect to the interest rate. Similarly, in the diagram there is an upward-sloping supply curve of loanable funds on the part of the lenders. The intersection of the demand for and supply of loanable funds then determines the market interest rate. If there is a change in the motivations of either the borrowers or the lenders, this will cause a change in the interest rate. For example, if there is an increase in the desire to save, this will tend to shift the supply curve of loanable funds down and to the right and reduce the interest rate, and so on.

Figure 3.3 repeats essentially the same analysis, but now in terms of the demand and supply for financial assets such as bonds. This will determine

Figure 3.3: The Demand for and Supply of Bonds



the capital price of the bond, rather than its yield. The lenders are demanding bonds, and the borrowers are supplying them. It is the lenders who are now associated with the demand side in the diagram. An increase in the desire to save, discussed in the context of interest rates above, in this diagram will cause an increase in the demand for bonds, shift the demand curve out and to right, and increase the price of bonds. The price of bonds and the interest rate (or yield) on bonds move in opposite directions.

Further examples of the operation of the price mechanism in assets markets will be given later in the book. For example, the market for **foreign exchange** is discussed in Chapter 12.

The Impact of a “Price Ceiling”

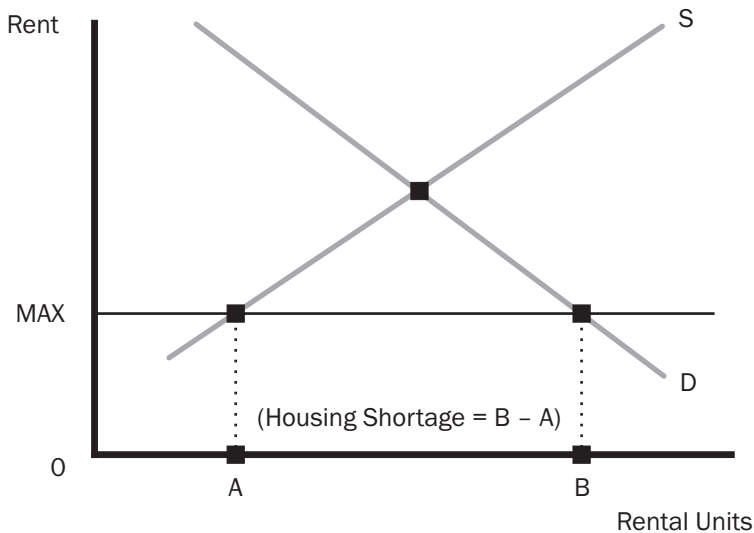
As mentioned, one possible form of market regulation is legislation specifying a maximum price that can be charged in a particular market, a **price ceiling**. Returning to our example of rental housing from the previous chapter, this frequently occurs in such markets. The argument in favor of rent controls will usually be along the lines that tenants in a particular city or other jurisdiction are entitled to “affordable housing”. The argument against rent controls is that they distort the market incentives for the provision of such housing, as discussed in that chapter. Figure 3.4 shows the likely result of rent control in the case where it is “binding”.

If the maximum price is to be binding (that is, if it is to have any effect) it must be set below the price that market forces would have established anyway; for example, at a level such as MAX in the diagram. In that situation, the supply of rental housing will be “A” units, but the demand will be much higher, at “B” units. Therefore, the effect of the rent controls is to cause a perceived housing **shortage** of $(B - A)$ units. In this situation a proponent of market forces would be likely to argue that the rent controls are themselves the problem. The reason for the shortage of housing is that there is no economic incentive for landlords to provide the extra apartments. The political response may be otherwise, however, to the effect that the existence of the housing shortage itself *proves* the need for rent control.

In the case of rent control, the supply curve can also be affected. At the artificially low price, some landlords cannot survive. They literally “walk away” from the buildings, or attempt to convert the rental units into condominium ownership. This happened, for example, in Toronto in the 1970s. To sustain the supply of rental units, the government was forced to pass legislation that prevented building owners from converting their rental properties to condominiums.

