

How to Study for Chapter 6 Supply and Equilibrium

Chapter 6 introduces the factors that will affect the supply of a product, the price elasticity of supply, and the concept of equilibrium price and equilibrium quantity.

1. Begin by looking over the Objectives listed below. This will tell you the main points you should be looking for as you read the chapter.
2. New words or definitions are highlighted in italics in the text. Other key points are highlighted in bold type. Answer the questions in the text as they are asked. Then, check your answer by reading further in the text.
3. You have more work with the demand-supply graph in this chapter. In particular, **you need to differentiate a movement along the supply curve and a shift in the supply curve**. Be sure to go over every point so that you can see how they are derived.
4. Do the three cases involving a change in equilibrium very carefully. Go over the explanations step-by-step. Then, try the three cases at the end of the chapter. In each case, draw the graph.
5. You will be given an In Class Assignment and a Homework assignment to illustrate the main concepts of this chapter. When you have finished the text and the assignments, go back to the Objectives. See if you can answer the questions without looking back at the text. If not, go back and re-read that part of the text. Then, try the Practice Quiz for Chapter 6.

Objectives for Chapter 6 Supply and Equilibrium

At the end of chapter 6, you will be able to:

1. Define the Law of Supply
2. Differentiate Between the Causes of a Movement Along the Supply Curve and a Shift in Supply
3. Define the Price Elasticity of Supply
4. Draw the Supply Curve (as Relatively Elastic; as Relatively Inelastic; as Perfectly Elastic; and as Perfectly Inelastic)
5. Define the “Short-run” and the “Long-run”.
6. Name the Factors that Determine Whether the Supply of a Product is Relatively Elastic or Relatively Inelastic.
7. Define “General Factor of Production” and “Specific Factor of Production”.
8. Name and Explain the Four Factors that will cause the Supply of a Given Product to Shift to the Left (or to the Right).
9. Explain "equilibrium"? How are the equilibrium price and quantity determined?
10. If the price is above (or below) equilibrium, explain what will result?
11. Explain what will happen to the price and the quantity in each of the following cases (as well as why this will happen):
 - a. there is an increase in demand or a decrease in demand
 - b. there is an increase in supply or a decrease in supply
12. Explain what will happen to the price and the quantity in each of the following cases, as well as why it will happen:

a. both demand and supply rise	c. demand rises and supply falls
b. both demand and supply fall	d. demand falls and supply rises

Chapter 6

Supply And Equilibrium

Thus far, we have been focusing exclusively on buyers. But buyers are only half of the market. We must also consider the behaviors of **sellers**. Discussing sellers is somewhat easier because we can safely **assume that sellers have only one motivation: to maximize their profits**. Sellers will be motivated to do more of anything that increases profits and less of anything that decreases profits. *The profits are calculated as the difference between the total revenues and the total costs.*

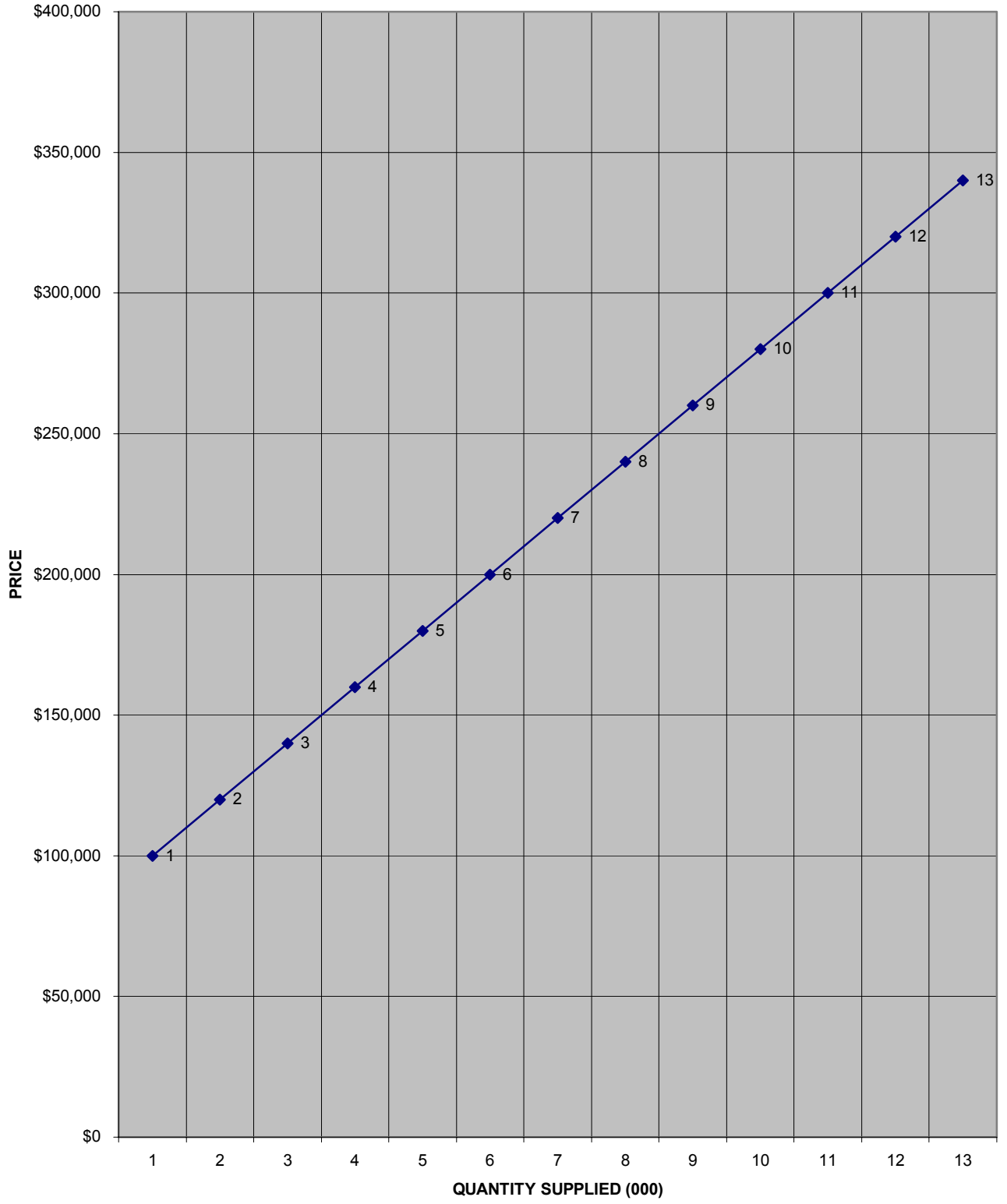
Let us begin with the *total revenues*, the money taken in from selling our product. In the chapter on elasticity, we calculated this as the **price of the product times the quantity sold**. If we sell 100 units at \$10 each, our total revenues equal \$1,000. If we sell 100 units at \$20, our revenues equal \$2,000. Since we gain more revenues if the price is \$20 than if it is \$10, we would likely want to sell more units of the product if the price is \$20. *So we can conclude that as the price of the product rises (falls), the quantity supplied will rise (fall). We call this statement the law of supply.* (Go back and compare this statement with the law of demand.) To illustrate the law of supply, you would expect that more and more homes would be built after 1995 when the prices of homes began rising greatly. This is indeed what has occurred. And you would expect that more and more people would want to become engineers and scientists when the prices paid for these people (called the wages) rose. Again, indeed, this is what has occurred. (Does it make any sense that when the ticket prices charged for baseball and football games rose, Major League Baseball changed from 154 games to 162 games per year and the National Football League changed from 12 games to 16 games per year?)

