Overview

So far we have noted in a purely verbal way that demand and supply come together in a market to determine price. In the next three chapters, we will work to *see* this interaction graphically and thereby deepen our understanding. In this chapter, we launch into the basics of demand.

Objectives

- Understand price, quantity and graphical analysis
- Learn how to move from the demand schedule to the demand curve
- Define elasticity of demand and identify the factors of demand elasticity
- Identify the non-price determinants of demand and how they shift the demand curve

Chapter 2: Real Estate Demand and the Demand Curve

The quantity of a product or service that consumers want to buy is called demand. The most obvious factor explaining the quantity demanded by buyers is the price of the product.

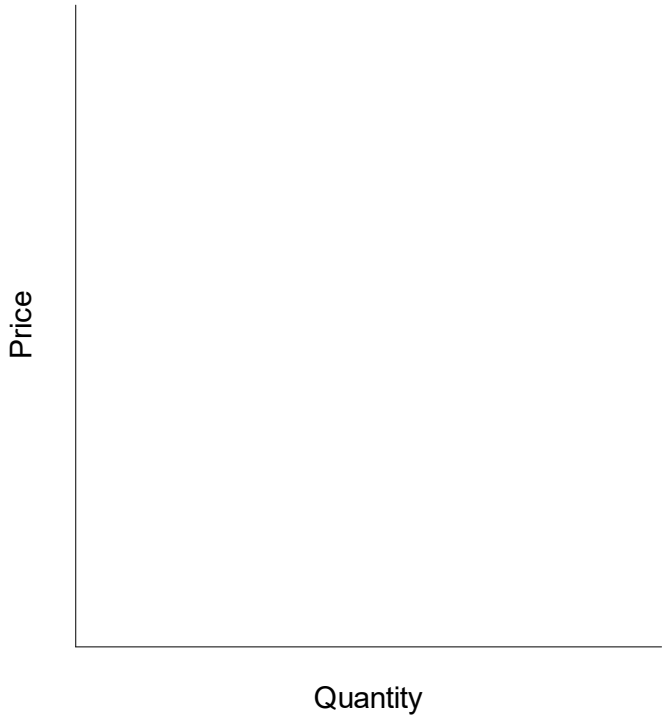
For example, in a given city we will call Metropolis 1,000 homes are demanded when the price is $140,000. At the much higher price of $220,000 only 600 are demanded. And at $340,000 no one would want to buy because it is just too expensive. This result is familiar to everyone who has gone shopping, and the trend is not limited to homes. As the price of a product rises, the quantity demanded of that product falls. In Economics this is referred to as the law of demand.

Let's pause for a moment for some brief remarks on the above example. The observant appraiser will rightly observe that the example is overly simplistic. Homes at the different price points in a real market are often of differing types, sizes, ages, qualities, etc. At this time, we introduce two more pieces of economic terminology. The first is the idea of a "model." For the economist, the model is a representation of reality created with simplifying assumptions in order to get a glimpse of that true reality. In a way, a map is a model of reality that helps us to get around without having to have every tree and mailbox specified. The second is when the economist makes assumptions, they are often phrased with the Latin term *ceterus parabus* meaning "all other things being equal." Thus, the example above should have given the three data points and then followed it with *ceterus parabus*, which means the homes are all assumed to be interchangeable. While it is true that this is unrealistic, it does nicely illustrate the law of demand and that is the important point.

Understanding Graphical Analysis: Prices and Quantities

Now we are going to begin exploring demand graphically. Get a blank sheet of paper and draw a large "L" on the sheet. These are your axes (plural of axis). Label price on the vertical axis and quantity on the horizontal axis. Can price and quantity be swapped to the other axis? Yes, but convention dictates that price is to be vertical and quantity horizontal. That way economists the world over are all on the same page.