Similar rationing or shortages can also occur in financial markets, of course. Suppose, for example, that in a particular credit market an interest

Figure 3.4: Rent Control



rate ceiling, or a maximum permissible interest rate, is imposed by the relevant authorities. In this case, we may observe the phenomenon of **credit rationing** in the amount $(B - A)$, as illustrated in Figure 3.5. In the field of development economics, this type of situation has sometimes been labeled **financial repression**. The idea is that interest rates in the developing world are often determined by purely administrative or political decisions, and if they are set “too low”, the financial sector will not develop (it will be “repressed”) because of the lack of incentives for lenders.

The Impact of a “Price Floor”

The opposite of a price ceiling is the imposition of a **price floor**. In such a case the legislation specifies a minimum price to be paid for any good or service. An obvious example would be minimum wage laws (treating the wage rate as the price paid for the services of labor). In practice, of course, minimum wage laws are often applied at the economy-wide or macroeconomic level. However, here we consider the impact in a particular labor market only, such as (to take a contemporary example) workers in fast-food restaurants. This is illustrated in Figure 3.6.

If the minimum wage law is to be binding, it must be set at a level above that which market forces would establish if there were no regulation. At the legislated minimum wage rate (MIN in the diagram), the demand for labor is “H”, and the supply of labor would be “G”. The supply of labor is greater than the demand for it, and there is unemployment in this particular sector, equal to $(G - H)$. The free market solution would be for wages to fall and employment to rise. However, this is ruled out by the legislation. Therefore, the argument would be that the basic effect of a binding minimum wage law is to cause persistent unemployment in the affected sector. Note that there is something of a conflict of interest here between two groups of workers: those who are employed and those who are unemployed. The workers who *do* have jobs are likely to be happy with their higher wages, which they will lose if employment increases. The unemployed, however, would be happy just to have jobs, even if the wages were lower. The economist interested in the optimal allocation of resources would tend to side with the unemployed workers in this case. The argument would be that if the labor market is allowed to clear, society as a whole would be better off and that this would be the efficient solution. Such issues will be discussed in more detail in the section on taxation below. Evidently, however, from the political standpoint such reasoning is not likely to cut much ice with those who would actually lose by the change. Also, from a political standpoint, the actual numbers matter. If unemployment is relatively low, politicians can “buy” many more votes by

Figure 3.5: Financial Repression

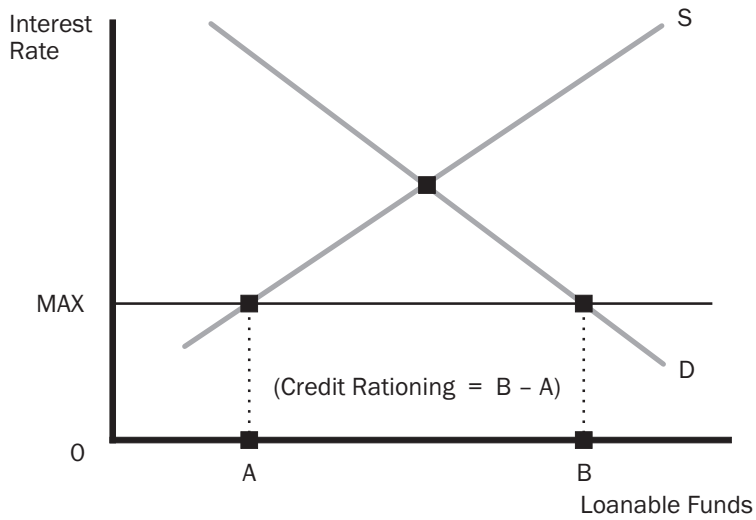
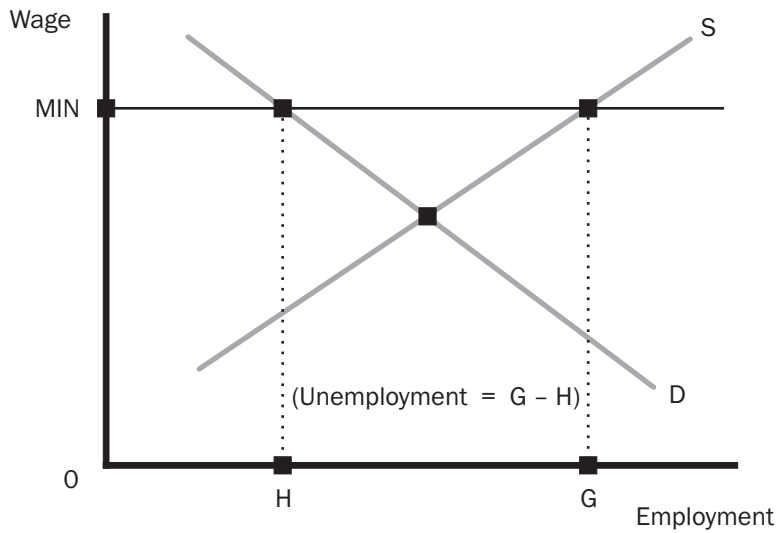