We can illustrate the law of supply with a *supply schedule* for homes.

	Price of Homes	Quantity Supplied
1	\$ 80,000	1000
2	\$100,000	2000
3	\$120,000	3000
4	\$140,000	4000
5	\$160,000	5000
6	\$180,000	6000
7	\$200,000	7000
8	\$220,000	8000
9	\$240,000	9000
10	\$260,000	10000
11	\$280,000	11000
12	\$300,000	12000
13	\$320,000	13000
14	\$340,000	14000

The table shows that, as the price charged for homes rises, sellers wish to sell more homes. We can also plot this in the graph on the next page. The graph depicts the law of supply as an upward-sloping line. Notice that the line does not begin at the origin. There is some price --- above zero --- at which no seller will produce at all. The factors that determine this price will be a topic to be discussed in a later chapter. As with the demand graph, we **move along** the line (for example, from point A to point B) if the price of the product changes. (So we move along the line from point 12 to point 13 if the price rises from \$320,000 to \$340,000 per home. This gives

THE SUPPLY CURVE



us the quantity supplied, which rises from 130,000 homes to 14,000 homes.) We **shift** the line if anything else changes. We shall consider the factors causing shifts in supply later in this chapter.

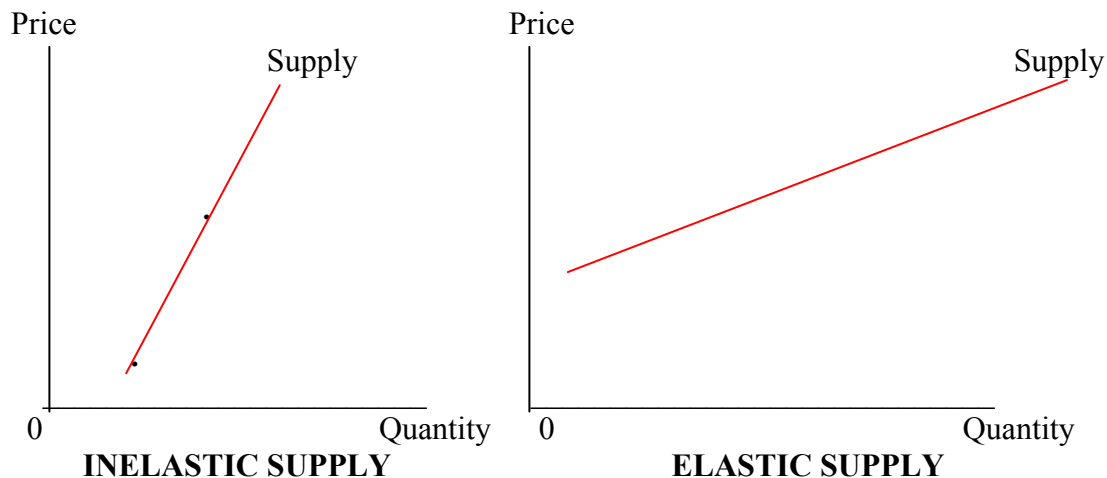
The Price Elasticity of Supply

As with demand, it is not enough information just to know that, if the price of the product rises, sellers will wish to sell more of it. We want to know "how much more?". More technically, we want to know *the price elasticity of supply. This tells us what percent the quantity supplied will increase if there is a given percentage increase in the price of the product.*

