Demand and Supply: The Basics

4

- → CHANGES IN DEMAND AND SUPPLY
- → COMPETITION
- → PRICE CEILINGS AND PRICE FLOORS
- → LAW OF DEMAND AND LAW OF SUPPLY
- → EQUILIBRIUM
- → CHANGES IN QUANTITY DEMANDED AND QUANTITY SUPPLIED

INTRODUCTION

Economics is sometimes said to be "common sense made complicated." This description is somewhat true of the concepts of supply and demand. Supply and demand are fundamental to the study of economics, and understanding supply and demand is essential for performing well on both the AP Microeconomics and Macroeconomics exams. At the heart of economics is the role of prices in decision making and in the allocation of scarce resources through supply and demand. By mastering the basics of supply and demand, essential concepts in AP Microeconomics and Macroeconomics are understood much more easily. This chapter will cover the basics of supply and demand for you in detail, and with a little effort, it should be common sense made simple.

THINGS TO KNOW

Based on the most frequently asked questions on previous advanced placement exams, the following are the most important concepts. In this chapter, we will expand on these and other concepts and examples.

1. **CHANGES IN DEMAND VERSUS CHANGES IN QUANTITY DEMANDED, AND CHANGES IN SUPPLY VERSUS CHANGES IN QUANTITY SUPPLIED.** Changes in demand or supply show how nonprice determinants cause a shift in the demand or supply curve. Changes in quantity demanded result from only a price change in the good being analyzed, and there is no shift of a curve, just a movement along a fixed curve.
2. **MARKET EQUILIBRIUM.** This is the level of output and price at which the quantity demanded equals the quantity supplied. This provides a reference point for discussion of shortages and surpluses as well as a base of government policies.
3. **NONPRICE DETERMINANTS OF SUPPLY AND DEMAND.** Examples follow in this chapter on what factors influence increases or decreases in demand (supply).

4. **SIMULTANEOUS CHANGES IN DEMAND AND SUPPLY.** Examples and a table will follow to illustrate this situation.
5. **GOVERNMENT INDUCED CHANGES IN THE FORM OF PRICE CEILINGS AND PRICE FLOORS.** Examples and graphs will follow in this chapter.

DEMAND AND THE LAW OF DEMAND

A market's **demand** shows the quantity of a product a consumer is willing and able to purchase at each and every price. The demand for a product is shown graphically as a demand curve (see Figure 4.1). The demand curve performs one important job, and that is showing the quantity consumers want to buy at every price. You likely already know that at higher prices, people tend to buy less of a product, and at lower prices, people buy more (common sense!). If so, then you also already know the **law of demand**, which states that when the price of a product increases, the quantity demanded decreases, and vice versa (ceteris paribus— "all other things remaining unchanged"). This relationship is shown in the down-sloping demand curve shown in Figure 4.1. An easy way to remember the demand curve's slope is "DEmand DEclines."

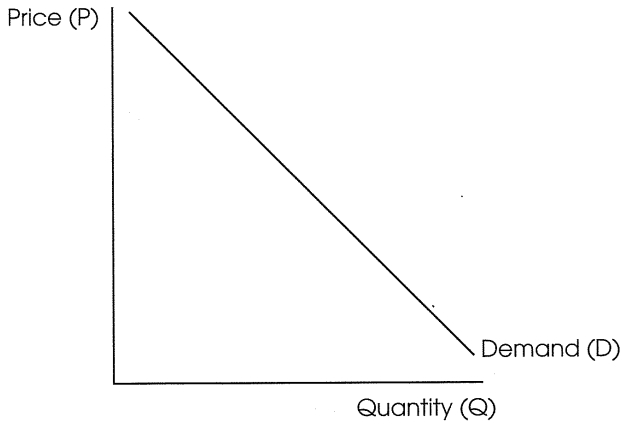


Fig. 4.1 A Demand Curve

Reasons for the Law of Demand

There are two important reasons why people buy less of a good when the price increases and more when a price decreases, giving the demand curve its downward slope.

1. **THE INCOME EFFECT.** When prices fall, consumers can afford to buy more of a particular good or service. When prices rise, consumers' income will not buy as many goods and services, and the quantity people will buy of a product decreases. This is known as the income effect.
2. **THE SUBSTITUTION EFFECT.** When the price of a good increases, its price has also gone up relative to the prices of other goods, all else equal. If we assume apples and oranges are substitutes, a increase in the price of apples will lead consumers to purchase more oranges and fewer apples. This is known as the substitution effect and further reinforces the notion of a downward sloping demand curve and the law of demand.

Change in Quantity Demanded vs. Change in Demand

One of the most confusing topics for students to comprehend about supply and demand is when there is a change in the quantity demanded or a change in demand. These two phrases

have different meanings although they sound similar. When the market for a product only has a price change, there is not a shift in the demand curve, but a movement along an existing curve. This is known as a change in the **quantity demanded.** As shown in Figure 4.2, as the price decreases from P_1 to P_2, the quantity demanded increases from Q_1 to Q_2. As price is the only variable that changes, this is just a change in the quantity people would buy at the new price (the quantity demanded), and no shift in the curve occurs. A change in price is just a movement along a fixed demand curve, a change in the quantity demanded.