Figure 3.6: A Minimum Wage



raising the wages of those employed than they can by creating jobs for the relatively few unemployed.

We can sum up the overall discussion of price ceilings and price floors with the observation that a binding maximum price will cause a shortage (in our example above, a housing shortage or credit rationing), whereas a binding minimum price will cause a **surplus** of the good in question (in our example, a “surplus” of workers seeking jobs).

The Impact of Taxation

If a tax is imposed on economic activity in any particular market, this will also affect the price charged and quantities bought and sold of the item. A tax can be imposed on either side of the market. It can be levied,

Case Study 5

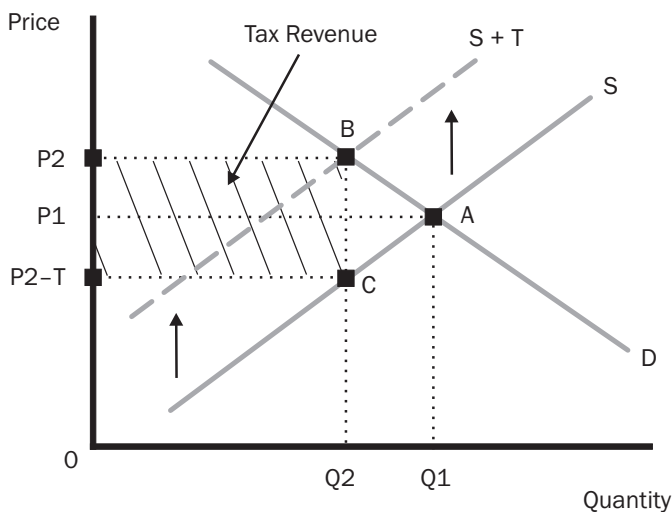
“California Abolishes
the Minimum Wage”
Sacramento; June 10, 2020

Today the governor of the State of California, Mr. Karl Vandenberg, signed a bill to eliminate the minimum wage for the state. The governor argued that the legislated minimum wage created rigidities in the California labor market and, therefore, an unacceptably high level of unemployment. The change will allow all workers to secure meaningful jobs. The governor acknowledged that there will be issues with respect to low wages. Therefore, the government has also introduced legislation to provide income support to working families. Also, there will be new programs to create more affordable housing to meet the needs of lower-income working families.

in the first instance, either on consumers at the point of purchase or on suppliers at some stage of the manufacturing process. An example of the latter was the old Manufacturers' Sales Tax (MST) in Canada, which was later replaced by a tax imposed on consumers known as the Goods and Services Tax (GST).