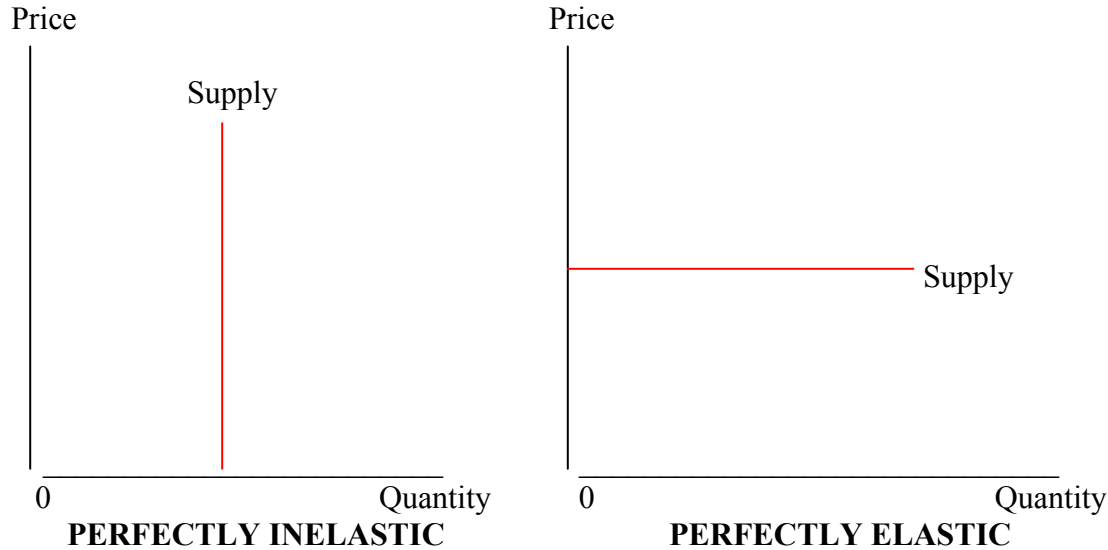
Percentage Change in the Quantity Supplied Percentage Change in the Price

The terms we use are the same as they were in the case of demand. If the number is between zero and one, we say that the supply is *relatively inelastic* (quantity supplied **rises very little** as the price rises). If the number is more than one, we say that the supply is *relatively elastic* (quantity supplied **rises greatly** when the price rises). If the number equals one, we say that the supply is *unit elastic*. If the number equals zero, we say that the supply is *perfectly inelastic* (the quantity supplied does not change at all if the price rises). For example, the quantity supplied of beachfront property may be the same as the price of it rises. And the number of seats in the stadium is unchanged when used for college football (\$25 per ticket) or for professional football (\$50 or more per ticket). If the number is infinitely large, we say that the supply is *perfectly elastic*. This means that a seller can sell as much as can possibly be desired at the going price.

The graphs also operate in the same manner as for the price elasticity of demand (except that the supply curve is upward sloping). *The steeper is the line, the more inelastic is the supply. The flatter is the line, the more elastic is the supply.*



As with demand, perfectly inelastic supply is shown as a vertical line (no change in the quantity supplied) while perfectly elastic supply is shown as a horizontal line.



As with the price elasticity of demand, it is difficult (and expensive) to make precise calculations of the price elasticity of supply. But if we know the factors that affect it, we can make a good estimate. One such factor is **time**. Assume that the price falls. The seller would like to sell less of the product. To do this, the seller must reduce the land, labor, or capital he or she uses. We distinguish two general periods, *the short-run and the long-run*. In the short-run, we assume that the seller is able to reduce the amount of natural resources used and the number of workers hired. This allows a certain reduction in the quantity of the product sold. ***But, in the short-run, the seller cannot reduce the amount of capital.*** Perhaps he or she has rented the building and has a lease for a fixed time. Or he or she has purchased the building and equipment and plans to stay in business. The inability to reduce the amount of capital limits the reduction in the quantity of the product sold. ***In the long-run, all of the factors of production can be changed.*** Particularly, this means that the amount of capital can be changed. Perhaps this means putting a wall in the middle of the building and renting out the other half. Perhaps it means going out of business altogether and selling the building. The ability to reduce the amount of capital as well as the natural resources and the labor allows a greater reduction in the quantity produced. So, we say that the ***supply is more inelastic in the short-run and becomes more elastic as the time to adjust increases.*** (Remember that the term “long-run” only refers to a period of time in which the amount of capital can be changed. This may or may not be a particularly long period of time.)

Another factor affecting the price elasticity of supply is the **generality of the factors of production** (natural resources, labor, and capital). Some factors are ***general, meaning that they can be easily shifted among many different uses.*** Accountants who can prepare taxes for one business can easily learn to prepare taxes for another business. Other factors are called ***specific, meaning that they are useful only for one type of employment and cannot be transferred to other uses.*** Many machines have only one use and cannot be used for other purposes. Many workers have skills gained from experience with one employer; these skills would be lost if the worker moved to a different employer. If the price falls and factors of production are general, it will be easy for them to adjust to produce something else. If the factors of production are specific, they may not be able to adjust to produce something else. **Therefore,**

the more general are the factors of production, the more elastic is the supply. The more specific are the factors of production, the more inelastic is the supply.