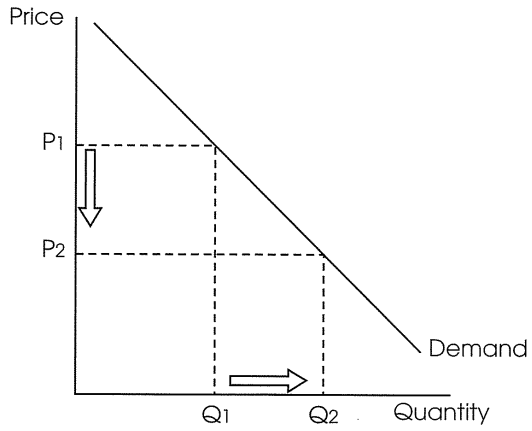


Fig. 4.2 A Change in Quantity Demanded

Shifts of the Demand Curve: The Determinants of Demand

There are other scenarios where people will want to purchase more or less of a good at the same price. These are not just price changes that result in a change in the quantity demanded but variables that cause consumers to buy more or less of a product at the same price. These are called the **determinants of demand** (also called shifters of demand). As shown in Figure 4.3, an increase in one of these determinants of demand would shift the demand curve to the right (D_1 to D_2), and a decrease would shift the curve to the left (D_1 to D_3).

USEFUL HINT

Useful Hint regarding curve shifts: "Less to the left, more to the right."

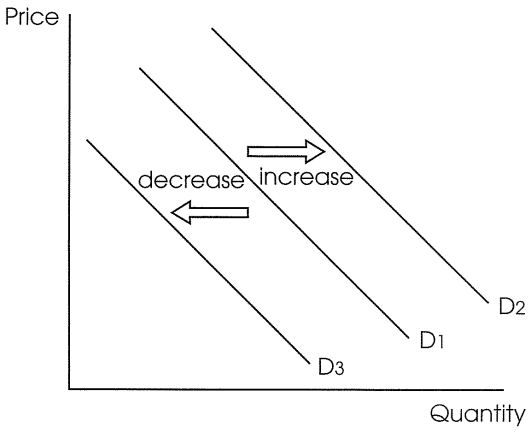


Fig. 4.3 Shifts in Demand

The determinants of demand can be learned by the acronym SPICE shown in Table 4.1, followed by an explanation of each with examples.

Table 4.1

Determinants of Demand—SPICE (Shifters of the Demand Curve)

S—Substitute goods

P—Preferences and population

I—Income

C—Complementary goods

E—Expectations

USEFUL HINT

Price and demand for substitute goods have a direct relationship: if the price of one goes up, the demand for the other product goes up.

SUBSTITUTE GOODS

Two goods are substitutes when an increase in the price of one good results in an increase in demand for the other good, and vice versa.

EXAMPLE

Assume consumers view apples and oranges as perfect substitutes. If the price of apples increases while the price of oranges remains constant, the quantity demanded of apples decreases, and consumers will now demand more oranges at each price, shifting the curve for oranges to the right (see Figures 4.4 and 4.5). (*Note*: The demand curve for apples will not shift, this is just a decrease in the quantity demanded, a movement along a fixed apple demand curve. The demand curve for oranges will increase and shift to the right.)

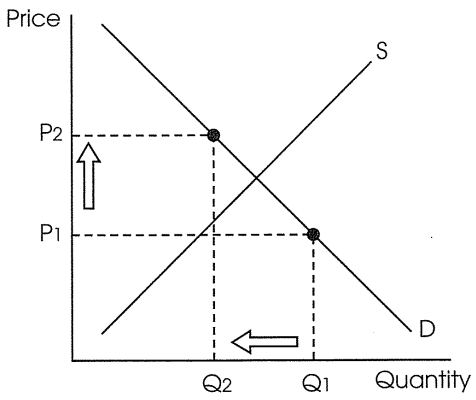


Fig. 4.4 Market for Apples

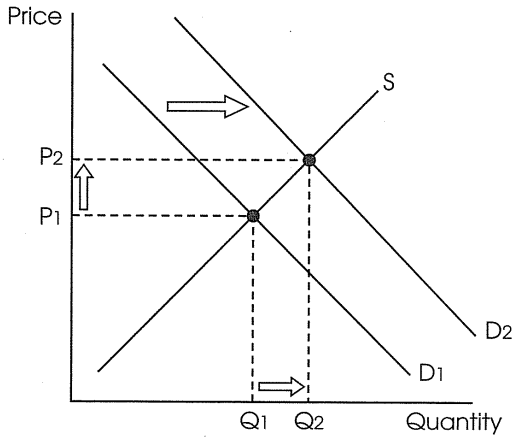


Fig. 4.5 Market for Oranges

PREFERENCES

Preferences refers to a consumer's tastes or preferences for a good or service. If people's preferences for a specific product increase, the demand curve will shift to the right.

