

The Coffee Market's Hot; Why Are Bean Prices Not?

Insights into Supply and Demand

Under fifteenth-century Turkish law, a wife could divorce her husband if he failed to provide her with a daily quota of coffee. Coffee is no longer grounds for divorce, but it is the world's most popular beverage after water and a common element of cozy getaways and productive workdays. Diamonds are another element that cements marriages, but although the price of diamonds drives people to steal, coffee beans have become a steal, costing only a few dollars a pound in the retail market. The paradoxical fall of coffee prices as popularity rises can be explained with the allied concepts of supply and demand.



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Supply, Demand, and the Great Explorers

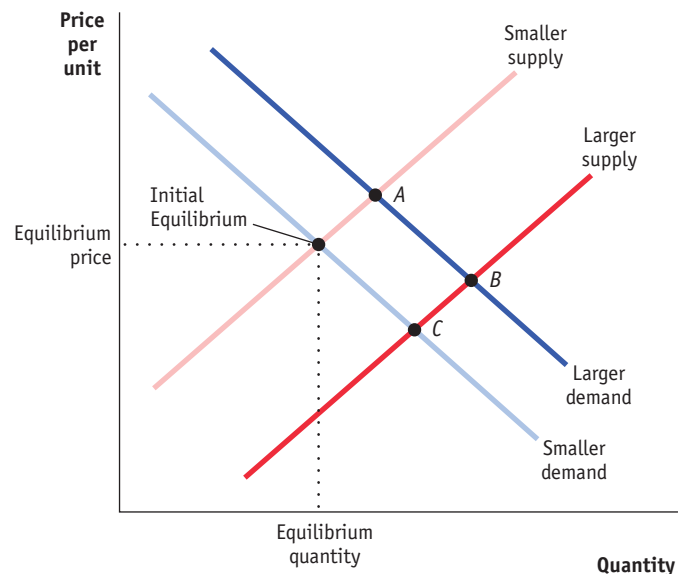
The story of supply and demand began long ago. Let's pick it up with the great explorers of the fifteenth and sixteenth centuries. In 1492, Christopher Columbus sailed the ocean blue in search of a westward route to Asia and its gold. In 1519, Ferdinand Magellan proved that the Earth is round on an expedition to the Spice Islands, where cinnamon, nutmeg, and cloves were abundant. The royalty of Spain paid generously for these trips because gold was precious and, at that time in Europe, some spices were worth more than their weight in gold. Why were these products so expensive? Because the combination of high demand and limited supply leads to high prices. Thanks to the incentives that high prices provide, new trade routes were established, supply increased, and spices became affordable. In other words, Europeans came to America and you

can have cinnamon in your latte thanks to the workings of supply and demand.

Because they explain so much, let's explore the concepts of supply and demand.

Supply

The supply curve exhibits the relationship between the price and the quantity supplied. According to the "law" of supply, as the price increases, the quantity suppliers would be willing to supply increases, and as the price decreases, the willingly supplied quantity decreases. This suggests, for example, that the Reno Philharmonic Orchestra would be willing to put on more performances per week if it could command an \$80 ticket price than if it could command a \$60 ticket price. This positive relationship between price and quantity is illustrated by the upward slope of the supply curve in the accompanying diagram.



It is likely that the law of supply describes your own behavior as well. Think about how many hours of burger flipping, lawn mowing, or babysitting you would supply per week at various prices. If you would supply more

hours for \$50 per hour than for \$5 per hour, your supply curve has an upward slope. Let's examine why that's probably the case, using the economic concept of opportunity cost.

