

How to Study for Chapter 13 Consumer Decision Making

Chapter 13 introduces the **law of diminishing marginal utility**. It provides examples of this law as well as explaining how this law led to the development of the law of demand.

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.
3. The class meeting will cover the technical points relating to the law of diminishing marginal Utility, to consumer surplus, and to the ways by which nature is valued. You are responsible for all of the examples whether they are covered in class or not. Be sure to go over them carefully to see how they illustrate the principles involved.
4. 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 12.

Objectives for Chapter 13 Consumer Decision Making

At the end of Chapter 13, you will be able to:

1. Explain how people use rational decision-making procedures to determine the quantity of each product that they wish to buy.
2. Explain what is meant by "**utility**"? Explain what is meant by "**marginal utility**"?
3. Explain the "**law of diminishing marginal utility**"?
4. Use the law of diminishing marginal utility to explain why water, which is essential to life, is virtually free while diamond, which has limited usefulness, is expensive.
5. Use the law of diminishing marginal utility to explain the argument for a progressive income tax.
6. Explain how the **law of demand** is derived from the law of diminishing marginal utility.
7. Explain what is meant by "**consumer surplus**" and why it exists.
8. **Explain how a dollar value is placed on utility.** Use this to explain how a value can be placed on scenic beauty, bio-diversity, and other environmental amenities.
9. Explain the **hedonic pricing method**. Explain the **travel cost method**. And explain the **contingent valuation method**.

Chapter 13 Consumer Decision Making (latest revision June 2004)

How do people decide what goods and services to buy? In this chapter, we will assume that consumers make this decision using the approach to *rational decision-making* described in Chapter 2. Remember that rational decisions are made one unit at a time. The question then is not "how many units of this product do you buy?" The question is "do you buy one?" To answer this question, two additional questions must be answered. (1) *What is the marginal benefit?* (2) *What is the marginal opportunity cost?* If the marginal benefit is greater than the marginal opportunity cost, buy unit #1. Then, ask the same about unit #2. And so forth.

The *marginal opportunity cost* is easy to measure. It is the value sacrificed when we choose to buy one unit and is equal to the price. For example, if you buy a movie ticket for \$9, you have sacrificed \$9 worth of other goods and services. No matter how many units you buy, the price will stay at \$9. The opportunity cost for each movie would be \$9. You are simply too small a part of the market to have any ability to change the price by yourself.

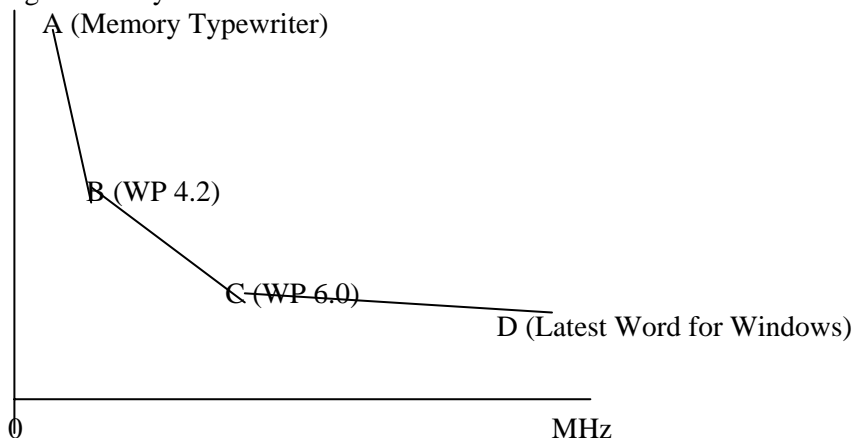
The *marginal benefit* is harder to measure. It is the additional benefit received from buying one more unit. What we get from buying a unit of a product can be called "satisfaction". Nineteenth century economists called it "*utility*" and we will use this term here.

The Law of Diminishing Marginal Utility

The *marginal utility* is the additional utility (satisfaction) from buying one more unit (for example, from going to see one more movie). What we can say is that *the marginal utility is likely to diminish as more and more units are consumed*. This is known as the *law of diminishing marginal utility*. If I am hungry, I would like a sandwich. The sandwich provides me with utility (satisfaction). After eating the sandwich, I am still somewhat hungry. So I eat a second sandwich. The second sandwich also provides utility, but not as much as the first did. After all, before I ate the first sandwich, I was starving. The third sandwich provides very little additional utility. The fourth sandwich provides negative utility (it makes me sick). For another example, think of movies. The first movie is interesting. The second is also good. But after the third, or fourth, or fifth, watching movies becomes tiresome and boring. You can think of other examples. The first car you get brings great utility (satisfaction). The second also adds utility, but not as much as the first. The third allows you to go camping, bringing yet additional utility. But the fourth has no great use. It sits there to be used once a year.