EXAMPLE

A successful advertising campaign for a product by a celebrity movie star may increase the demand for a product, making consumers want to buy more at each price level (a shift from D_1 to D_2 on Figure 4.3). Other examples of preferences changing demand are the latest fads in fashion, coolness of a product, or a decline in popularity for out-of-date technology.

POPULATION

Sometimes also referred to as the number of consumers in a market, population refers to the total number of buyers in a specific market. A bigger market will mean more demand.

EXAMPLE

If there is a huge baby boom in a country, there will be more demand for baby supplies. Conversely, an increase in the number of people older than 65 would lead to more demand for retirement and nursing homes.

INCOME

When people have more income, they generally increase their demand for most products. Most goods are **normal goods**, where as income increases, the demand for a product increases. Some goods, however, are **inferior goods**, where an increase in income leads to a decrease in demand.

EXAMPLE

Some normal goods are steak and vacation homes. As consumers have more income, their demand would go up for these products. Or consider used cars or goods sold at thrift stores. As consumers' incomes increase, they may buy more new cars instead of used or shop for new clothing as opposed to second hand clothes.

USEFUL TIP

The price and demand for complementary goods have an inverse relationship. If the price of one increases, the demand for the other good decreases, and vice versa.

COMPLEMENTARY GOODS

Goods that are purchased separately but are used together are known as complementary goods.

EXAMPLE

Consider the market for large cars and gasoline. If the price of gas rises significantly, consumers will find it more expensive to own a large, gas-guzzling car. The demand for large cars would decrease due to the increase in price for gas. Another example would be hot dogs and hot dog buns. If the price of hot dogs decreases, the quantity of hot dogs purchased would increase, and the demand for buns would increase, shifting the bun demand curve to the right.

EXPECTATIONS

Consumers' expectations of future prices can have a large effect on current demand for a product. An expectation of higher prices in the future will cause an increase in current demand.

EXAMPLE

If consumers expect prices of new houses to increase dramatically in the future, the present demand for new houses will increase, shifting demand to the right. If people feel that home prices will decrease significantly next year, that would decrease current demand for housing, as consumers will wait until next year.

SUPPLY AND THE LAW OF SUPPLY

Buyers dislike high prices, but they are likely to make sellers happy. Since buyers and sellers feel differently about prices, the supply curve will have a different meaning and slope than the demand curve. A market's **supply** shows the quantity of a product a producer is willing and able to offer for sale at various prices. The supply for a product is shown graphically as a supply curve, as in Figure 4.6. The supply curve performs one important job, which is showing the quantity producers want to offer for sale at every price. The **law of supply** states that when the price of a product increases, the quantity supplied increases, ceteris paribus. An easy way to remember the positive slope of the supply curve is "Supply to the sky."

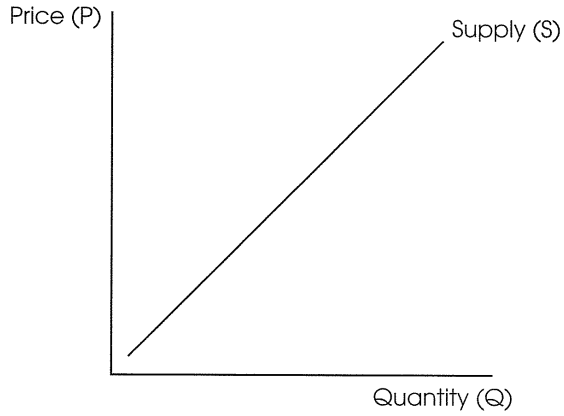


Fig. 4.6 A Supply Curve

Reasons for the Law of Supply

When prices increase, sellers have greater opportunities for increasing their profits. This is one reason to explain why as prices rise, so does the quantity supplied. Also, as producers increase production, the cost of producing each additional unit generally increases as sellers face rising marginal costs of production. Hence, it takes a higher price for the product to induce producers to offer more for sale. Conversely, if the price falls for a product, there is less incentive or motivation to offer a product for sale and the quantity brought to market will decrease. As prices fall, firms find it harder to cover costs of production and earn smaller profits, so less is offered for sale.

Change in Quantity Supplied vs. Change in Supply

Similar to demand, supply also makes a distinction between a change in quantity supplied vs. a change in supply. When the market for a product only has a price change, there is not a shift in the supply curve, but a move along an existing curve. This is known as a change in the **quantity supplied.** As shown in Figure 4.7, as the price increases from P_1 to P_2, the quantity supplied also increases from Q_1 to Q_2. Because price is the only variable that changes, this is just a change in the quantity supplied, and no shift in the curve occurs. There is a change in the quantity producers will offer for sale, but the curve does not shift. A change in price is just a movement along a fixed supply curve.

