CHAPTER 3

THE LAW OF DEMAND

There is nothing more immutable than the law of demand. The way one improves his lot in life is by paying attention to the law.

"An individual or family must learn to distinguish between wants and needs." This kind of statement is often made in the context of giving advice to someone who seems to have a propensity to spend his income on things that the advice giver thinks may not be appropriate. Essentially, it is a statement of encouragement meant to champion the virtue of prioritizing one's wants. This kind of paternalistic guidance may be quite appropriate, especially in a context of teaching young people about life, but for economic analysis we shall make the assertion here that there is no distinct or objective difference between "wants" and "needs."

The important element that is missing from many discussions about wants and needs is the concept of price. While milk for a baby, for example, might seem like a need at $2.50 per gallon, would it still be a need if the price were $100 per gallon? It might be worthwhile to use the words want and need in communicating the intensity of the desire to have certain goods -- the word "need" portraying a more intense desire than the word "want." But to treat the two words as though they were two separate categories, into which all human desires can neatly fit, is often misleading. With milk at $100 per gallon, we would find that other things could be substituted for milk quite satisfactorily, and milk would therefore not be a "need" after all -- even for a new-born baby.

A young man that obtains employment thirty miles away from home says he "needs" a car, and that he would not be able to hold his job without one. That may sound like a real need until we think about it a little deeper. What if the cheapest car available was priced at $200,000? First we could think about the standard alternatives -- bus, bicycle, riding with a friend, etc. If those alternatives seem unrealistic for some reason, what about a taxi? And if none of those seem like good alternatives, he still has the alternative of not accepting the job. If the costs of accepting the job, after thoroughly assessing the transportation issue, seem to outweigh the benefits, then he will presumably take the best action -- turn down the job offer after all. There is nothing in economic theory or basic logic that suggests that a job is valuable at all costs.

The point to be made is this: there may be no such thing as a need in the strict sense, because everything seems to have substitutes. We can argue that there are substitutes for almost all economic goods. Sometimes we don't recognize some goods as substitutes until their relative price is decreased sufficient to cause us to notice. For example, at prices of $3 per pound for steak and $1 per pound for hamburger, someone might think that steak is a poor substitute for hamburger. But what if the price of steak moved to $1.10 per pound? Some people would find that steak could be used quite satisfactorily to meet some of the purposes that were previously met by the hamburger.

The amount of anything that is desired depends on the amount of something else that has to be given up in order to obtain it. Demand is the term that is used to describe the relationship
between the amount wanted and the price of a good\(^9\) As we have seen, when the price is high, the quantity demanded is very small. When the price is lower, more of the good is demanded. This inverse relationship between price and quantity is so pervasive in human behavior that it is called the law of demand. The law of demand simply states that, \textit{all else being equal, more is demanded at lower prices, and less is demanded at higher prices}. The fact that this concept has the designation of a law denotes that it is always and forever true, and without exception.

Demand is more than a mere \textit{desire} to purchase various quantities of a good at certain prices. If the price of a Mercedes automobile drops from $80,000 to $70,000, I may have an increased desire to purchase one. But if I am not actually able and willing to sacrifice the $70,000 to purchase the Mercedes, then my desire is not truly an effective demand at that price.

Demand is always a schedule -- it shows the amount that prospective buyers are willing and able to purchase at various prices. To talk about the demand for something without specifying a price is not using the concept of demand correctly, because the quantity demanded of a good depends on the price. For example, people often talk of the demand for medical care (or other things) being greater than the amount available. This is meaningless without specifying a price to go along with the quantity demanded. At a price of $4,000 per doctor's visit, for example, the quantity of medical care demanded would certainly be much less than it is at $4 per visit.

\textbf{Behind the Law of Demand}

Bill Buyer's portion of the hypothetical personal value scale for eggs that was presented in chapter two is duplicated below. Recall that because of the law of marginal utility, Bill valued the fifth dozen eggs less than the fourth, he valued the fourth less than the third, the third less than the second, and so on.