The Determinants of Supply

As with the demand curve, **we move along the supply curve, from one point to another on the same line, if the price of the product changes. We shift the line if anything else changes.** Those factors that will cause the shifts in supply are called the *determinants of supply*. There are **four** of them.

(1) The goal of a company, once again, is to maximize profits, calculated as the difference between the total revenues and the total costs of production. So, one of the determinants of supply must be the **costs of production**. *As costs of production rise, profits fall, and therefore the quantity supplied should fall (shift to the left). Conversely, as costs of production fall, the profits rise, and the quantity supplied should rise (shift to the right).* Costs include the costs of natural resources such as wood used in building a home, the costs of labor (wages and benefits), and the costs of the capital. We shall cover them in later chapters.

(2) When we considered demand, one of the determinants was population (the number of buyers). The same is true for supply. One of the determinants of supply is the **number of sellers of the product**. *When the number of sellers increases, the supply should increase (shift to the right). When the number of sellers falls, the supply should decrease (shift to the left).*

(3) When we considered demand, one of the determinants was the price of a substitute good. Again, the same is true for supply. In this case, the substitute is **a substitute for the seller --- another good also produced by the same seller**. This may or may not be a substitute for the buyer. For example, wheat and corn can be grown on the same land; they are substitutes for the seller. So are avocados and oranges or Coca Cola and Diet Coke (because they are produced by the same company). *If the price of the other good rises, the supply of the good in question will fall (shift to the left).* For example, if the good in question is wheat and the price of corn rises, sellers will produce less wheat (and more corn). If the price of regular Coca Cola rises, the supplier will produce less Diet Coke (and more regular Coca Cola). On the other hand, *if the price of the other good falls, the supply of this good will rise (shift to the right).* Remember that goods are substitutes for the seller only if they are produced by the same company.

(4) Finally, when we considered demand, one of the determinants was **expectations**. This is true for supply as sellers also have expectations that affect their behavior. *If sellers expect the price to rise, they will want to sell less today (shift to the left)* and wait for the price to rise later. Home sellers will hold their homes off the market if they believe the prices will rise soon. In 1973, oil tankers remained offshore while angry motorists waited in long lines for gasoline. The reason was that the price of gasoline was 36 cents per gallon. The government was allowing the price to rise only 2 cents per week; the oil companies estimated that it would rise to about 65 cents. So they reduced supply and waited until the price would reach the predicted 65 cents. Conversely, *if sellers expect the price to fall, they want to sell more now (shift to the right).* At the beginning of 1995, holders of Mexican pesos believed that the price would fall. They got rid of them (sold them in the foreign exchange market) as fast as they could! The same is true for

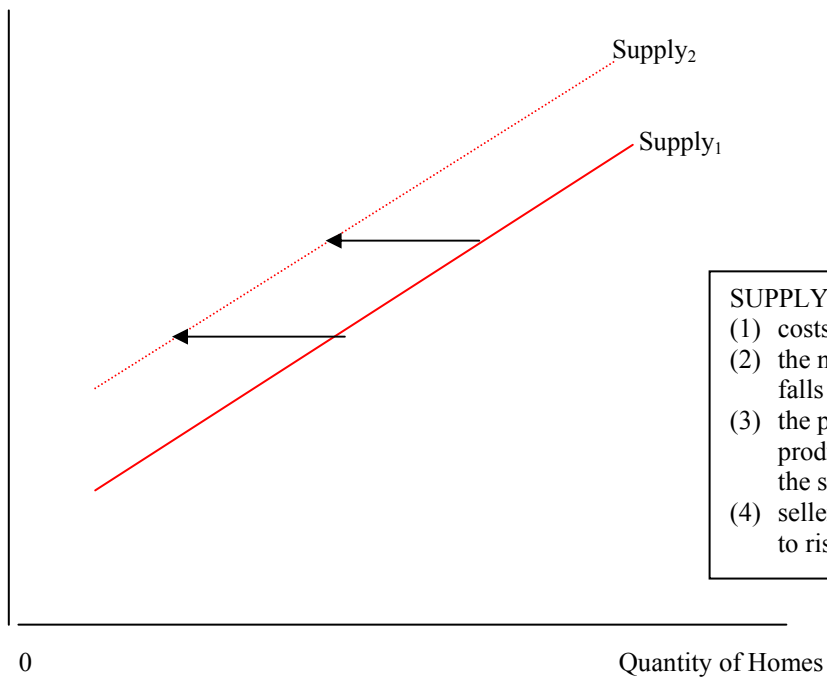
holder of stocks in the fall of 1998.

In summary, supply will shift to the left (right) if:

- (1) costs of production rise (fall)**
- (2) the number of sellers falls (rises)**
- (3) the price of another good produced by the same seller rises (falls)**
- (4) sellers expect the price of the product to rise (fall) in the near future.**