Here are our axes:

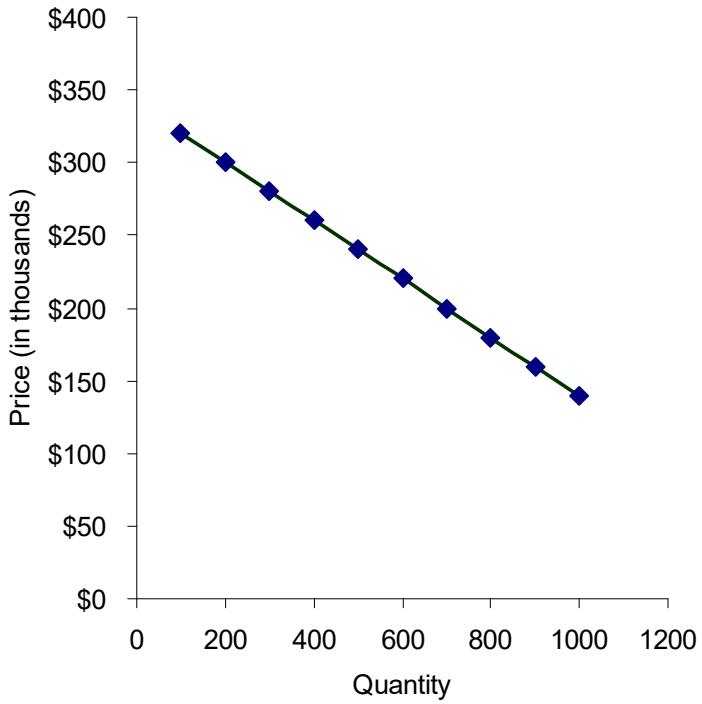


The Demand Schedule and the Demand Curve

The following array of numbers is the demand schedule for homes in our example.

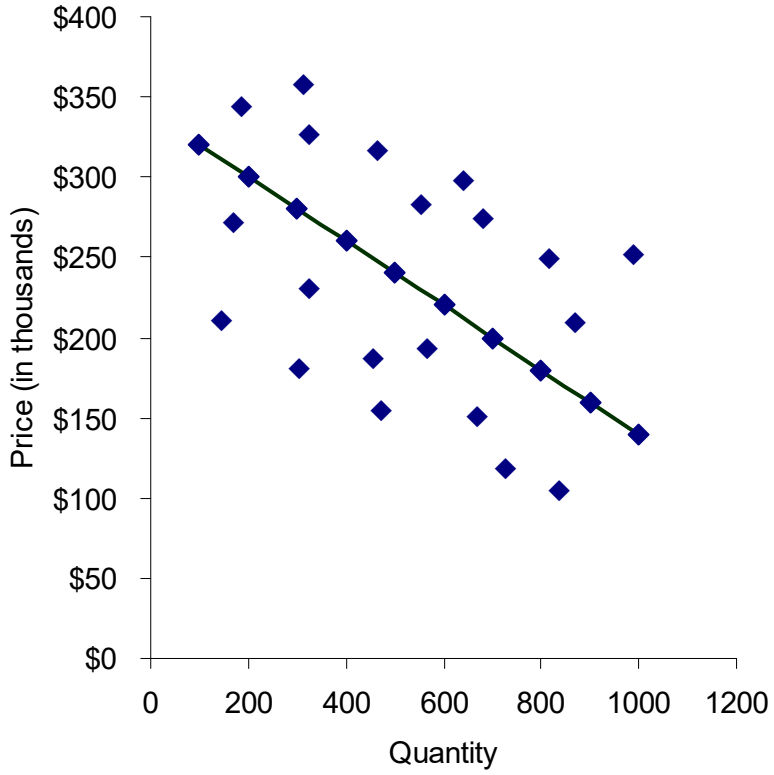
Data Point #	Price	Quantity Demanded
	$340,000	0
1	$320,000	100
2	$300,000	200
3	$280,000	300
4	$260,000	400
5	$240,000	500
6	$220,000	600
7	$200,000	700
8	$180,000	800
9	$160,000	900
10	$140,000	1,000

As the price falls, consumers desire more homes. When we plot the data points from the demand schedule onto our price and quantity axes, we create the demand curve (economists call it a curve even though it is often represented as a straight line) shown below. The graph allows us to analyze more clearly because we can see visually what is taking place. Note the line is downward-sloping.