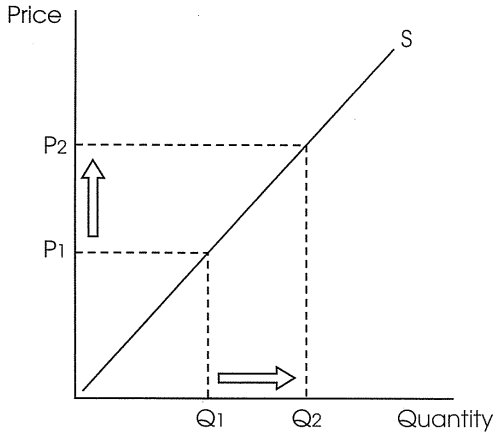


Fig. 4.7 A Change in Quantity Supplied

Shifts of the Supply Curve: Determinants of Supply

There are many factors for producers that impact the amount of a good that will be offered for sale at each price. Just as with the demand curve, these are more than mere price changes. These factors that cause producers to offer more or less of a product for sale at the same prices are called the **determinants of supply** (also called shifters of supply). As shown in Figure 4.8, an increase in one of these determinants of supply would shift the supply curve to the right (S_1 to S_2), and a decrease would shift the curve to the left S_1 to S_3).

USEFUL HINT

Students sometimes mistakenly shift an increase in supply to the left, as it looks like it is going up. However, an increase in supply shifts to the right, and a decrease to the left, just like demand shifts.

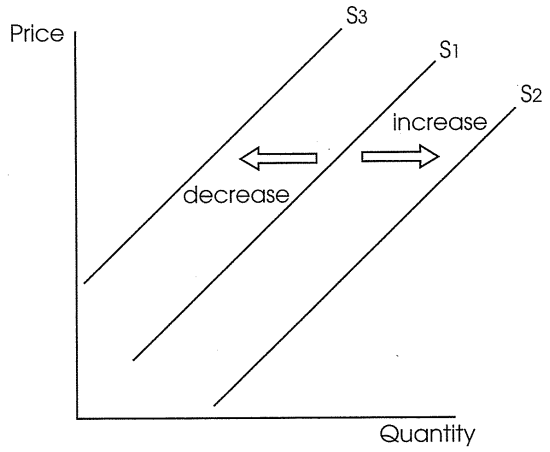


Fig. 4.8 Shifts in Supply

The determinants of demand can be learned by the acronym COTTEN shown in Table 4.2, followed by an explanation of each with examples.

Table 4.2

Determinants of Supply—COTTEN (Shifters of the Supply Curve)

C—Cost of Inputs
O—Opportunity cost of alternative production
T—Technology
T—Taxes and subsidies
E—Expectations
N—Number of sellers

COST OF INPUTS

When the cost of producing a product increases, the supply of a product decreases, and vice versa. A change in the cost of producing a product affects the supply of a good or service.

EXAMPLE

If the cost of fertilizer used in the production of corn increases, the supply of corn would decrease (shown by a shift from S_1 to S_3 on Figure 4.8). If labor costs decrease for smartphones producers, resource costs fall, and the supply of phones would increase (shown by a shift from S_1 to S_2 on Figure 4.8).

OPPORTUNITY COST OF ALTERNATIVE PRODUCTION

Sometimes a firm can easily switch between production of several different products. Profit-maximizing firms will choose to produce what gives them the most profit or where their opportunity cost is lowest.

EXAMPLE

A farmer who has a fixed amount of land is producing corn but can use his land to grow either corn or wheat. If the price of wheat increases significantly relative to corn, the farmer will switch from producing corn to producing wheat. The opportunity cost of producing corn increased, thus the switch to wheat. This would decrease the supply curve for corn, and shift to the left.

TECHNOLOGY

New technology can decrease production costs and increase productivity that results in the supply curve shifting to the right.

EXAMPLE

Many automobile factories today use robots and other machines in the production process, increasing productivity and shifting the supply curve to the right. Several hundred years ago, the invention of the cotton gin drastically increased the supply of cotton.

TAXES AND SUBSIDIES

A **tax** on the production of a good will result in increased production costs, which will decrease supply. If a firm is fortunate enough to get a **subsidy**, a payment from the government to produce a product, profits increase at each price level that induce increased supply.

EXAMPLE

A farmer receives a subsidy for producing corn and now has an incentive or motivation to increase supply. Conversely, a cigarette producer may be taxed on each unit produced, thus increasing the cost of production and decreasing supply, shifting the supply curve to the left.

EXPECTATIONS

Similar to buyers, sellers also include future price considerations into their actions in a market. If sellers think the price will increase in the future, they may hold back the amount offered for sale, decreasing current supply, with the ultimate goal of increasing profits in the future. The converse holds true if producers think the price of a good may fall. They would increase current production today, increasing supply, shifting the supply curve to the right.

EXAMPLE

A cotton farmer who thinks the prices will rise next year may not bring his current harvest to market, with the hope of selling for higher prices in the future. This would decrease the current supply curve for cotton.