One economist recently provided the following example of diminishing marginal utility. Consider the utility of word processing with four stages of improvement. Let A represent the memory typewriter that eliminated much repetitive typing. B represents the early slow DOS personal computer with Word Perfect 4.2. C represents the faster Word Perfect 6.0 for DOS with a fully graphical WYSIWYG (what you see is what you get) interface. Finally, D represents today's Microsoft Word. The greatest gain in utility came with the development of the memory typewriter. This allowed revisions to be inserted while the rest of the document would automatically reformat itself. The gain from WYSIWYG was significant, but was not as large as the gain from the development of the memory typewriter. The utility gain from the move to Microsoft Word would seem small in comparison.

Marginal Utility



The Diamond Water Paradox

Diminishing marginal utility was developed from a famous paradox that was seriously debated in the 19th century. Philosophers wanted to explain why water, which is absolutely essential to life, has virtually no value in the market (the water itself is sold for only a few dollars a month) whereas diamond which has trivial value (for cutting in industry and for showing that we are married or rich) is so expensive in the market? The answer, of course, is that water is very plentiful (except during droughts in the West) whereas diamond is scarce (an artificial result of control by the DeBeers company). *From this paradox, people learned that the value of a product in the market is determined by its marginal utility, not by its total utility.* The total value of all the water on the planet is very high. Without water, all life would cease to exist. **But the value of water is not determined by the total value of all water on the planet. Instead, it is determined by the marginal utility of the very last gallon of water.** Because there is so much water, the marginal utility of the very last gallon is very low. (If one gallon of water were removed, what would people lose? The answer is, of course, not much. They would lose little because there is so much water left.) On the other hand, the total value of all of the diamond on the planet is not as large as it is for water. But the value of the last carat is very high because there is so little diamond. If one carat of well-cut diamond were removed, people would lose greatly because there is so little well cut diamond. Therefore, marginal utility is an important concept in understanding why a given product has the market value that it does.

How is Utility (Satisfaction) Measured?

How can we measure utility (satisfaction)? I cannot say that a banana is a 10 and an strawberry is a 6. *Today, utility (satisfaction) is typically measured in dollars according to the willingness-to-pay principle.* To value a sandwich, we ask: **“what is the most that you are willing to pay for that sandwich?”**. To value a second sandwich, we ask: "given that you have just eaten the first sandwich, what is the most that you are willing to pay for a second sandwich?" And so on. **The law of diminishing marginal utility tells us that you will be willing to pay less for the second sandwich than for the first.**

Rational decision-making requires us to compare the marginal benefit to the marginal opportunity cost (that is, the price) for each unit. **The marginal benefit (utility) is measured as the most money one would be willing to pay.** So we start with unit #1. Should you buy this? What is the most you are willing to pay for Unit #1? What is the opportunity cost (the price) of Unit #1? **If you are willing to pay more than the price you must pay, buy Unit #1.** Go on to number two. And so on. What is the most you are willing to pay for a second unit given that you have already bought the first unit? What is the opportunity cost of the second unit (i.e., the price) given that you have already bought the first unit? **As noted, the marginal benefit (utility) will diminish as we consider subsequent units of the product. In this case, the marginal opportunity cost (the price) will stay the same as we consider subsequent units of the product.** When the marginal benefit (the most you are willing to pay) becomes less than the price, you should not buy that unit. *Buyers will continue buying a product up to that unit for which the marginal benefit (the most one is willing to pay) is equal to the price.*

Assignment: I am selling my printer. It is an HP psc2175. It is a printer, copier, and scanner. It prints in color as well as in black. It is one year old. It comes with new cartridges. What is the maximum you would be willing to pay for this printer? \$_____