An Example of a More Realistic Demand Curve

As we mentioned before, our example from fictional Metropolis is greatly simplified. To give you a taste of what a graph would look like with more realistic data, see the graph below. In the real world, the data is much less tidy and rarely comes together to form a perfectly straight line.



The demand curve here is a line that best fits the data which economists develop with the aid of regression analysis (see Chapter 1 for a review of regression analysis).

The Elasticity of Demand and Why It Matters

The law of demand provides useful information. At a lower price, people will seek to buy more of a given product. While this is helpful it is still quite general. It would be useful to know what would happen to the quantity demanded as the price falls or rises by a given amount. Imagine a builder of a subdivision; she would like to know how many fewer three-bedroom ranches she would be able to sell if she raised the price by a certain amount. For even though she would be selling fewer houses, the price increase may make her total revenue (price times quantity) higher.

To answer this question, economists have developed something called the price elasticity of demand. Here is the formula:

$$\frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

To state the formula in words, this is the percentage change in the quantity demanded of a given product that results because of a given percentage change in the price of that product. It measures how responsive buyers are to a change in price.

Calculating Elasticity

If the elasticity calculated is a negative number, ignore the minus sign; it is not important. We are interested in the value of the number only.

Elasticity Equal to 0

If the number exactly equals zero, demand is considered to be *perfectly inelastic*. This means that consumers do not change their quantity demanded as price falls or rises. (Prove to yourself that perfectly inelastic demand would violate the law of demand.)

Elasticity Between 0 and 1

If the number is greater than zero but less than one, demand is *relatively inelastic*. This is shown when buyers increase their buying, but only a moderate amount, as the price of the product falls.

Elasticity is Equal to 1

If the number is exactly equal to one, demand is *unit elastic*. "Unit" in this case means one. We will have more to say about this when we discuss total revenue.

Elasticity is Greater than 1

If the number is more than one, demand is *relatively elastic*. This is demonstrated when price falls and buyers not only increase their buying, but they increase it considerably.

Elasticity is Infinitely Large

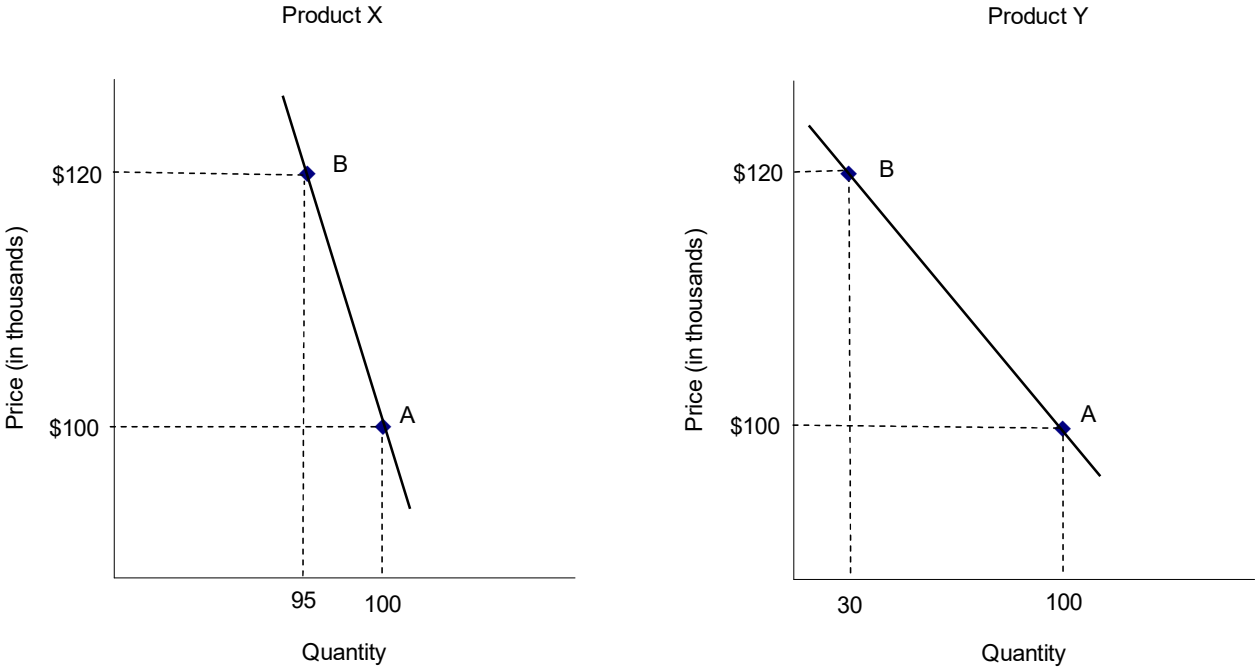
If the number is infinitely large, demand is *perfectly elastic*. (Mathematical note: an infinity occurs when a number is divided by zero. In the case of the elasticity calculation, the percentage change in price is zero.) In a perfectly elastic market, the producers can sell as much as they want at the price that exists in the market.