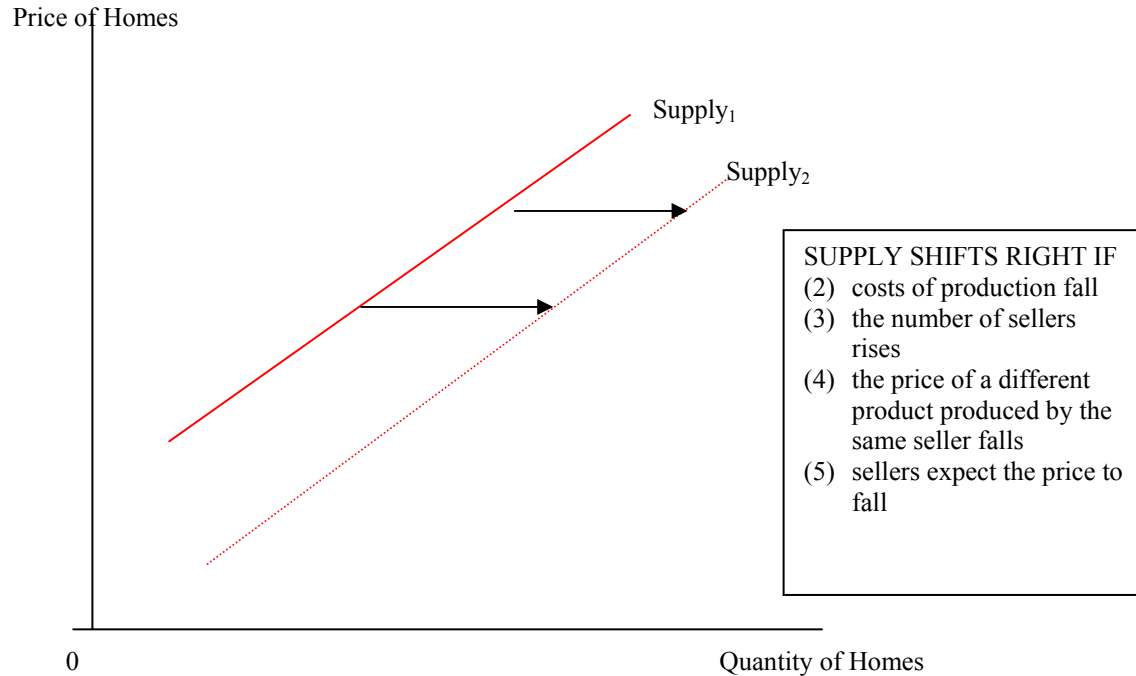
The graphs of a shift to the left and of a shift to the right are shown below. The possible reasons for the shifts are also shown. **A shift to the left means that sellers want to produce and sell fewer homes than they did before at any price.** (Note that the shift is to the left and represents a decrease. It is NOT a shift up. The graph is read left to right, not up and down.) **A shift to the right means that sellers want to produce and sell more home at any price than they did before.**

Price of Homes



SUPPLY SHIFTS LEFT IF

- (1) costs of production rise
- (2) the number of sellers falls
- (3) the price of a different product produced by the same seller rises
- (4) sellers expect the price to rise