\textbf{Figure 3.1 Value Scale for Bill Buyer}

<table>
<thead>
<tr>
<th>Bill Buyer</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.30</td>
</tr>
<tr>
<td>1(^{\text{st}}) dozen eggs $1.25</td>
</tr>
<tr>
<td>2(^{\text{nd}}) dozen eggs $1.20</td>
</tr>
<tr>
<td>3(^{\text{rd}}) dozen eggs $1.15</td>
</tr>
<tr>
<td>4(^{\text{th}}) dozen eggs $1.10</td>
</tr>
<tr>
<td>5(^{\text{th}}) dozen eggs $1.05</td>
</tr>
</tbody>
</table>

This was based on the idea that the first dozen eggs will be used to satisfy the purpose that is valued highest on Bill's list of uses for a dozen eggs. Each successive dozen will be used to satisfy successively lower-valued purposes.

\(^9\) Economists use the word ‘demand’ quite differently than most people. For ordinary people, the word ‘demand’ might conjure up pictures such as a bank robber holding up the teller “demanding” the cash. In economics, the word demand simply refers to the amount that a person is willing and able to purchase at a given price. No threat of any kind is implied.
Another way of looking at this scale of values is to think of it as a demand schedule for eggs. At $1.25, Bill will demand one dozen eggs because he values the first dozen more than $1.25 in cash, at $1.20, he will demand two dozen for a similar reason, and so on. His relevant demand schedule is thus presented as Figure 3.2 shown below.

**Figure 3.2 Demand Schedule for Bill Buyer**

<table>
<thead>
<tr>
<th>Price Per Dozen Eggs</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1.30</td>
<td>0</td>
</tr>
<tr>
<td>$1.25</td>
<td>1</td>
</tr>
<tr>
<td>$1.20</td>
<td>2</td>
</tr>
<tr>
<td>$1.15</td>
<td>3</td>
</tr>
<tr>
<td>$1.10</td>
<td>4</td>
</tr>
<tr>
<td>$1.05</td>
<td>5</td>
</tr>
</tbody>
</table>

The schedule above reveals the important law of demand -- that more eggs are demanded at lower prices, and that fewer eggs are demanded at higher prices. These same quantities and prices can be plotted on a graph with price on the vertical axis and quantity demanded on the horizontal axis. This is done in Figure 3.3, and the points are connected with a line, which is called a demand curve. Notice that the line is downward sloping, denoting a negative or inverse relationship between price and quantity. This again is what the law of demand tells us -- that price and quantity demanded are inversely related.

We see here that, for any individual, more is purchased at lower prices because each successive unit is valued less than previous units. A decrease in price is required in order to persuade Bill to purchase more. Alternatively, we could say that demand curves are always downward sloping because of the law of marginal utility.

**Figure 3.3 Demand Curve for Bill Buyer**

And, as was discussed in chapter 2, the law of marginal utility is deduced from the idea that in attempting to better their own lives, people act in purposeful ways by prioritizing their options
and choosing the actions that tend to satisfy their most important purposes. In other words, they list their priorities, and consistently choose from the top of the list.

**Relative Price is the Relevant Price**

When we speak of price, we are talking about the amount of another good (usually money) that is required to be given up to purchase a specific good. It is important to recognize that if we are talking about changes in prices in terms of money, then it is at least conceptually assumed that the value of money itself is staying constant. Because we know that the purchasing power of money is not constant in reality, we must be aware of this fact in analyzing various situations. For example, we might observe that the quantity of gasoline purchased during a year increased while the price increased by 5 percent in dollar terms. This appears to be a contradiction of the law of demand until we learn that the prices of other goods and services (the general price level in the economy) increased an average of 20% during the year. With this additional information in mind we can see that relative to other goods and services the price of gasoline actually decreased, and therefore the observed increase in quantity demanded would seem reasonable after all. The law of demand holds true when we talk in terms of relative prices but not necessarily nominal money prices.