Relation Between the Law of Diminishing Marginal Utility and the Law of Demand

This law of diminishing marginal utility led to the law of demand as was explained in Chapter 4. If it is true that you buy up to that unit at which the marginal benefit (utility) is equal to the price, and it is true that the marginal benefit (utility) diminishes as more of the product is bought, then **the price must fall in order to induce you to buy the next unit**. Suppose the price of a pound of apples is 50 cents. I value the first pound at 60 cents, so I will buy it. However, I value the second pound at only 40 cents. I will not buy it unless the price falls to less than 40 cents. "If the price falls, buyers will buy more" is, of course, **the law of demand**. The demand curve is a picture of the law of demand. *Thus, the law of demand is derived from the law of diminishing marginal utility.*

Consumer Surplus

Suppose that I am willing to pay 70 cents for the first pound of apples, 60 cents for the second pound, 50 cents for the third pound, and 40 cents for the fourth pound. The market price is 49 cents per pound. According to this reasoning, I will buy three pounds. But notice that I have a gain here. For the first pound, I was willing to pay 70 cents. However, I only had to pay 49 cents. I am better off by 21 cents. For the second pound, I was willing to pay 60 cents. I only had to pay 49 cents. I am better off by 11 cents. For the third pound, I was willing to pay 50 cents. I only had to pay 49 cents. I am better off by 1 cent. If you add the amounts of my gain (21 cents + 11 cents + 1 cent = 33 cents), you have what is called **consumer surplus**. *It represents the total that I was willing to pay above the amount I actually had to pay in the market.* To illustrate this, think of a very hot day; you are extremely thirsty. How much would you be willing to give up for a soft drink? The answer is "probably much more than the \$1.00 you would actually have to pay". The difference is your consumer surplus.

Case: The Progressive Income Tax

Diminishing marginal utility has also been used as an argument on behalf of a **progressive income tax**. *A progressive tax means that the percent of income paid as tax rises as one's income rises.* The idea is that everyone should sacrifice equally --- sacrifice being in terms of utility. Suppose Joe and Bill are both married with five children. Joe has an income of \$10,000. Bill has an income of \$100,000,000. Now let us tax each equally; each is to pay \$2,000 in tax. Who is making the larger sacrifice? Obviously, the answer is Joe. After Bill had already spent \$99,998,000, the goods and services sacrificed by not spending the last \$2,000 have very little, if any, value. This is a result of diminishing marginal utility. On the other hand, the \$2,000 sacrificed by Joe represents a great amount of utility. This could mean some clothes, or even a place to live. Therefore, equal taxation does not generate equal sacrifice of utility. What about equal tax rates? Suppose both are to pay 20% of income as tax. This is a so-called **flat tax**. For Joe, this is the same \$2,000. For Bill, this is \$20,000,000. But Bill is still left with \$80,000,000. Due to the law of diminishing marginal utility, the sacrifice Bill makes by giving up the last \$20,000,000 is not large. Bill has already bought \$80,000,000 worth of goods and services for the year. Therefore, Joe is still making the larger sacrifice in terms of utility. **The principle that is argued is that equal sacrifice in utility requires that Bill pay a higher percentage of his income as tax than Joe.** No one has ever figured out how much tax would indeed represent

equal sacrifice. And this is just one argument in the debate over the progressive income tax. There are many other concerns in this matter. But the point here is to show how the law of diminishing marginal utility was used to justify a position in a matter of public policy.

Test Your Understanding.

Assume that the only purpose of earning income is to buy and enjoy goods and services. Some people have claimed "the total utility of the people in the society would be increased if income were taken away from very rich people and given to poor people". Use the law of diminishing marginal utility to explain how one would argue that this statement is true.

Case: Valuing Nature

Economists are using the principles of this chapter in matters relating to the environment. Every decision involves both benefits and costs. In the decisions to be discussed, the costs are relatively easy to measure. But the benefits are very difficult to measure. How much is a beautiful view worth? How much is a national park used for recreation worth? How much is an old-growth forest ecosystem worth? How much is maintaining bio-diversity worth? Some would argue that these questions cannot be answered. But economists argue that attempting to answer them does provide information that helps policy-makers make better decisions. There are several techniques that have been used.