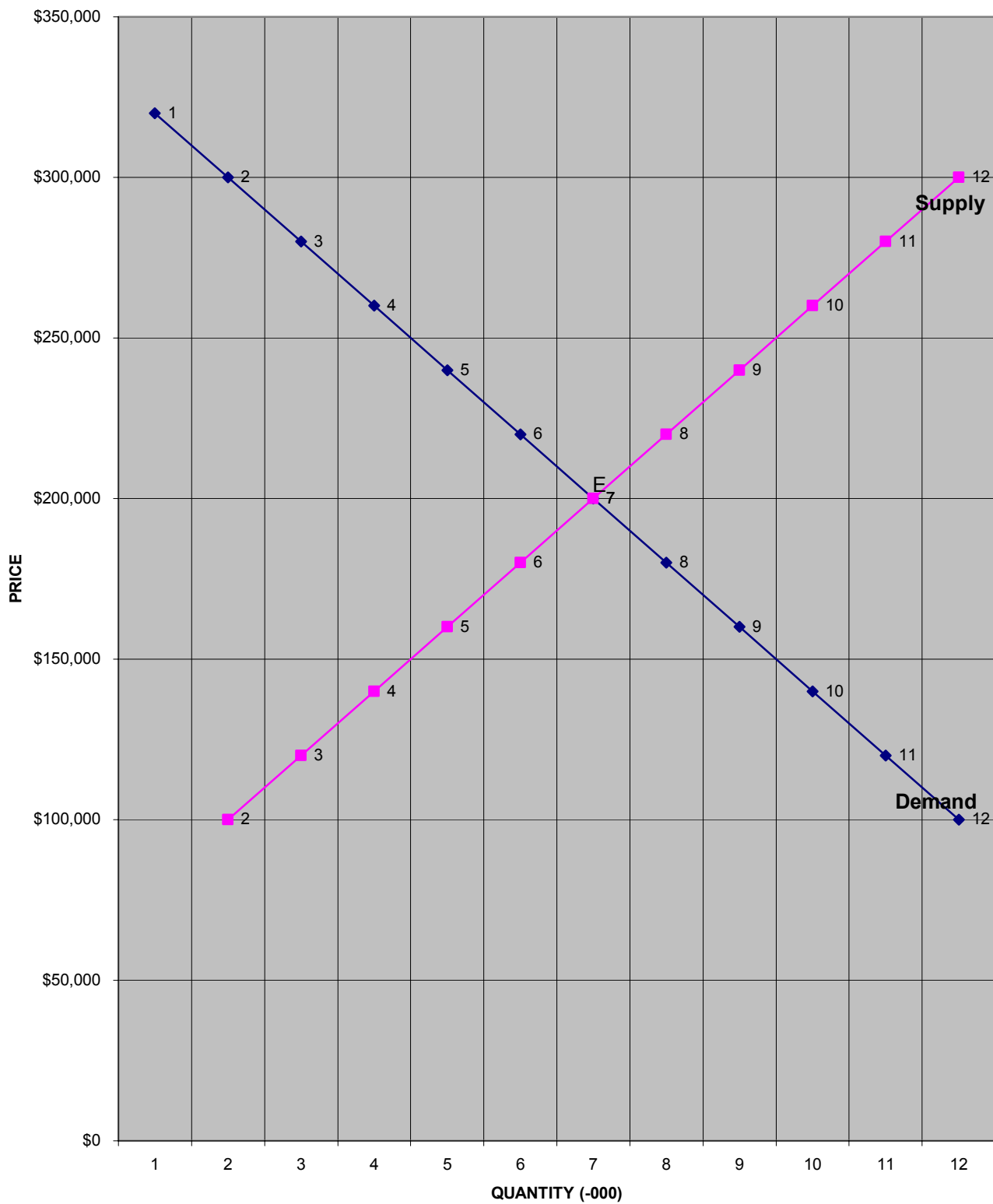
Equilibrium

Now, we can take the two sides of the market, demand and supply, and put them together. In the graph on the next page, the demand curve and the supply curve have been superimposed on each other. They reflect the demand and supply schedules that we had before.

	<u>Price</u>	<u>Quantity Demanded</u>	<u>Quantity Supplied</u>
1	\$340,000	0	14,000
2	\$320,000	1000	13,000
3	\$300,000	2000	12,000
4	\$280,000	3000	11,000
5	\$260,000	4000	10,000
6	\$240,000	5000	9,000
7	\$220,000	6000	8,000
8	\$200,000	7000	7,000
9	\$180,000	8000	6,000
10	\$160,000	9000	5,000
11	\$140,000	10000	4,000
12	\$120,000	11000	3,000
13	\$100,000	12000	2,000

EQUILIBRIUM

9



Assume that, for whatever reason, the price is \$300,000 per home. The demand curve tells us that buyers wish to buy 2,000 homes (point 3). The supply curve tells us sellers wish to sell 12,000 homes (point 3). We have a problem. There are 10,000 homes that sellers wish to sell that no one wishes to buy (12,000 - 2,000). This is called a **surplus**. Graphs may seem abstract, but surpluses are not. A seller knows there is a surplus by the fact that goods for sale are not selling. Resale homes go on sale and sit for months and months without any buyer making an offer! New homes have the "Grand Opening" flags out for months and even years! Eventually, sellers figure out that they must **lower the price**. As the price falls, buyers will buy more (a movement along the demand curve). Sellers may even choose to sell less at the lower price, taking homes off the market (a movement along the supply curve). The surplus becomes smaller and smaller until it disappears.

Assume instead that the price begins at \$100,000 per home. The demand curve tells us that buyers wish to buy 12,000 homes (point 13). The supply curve tells us that sellers wish to sell 2,000 homes (point 13). We have a problem. All 2,000 homes for sale will sell quickly and many more buyers will come seeking to buy. We call this a **shortage**. A shortage is also easy to recognize. A few years ago, 35 homes in La Jolla were to go on sale for a minimum price of \$350,000. A week before orders were to be taken, about 500 people lined up to spend a week in line! It was easy for sellers to realize that there was a shortage. \$350,000 per home may have seemed a high price. Obviously it was not! As a result, **sellers raise the price**. The higher price will cause buyers to buy less (move along the demand curve). It may also induce sellers to sell more homes (move along the supply curve). The shortage becomes smaller and smaller.

At the price of \$200,000 (point 8), there is no surplus. There is also no shortage. Sellers want to sell 7,000 homes. This is exactly what buyers want to buy. There is no reason to either lower to raise the price. We call \$200,000 **the equilibrium price**. We call 7,000 homes **the equilibrium quantity**. The demand and the supply are equal. All forces affecting the price or quantity are in balance; there is no tendency to change.

Case 1: Assume that we begin with a market for homes in equilibrium. Then, something changes. Let us assume that **income rises**. How do we analyze this case?

Case 2: Again, assume that there is a market for homes that begins in equilibrium. In this case, the change that occurs is **an increase in the price of wood**. How do we analyze this case?