The *opportunity cost* of a particular action is the value of the next-best alternative action. Part of the opportunity cost of going to college is the money you could have earned working at McDonald's instead. The opportunity cost of an hour of babysitting is the value you would have received from your next-best use of that hour. Your first hour of babysitting would substitute for the least valuable alternative activity that day—perhaps perusing YouTube. Additional hours of babysitting must be carved out of more and more valuable alternatives, such as spending time with friends, sleeping, and (as a last resort!) studying economics. Losses of activities like these constitute the opportunity cost of each hour of babysitting. You are rational to babysit until the opportunity cost of one more hour of babysitting would be the loss of an activity that you value more highly than the hourly wage for babysitting. Your babysitting will obey the law of supply because an increase in the wage (that is, an increase in the price of babysitting) justifies the loss of additional alternative activities and makes you willing to supply a larger quantity of babysitting hours.

In some cases opportunity costs rise because, to make more and more of a good, producers must use inputs that are less and less specialized for making that good. For instance, farmers begin producing soybeans on the land best suited for that crop. As more soybeans are grown, farmers must use land that is less suitable for soybeans, which means lower yields or larger expenditures on fertilizers and irrigation. Similarly, as more silver is mined, mines must be dug deeper and in areas with lower concentrations of silver. The rising opportunity cost of gradually shifting to ill-suited inputs causes the marginal cost—the cost of making one more unit—to increase.

Even when output is increased by adding identical units of a particular input, *diminishing returns* can cause an increase in the marginal cost of production. Diminishing returns set in when successive units of one input added to a fixed quantity of another input contribute less and less to the level of output. The classic example is adding seeds to a flowerpot: if you keep adding seeds, the additional returns in terms of flowers will eventually decrease, and, at some point, there will be so many seeds in the pot that another seed will find no soil. Similarly, as more fishers are added to a fishing boat, or more tractors are added to a farm, they will eventually experience redundancy and congestion. When another unit of input contributes less to output than the preceding unit, the marginal cost rises. And with the cost of making each additional unit rising, firms require higher prices in exchange for larger quantities, and the supply curve is upward-sloping.



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A change in the marginal cost of producing each unit shifts the supply curve. When the marginal cost falls, the supply increases, and the supply curve shifts downward and to the right (as from the light red supply curve to the dark red supply curve in the figure). For example, an improvement in fishing-net technology could lower the cost of catching fish and increase the supply. An *increase* in the marginal cost shifts the supply curve upward and to the left.

You can find the market supply curve by adding up the quantities supplied by all the individual firms at each price. Suppose the fish market consists of two firms: Fred's Fish and Fay's Fish. If, for a price of \$1 each, Fay would supply 10 fish and Fred would supply 6 fish, then the market supply is 16 fish (10 from Fay plus 6 from Fred) at \$1. The market supply at any other price is determined in the same way—by adding up the quantities supplied by all firms at that price.

Note that a change in the *price* of fish does not change the marginal cost of catching fish, so it does not shift the supply curve. Rather, it causes a movement to a new point along the existing supply curve, as from the point labeled "Initial equilibrium" to point A in the figure. To distinguish between these two types of changes, we call a movement along a stationary supply curve a *change in the quantity supplied*, and a shift in the supply curve itself a *change in supply*.

Demand

The demand curve shows the relationship between the price and the quantity demanded. The demand for a good depends on the benefits it conveys. Whether it is fish, clothing, coffee, or almost anything else, the *marginal benefit*—the benefit gained from one more—generally decreases as quantity increases because needs become satisfied and desires become satiated. The first beverage you drink in a week keeps you alive, whereas the 50th provides no such benefit. The height of the market demand curve at each quantity indicates the most that anyone would be willing to pay for that unit of the good. With benefits decreasing as individuals receive more and more of a good, the height of the market demand curve decreases, giving it a negative slope, as shown in the figure. The downward-sloping nature of the demand curve embodies the "*law*" of demand: as the price of a good decreases, the quantity demanded increases. This makes sense because lower prices justify the purchase of additional, less-valuable units.

Consider your demand for canned tuna fish. Your first can in a week provides the important benefits of protein, minerals, omega-3 fatty acids (to reduce the risk of heart disease), and a welcome break from peanut butter and jelly.



