

How to Study for Class 2

Class 2 introduces two important concepts. **The first is that opportunity costs rise as more of something is done. The second involves the manner by which rational decisions are made.** Both will be used throughout the course.

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. You will be given an In Class Assignment and a Homework assignment to illustrate the two 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. Be sure that you can **explain in your own words** how rational decisions are made, using the examples of the text and the assignments. When you are ready, take the practice quiz for Chapter 2 at the back of the text.

Objectives for Chapter 2 Increasing Marginal Cost; Rational Decision Making

At the end of Chapter 2, you will be able to answer the following:

1. What are the **three questions** that every society must answer?
2. What is meant by "**opportunity cost**"? Give some examples. For example, what is the opportunity cost to you of taking this course?
3. Describe what is meant by "**increasing marginal opportunity cost**" and explain why it occurs. Define the term "*marginal*"?
4. What is meant by "**labor-intensive**" or "**capital intensive**"?
5. What is meant by "**capitalism**"? by "**socialism**"?
6. What is a "**market economy**"? What is a "**command economy**"?
7. Describe "**rational behavior**"? That is, explain the procedure by which rational decisions are made, giving some examples. Explain what "**marginal benefit**" and "**marginal opportunity cost**" mean.
8. Explain what is meant by the **optimal amount of pollution control**. Why is it not zero?

Class 2 The Nature of an Economy; Rational Decision Making (latest revision August 2004)

As we learned in the previous chapter, the factors of production determine the maximum amounts of the various goods and services that can be produced. But people's desires for these goods and services are insatiable. *As a result, the desires always exceed the ability to meet them, a phenomenon known as scarcity.* Scarcity generates the fundamental problem faced by all societies. Because of scarcity, every society must answer **three major questions**:

1. The Three Questions Every Society Must Answer

(1) What to Produce?

In a world of scarcity, any choice to produce something is also a choice not to produce something else. Production of all of the goods and services that are desired is simply not possible. *The value of whatever is sacrificed when a decision is made is called "opportunity cost".* Sometimes, opportunity cost can be easily measured in money. If you choose to spend \$15 on a CD, you are sacrificing \$15 worth of other goods or services that you could have bought. In other situations, opportunity cost may be harder to measure. Your decision to take Economics this term has an opportunity cost. The most important opportunity cost is the value of the time you will sacrifice. If you would have worked during this time, your sacrifice can be measured easily; you sacrificed the wages you would have earned. But if you would have watched television, slept, or spent time with your children or friends, it is harder to put a dollar value on your sacrifice. But that does not change the fact that you have sacrificed time to take Economics.

Test Your Understanding

You have decided to take Principles of Microeconomics this semester. What is the opportunity cost of this decision? Try to consider all of the sacrifices you expect to make. Then, try to put a dollar value on them so that you can determine exactly what you are giving-up.

The opportunity costs are composed of _____.

I estimate that the dollar value of the opportunity costs of taking Economics is equal to:

\$_____ Show how you arrived at this number.

Increasing Marginal Opportunity Cost

Remember that opportunity cost is defined as the value of whatever is sacrificed when a decision is made. *We shall see over and over that, as we decide to choose more units of anything, the opportunity cost of each additional unit will rise.* This means that the opportunity cost of the second unit will be greater than that of the first unit. The opportunity cost of the third unit will be greater than that of the second unit. And so forth. Economists use the word *"marginal"* instead of the word additional or change in. So we say that, as more units of anything are chosen, the marginal opportunity cost of an additional unit increases.

Let us illustrate increasing marginal opportunity cost with an example: your choice of the number of classes to take this term. Assume that your first choice is Economics. What is the

opportunity cost of your decision to take Economics? The answer is that your opportunity cost includes the dollar value of the fees, books, and perhaps extra gasoline that you must pay because you chose to take the class. But it also includes the value of the time sacrificed. This sacrifice involves three hours per week of class time and an expected six additional hours per week for study. Which hours are you going to sacrifice? The answer is that you will presumably choose to sacrifice those hours that are worth the least to you. You take the class at the time that is most convenient for you. And you will study at times when you would be doing activities that are not very important --- perhaps in the late afternoon. Having decided to take Economics, let us now ask about your second choice --- History. The dollar cost of taking History will be the same as it was for Economics. But the value of the time will be greater. Why? The answer is that you have already sacrificed your least-valued time for Economics. You may take History at a time that is less convenient for you. And you must now study for History in the evenings, when you might otherwise be spending time with friends or family. So the opportunity cost of taking History is greater than for Economics. The same would be true for your third choice --- English. You have already sacrificed the late afternoon to study for Economics and the early evenings to study History. Now you must sacrifice later evenings to study English, reducing your sleep and eventually harming your health. And the third class may be scheduled at such a time that you are required to work fewer hours. Again, the opportunity cost of taking English will be greater than that of History. **We expect this principle of increasing marginal opportunity cost to hold as long as scarcity exists** (in this case, it is your time that is scarce).