NUMBER OF SELLERS

As more sellers and competition enter a market, the supply increases. While the extra competition may be difficult for sellers, the extra supply usually is good for consumers, who receive more choice and lower prices as the supply curve shifts to the right.

EXAMPLE

The opening of new pizza restaurants in a college town increases the supply of pizzas, shifting supply to the right. Students benefit from more choice and lower prices from the extra competition.

MARKET EQUILIBRIUM: SUPPLY AND DEMAND TOGETHER

The establishment of prices in a competitive market comes about by trial and error—sellers initiating a price only to discover a surplus has occurred. A **surplus** exists when the quantity supplied is greater than the quantity demanded, which is above the equilibrium price. In a competitive market with a surplus, prices will eventually fall to the equilibrium price. A **shortage** is below the equilibrium price when the quantity demanded is greater than the quantity supplied, and buyers want more products than are offered for sale. In a competitive market, prices will increase to the equilibrium price.

Increases in the price reduce the shortage (buyers or consumers "bid" against one another) until it disappears at equilibrium. This equilibrium (illustrated below) has the following characteristics:

1. There is no tendency for change; the demand and supply stay the same or constant.
2. The amounts demanded equal the amounts supplied (at the intersection of supply and demand).
3. There is no surplus or shortage; the equilibrium price "clears" the market.

Equilibrium—The Illustration

Equilibrium occurs at E (Price = \$5; quantities exchanged = 300), the intersection of S and D (supply and demand), where the quantities demanded = quantities supplied. The characteristics of equilibrium (above) apply.

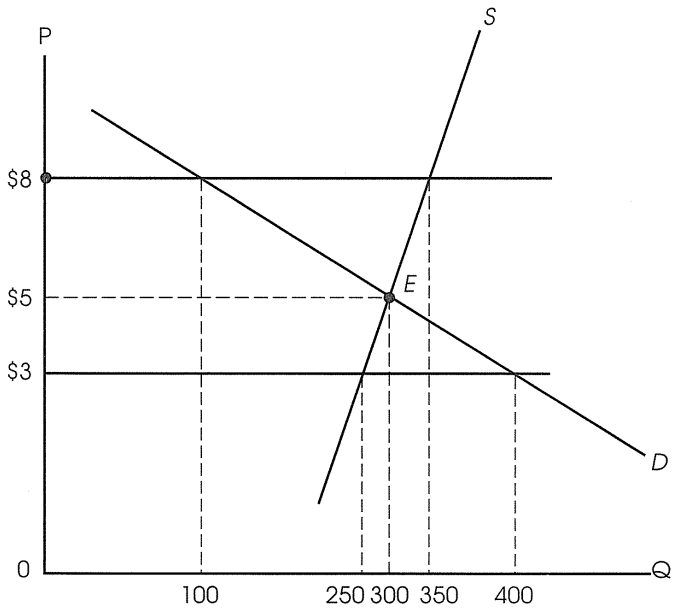


Fig. 4.9 Market Equilibrium

Disequilibrium

If the price is $8, then there is disequilibrium since the quantities demanded at $8 would equal 100 and the quantities supplied would equal 350; therefore, there would be a surplus of 250. As the market (suppliers) react to the surplus, the price will drop until it equals $5 (equilibrium price) at which the market is "cleared" of the surplus. The converse holds, when the price is *below* the equilibrium, such as $3, when a shortage of 150 would develop. At $3, the quantities demanded exceed the quantities supplied (400 > 250) and the consumers (buyers) would bid the price up until it reaches $5 (equilibrium price) and the market is cleared of any shortage.

Changes in Equilibrium

1. When given a problem on supply and demand, the first step is to figure out whether an event affects either the supply or demand curve (or both if it is a double shifter—watch out for those!). Knowing the acronyms for the determinants of supply (COTTEN) and demand (SPICE) are necessary. Once you discern what curve is affected, is it an increase or decrease? Then for the final step, just shift it, noting your new equilibrium price and quantity.
2. Demand and/or supply shifts will cause new equilibrium positions (new intersections of supply and demand). With supply constant, changes in the demand determinants would cause shifts in the demand curve. These shifts would cause new equilibrium price and equilibrium quantity positions. For example, if there is an increased preference for SUVs, then the demand for SUVs would increase in the form of a shift in the demand curve (as illustrated in Figure 4.10).

