Supply and Demand: Buyers, Sellers, and Markets
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There are many situations in which you might want to ask: What is a reasonable price for a product X? You might be an equity analyst trying to value a firm that produces X. Or you could be a consultant trying to evaluate the benefits for a client of entering the market for X. Or you could be a venture capital investor trying to assess the prospects of a startup planning to produce X. A glib answer is to look at the market's current price, but there are times that's not enough. It's not enough, for example, in a market that does not yet exist. And it’s not enough when you think the current price is likely to change. When production at Canada's Diavik diamond mine comes online in 2003, what is the likely impact on the price of diamonds? What is the impact on airline fares of an increase in the price of jet fuel?

The supply and demand diagram is the basic tool of analysis for addressing such questions. In this lecture, we describe the tool and explain how to use it. A critical distinction is the difference between movements along curves and factors that cause one or both of the curves to shift. Unless you've had economics before, this will sound a little mysterious, but it should be less so by the end of class. In future lectures, we go into greater depth on the supply and demand curves themselves.

Buyers: Demand

In class, we looked at an example in which people expressed their willingness to buy a soda at various price points. As the price decreased, more people were willing to buy the soda. A "demand curve" represents graphically the relationship between quantity desired and price: the number of units people are willing to buy ("the demand") at a given price. By tradition, we graph this relation with price on the vertical axis and quantity on the horizontal access. This can be confusing, but it’s hard to break a century-old habit among economists. The demand curve is normally downward-sloping, meaning that more people are willing to buy a good if the price is lower. Similarly, if someone is willing to buy a product at one price, he or she is generally willing to buy it at a lower price, as well.

The location and shape of the demand curve depend on people's tastes. Hence the demand for cod fish is greater in Portugal than it is in Japan, and the demand for rice is greater in Japan than Portugal. The demand for wireless phone service is relatively sensitive to price (the demand curve is flat) but the demand for basic service is not (steep), since people are generally less willing to forgo basic service to save money for other uses. We frequently represent the demand curve as a straight line, but that's purely
a graphical convenience. We saw, for example, our demand curve for soda was not straight.

The quantity of a product people are willing to buy depends, of course, on more than price. It can depend on the prices of other products, the incomes of buyers, the age distribution of the population, and lots of other things. We represent all of these other factors in a "demand function," in which quantity demanded is a mathematical function of as many of these other variables as we need. (Pay close attention to what's coming!) The question is how to picture changes in these variables in a diagram with price and quantity on the axes. We do so by shifting the demand curve up or down when these other variables change. The demand curve gives us the relationship between price and quantity for given values of the other variables. If any of these other variables changes, the demand curve shifts.

Now to some examples. Prices of other goods often affect the quantity demanded. For example, if the price of Coke rises, we might expect the quantity of Pepsi demanded to increase at any given price. The demand curve for Pepsi shifts up and to the right. We say that Coke and Pepsi are "substitutes" since an increase in the other's price leads to an increase in demand. If the dependence goes the other way, we call the products "complements." For example, if the price of gas goes up, we would expect the demand for SUVs to decline.

Population and income also affect demand. For example, the demand for undergraduate education is increasing due to a demographic bulge of people of college age. We could represent this as a shift up/right of the demand curve for education. Income also affects demand for many products, with more people willing to buy higher-price goods as income increases. In the UK, for example, the demand for relatively déclassé vacations in Southern Europe has declined as people have become prosperous enough to afford vacations in Florida and the Caribbean. We can represent this as a shift down/left in the demand curve for European vacations. Advertising can also have an impact on demand, by raising the visibility and perceived quality of products.