**Are There Exceptions?**

One can try to find examples where the law of demand does not hold, but these attempts are usually misinterpretations regarding the facts of the analysis in one way or another. It might seem, for example, that people are willing to pay more for mink coats or other prestige items because the prices are high. This seems contrary to what the law of demand says. But when we think about what is really being purchased, we can see that such a person is really buying prestige. And he is willing to pay a positive price for it. He may want to be able to tell his friends that he paid a high price for the good. He may want his acquaintances to see him walk into the store where only high-priced goods are sold, and he is willing to pay a price for this prestige.

Of course not everyone will be willing to go very far in paying positive prices for the good called prestige. Those who do not value prestige very highly will presumably not be purchasing high-priced items simply because they are high priced.

Another possible exception to the law of demand is the case where the price of something goes up and people buy more immediately in anticipation of the price going up more in the future. One might think that the increased price has caused the increase in the quantity demanded -- a contradiction of the law of demand. But people make their purchasing decisions based on their perception of future prices as well as current prices. If they expect that prices will be higher in the future than they are currently, then they are obeying the law of demand and acting very rationally by purchasing more now while prices are lower (even though prices have increased some) and less in the future when prices will be even higher still.

True exceptions to the idea that people will purchase more at lower prices and less at higher prices are difficult if not impossible to find. Consequently, there is no such thing as a demand curve that is completely vertical throughout. Such an occurrence would nullify the law of demand. The law of demand is part of human nature, and is therefore a fundamental element of economizing theorizing.

"Demand" versus "Quantity Demanded"

We have said that demand is always a schedule -- a series of prices and the quantities that willing and able buyers will purchase at those prices. Using the demand curve presented in Figure
3.3, let us propose a change in the selling price of eggs from $1.10 to $1.15 per dozen. We can see that by moving up the demand curve to $1.15, only 3 dozen eggs will be demanded instead of the 4 dozen demanded at $1.10. As a result of the change in price, the quantity demanded has decreased, but the demand schedule itself has remained constant. In common terminology, economists say that the "demand" has not changed. Rather, we call a shift in a demand curve inward or outward a decrease or increase in demand respectively.

You may wonder why we make a big deal of the difference between "demand" and "quantity demanded." What is the significance of the difference between the two? The significance is that they mean very different things, and if we are not specific in our terminology, we will likely be misunderstood.

Take, for example, the newspaper headline that says: "Milk prices rise as demand falls." If we are to understand from this that something in the economy has caused the demand for milk to decrease, and this has caused an increase in the price of milk, then the statement is clearly false, or at least a contradiction in terms. For a decrease in demand shifts the demand curve inward, and the price of milk at any given quantity is then lower than before -- rather than higher as is asserted in the headline.

If the headline means that as a result of an increase in the price of milk, the quantity of milk demanded has decreased, then the statement is correct. And this is exactly the point we are making. When we hear that "demand falls," are we to understand this as a decrease in the demand schedule, or a decrease in the quantity demanded (which is caused by an increase in price)? As we see from the headline just quoted, it makes a big difference -- one is demonstrably wrong, while the other is quite correct.

The economics profession has generally agreed that using just the word "demand," without any "quantity" modifier, refers to a shift in the demand schedule, rather than a movement along a demand curve. While it might be better to use the words "demand schedule" rather than "demand," the student should be aware that it is common practice to just use the word "demand" when referring to the demand schedule, and to specify "quantity demanded" when referring to a movement along a demand curve.

**Shifting Demand Curves**

If a change in price causes only a movement along a demand curve, or equivalently an upward or downward movement on a demand schedule, what causes a demand curve itself to move or shift? A quick answer would be that a shift in a demand curve can be caused by a change in anything other than the price of the specific good under consideration.