(2) How to Produce?

Having decided what to produce, we must now determine how to produce it. **This means that we must decide on the combinations of the factors of production that we will use.** Goods produced mainly by labor are called *labor-intensive*. Goods produced largely by machinery and equipment are called *capital-intensive*. Some goods may be natural resource intensive, technology-intensive, energy-intensive, skill-intensive, and so forth. There are usually many different ways to produce a given product. Rice grown in China is both labor-intensive and water-intensive. But rice grown in California is capital-intensive as well as water-intensive. Similarly, cotton grown in the American South was labor-intensive while cotton grown in California is capital-intensive. Recently, California's main growth industries have been technology-intensive and skill-intensive rather than capital-intensive.

(3) For Whom to Produce?

Once it has been decided which goods and services are to be produced, it must be decided who will have these goods and services. Remember that goods and services are scarce; not every desire can be satisfied. Production of goods or services that will meet my desires may mean less of the goods or services that would meet your desires and vice versa. We are in conflict. Somehow, we must resolve this conflict in a manner that allows us to exist as part of the same society. In an economy such as that of the United States, our incomes determine which of our desires can be satisfied. In a later chapter, we shall discuss the factors that determine why some people have much higher incomes than others have.

2. Economic Systems

Every society must answer these three questions: what to produce, how to produce, and for whom to produce. Usually people organize in some way to find the answers. Such an organization of people is called *an economy*. And, of course, the study of an economy is called *Economics*. There are two extreme types of economies: command economies and market economies. Most existing economies are some combination of the two types.

A command economy, or hierarchy, describes itself. A commander, usually the government, decides what will be produced, how it will be produced, and who will get the goods and services that are produced. The former Soviet Union was a good example of a command economy. The government decided which goods or services would be produced (for the most important products). This came as an annual plan. The plan would be very detailed. So, for example, if you managed a shoe company, the plan might specify how many size 6 shoes that were black you must produce, how many size 8 shoes that were green you must produce, and so forth. The plan was more than a goal; there were significant penalties to the company management for failing to meet the plan quotas and significant rewards for succeeding. The plan also specified how goods and services were to be produced. Again, if you were the manager of a shoe company, you might be told how much leather you could have and where you must get it, how many workers you may have, how much machinery you may have, and so forth. One feature of the former Soviet economy was that the "what" and the "how" often did not reconcile. For example, it might not have been possible to produce the number of size 6 shoes that you were required to produce with the amount of leather you were allowed to have. This led to behaviors that were not intended by the government. For example, the manager would have shoes produced that were actually size 3 but have size 6 labels put on them. Or the manager would record leather as "lost in shipment" and then hoard it for use at a later time when there would not be enough. Even in the former Soviet Union, the government did not decide the "for whom" question. Generally, people would stand in line for the goods and services; those in the line first would have their desires met first. However, there was one exception: if you were a member of the communist party, you came first.

In the United States, a good example of such a command economy is the military: the commanders give the orders on most matters and others are merely expected to follow. Many large companies in the United States and in Europe copied this military command principle. Another example of a command economy involves the control over land in the United States. In the eleven western states, more than 40% of all land is under the control of the United States government (most commonly the Forest Service or the Bureau of Land Management). These agencies determine who is allowed to graze animals on the land, how much grazing can be done, and what price is to be paid for grazing rights. The Forest Service also determines how many trees can be cut, who can cut them, and the price to be paid to cut them. Hunting, fishing, access to national parks, and so forth are also controlled mainly by this command economy principle.

The other extreme type of economy is *the market economy. Markets are merely places where buyers come to buy and sellers come to sell.* The market may be a physical place, such as the New York Stock Exchange. Or it may not be a physical place; for example, foreign exchange market transactions take place through communications via telephone and computers between banks and other dealers around the world. *In a market economy, it is through the*

interaction of the buyers and the sellers that the questions of "what to produce", "how to produce", and "for whom to produce" are answered. How markets do this is a main topic of this course. There has been a major change in the world since the late 1970s: market economies are replacing command economies. The former communist countries, including all of Eastern Europe as well as China, are substituting markets for command. Countries such as Mexico, the countries of South and Central America, and the countries of Asia are also increasing their use of markets. And, in the United States, large, hierarchical corporations are losing ground to smaller, more entrepreneurial companies.