Economists attempt to answer the question of the value of a beautiful view by what is called the hedonic pricing method. ("Hedonic" refers to pleasure.) A common approach is to estimate the price of housing in the area. The price depends, for example, on the number of rooms in the house, the year the house was built, the size of the landholding, the distance to shops and workplaces, and so forth. Then, statistically, we can determine the value of homes that are similar on all of these characteristics but different in terms of the view. The difference should measure the amount buyers are willing to pay for the view. Some studies show this figure to be as high as \$100,000 in beach areas. We can also use this approach to measure **the value of peace and quiet**. In this case, we measure the value of homes that are similar in all characteristics except traffic noise or airport noise. So, for example, according to one study, a one-unit increase in traffic noise in Chicago will reduce the price of the average house by 0.65%. This provides a measure of the amount that buyers are willing to pay to avoid the traffic noise.

The value of a national park or beach is measured using what is called the travel cost method. Visitors to the parks are given questionnaires asking how far they have traveled. The cost incurred is the cost of gasoline, wear and tear on the car, and, of course, the value of the time (commonly measured by the average wage). Multiplying this cost per visitor by the total number of visitors provides an estimate of the amount that buyers are willing to pay for the recreational value of the park. While this method is subject to some obvious criticisms, it is interesting that it does tend to arrive at a normal demand curve. As travel costs rises, the number of visits to a park tends to fall.

A recent court case illustrates the use of the travel cost method. In 1990, a steam tanker spilled over 400,000 gallons of crude oil about a mile off the coast of Huntington Beach, California. About 14 miles of beach were closed for up to 34 days. The state of California sued the owner of the tanker for damages mainly for the loss of general beach use and surfing. The economists who were hired as experts for the state had to first estimate what the beach

attendance would have been. Then, they used the travel cost method to estimate a demand curve for beach use. They estimated a **consumer surplus** of \$13.19 per trip for general beach use and \$16.95 for surfing. Adding in the losses from boating and sport fishing, they estimated that the total loss came to over \$12 million (in 1990 dollars). In the 1997 court case, the jury deliberated and then agreed with the economists. The state of California was awarded \$12.7 million for recreational damages.

The question of the value of an old-growth forest ecosystem or maintaining biological diversity are answered using what is called the contingent valuation method. Here people are asked to respond to a survey by placing values on the environment. That is, people are asked what they are willing to pay to preserve an old-growth forest ecosystem or to protect biodiversity. The average willingness to pay of respondents is then calculated and multiplied by the number of people who benefit. (Studies that followed up with actual requests for money found that the amounts that people actually paid were between 70% and 90% of the amounts they said they would be willing to pay.) Note how this approach derives from the valuation of goods and services discussed in this chapter.

As one example, there was a contingent valuation study done for the Los Angeles area. A beetle has been eating the leaves of eucalyptus trees. This was reducing the aesthetic value of the neighborhood. People were sent a pamphlet explaining the nature of the problem. They were given three choices to solving the problem: a chemical pesticide, a bacterial pesticide, and a wasp that was the natural enemy of the beetle. They were asked how much they would be willing to pay for each solution. People exhibited a willingness to pay when the damage to the trees was 10% or more. For the chemical pesticide, on average each household was willing to pay \$27. For the bacterial pesticide, each household was willing to pay \$135. But for the natural enemy, each household was willing to pay \$490. Therefore, people do express their desire to preserve to environment and are willing to pay to do so.

The contingent valuation approach, despite the criticisms made of it, generates some interesting results. ***One is that the amounts that individuals are willing to pay are not large. However, because the number of beneficiaries is very large, the total benefits to society are very large. A second result is that, as higher and higher levels of environmental quality are considered, the amount people are willing to pay declines.*** The pattern traces out a typical demand curve. Like all demand curves, it illustrates the law of diminishing marginal utility. ***People value the initial improvement in environmental quality highly; however, they value greater improvements in environmental quality less and less.*** A third result of significance is that ***even non-users are willing to pay*** to preserve environmental assets such as old-growth forests. They are willing to pay less than users are willing to pay; but they are willing to pay something. Economists call this ***an existence demand*** --- we demand environmental assets simply because we get utility from knowing they exist.

Test Your Understanding.

1. San Diego County has 17 coastal wetlands. Some you may be familiar with include the Batiquitos lagoon, the San Elijo Lagoon, and Mission Bay. These coastal wetlands provide flood protection, habitat for wildlife (especially migratory birds and marine life), protection of the shoreline, protection against water erosion, recreation activities, and many other benefits. Many of these wetlands have been degraded. In order to manage them properly, it is necessary to evaluate the both marginal benefits and the marginal opportunity costs.