Here is an elasticity summary:

If the Number is:	Demand is:
Equal to 0	Perfectly Inelastic
Between 0 and 1	Relatively Inelastic
Equal to 1	Unit Elastic
Greater than 1	Relatively Elastic
Infinitely large	Perfectly Elastic

Graphing Elasticities

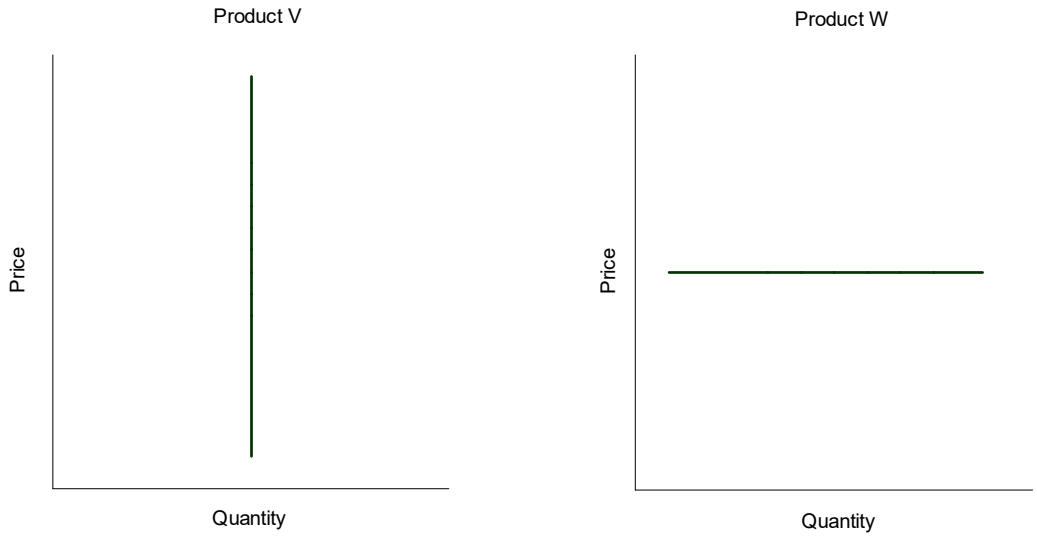
Recall that the demand curve is graphed as a downward-sloping line. Below are two demand curves for two products X and Y. Based on your new knowledge of elasticity, which of the two indicate relatively inelastic demand?



The answer is the first one, Product X. On both graphs, the initial price is $100,000 and the quantity demanded is 100 (Point A). Now assume the price rises to $120,000 for both. For Product X the quantity demanded only falls to 95 units while for Y the quantity demanded falls to 30 units (Point B). The demand for Product X is considered to be more inelastic than the demand for Product Y. We can generalize this to say that the more inelastic demand is for a product, the steeper its demand curve will be. Of course the opposite is also true; the more elastic demand is for a product, the flatter the demand curve will be.

Perfectly Inelastic and Perfectly Elastic Demand Curves

Below are the graphs of the demand curves for two products, V and W. Which do feel represents perfectly inelastic demand?