Do not confuse the terms market economy and command economy with the terms **"capitalism" and "socialism"**. Literally, these latter terms refer to ownership of capital goods. As we saw in the previous chapter, ***in capitalism, capital goods are owned by private individuals, called capitalists. In socialism, capital goods are owned by the government.*** In both types of systems, private individuals own consumer goods, such as clothes and televisions. Most economies are mixtures of market and command and also are mixtures of capitalism and socialism. ***But the United States is basically a market economy that is capitalist. The former Soviet Union was basically a command economy that was socialist. China today is becoming more and more of a market economy but is still basically socialist. Nazi Germany was basically a command, capitalist economy.*** So there are many possible combinations.

3. Rational Decision Making

Economic thinking makes a specific assumption about the nature of people: ***people are rational, self-interested, maximizers.*** Such a being is often called **homo economicus** (economic man). As noted in the last chapter, **"rational"** means that each person knows what is best for himself or herself. **"Self-interested"** does not mean that people only act for themselves and never care about others. But it does mean that people do act in their self-interest as they perceive it. (A recent study concluded that people who study Economics tend to be more selfish than others. It therefore needs to be stressed that no economist argues that people should care only about themselves. But assuming that people do act in their self-interest allows economists to learn much about their behaviors.) A **"maximizer"** acts to get the most possible. We assume that consumers act to maximize the satisfaction they receive from the goods and services they buy. We assume that businesses attempt to maximize the profits they earn and that workers attempt to maximize the wages (or other benefits) they earn. Our focus for the rest of this chapter is the question: **how do people make rational decisions?**

Let us look at the procedure for making rational decisions. Read this paragraph first. The examples below should clarify it. First, one does not ask the question "how many units should be chosen?" Instead, **treat the units of the decision one at a time.** The question then becomes: should we choose one unit? If yes, should we choose a second unit? And so on. For unit #1, we need to ask two questions to determine if we should choose it. ***First, what is the additional benefit we get from unit #1?*** (Benefit is a general term. There are many kinds of benefits: satisfaction if we are consuming products, revenues if we are selling products, wages if we are working, and so forth.) ***Second, what is the additional opportunity cost*** (that is, what is the additional sacrifice that must be made to choose unit #1)? In place of the word additional, we use the word **"marginal"**. So we are asking about the marginal benefits and marginal

opportunity cost of unit #1. If the marginal benefit is greater than the marginal opportunity cost, we are better-off choosing unit #1. That being so, go on to unit #2. What is the marginal benefit of unit #2 given that we have already chosen unit #1? What is the marginal opportunity cost of unit #2 given that we have already chosen unit #1? If this marginal benefit is still greater than the marginal opportunity cost, choose to do unit #2. Go on to unit #3. In the examples we shall use, *you will see that the marginal benefit will either remain unchanged or will fall as we move from unit #1 to unit #2 to unit #3. The marginal opportunity cost will always rise*, a principle you learned earlier in this chapter. At some point, the marginal benefit will be less than the marginal opportunity cost. That unit should not be chosen. When this point is reached, you may stop the process. *The maximum is reached where the marginal benefit and marginal opportunity cost are equal.* This reasoning is complicated. So, to illustrate it, let us take some examples.

Example 1: Courses Taken This Term

Let us consider again your decision about the number of courses to take this semester. The course is the unit of our decision. We do not ask: "how many courses do you take this term?" Rational decision-making requires that you consider the choices one at a time. Course #1 is, of course, Economics. Should you take this course? First, what is the marginal benefit? The answer is that you get three units of credit toward a degree or certificate. Also, you gain some valuable knowledge. There may be other benefits. What is the marginal opportunity cost? The answer, as discussed earlier, is the fees, books, extra gasoline and so forth as well as the value of the hours you will sacrifice (assumed to be 3 hours per week for class meeting and 6 hours per week for study). As noted earlier, if you work, we can measure the value of the sacrificed hours --- you have given up the wages you would have earned. If you would not work these hours, there is still a value to the time sacrificed. Obviously, the marginal benefit you expect is greater than the marginal opportunity cost you expect. I know this because you have chosen to take this course. Now, go on to course #2 --- History. What is the marginal benefit? Another three units of credit or some more valuable knowledge. What is the marginal opportunity cost? More fees and books and more hours sacrificed. However, when you chose to take Economics, you already chose to sacrifice the hours that were least valuable to you. When these already used for Economics, you must sacrifice more valuable hours to study History. If you expect the marginal benefits of History to be greater than the marginal opportunity cost, you will take that course too. This process will go on and on. **Notice that, as we consider each course, the marginal benefit stays the same (3 units) while the marginal opportunity cost rises.** Eventually, the marginal benefit will be less than the marginal opportunity cost. You will choose to not take that course.