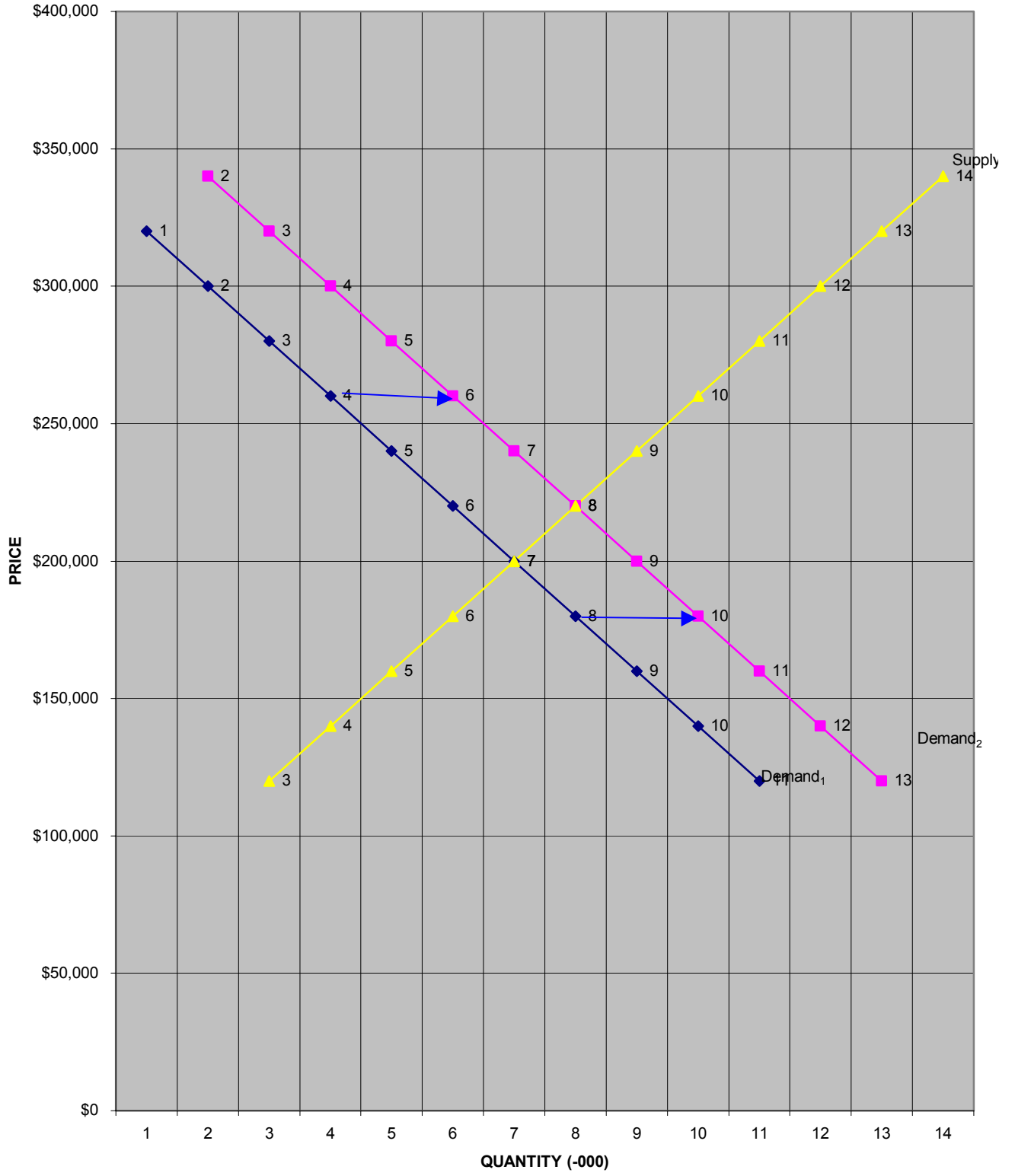
Case 3: Again, assume that the market for homes begins in equilibrium. In this case, the change that occurs is that **buyers and sellers both expect the price to rise soon**. How do we analyze this case?

Case 1: Does income affect demand or supply? The answer, as we saw in the last chapter, is demand. Will there be a shift or movement along demand? The answer is shift, because the change is caused by something other than the price. Is the shift right or left? Assuming that homes are a normal good, demand will increase, which is a shift to the right. The data below are repeated from the last chapter.

	<u>If the price is:</u>	<u>The quantity demanded is:</u>		<u>The quantity supplied is</u>
		<u>Income = \$50,000</u>	<u>Income = \$100,000</u>	
1	\$340,000	0	2000	14000
2	\$320,000	1000	3000	13000
3	\$300,000	2000	4000	12000
4	\$280,000	3000	5000	11000
5	\$260,000	4000	6000	10000
6	\$240,000	5000	7000	9000
7	\$220,000	6000	8000	8000
8	\$200,000	7000	9000	7000
9	\$180,000	8000	10000	6000
10	\$160,000	9000	11000	5000
11	\$140,000	10000	12000	4000
12	\$120,000	11000	13000	3000

Just looking at the data and at the graph on the next page tells us that there will be a new equilibrium price and quantity. **The equilibrium price will rise to \$220,000 and the equilibrium quantity will rise to 8,000 homes.** With the aid of the numbers and the graph, we can explain what occurs. Buyers wish to buy more homes (9000) at the price of \$200,000 per home because they have more income. But there are no more homes to buy (7000). This causes a shortage to result (a shortage of 2000 homes). Recognizing the shortage, sellers will raise the price (from \$200,000 to \$220,000). As the price rises, sellers will desire to sell more homes (from 7000 homes to 8000 homes). And the quantity demanded will fall from 9000 homes back to 8000 homes. The shortage will be eliminated.