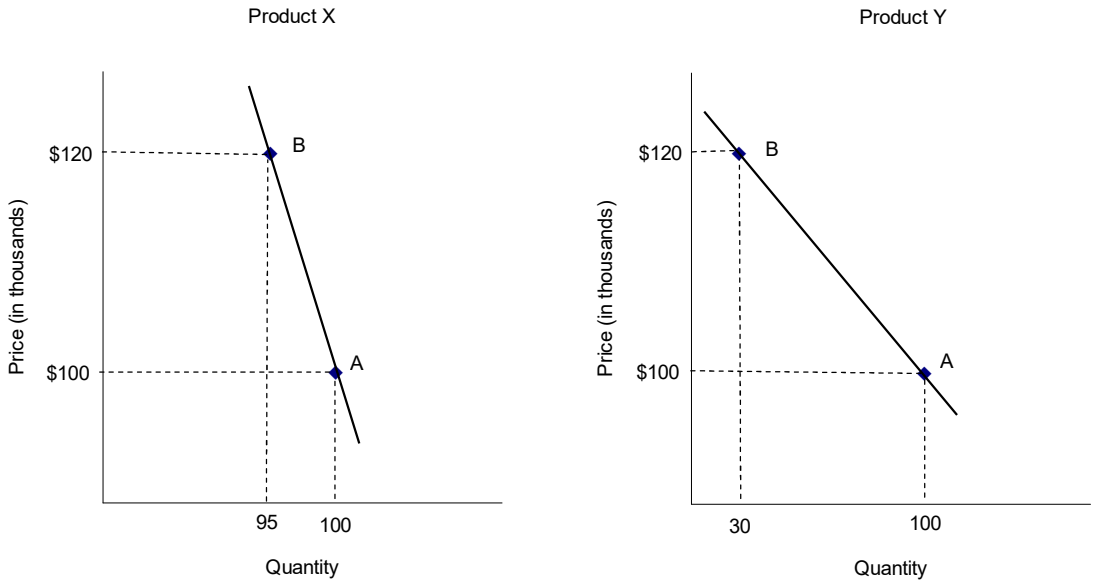


The answer is Product V. A vertical line represents perfectly inelastic demand. The quantity demanded remains constant regardless of the price. Demand for Product W, the horizontal line, represents perfectly elastic demand. At the given price, a company could sell all that it desired.

Elasticity and Total Revenue

As we noted above, the elasticity between relatively inelastic demand and relatively elastic demand is unit elastic demand. The elasticity is equal to one, and the reason for this has to do with total revenue.

Let's review our first pair of elasticity graphs:



Let's consider the question of what happens to total revenue as price rises? For Product X, the one with relatively inelastic demand, total revenue goes from $10 million ($100,000 times 100 units) to $11.4 million ($120,000 times 95 units). Total revenue increases.

For Product Y with relatively elastic demand, total revenue drops from $10 million ($100,000 times 100 units) to $3.6 million ($120,000 times 30 units). Total revenue decreases.

Thus, for unit elastic demand, the slope of the curve would be between the two shown above and total revenue would remain the same after the change from Point A to Point B. (I leave it to the interested student to confirm that the Point B quantity would be 83.3 units.)

Summarizing Elasticity and Total Revenue

If the price **rises** and demand is:
- Relatively inelastic, then total revenue rises
- Unit elastic, then total revenue stays the same
- Relatively elastic, then total revenue falls

If the price **falls** and demand is:
- Relatively inelastic, then total revenue falls
- Unit elastic, then total revenue stays the same
- Relatively elastic, then total revenue rises

Elasticity is all too often poorly estimated by businesses. The tendency is for companies to assume that the demand for their products is relatively inelastic. They take the obvious stance that if they raise their price, they will make more money. This is not always the case. For example, until the early 1980's one reason the airline industry was regulated was for the purpose of keeping ticket prices high. The airlines believed that the end of these regulations would mean lower airline prices (that was true). They also believed that this would mean lower total revenues because they assumed that the demand for air travel was relatively inelastic. When the regulations were eliminated as expected, airline ticket prices did fall. However, total revenues went up dramatically. This indicates that the demand for air travel was in reality relatively elastic. The increased demand more than off-set the lower ticket prices.