**Sellers: Supply**

The "supply curve" represents the quantity sellers are willing to sell at different prices for given values of other variables. The supply curve is generally upward-sloping since companies will be willing to produce and sell more of a good as prices go up. For example, crude oil producers supply more oil at higher prices, since a higher price makes more wells profitable. Markets differ in how steep the curve is, however. A high price of electricity has elicited little immediate increase in supply in California (the supply curve is steep, at least in the short run). But if there were a sudden increase in the demand for basic blue jeans, we would expect producers to meet it with little increase in price (the supply curve is flat).
Like demand, supply is affected by factors other than price and we represent changes in these factors by shifts in the supply curve. One such factor is input prices. If the price of jet fuel rises, we would expect it to increase the price at which airlines are willing to sell tickets (the supply curve shifts up). Technology also affects the supply curve. If improvements in technology reduce costs of production, then we would expect the supply curve to shift down/right. Nature can also play a role. For example, an earthquake that destroys some of the market's capacity would result in a shift left/up in the supply curve. This happened in the semiconductor market after the 1999 earthquake in Taiwan. The number of suppliers also affects supply, with more suppliers tending to mean greater quantity supplied at any given price. Similarly, an investment in a new plant would result in a shift right/down in supply.

Once again, it is important to distinguish changes in price from changes in other factors. The former is a movement along the supply curve, whereas the latter results in a shift of the whole supply curve.

**Market Equilibrium**

In competitive settings, the price of a product is the result of the interaction of buyers (demand) and sellers (supply). We refer the point at which the supply and demand curves intersect as "equilibrium." It's an equilibrium in the sense that none of the market participants have an incentive to change their behavior: buyers are buying what they want at that price (the point is on the demand curve) and sellers are buying what they want (it's on the supply curve). If the price were higher than the equilibrium price, fewer people would want to buy than sell. The excess of sellers would tend to drive the price down. Conversely, if the price were lower than the equilibrium price, fewer people would be willing to sell than buy. The excess of buyers would cause the price to tend to rise to the equilibrium price.

We thus have an answer to one of the questions with which we started: a reasonable price is one at which demand and supply are equal. In practice, we need to know what the supply and demand curves look like, which requires both data and enough expertise and judgment to construct the two curves. But the logic is just what we've described.

Our other questions concern changes in market conditions. If the demand or supply curve shifts due to changes in one of the "other" factors discussed above, then a new equilibrium price will be established. The term “comparative statics” is used by economists to describe the exercise of looking at what happens to equilibrium if an exogenous factor changes. We would represent this by shifting the supply or demand curve and noting the change in the equilibrium price and quantity.

If you work through such an example, you'll see that the impact on price depends on the slopes of the supply and demand curves. The effect of a shift in the supply curve depends on the slope of the demand curve. (This sounds a little strange, but it's true because the demand curve hasn't shifted, so the change in equilibrium is a movement along the
If the demand curve is steep, price will react more to a shift in supply than quantity. If the demand curve is flat, the impact of a shift in supply will be predominantly on quantity. For shifts in demand, the impact depends on the slope of the supply curve.

Thus a key ingredient to any market analysis is an assessment of the slopes of the supply and demand curves: how sensitive the decisions of buyers and sellers are to changes in price. Consider the California electricity market. Maximum supply is virtually fixed, since the capacity of local power plants can't be changed much without building new ones. Similarly, the lines to bring in power from other states also have limited capacity. Hence, for high levels of output the supply curve is very steep (vertical?) and the impact of an increase in demand (the result of growth of the California economy) is reflected almost entirely in the price. Another example is the September 20, 1999 earthquake in Taiwan, which damaged plants producing a substantial fraction of the world's 64 MB DRAM chips. This can be viewed as a left/up shift in the supply curve (a reduction in supply). The price of the chips increased about 50%, from which we might infer that the demand curve for chips is fairly steep. A third example is copper, whose quantity has increased substantially while price declined slightly over the last century. (This is a general property of primary commodities: their prices have tended to go down, not up, over time.) How is this possible? One explanation is that demand has increased as the world economy has grown, but supply has shifted, too, as new technologies make copper extraction more efficient. In other words, both the supply and demand curves have shifted to the right, with supply shifting slightly faster.

**Further Reading**

Similar material can be found in many economics texts, including:


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