Perhaps you'd pay up to \$5 for the benefits of a first can of tuna. (You are unlikely to need to pay \$5 for a can of tuna, but the demand curve describes the most you would pay if you had to, not what you must or do pay.) If so, your demand curve has a height of \$5 at the quantity of

1. A second can of tuna provides a little more variety and more of the same nutrients. Getting those benefits for the second time in a week isn't as essential as getting them the first time, but perhaps a second can is worth \$1 to you. In that case, your demand curve has a height of \$1 at a quantity of 2. A third can is even less important and may have you craving a break from tuna fish. Let's say you would pay up to 30 cents for a third can, and you wouldn't pay anything for any more tuna. Your demand curve thus has the height of 30 cents at a quantity of 3 and a height of 0 at every higher quantity.

It is rational for you to buy cans of tuna fish until the benefit you receive from 1 more can is no longer worth at least as much as the price you must pay for it. If the price were \$6, you wouldn't buy any tuna fish because even the first can is only worth \$5 to you. If the price were \$4, you would buy 1 can because it's rational to pay \$4 for something that's worth \$5. At a price of \$1 or less, you would buy the second can, which is worth \$1 to you, and if the price were 30 cents or less, you would buy 3 cans but no more.

The market demand curve is found by adding up the quantities demanded by all individuals in the market at each price. Suppose you and I are the only consumers in the tuna fish market. If, at a price of \$1, I would buy 3 cans of tuna fish and you would buy 2, then the market demand is 5 at a price of \$1. The demand at any other price can be determined in the same way—by adding up the quantities demanded by all consumers.

Because the demand curve reflects consumers' willingness to pay for each additional unit of a good or service, the curve will shift upward and to the right, as from the light blue demand curve to the dark blue demand curve in the figure, when the willingness to pay increases. This could result from

- a change in income
- a successful advertising campaign
- expectations of an upcoming increase in prices

- an increase in the price of substitutes, such as peanut butter and jelly
- a decrease in the price of complementary goods, such as bread
- an increase in the number of tuna fish consumers

The opposite of these changes would cause the demand curve to shift downward and to the left.

The effect of a change in income depends on the type of good in question. A *normal good* is one that consumers buy more of when their incomes increase; an *inferior good* is one that consumers buy less of when their incomes increase. Whether a good is normal or inferior depends on individual preferences. For some people, tuna fish might be a normal good. A higher income might lead other people to buy more steak and less tuna fish, so for them, steak would be normal and tuna fish would be inferior. Other examples of goods that are inferior for some people include secondhand clothing, rides on public buses, store-brand soda, and Spam. An increase in income shifts the demand curves for normal goods upward and to the right, and shifts the demand curves for inferior goods downward and to the left. Again, the opposite is also true.

The Marriage of Supply and Demand

The supply and demand curves reside on the same graph, with the price per unit measured on the vertical axis and the quantity of a particular good measured on the horizontal axis. The curves meet at the *equilibrium point*, which is so named because it represents a balance between the quantity demanded and the quantity supplied. The price directly to the left of the equilibrium point is the *equilibrium price*, and the quantity directly below the equilibrium point is the *equilibrium quantity*. If the price is initially set above the equilibrium price, the quantity supplied will exceed the quantity demanded, and the resulting surplus will lead suppliers to lower their price. If the price begins below the equilibrium price, the quantity demanded will exceed the quantity supplied, and the resulting shortage will motivate an increase in the price. Thus, we expect the price to reach the equilibrium level and stay there until a shift occurs in either the supply curve or the demand curve. We can find the effect of any shift by drawing the new curve and comparing the new and old equilibrium points.