How Do I Know If Demand is Relatively Elastic or Inelastic?

The airline example illustrates that for accurate decision-making, it is of great importance to understand the elasticity of demand for a company's product. To get at elasticity, it is possible to carry out complex statistical studies, but these are often very expensive. Another option is examining the three factors that influence elasticity for the product in question.

Availability of Substitute Products

The first factor is how many substitutes are available for the product in question. Consider the example of electricity. If the price of electricity falls by 10 percent, will the quantity demanded go up by just a little or a great deal? The quantity demanded is not likely to change much, thus electricity demand can be considered relatively inelastic. Why? The answer has to do with how many substitutes exist and how close they are as substitutes. If the price of electricity falls what do buyers do? It is not like people will switch from kerosene lamps to electric due to the price change. There are simply few substitutes for electricity. Thus, consumers will reduce their buying very little, making the demand relatively inelastic.

Time to Develop Substitutes

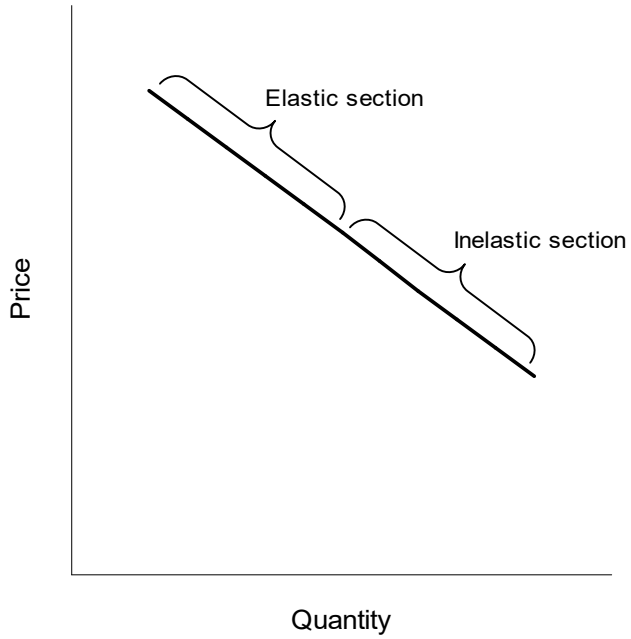
A second factor which is closely related to the first is time. This refers to the time it takes to develop substitutes. Let's say that today the price of gasoline rose to $7 per gallon and your car is nearly empty. You will probably pay the higher price and complain. But if the price remains high as time goes on, you will adjust and find ways to substitute. You will change your driving habits, car pool, ride a bike, or eventually buy a new car that gets better mileage.

Price Relative to Income

The third and final factor influencing the elasticity of demand is the price of the product in relation to one's income. Consumers respond more readily to an increase in the price of an expensive product than an inexpensive one because it takes up a larger proportion of their income. Assume that the price of a soda in a vending machine rises by 5%. This would be a nickel (usually) and for most of us, a nickel is not much money. Quantity demanded will fall only slightly. Now assume that the price of an automobile rises by the same 5%. On an average car, this would be about $2,000. For most consumers, this is expensive, and people are more likely to considerably reduce their purchasing of cars.

Revisiting the Demand Curve

There is an additional detail to be aware of regarding the product price relative to income. This refers back to our discussion about slope of the demand curves. Recall that for relatively inelastic demand, the curve will be steeper, and for relatively elastic demand, the curve will be flatter. However, because of the third factor affecting elasticity, the elasticity of demand changes as we move along the demand curve. At higher prices, the demand is likely to be relatively elastic because the product is expensive relative to one's income. As the price falls, the demand will become increasingly Inelastic.