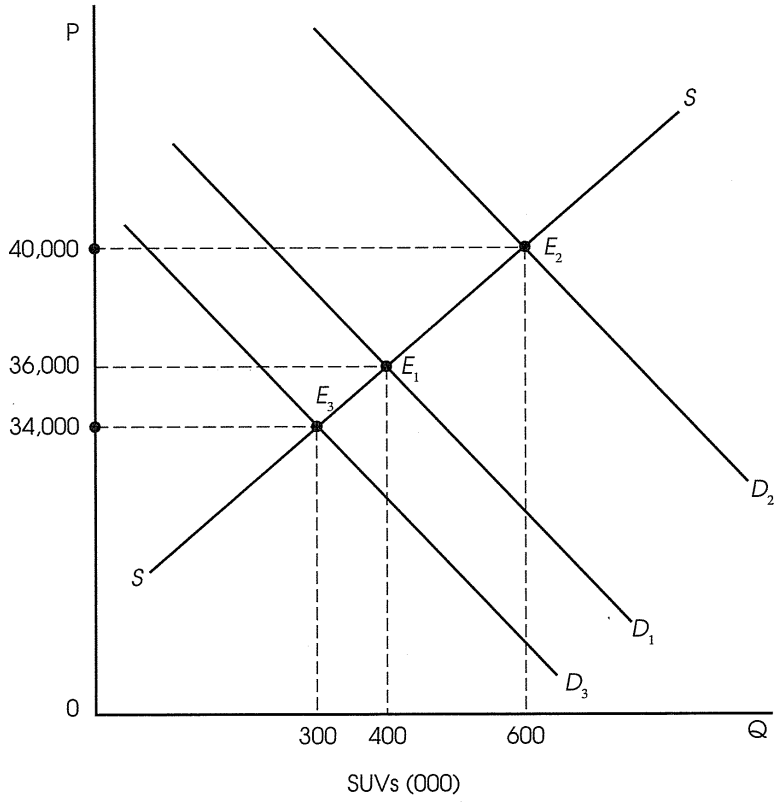


Fig. 4.10 Market for SUVs: Equilibrium Changes

The demand curve would shift (increase) from D_1 to D_2 (with supply constant at S). As illustrated above, the new equilibrium is at E_2 with the equilibrium price of $40,000 (up from $36,000) and the equilibrium quantity at 600,000 SUVs (up from 400,000 SUVs). This same kind of effect would occur if one of the other determinants of demand changed in the same direction; for example, if there was a sharp increase in the number of buyers with very high incomes.

USEFUL HINT

With supply constant, an increase in demand will cause an increase in equilibrium price and quantity. Conversely, a decrease in demand leads to a decrease in equilibrium price and quantity.

3. With supply again given at S, and with the expectation that the prices of SUVs will decrease very soon since the market is becoming saturated with new models from competitors, demand for SUVs will now decrease as potential buyers wait for a better deal. This is illustrated (above) with a shift of D_1 to D_3 and a new equilibrium at E_3 (equilibrium price at $34,000, down from $36,000, and equilibrium quantity at 300,000, down from 400,000 SUVs).
4. In brief, we will now analyze shifts (increases or decreases) in supply with demand as given or constant.

   With demand constant, an increase in supply will lead to a decrease in equilibrium price and an increase in equilibrium quantity; conversely, a decrease in supply will lead to an increase in equilibrium price and a decrease in equilibrium quantity.

   Thus, if a producer of a particular form of steel faces increasing costs of coking coal (an input in steel production), he will decrease his supply of steel. This is illustrated in Figure 4 .11.

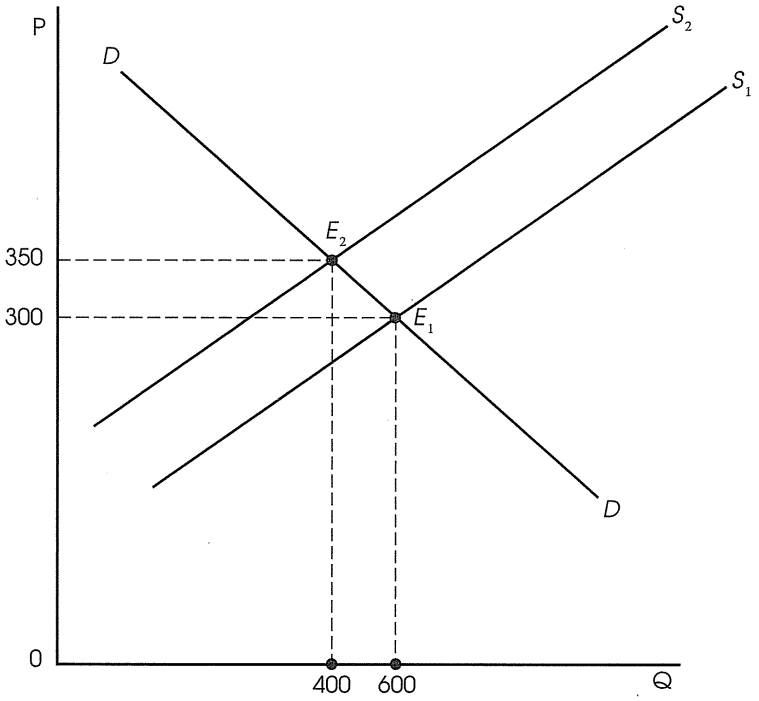


Fig. 4.11 Steel Market

As a result of a supply shift (decrease) from S_1 to S_2, the equilibrium price increases to \$350 a ton (from \$300) and the equilibrium quantity decreases to 400 tons (from 600).