In the example shown in Figure 3.7, we consider a so-called **specific tax** imposed on the supply side of the market. What is meant by a specific tax is simply an imposition of "x dollars" per unit on the item. From the producers' point of view, if the tax is levied on them, this increases costs at each level of output by the amount of the tax. This is shown by a shift of the post-tax supply curve up and to the left. The new equilibrium price in the market will be higher than it was before the tax, and the level of output will be lower. Price increases from P_1 to P_2 , and output falls from Q_1 to Q_2 . However, producers obviously do not receive the whole of the price P_2 for their efforts. Although the consumers pay P_2 , the producers receive only $(P_2 - T)$, where T is the specific tax. The rest of the proceeds represent the total revenue received by the government, equal to the shaded area in the diagram. It is therefore also possible to use the analysis to discuss the **incidence** of this tax, meaning who ultimately pays, regardless of where the tax is first imposed. Actually, both consumers and producers "pay" something. The consumers in effect lose that portion of the rectangle $(P_2 - T, C, B, P_2)$ above the line (P_1, A) , whereas the producers lose the

Figure 3.7: A Specific Tax



taxation of that portion of the rectangle below the line. These represent parts of lost **consumer surplus** and lost **producer surplus**, respectively. (Consumer surplus is the area under the demand curve and above the original price point; producer surplus is the area above the supply curve and below the original price point.) By reducing output and raising prices, the producers have been able to **shift** some of the tax to consumers, even though the tax was imposed on producers in the first place. The extent to which they will be able to do this clearly depends on the elasticities of demand and supply, as discussed in Chapter 2.

From the point of view of the idea that a market solution represents the most efficient allocation of resources, the main complaint about the tax would be that it distorts market incentives and moves the economy away from the presumed optimum. Prices end up higher, and output is lower than would be the case in a free market with no tax. It is even possible to put a dollar figure on these losses. The amount that society *as a whole* is supposed to lose can be calculated from the area of the triangle (C, B, A) in the diagram. This can be calculated as a dollar sum as it involves both prices and quantities. This is known as the **deadweight loss** of the market distortion. As mentioned, consumers lose some consumer surplus and the producers lose producer surplus, but the shaded portion of these losses is transferred to the government (and, presumably, ultimately to the beneficiaries of government programs) in tax revenue. They are not lost to the society as a whole. The triangle (C, B, A), the area *not* shaded in the diagram, however, consists of lost consumer and producer surplus that is not received by, or transferred to, anybody. This is a net loss to the whole society.

The diagram in Figure 3.8 illustrates the concept of consumer surplus in more detail. The notion of consumer surplus arises because in most markets, all consumers pay the same price, the market price, for all of the units of the item that they purchase. They get some benefit from this circumstance because, as the downward slope of the demand shows, if the supply had been more restricted they would have actually been prepared to pay a higher price for some of these units. In other words, the first Q_1 units of the good would have been valued at P_1 each, the first Q_2 units at P_2 each, and so on. Therefore, apart from the “marginal” (last) unit, the subjective valuation of all units sold is greater than the price, P' , that all consumers are asked to pay. The total benefit of this can be expressed in dollar terms as the shaded area under the demand curve above P' . This is the so-called consumer surplus. Producer surplus, analogously, would be an area *above* the supply curve, representing the fact that producers also receive the market price on all units sold but that the actual costs of each unit, except for the marginal unit, are typically less than this (in the case of an upward-sloping supply curve).