But we need to be a little more specific. The shape of a given demand curve is determined by a multitude of psychological, physical, social, and economic factors. A change in any one or more of these factors will tend to shift the demand curve. An increase in the quantity demanded at each and every price is called an *increase* in demand, and it is depicted as an outward shift of the demand curve. Alternatively, a *decrease* in demand is shown by an inward shift in the demand curve. Figure 3.4 on the following page depicts three demand curves. The middle one is assumed to be the initial demand curve, the curve to the left and below this initial curve is meant to show a decrease in demand, and the larger curve upward and to the right of the initial curve shows an increase in demand.

What we are really demonstrating here is that changes in demand curves are caused by changes in the personal and subjective tastes and preferences of individuals. While these specific tastes and preferences are influenced by a wide variety of economic and other factors, we will now take a look at some of the economic factors that can be expected to cause a shift in the demand for goods generally.
Incomes of individuals. We would expect an individual’s increased income to allow him to enjoy more of most goods and services. This would result in an outward shift (an increase) in the demand curve. To the extent the demand for a good does increase as a result of an increase in personal income, the good is called an *ordinary good*. But the demand for all goods does not increase with an increase in income. For example, an increase in income might allow people to substitute more expensive goods for less expensive goods. These less expensive goods, for which an increase in income will lead to a decrease in demand, are called *inferior goods*. Potatoes, rice, hamburger, and oatmeal might be considered inferior goods for many people in the economic sense.

One point of caution is in order here. The distinction between an ordinary good and an inferior good is not necessarily inherent in the good itself, but is rather a description of observed consumer behavior of certain individuals. This is why an inferior good for one person might be an ordinary good for someone else.

Prices of Related Goods. We have said that changes in the prices of goods themselves do not cause a shift in the demand curve. But a change in the prices of goods that can be used to satisfy similar purposes, called *substitute goods*, does cause an increase or decrease in the whole demand schedules of the goods for which they are substitutes. Two or more goods that are often consumed jointly, or enjoyed as a package, are called *complementary goods*. An analysis of the direction of the changes caused by changes in the prices of both substitute goods and complementary goods is beyond the scope of this book.

Elasticity of Demand

The total revenue going to the seller of a good is measured by the price of the good times the quantity sold. Figure 3.5 presents a hypothetical demand schedule for widgets, along with the total revenue that would be obtained at each price.
Notice that the total revenue in the particular demand schedule above increases as price is lowered from $45, then it begins to fall at prices below $20. The range of a demand curve where decreases in price correspond with an increase in total revenue is called the elastic portion of the demand curve, while the range where a decrease in price yields a lower total revenue is called the inelastic portion.

Elasticity can be thought of as the sensitivity or responsiveness of buyers to changes in price. The conventional formula for the coefficient of elasticity of demand is as follows:

\[
\frac{\% \text{ Change in Quantity Demanded}}{\% \text{ Change in Price}}
\]

Using this formula, a coefficient of elasticity greater than 1.0 is considered *elastic*, while a coefficient less than 1.0 is considered *inelastic*. In more general terms, the *elastic* portion of a demand curve shows greater sensitivity to changes in price, while the *inelastic* portion depicts less sensitivity. But perhaps a word with regard to the limited usefulness of the elasticity concept might be in order. We must not forget that behind demand curves, and their elasticities, lies the value scales of individual economic actors who are constantly re-ordering their priorities in response to actions of other individuals. Therefore elasticity in the economic sense is different than similar measurements in the physical sciences, which are often very precise. We cannot then take elasticity as a constant number inherent in particular goods, using it to predict precisely the behavior of acting individuals in society. Such a precision in economics is not warranted. But still, the general size of the coefficient does have some important implications about the expected responses to price changes.

**Substitutes & Demand Elasticity.** The existence of substitute goods -- goods that can be used to satisfy the same or a similar purpose to the good under consideration -- have a profound influence on the shape of demand curves. To the extent there are close substitutes available for a particular good, the demand curve will tend to be more elastic. A product with few good substitutes will have a rather inelastic (steep) demand curve, so that a large increase in price will not cause a big decrease in the quantity demanded. From a practical point of view, a business firm will attempt to make the demand curves for their products less elastic by differentiating their product from their competitors' products, at least in the minds of existing and potential customers.