5. What happens if there are changes in demand and, simultaneously, in supply? Table 4.3 is a schedule of which effects on price and quantities are determinable.

Table 4.3

Effects on Price and Quantity

Change in Demand	Change in Supply	Effect on Equilibrium Price	Effect on Equilibrium Quantity
Increase	Increase	Indeterminate	Increase
Decrease	Decrease	Indeterminate	Decrease
Increase	Decrease	Increase	Indeterminate
Decrease	Increase	Decrease	Indeterminate

Government-induced Changes—Price Ceilings and Price Floors

For varying reasons, a government may wish to establish a **price ceiling**, which prohibits prices to rise above a certain level as in rent (city-controlled prices or rents for apartments), or as in the establishment of a ceiling or interest rates for mortgage loans. In other situations,

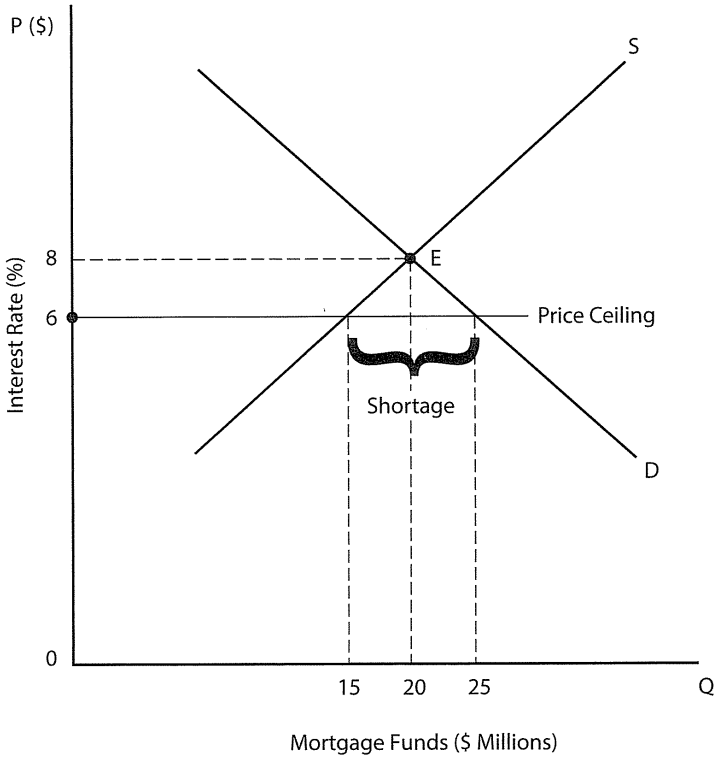


Fig. 4.12 Market for Mortgage Loans

a government may wish to establish a **price floor** making it illegal, for example, to hire workers at a wage lower than the minimum wage. Thus, as illustrated in Figure 4.12, if the state government sets 6 percent as the maximum rate that can be charged on mortgage loans, and if the market equilibrium price would be 8 percent, the amount of mortgage loan funds actually exchanged would decrease to $15 million from $20 million.

This is an example of an effective price ceiling that would produce a shortage of mortgage funds relative to the amounts desired by borrowers.

A price floor might be instituted by the federal government for agricultural prices in order to support farmers who take losses under market prices and to maintain an adequate supply of agricultural products to the population. The floor would be established above the equilibrium or market price while a price ceiling would be established under the equilibrium or market price. See Figure 4.13. With the equilibrium price of $8, a total of 100 bushels of wheat are exchanged (the amounts demanded are equal to amounts supplied). At the price floor, by government, of $10, suppliers are willing to provide 140 bushels. Thus a surplus develops.

Note: A price ceiling is meant to set a price above the equilibrium and a price ceiling below. If for some reason a government sets a price floor below or a price ceiling above the equilibrium price, it will have no effect, or be a nonbinding price floor/ceiling. For example, in the oil boom areas of North Dakota, the wage being paid to fast-food workers and other low-skilled labor is much higher than the minimum wage. Here the minimum wage (a price floor) has no effect as the equilibrium wage is far above the government-set minimum wage. A price ceiling or price floor that does work as intended is known as an effective price ceiling/floor.