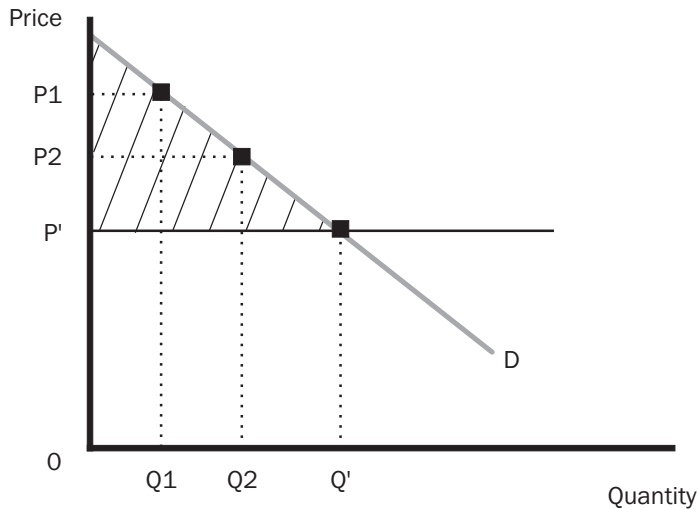
Figure 3.8: Consumer Surplus

Figure 3.10 shows how it is possible to put some dollar numbers on consumer and producer surplus and, hence, use these numbers rhetorically in debate about various economic changes. In the diagram we see that an increase in price of this product from \$8 to \$16 causes demand to fall from 18 units to 16 units. By working out the total area of lost consumer surplus we can make statements such as “this change has cost consumers \$136”.

Note that the idea of consumer surplus, in particular, would have some relevance to the business strategy for a firm that had some **market power** in a particular field, and could split up or **segment** the market in some way so that all or some consumers will pay different prices, reflecting the actual valuation they individually place on the particular good or service, rather than a single market price. An example of this is when home service contractors provide an “estimate” to each individual customer for each individual contract, and therefore some consumers pay a higher price (for roughly the same work), depending on their negotiating skills. This would be an example of so-called **price discrimination**. If there could be **perfect price discrimination**, the seller would be able to extract all the consumer surplus from the customers (i.e., the whole of the area under the demand curve).

Returning now to the issue of taxation, we should also consider the case of an **ad valorem tax**, which is probably a more familiar method of taxation than the specific tax discussed above. This is where the tax is expressed as a percentage of (in this case) the original supply price: in