The reading for this class discussed methods for evaluating the marginal benefits of a beautiful view, peace and quiet, a national park, and biological diversity. Based on your reading, explain how you would go-about trying to evaluate the marginal benefits of each of San Diego County's coastal wetlands.

2. The California gnatcatcher is a San Diego County bird on the endangered species list. This bird is considered a "management indicator species". This means that the bird becoming endangered is an indicator that the entire habitat is endangered. The bird is dependent on the habitat known as coastal sage scrub. The habitat supports a large number of plants and animals, many of which are found nowhere else in the world. This environment provides much of the scenery of the county, provides opportunities to study nature, and provides hiking and other outdoors activities for many San Diegans. Because of its sensitivity to air pollution, the sage scrub provides a warning of air pollution that may be dangerous to people.

0 Actions to save the California gnatcatcher would act to save the entire habitat. But these actions do not come without cost. There are many options available. Assume that one of these options must be selected; even if you do not like any, one of these must be selected. Assume that everyone in the country will pay the same amount to protect the California gnatcatcher once an option is selected. Choose the cost of the one option that you would want the federal government to adopt. In making your choice, be sure to consider (a) how well the problem is solved by the option compared to other options and (b) how much the option would cost your household. (Choose only one option) Explain why you made the choice you did.

1. \$1 per year for ten years

Protects 21% of the coastal sage scrub lands

Protects 13% of California Gnatcatcher pairs

The California Gnatcatcher would have a 2% chance of surviving the next 150 yrs

2. \$32 per year for 10 years

Protects 30% of coastal sage scrub lands

Protects 29% of California Gnatcatcher pairs

The California Gnatcatcher would have a 5% chance of surviving the next 150 yrs

3. \$68 per year for ten years

Protects 49% of coastal sage scrub lands

Protects 46% of California Gnatcatcher pairs

The California Gnatcatcher would have a 72% chance of surviving the next 150 yrs

4. \$107 per year for ten years

Protects 77% of coastal sage scrub lands

Protects 54% of California Gnatcatcher pairs

The California Gnatcatcher would have an 81% chance of surviving the next 150 years

5. \$148 per year for ten years

Protects 100% of coastal sage scrub lands

Protects 69% of California Gnatcatcher pairs

The California Gnatcatcher would have a 90% chance of surviving the next 150 yrs

3. In 1991, the Exxon Valdez spilled oil into Prince William Sound in Alaska, causing major environmental damage. A contingent valuation study was done to assess the value of the damage. From your reading of the chapter, briefly describe how a contingent valuation study of the environmental damage to Prince William Sound would be done.

Practice Quiz on Chapter 13

1. The **satisfaction** one receives from a product is called its
 - a. satisfaction
 - b. utility
 - c. pleasure
2. The **additional satisfaction** one receives from an additional unit of the product is called the
 - a. marginal satisfaction
 - b. marginal utility
 - c. marginal return
3. As we consume more of a product, the **marginal utility**
 - a. rises
 - b. falls
 - c. stays the same
4. Why is water free while diamond is very expensive?
 - a. the **total utility** of diamond is greater than of water
 - b. the **marginal utility** of the last unit of diamond is greater than that of water
 - c. water is less important than diamond.
 - d. the **marginal opportunity cost** of water is greater than of diamond
5. The difference between the amount one would pay for a unit of the product and the amount one has to pay is called the
 - a. marginal happiness
 - b. marginal utility
 - c. consumer surplus
6. The **utility** of a unit of a particular good is actually measured by:
 - a. the number of utils one believes the unit is worth
 - b. the number of dollars one would be willing to sacrifice in order to have that unit
 - c. the cost of producing that unit of the good
 - d. all of the above
7. Measuring utility by asking people how much they would pay for something is called the
 - a. hedonic pricing method
 - b. travel cost method
 - c. contingent valuation method
8. Measuring utility by evaluating how much more people will pay for a home with a view than for a similar home with no view is called the
 - a. hedonic pricing method
 - b. travel cost method
 - c. contingent valuation method
9. Measuring the value of a park by seeing how far people are willing to drive to use the park is called the
 - a. hedonic pricing method
 - b. travel cost method
 - c. contingent valuation method
10. A tax is **progressive** is, as one's income rises,
 - a. the amount of tax paid rises
 - b. the tax rate rises
 - c. the tax rate falls
 - d. the tax rate is unchanged

Answers: 1. B 2. B 3. B 4. B 5. C 6. B 7. C 8. A 9. B 10.