For example, is the demand for cigarettes relatively inelastic or elastic? Most would answer relatively inelastic on the basis that people are "hooked" and cannot quit easily. Assume cigarettes currently sell for about $7 a pack. Then imagine what would occur if the price rose to $10, $20, or $30. As the price of cigarettes becomes extremely expensive, we would expect that people would find a way to quit or at least cut down. Thus, as the price rises, the demand has become relatively more elastic. To summarize, the demand for a given product will be relatively more elastic (buyers will respond more if the price rises) if:

- There are many good substitutes for the product, including doing without
- There is a longer time under consideration
- The price of the product is relatively high in relation to buyers' incomes.

The reverse would cause the demand to be relatively more inelastic.

Non-price Determinants of Demand

Thus, far we have focused mainly on price as a factor that influences the demand for a product. We now turn to six other factors. These are called the non-price determinants of demand. Here is a list for the sake of convenience. We will go through them one by one.

- Income
- Complement goods
- Substitute goods
- Tastes or preferences
- Expectations
- Number of buyers

Income

Let's say that you want to purchase a new home so you pick one out that you like. The price is $500,000 and you do not buy. Why? One reason could be that your income is not large enough to sustain that level of purchase. You simply cannot afford it. We can conclude that consumer income must be a factor that affects the demand for a given product. Normally, we expect that as one's income rises, the demand for a product will rise.

Complement Goods

Now let's assume that you are willing to pay the price for your selected home and have sufficient income. There are still other factors that will enter into your decision. One may involve the method you will use to pay for this home, the financing. The price of financing is the interest rate. Financing is an example of a complementary good or complement. A complement is a different good that goes together with the one under consideration. Homes and financing obviously go together as do bread and butter, cars and gas, etc.

As the interest rate rises, the demand for homes falls. We can generalize that as the price of the complement rises, the demand for the product falls. And the converse is also true, as the price of the complement falls, the demand for the product rises.

Substitute Goods (More Non-price Determinants of Demand)

Substitute goods are different goods that compete with the one under consideration. Apartments and single-family homes are substitutes (as are Coke and Pepsi, etc.). If the price of apartments rises, demand for single-family homes will rise. If apartments rented for $3,000 per month, fewer people would want to live in apartments and more in homes. We can generalize the relationship to as the price of the substitute rises, the demand for the product rises.

Taste or Preferences

In our example, one more obvious factor that influences your desire for a new home may be that you simply like homes. It is a matter of taste or preferences. Liking or disliking a particular good can have a certain psychological component. This principle when stated seems obvious: the more we like a good or service, the greater is our demand for it.

Expectations

In the case of homes, people sometimes buy many. This does not mean a regular home plus a vacation home, etc. Rather, it means several homes in the same area. One reason for this is that the buyer (really more accurately called an investor) expects that the price of homes will rise in the near future. Of course, the buyer does not know for certain that the price will rise. The buyer *expects* the price to rise. Expectations influence the demand for many products including stocks, gold, etc. We can generalize that if buyers expect the price to rise in the future, demand increases today.

Conclusion of Non-price Determinants of Demand

Other types of expectations will also influence the demand for a given product. If people expect that the product will soon be unavailable, the demand will rise today. This was the case for gasoline in the early 1970's, and the wild stocking up of Classic Coke in the 1980's.

Also, if you expect that your income will fall, your demand for most products will also fall. For example, during recessions people lose jobs or have to take pay cuts. While this may not yet have happened to you, you may still be worried that it will. As a result, you reduce your spending.

Number of Buyers

The last of the factors we will consider that influence demand is the number of buyers. Market demand is simply the sum of individual demands. If, at the price of $10, Dan wants to buy 10 units of a product, Fred wants to buys 20 units, and Susan wants to buy 30 units, then, of course, the market demand is 60 units. If Donna becomes a buyer and wishes to buy 40 units, the market demand rises to 100 units. With more buyers there is increased market demand.

To summarize, the demand for a given product will rise if:

- incomes rise (if the product is "normal", do an internet search for more detail)
- the price of a complement falls
- the price of a substitute rises
- people like the product better
- people expect the price to rise soon
- people expect the product not to be available soon
- people expect their incomes to rise in the near future
- there are more buyers

The opposite of each will cause the demand for the product to fall.