Figure 3.9: Producer Surplus

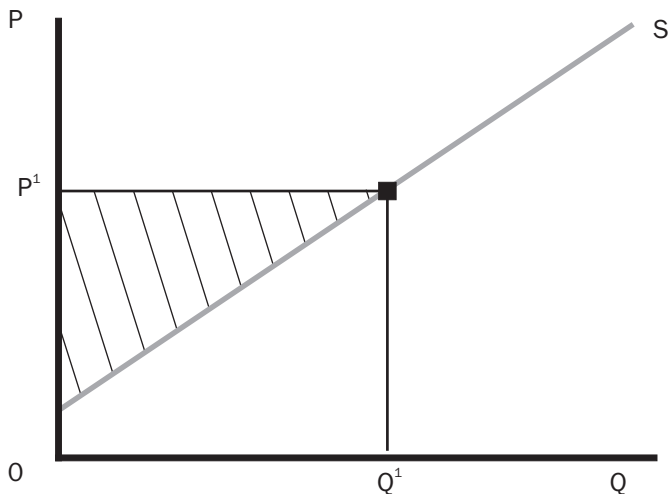


Figure 3.10: Numerical Example of Consumer Surplus

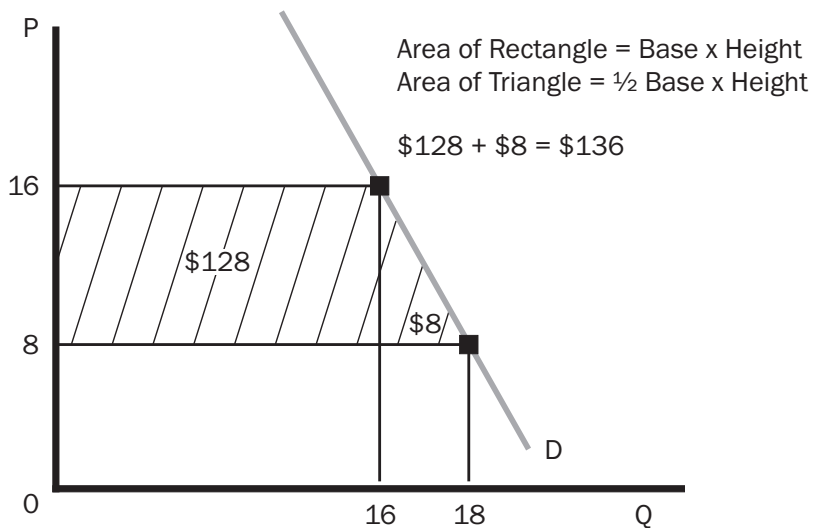
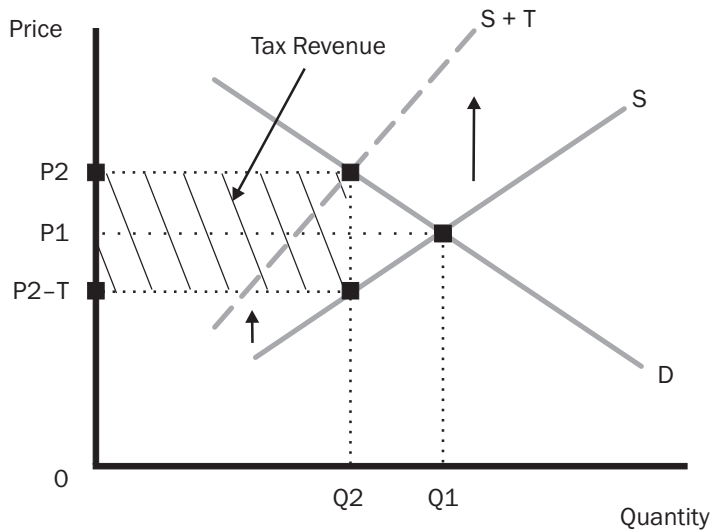
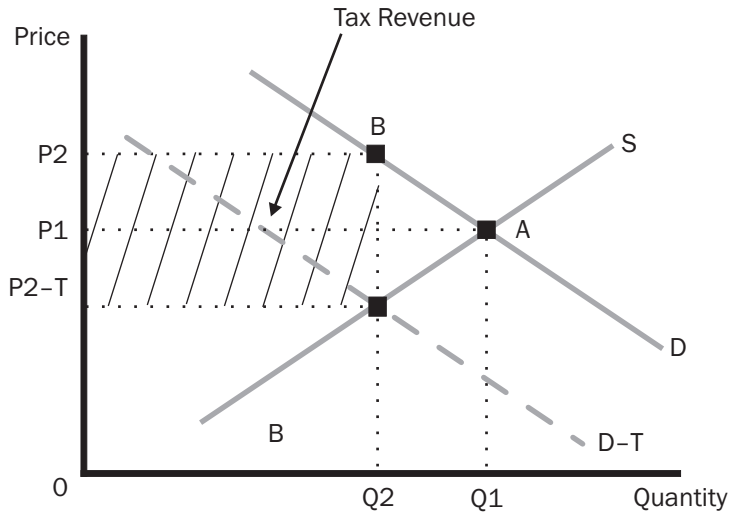


Figure 3.11: An *Ad Valorem* Tax

other words, a tax of 10%, 15%, 20%, and so on. This type of tax is shown in Figure 3.11. As can be seen, in this case not only does the post-tax supply curve shift up and to the left, but the slope of the curve also becomes steeper. Otherwise, the analysis remains unchanged.

Finally, note that both a specific tax and an *ad valorem* tax could also be imposed on the demand side of the market in the first instance, thus shifting the demand curve rather than the supply curve, as is assumed in Figures 3.7 and 3.11. Figure 3.12 illustrates the effect of a specific tax imposed on the demand side of the market. This shifts the demand curve vertically upward by the amount of the tax. Note, however, that the final analysis of the price ultimately paid by both consumer and producers, and how the tax is shifted, works out exactly as in the earlier example where the tax was imposed on the supply side. Why then would government tend to prefer to impose a tax on producers rather than consumers? The answer is probably quite simple: more votes. But, on the other hand, why do we often actually see **value-added taxes** (VAT) on demand (i.e., at the retail level), like the GST in Canada mentioned earlier? The explanation here may be the power of the business lobby and the need to maintain international competitiveness if this form of taxation is common among trading partners.