**Elasticities and the Time Horizon.** If the price of electricity were to increase 400% tomorrow, how much would you decrease your consumption within the next month? The law of
demands says that consumption would decrease some, but we could argue that the decrease would not be very much in the short run. Whatever that amount turns out to be, we could further argue that the decrease in consumption will be greater after a year has passed than after just one month. And after three years the decrease would be even greater still. It takes time for people to adjust their behavior. In our electricity example, a longer amount of time would allow us to make adjustments such as more and better insulation in our homes, more efficient heating and cooling units, gas, solar, or wind powered appliances rather than electric ones, or thicker blankets on our beds.

So it is sometimes useful to specify the time horizon we are talking about when analyzing changes in prices, and the corresponding effect of those changes, on the quantities demanded at each price. Longer time horizons will tend to yield more elastic demand curves, while demand curves will be less elastic in the short run.

**Chapter Summary**

A fundamental principle of human action is that economic goods (usually money) are given up in order to obtain goods that are valued higher by the economic actor. There are substitutes for all economic goods; and as the price of a good goes up, incentives for people to find and use these substitutes increases.

The concept of demand relates the price of a good to the amount that people want to purchase. The law of demand asserts that a larger quantity of a good will be demanded at lower prices and a smaller quantity will be demanded at higher prices.

Because of the law of marginal utility, each successive unit of a good that is purchased will fulfill purposes that are valued lower on a person's value scale. Therefore demand curves are downward sloping to the right.

When we say that more is demanded at lower prices, and less at higher prices, we are talking about the price of the good relative to other goods. We must keep this in mind when analyzing the effects of changes in money prices.

The word "demand," used by itself, refers to a demand schedule or curve showing the quantity demanded at various prices. So a change in price is analyzed by moving up or down the demand curve, and it changes the quantity demanded rather than the demand schedule itself.

A change in a demand schedule itself is caused by changes in factors other than the price of the good under consideration. Some of these factors are incomes of individuals, tastes and preferences, and prices of related goods.

The responsiveness of consumers to a change in price is called the price elasticity of demand. Demand is called elastic if an increase in price leads to lower total revenue to the seller, while the term inelastic refers to an increase in price that yields higher total revenue.

More and closer substitutes available in the market, as well as longer time horizons, make for more elastic demand curves.

**Questions To Think About**

*1. "Medical care constitutes a need rather than just a want like other things. This is demonstrated by the fact that people have little or no control over when they get sick." Do you agree? Does the quantity of medical care demanded depend on the price of medical care?*

*2. Would you expect the elasticity of demand for automobiles to be more or less than for Ford automobiles? Why?
3. How would the development of cheap, safe, fast, refrigerated, and very large airplanes affect the elasticity of demand for goods in general?

4. Is elasticity the same thing as the slope of the demand curve? Create an example that proves your answer.

*5. A hypothetical demand schedule for tomatoes is presented below.

<table>
<thead>
<tr>
<th>Price Per Bushel</th>
<th>Quantity Demanded</th>
</tr>
</thead>
<tbody>
<tr>
<td>$55</td>
<td>10,000</td>
</tr>
<tr>
<td>$50</td>
<td>15,000</td>
</tr>
<tr>
<td>$45</td>
<td>20,000</td>
</tr>
<tr>
<td>$40</td>
<td>25,000</td>
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<td>$35</td>
<td>30,000</td>
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<td>$30</td>
<td>35,000</td>
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<tr>
<td>$25</td>
<td>40,000</td>
</tr>
<tr>
<td>$20</td>
<td>45,000</td>
</tr>
<tr>
<td>$15</td>
<td>50,000</td>
</tr>
</tbody>
</table>

If good weather and wise management combine to produce a crop of 50,000 bushels, what price will be obtained in the market? Under such a scenario, what will be the total revenue to tomato growers?