Shifting the Demand Curve

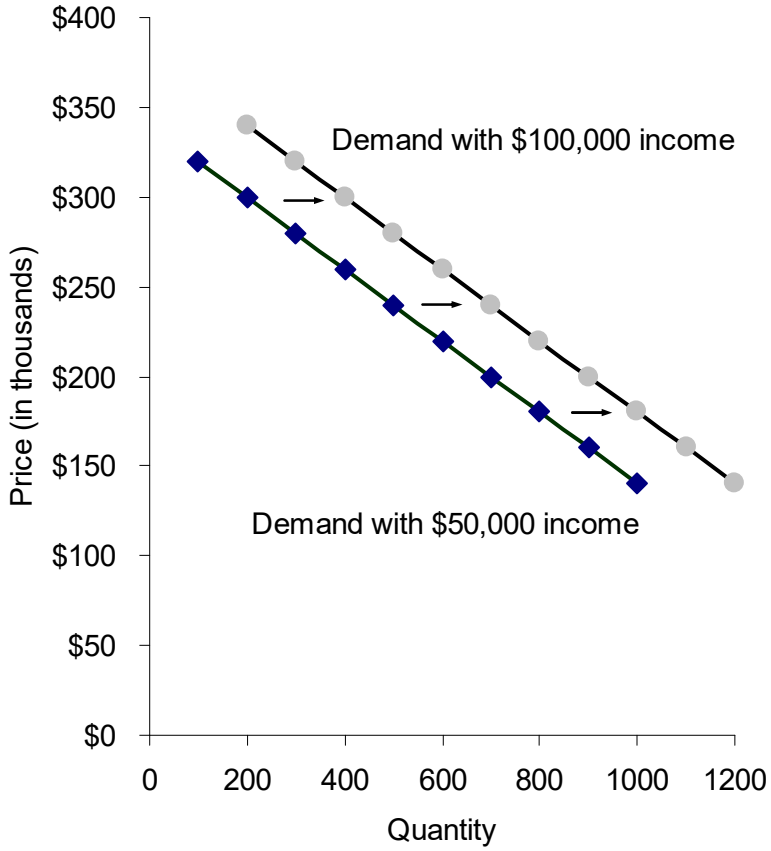
We now return to graphical analysis. Recall that along the demand curve, as the price of the product falls, the quantity demanded of that product will rise. The question is how to show the non-price determinants of demand on the same graph. The solution is to show a *shift* of the demand curve. We construct a new demand curve to replace the original one. The new curve illustrates that with a shift, at every price of the product, consumers will want to purchase a different quantity than they did before.

Let's use an example of increasing income. The demand schedules below show the demand for homes before and after an increase in consumer income. The income increase results in increased demand since people will desire more homes.

Data Point #	Price	Quantity Demanded	
		Income=$50,000	Income=$100,000
	$340,000	0	200
1	$320,000	100	300
2	$300,000	200	400
3	$280,000	300	500
4	$260,000	400	600
5	$240,000	500	700
6	$220,000	600	800
7	$200,000	700	900
8	$180,000	800	1,000
9	$160,000	900	1,100
10	$140,000	1,000	1,200

When we graph price and quantity at the two income levels, we get the two demand curves on the following page. This is interpreted by saying that the demand curve has shifted to the right.

Graph of a Shifting Demand Curve



To summarize the way the graph works: we move along the demand curve from one point to another on the same line if the price of the product changes. We shift the curve if anything else (the non-price determinants of demand) changes. If demand increases, the shift is to the right. If demand decreases, the shift is to the left.

Summary

In this chapter we have looked in substantial detail at the nature of demand. We have introduced graphical analysis and have shown that the demand curve is downward sloping, i.e. consumers demand more at lower prices. We determined that the elasticity of demand needs to be understood from the perspective of total revenue and can be evaluated by the steepness of the demand curve. Finally, a change in price involves a movement along the demand curve while a change in any other determinant of demand would mean that the curve itself would shift.