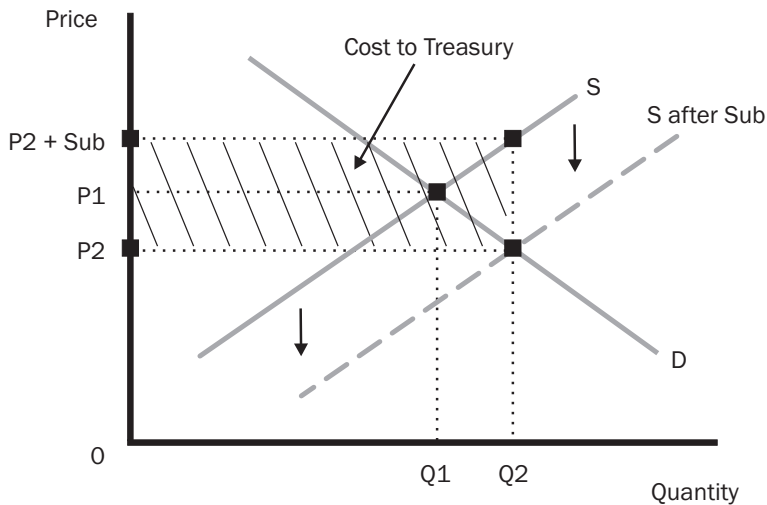
Figure 3.12: A Specific Tax Imposed on Consumers



Subsidies

The opposite of a tax (in some sense) is a subsidy, where one level of government or another is willing to subsidize either producers or consumers in a particular market, by literally paying some portion of either the cost or purchase price. Needless to say, however, taxpayers elsewhere in the economy are still being asked to pay for this *largesse*. Subsidies are usually justified on social grounds: for example, that a particular industry may not survive unless a subsidy is granted. As with taxes, there can be either **consumer subsidies** or **producer subsidies**. We illustrate the issue of subsidization with just one example, that of a producer subsidy of “x dollars” per unit, as in Figure 3.13. The impact of the subsidy in this market is to shift the supply curve down by the amount of the subsidy. As they now receive the subsidy, the producers can sell more of the good at a lower price. The impact in the marketplace is that output and the quantity sold increase from Q1 to Q2, and the price paid by consumers falls from P1 to P2. The actual cost of producing Q2 units, however, is (P2 + sub), and the difference must be paid by the government. The total cost to the treasury on Q2 units, therefore, is the shaded area in the diagram. So, the subsidy is beneficial to both the consumers and producers in this particular market, but the costs are paid by other taxpayers. It can also be argued that the market

Figure 3.13: A Producer Subsidy



mechanism is distorted, once again. In this case, too *many* resources are devoted to the production of this particular item. Output is inefficiently large because the price paid by consumers does not represent the true costs of production. There is also a case to be made, however, that *assuming* the authorities have indeed decided to intervene in the market mechanism for social reasons, the deadweight loss of achieving their particular goal by the route of a subsidy will be less than by other methods. The reason is that there is no loss of consumer surplus here. Consumers get all they want; it is just the loss to taxpayers from subsidizing inefficient production that causes losses to the society. As suggested previously, however, such niceties probably do not carry much weight in the political arena. Note that this type of analysis can explain such things as the “success” of Airbus, the European commercial jet aircraft venture at the end of the 20th century. It is true that by that time Airbus could be counted as a player in the commercial airline industry; but this was based on an initial deadweight loss of, literally, billions of Euros in subsidies.

Chapter Summary

- Economists apply the logic of the price mechanism to all types of markets, including factor markets and asset markets.

- Any attempt by government to set a price different than that which would be established by the market (e.g., for social reasons) will have a definite impact on the economy.
- Price ceilings (e.g., rent controls) create shortages while price floors (e.g., agricultural price supports) create surplus production.
- Taxes distort equilibrium prices and quantities in the marketplace. Both producers and consumers are given incentives to change their behavior.
- Subsidies are another form of market distortion. Governments take money from one activity, such as education, and use it to support another area, such as steel production.
- Subsidies are defended on the basis of their social benefits. In the case of steel this could include jobs, exports, regional development, research and development, etc.
- Economists always tend to stress the opportunity costs involved and the need for rigorous cost-benefit analysis before a decision to tax or subsidize is finalized.