Suppose bad weather and/or poor management conspire to produce a crop of only 30,000 bushels. What price would be obtained in the market? At this price, what would be the total revenue?

If the revenue to tomato growers is higher when fewer are produced, why don't farmers just destroy approximately one third of their crop in a good year in order to get more revenue?

6. The computer industry over the past decade has come out with a seemingly endless stream of improved products. Intel's "286," "386," "486," and "Pentium" micro-processor chips are good examples. What does the development of new technologies do for the elasticity of demand for goods produced using already existing technologies?

*7. "Even though the floods in California destroyed one third of the lettuce crop, the value of the remaining crop was actually more than it would have been without the floods. Therefore the people of the state are actually better off than if there were no floods."

Is that possible? Straighten out this seeming confusion -- that a smaller crop is worth more than a larger one, and that people are better off with floods that do vast amounts of physical damage.

*8. If the price of beef shoots upward, and consumers generally have good reason to expect further sharp increases, would you expect the current demand for beef to increase or decrease?

9. College administrators think that by increasing tuition they can generate more tuition income for the college. What are they assuming about the elasticity of demand for college services?
10. If the price of propane suddenly went up 200%, would you expect to see a sudden decline in consumption or a gradual decline over a period of a year or more? Why?

11. "Our community needs more tennis courts, and this is verified by the fact that many people cannot play tennis as often as they would like because of the lack of courts." Is anything being ignored in this statement?

12. Assume that we often see long waiting lines of people wanting to rent small apartments but no such waiting list for larger apartments and houses. How can you reconcile this with the economic assertion that people prefer more expensive rather than less expensive economic goods?

13. How would you expect the development of fax machines and email to affect the demand for U.S. mail services?

Answers to Selected Questions

1. We can agree that people sometimes have little control over when they get sick, but this fact does not mean that medical care is a "need." The term "need" often connotes that someone has a "right" to something without respect to price. The quantity of medical care demanded most certainly does depend on price, even though the person talking about something as a "need" seems to indicate that either he thinks otherwise or he hasn't thought very much about it.

2. Because Ford automobiles presumably have more substitutes, we would expect their demand to be more elastic than simply automobiles taken as a whole.

5. With a bumper crop of 50,000 bushels, the price would be $15, and the revenue going to tomato growers would be $750,000. Under the bad weather scenario where only 30,000 bushels were produced, the price would be $35 per bushel, and the tomato growers' revenue would be $1,050,000.

It is true that the total revenue going to the farmers is more when less in produced, because they are in the inelastic portion of their demand curve. The difficulty with the farmers destroying a large portion of their crop is that they would have to make sure all competing farmers did the same. Otherwise the quantity would end up being large, and the price and total revenue would be lower as a result. Trying to enforce such an agreement among thousands of farmers would be difficult -- and they would have to deal with the ire of the consuming public as well.

7. If the demand for lettuce is inelastic in the relevant range, it is true that the market value of the lower quantity brought to market will be greater than if a larger quantity were produced (see answer to question 5). But the part about the people being better off with a smaller crop is not true. The whole area under the demand curve out as far as the quantity demanded is a closer measure of the welfare of the consumers. And this area is larger with a larger crop than with the smaller. Only the lettuce farmers are better off with the smaller crop.
8. The price of beef itself does not affect the demand for beef. It affects the quantity of beef demanded. However, the current demand might increase due to the expectations of future price increases. These expectations are non-price factors and thus the demand curve itself might be expected to increase as a result of these changes in expectations.

10. Since it takes time to change living habits, we would expect the demand for propane to be more elastic after a year or two than after a short period of time. It would take time for people to shift to alternative heating methods.

11. It seems that the cost of the tennis courts has been overlooked. This is often the case when a large number of people are expected to be paying the cost. Of course there is no way to scientifically determine and compare the costs and benefits when force is used to extract taxes from one group for the benefit of another. (See the discussion of social welfare in chapter 2.)

13. The development of fax machines and email should reduce the demand for mail service, and make it more elastic as well.