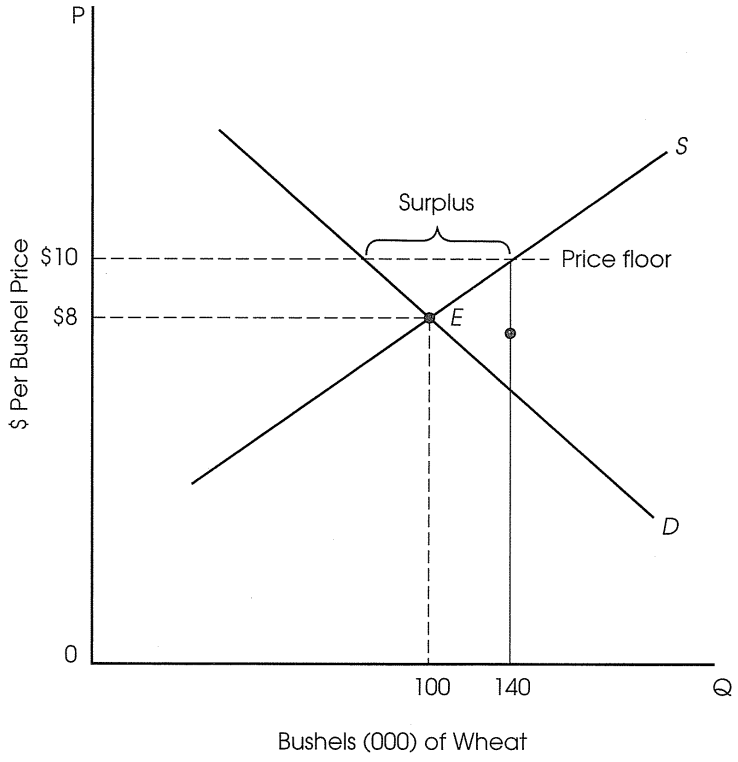
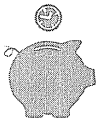


Fig. 4.13 Wheat Market



SUMMARY

DEMAND

1. A market's **demand** curve shows the quantity of a product a consumer is willing and able to purchase at various prices.
2. If the price of a good changes, move along an existing demand curve for that good. A price change does not shift the curve. This is called a **change in quantity demanded.**
3. A nonprice change in demand, one of the determinants of demand (remember the SPICE shifters), shifts the demand curve. Shift to the right for an increase or left for a decrease. This is called a **change in demand.**
4. The **law of demand** states that when the price of a product increases, the quantity demanded decreases, and vice versa.
5. The demand curve is downward-sloping due to the **income** and **substitution effects.**

SUPPLY

1. A market's **supply** curve shows the quantity of a product a producer is willing and able to offer for sale at various prices.
2. If the price of a good changes, move along the existing supply curve of the good. A price change does not shift the curve. This is called a **change in quantity supplied.**
3. A nonprice change in supply, one of the determinants of supply (remember the COTTEN shifters), shifts the supply curve. Shift to the right for an increase or left for a decrease. This is called a **change in supply.**

4. The **law of supply**, states that when the price of a product increases, the quantity supplied increases.
5. The supply curve is upward-sloping because as the price of a good rises, producers will have a greater incentive to produce more.

EQUILIBRIUM

1. Steps for solving supply and demand problems: Is it the supply or demand curve affected? Is it an increase or decrease? Just shift it!
2. The **equilibrium price** is the price at which the supply and demand curves intersect.
3. Only at this one price will the quantity demanded be equal to the quantity supplied. The quantity at this price is called the equilibrium quantity.
4. At any price above the equilibrium price, there is a surplus as quantity supplied is greater than quantity demanded. Competitive market forces will cause the price to decrease.
5. At any price below the equilibrium price, there is a shortage as quantity demanded is greater than the quantity supplied. Competitive market forces will cause the price to increase.
6. A **price ceiling** is a government-fixed price below equilibrium to lower the price of a product. This results in a shortage. To be effective, it must be set below equilibrium.
7. A **price floor** is a government-fixed price above equilibrium to provide a high price for sellers. This results in a surplus. To be effective, it must be set above equilibrium.

TERMS

Ceteris Paribus holding all other factors or conditions constant

Determinants of Demand the factors that cause consumers to buy more or less at the same price; these are substitutes, preferences, population, income, complements, and expectations

Determinants of Supply the factors that cause sellers to offer more or less for sale at the same price; these are cost of inputs, opportunity cost of alternative production, technology, taxes and subsidies, expectations, and number of sellers

Equilibrium Price price at which quantity supplied equals quantity demanded

Income Effect a reason for the law of demand, the purchasing power of income is inversely related to the price of a product; If the price of a particular good decreases, a consumer may buy more of this good as his income has more buying power

Inferior goods where an increase in income leads to a decrease in demand

Law of Demand law that states that when the price of a product increases, the quantity demanded decreases and are inversely related

Law of Supply law that states that when the price of a product increases, the quantity supplied increases and are directly related

Market place where buyers and sellers meet to exchange goods and services

Normal goods where as income increases, the demand for a product increases

Price Ceiling a maximum legal price established below the equilibrium price

Price Floor a minimum legal price established above the equilibrium price

Quantity Demanded has an inverse relationship with changes in the price of a particular good

Quantity Supplied has a direct relationship with changes in the price of a particular good

Shortage when the quantity demanded is greater than the quantity supplied; in a competitive market with a surplus, prices will fall to the equilibrium price

Substitution Effect a reason for the law of demand, as the price of a particular good decreases, a consumer may buy more of this good relative to higher-priced goods

Surplus when the quantity supplied is greater than the quantity demanded, which is above the equilibrium price; in a competitive market with a surplus, prices will fall to the equilibrium price