DEMAND SHIFTS TO THE RIGHT

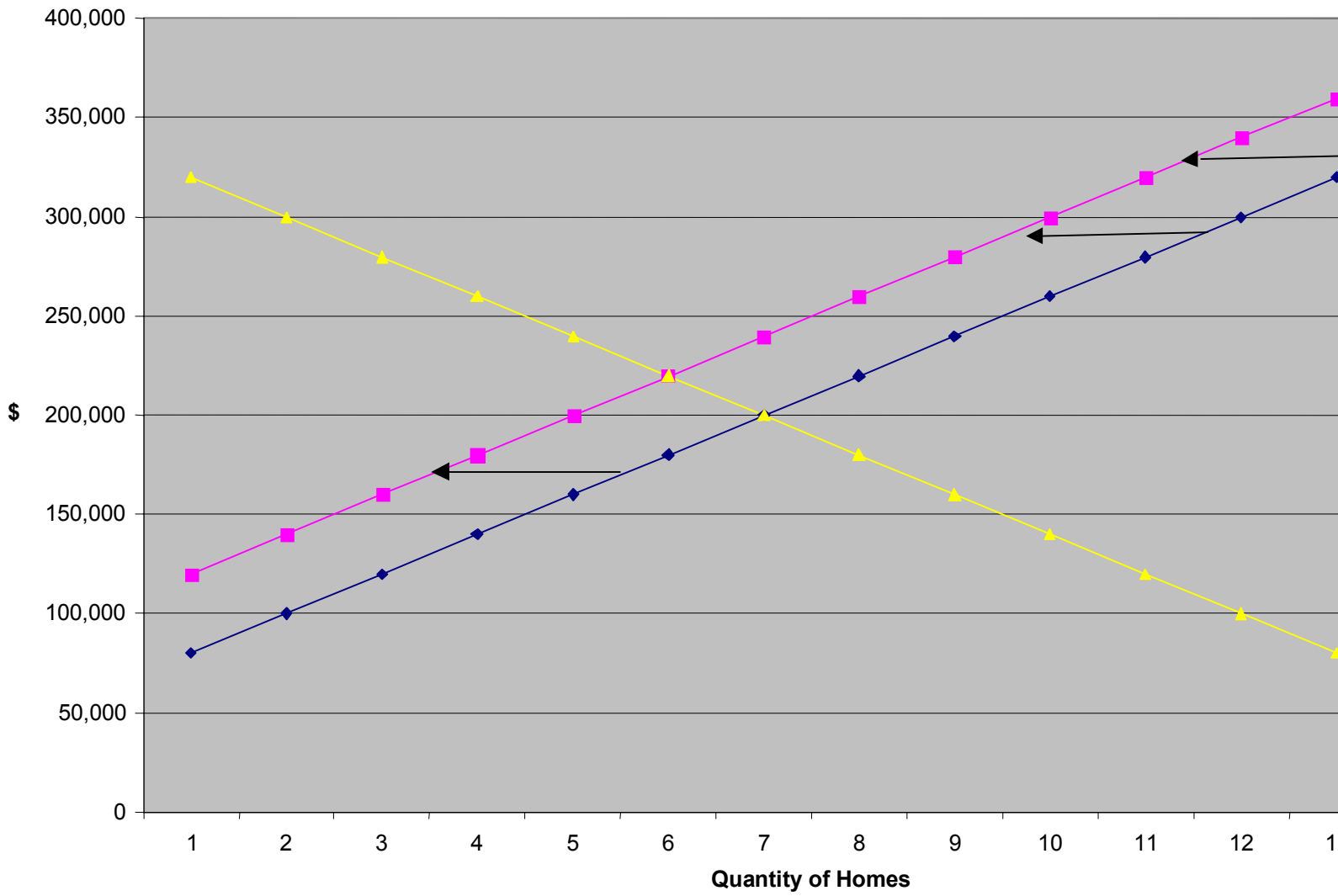


Case 2: Since wood is used to build homes, this is **an increase in a cost of production**. Do costs of production affect the demand or the supply? The answer, as shown earlier in this chapter, is supply. Will there be a shift in or movement along the supply? The answer is a shift, since the cause is something other than the price of the product. Will the shift be right or left? Since costs are increasing, **supply will decrease --- a shift to the left**.

	<u>If the price is:</u>	<u>quantity demanded is:</u>	<u>quantity supplied is:</u>	<u>new quantity supplied is:</u>
1	\$340,000	0	14000	12000
2	\$320,000	1000	13000	11000
3	\$300,000	2000	12000	10000
4	\$280,000	3000	11000	9000
5	\$260,000	4000	10000	8000
6	\$240,000	5000	9000	7000
7	\$220,000	6000	8000	6000
8	\$200,000	7000	7000	5000
9	\$180,000	8000	6000	4000
10	\$160,000	9000	5000	3000
11	\$140,000	10000	4000	2000
12	\$120,000	11000	3000	1000

From looking at the numbers and the graph on the next page, you can see that **the price of homes will rise to \$220,000 while the quantity of home will fall to 6,000**. With the aid of the numbers and the graph, we can explain what occurs. As costs rise, selling homes becomes less profitable. Sellers wish to sell less (shift from Supply₁ to Supply₂ --- from 7000 homes to 5000 homes). But, buyers still want the same number of homes (7000 homes). The result is the creation of a **shortage** (of 2000 homes). Recognizing the shortage, sellers will raise the price (from \$200,000 to \$220,000). As the price rises, buyers will buy fewer homes (from 7,000 to 6,000) while the quantity supplied will rise from 5000 homes to 6000 homes. The shortage will be eliminated.

Case 2: Supply Shifts Left



Case 3: In this case, both buyers and sellers are affected. Since the case involves expectations, both the demand curve and the supply curve will shift. **The demand curve shifts to the right because buyers will want to buy more homes now before the price rises. The supply curve shifts to the left because sellers will want to wait to sell their homes until the price they will receive will rise.** As shown in the graph, if the demand curve shifts to the right and the supply curve shifts to the left, **we know without doubt that the price of homes will rise. But we cannot say definitively what will happen to the quantity of homes.** By itself, an increase in the demand for homes will make the quantity of homes rise. By itself, a decrease in the supply of homes will make the quantity of homes fall. If both happen simultaneously, we cannot know what will happen to the quantity of homes unless we know which of the two shifts is greater.

SHIFTS IN BOTH DEMAND AND SUPPLY