Now we are equipped to explain the happenings in the spice and coffee markets of the past and present. In the sixteenth century, the supply of cinnamon in Europe was very small. We represent a relatively small supply with the light red "smaller supply" curve on the left side of the graph. Suppose the light blue "smaller demand" curve represents demand. To discover the influence of supply fluctuations on price, compare the price level (height) at the initial equilibrium of the light-colored supply and demand curves and at equilibrium point C at the intersection of the dark blue "larger supply" curve and the light

blue demand curve. With limited supply, the price is higher, which helps to explain the high equilibrium price fetched by cinnamon and other spices imported by Europeans 500 years ago. The supply of spices to Europe and America increased dramatically after Columbus, Magellan, and other explorers established faster and safer trade routes to Asia. As more and more ships brought spices to Western shores, the supply curve shifted from left to right and the equilibrium price fell.

The Coffee Crisis

To examine recent activity in the coffee market, we must consider the effect on prices of changes in demand. Starting again at the initial equilibrium of the light-colored demand and supply curves in the figure, an increase in the popularity of coffee shifts the demand curve to the right. This demand shift indicates that people are willing to buy more coffee at any given price. What happens to the equilibrium price when demand increases? It rises to the level of equilibrium point *A*, and the higher price entices an increase in the quantity of coffee supplied. Note that the change in demand has not affected the cost of producing coffee, which depends on input costs rather than demand, so the supply curve does not shift. Point *A* is on the same supply curve that we started with, but the price has risen because the demand curve shifted outward.

U.S. consumers demand roughly \$2.4 trillion worth of imported goods annually. The United States is the largest importer of coffee, which, after oil, is the most traded commodity in the world. More than 500 billion cups of coffee are consumed worldwide each year. But as increasing demand led Starbucks, Inc., to open tens of thousands of retail outlets around the world, the price of coffee beans declined. Let's examine the paradox of coffee prices in the context of supply and demand.



Teerawut Masawat/Alamy

The price of coffee rose fairly steadily in the 2000s and reached \$2.89 per pound in the world market in 2011. This price provided healthy profits for coffee growers and led to a rapid expansion in the allocation of land to coffee farming in countries such as Vietnam and Brazil. The fruits of these plantings became available three years later. Although coffee demand was robust during that period, supply increased by *even more than* demand. The dark-colored curves in the figure

represent the larger demand and the much larger supply of coffee in the mid-to-late 2010s. An increase in demand lifts prices, but an increase in supply lowers them, and the downward effect on prices was dominant in this case. Despite the large demand, prices were depressed by the overarching supply glut. Prices as low as \$1.00 per pound sunk the incomes of some 25 million farmers in 50 countries. Over time, some farmers have been able to respond to the low prices by switching to other crops. The resulting decrease in supply, and its upward influence on prices, mark the beginning of the end of the latest coffee crisis.

Conclusion

Supply is determined by the marginal cost of production, which generally increases with quantity. Demand is determined by marginal benefit, which tends to fall as quantity increases. The price-setting duo of supply and demand, along with the predominant influence of a large supply of coffee beans, explain why coffee prices are low despite the long lines at Starbucks. Similar paradoxes abound. Why are essentials, such as food and water, inexpensive, whereas nonessential jewels and professional ball players command lofty prices? The answer lies in the abundant supply of food and water and the limited availability of jewels and great ball players. Sometimes it is the demand side that is neglected. Struggles to combat high oil prices have focused on the supply side—seeking new sources and tapping into petroleum reserves. A decrease in the demand for oil would also lower prices, although that may be unlikely given consumers' appetite for gasoline consumption. Whether trying to explain, predict, or influence prices, keep in mind that supply and demand work together to determine price and that both can be influenced by policy.

Critical Thinking Questions

1. Although the supply of Jeeps expanded in the late 2010s, people were paying higher prices than ever for those vehicles. Explain how an increase in price can accompany an increase in supply.
2. As your income increases, what do you think will happen to your demand curve for Folgers Coffee? What will happen to your demand curve for Starbucks coffee? Are these goods, therefore, normal or inferior for you?
3. To help coffee farmers, some organizations sell "fair trade" coffee for a price that is higher than the price of most other coffee. Why do you suppose they are able to sell some coffee at the higher price? What would happen to the quantity of coffee supplied and demanded if a law prevented the price of coffee from falling below the fair-trade price?