Problems

1. Ticket prices for sporting and entertainment events are often regulated by municipalities. For example, the city of Los Angeles oversees pricing of events at baseball's Dodger Stadium. If scalping is legal, there will be a market price for scalped tickets, set in the usual way. However, if it is illegal, it is possible to impose a penalty on either the seller (the scalper) or the buyer. Using supply and demand analysis, show that there will be a larger impact on the equilibrium level of scalping if penalties are imposed on both sides of the market.
2. The rent control agency in Bucharest has found that the demand for apartments is $Q_d = 320 - 16P$. Quantity is measured in tens of thousands of apartments. Price, the average monthly rental rate, is measured in hundreds of Euros. The agency also noted that the increase in Q at lower P results in more three-person families coming into the city and demanding apartments. The city's board of realtors acknowledges that this is a good estimate of demand and has shown that supply is $Q_s = 140 + 14P$.
 - (a) If both the agency and the board are right about demand and supply, what is the free market price? What would be the change in the population of the city if the agency sets

a maximum average monthly rental in Euros, and all those families who cannot find an apartment leave?

- (b) Suppose the agency bows to the wishes of the board and sets a rental rate of €1800 per month on all apartments to allow landlords a “fair” rate return. If 50% of any long-run increase in apartment comes from new construction, how many apartments are constructed?
3. Suppose that a government argues that it can increase revenue from a particular sector by actually *lowering* tax rates. Choose a constant excise (specific) tax, and show a case in which this is possible. Would it make a difference if demand is elastic or inelastic?
4. The city council of a small college town decides to regulate rents in the town order to reduce student living expenses. Suppose the average annual market-clearing rent for a two-bedroom apartment has been \$900 per month, and rents were expected to increase to \$1,200 within a year. The city council limits rents to the current \$900 per month level.
- (a) Draw a supply and demand diagram to illustrate what will happen to the number of rental apartments after the imposition of rent control.
- (b) Do you think this policy will benefit all students? Why or why not?
5. The market supply and demand functions for milk are:
- $$Q_s = 800 + 100P$$
- $$Q_d = 2,000 - 500P$$

To assist milk producers, the government is implementing a price floor of 2.25 per unit. How many units of milk must the government buy at 2.25? How much money must the government spend? What is the increase in producer surplus?

6. How can consumer surplus be determined?

Appendix 3.1

The Relationship between Yields and Financial Asset Prices: An Example

Consider a financial security, such as a bond, which has a **face value** F , attracts an annual **coupon payment** C , and has a term of n years to **maturity**. In a competitive financial market the price of the bond should be equal to the present discounted value of the stream of future coupon payments, and the eventual repayment of **principal**, discounted at the market rate of interest, i . That is:

$$(3A.1) \quad P_B = C/(1+i) + C/(1+i)^2 + C/(1+i)^3 + \dots + C/(1+i)^n + F/(1+i)^n$$

This immediately shows the inverse relationship between the price of bonds and interest rates. When interest rates fall, the price of bonds goes up and vice versa.

For a **zero coupon bond**, that is, a debt instrument that promises only to pay back the principal or face value after a certain number of years, this will reduce to:

$$(3A.2) \quad P_B = F/(1+i)^n$$

In other words, such a bond will sell only at a discount.

Finally, for a debt instrument that is a **consul** or a **perpetuity** (meaning that the principal will never be repaid, and the holder is simply promised a certain coupon payment in perpetuity), the bond price reduces to the simple expression:

$$(3A.3) \quad P_B = C/i$$

Suppose, for example, that in equation 3A.3 the coupon is \$50. When the market interest rate is 5%, the bond will sell at \$1,000 (which is probably

Chapter 3

its nominal face value). If the interest rate rises to 6.25%, the price of the bond will fall to \$800. If, however, the interest rate falls to 4%, the price of the bond will rise to \$1,250.