You are probably saying that you did not go through a thinking process like this one. But, without consciously figuring the marginal benefits and the marginal opportunity costs, you did. You are taking a certain number of courses. You are allowed to take one more if you so choose. If you were asked why you do not take one more course, you would probably answer something like "it isn't worth it!". "It isn't worth it" translates as "the marginal opportunity cost (no sleep for the next four months) is greater than the marginal benefit (three more units).

Of course, you don't know what the marginal benefits and the marginal opportunity costs will be. You have certain expectations of them based on the information available to you at this time.

But this information is limited. And if we have an enormous amount of information, we have only a limited ability and a limited time to process this information. So we are rational, as described, but only within the limits of the information available to us and our ability to process it. Economists call this *“bounded rationality”*.

Example 2: Air Pollution Control

In making rational decisions, we analyze the units of the decision one-at-a-time. So, the question is NOT "how much should air pollution be reduced?" Instead, treat the units of the decision one at a time. Let us assume that the unit to consider is a 5% reduction in pollutants. Should we undertake policies to reduce pollutants by 5%? To answer this, we must answer our two questions. **First, what is the marginal benefit of reducing air pollutants?** The most obvious is the improvement in people's health. Another would be the reduction in property destruction, since pollutants destroy plants as well as paints on buildings and cars. Yet a third would be the aesthetic gain from being able to see the beautiful scenery. **Second, what is the marginal opportunity cost?** The answer depends on the manner in which pollution is to be reduced. If this is to be accomplished by forcing all drivers to have a pollution control device on their cars, the marginal opportunity cost is the value of whatever would have been produced if the pollution control devices had not been required. In a similar way, assume that pollution reduction is to be accomplished by forcing electricity-producing companies to install equipment to reduce the amount of pollutants they put into the air. In this case, the marginal opportunity cost is the value given-up to produce the equipment plus the effects the equipment might have on the cost of producing electricity. (Question: What is the marginal opportunity cost if pollution reduction is accomplished by forcing drivers to car pool to work?)

If the marginal benefit from a 5% reduction in pollutants is greater than the marginal opportunity cost, society is better off to do so. Then, we should consider the next 5%. And so on. **As the air becomes cleaner, the marginal benefit declines.** When the air is very polluted, a 5% reduction in pollutants may have great beneficial effects. But when the air is only 5% polluted, the reduction to zero pollution may have little benefit (a small amount of pollution may cause little harm). On the other hand, to make the air cleaner and cleaner, the marginal opportunity cost rises. Indeed, a certain amount of pollutants can be removed at zero cost as part of the natural assimilative capacity of the environment. (For example, the smoke from one cigarette is completely broken down by the environment.) Beyond this, removing a small amount of pollutants from the air may be relatively easy. But since the easy choices are done first, removing more and more pollutants from the air becomes progressively more difficult. At some point, the marginal opportunity cost is greater than the marginal benefit, and removing any more pollution "is not worth it". ***The point where the marginal benefit and the marginal opportunity cost are equal is the optimum amount of pollution reduction.*** Notice that this is NOT zero. Beyond this point, we would have to sacrifice more than we would gain to remove additional pollutants.

Economists make studies of the desired amount of pollution control in this manner. Consider, for example, a recent study of one region (Baltimore). The authors estimated the marginal benefits and costs of various total suspended particulates. Total suspended particulates are small particles of ash or soot emitted as a result of burning oil or coal. They cause health problems,

damage property and clothing, and reduce visibility. They found that the marginal cost of pollution reduction rises; reducing the pollutants from 110 to 109 parts per million would cost \$3 million while reducing them from 95 to 94 parts per million would cost an additional \$16 million. They also found that the marginal benefits decreased approximately \$10 million for each one unit decrease in particulates. In this study, the optimum amount of pollution reduction came at about 99 parts per million. The marginal benefits of reducing the particulates in the air are greater than the marginal opportunity costs up to this amount. Beyond it, the marginal opportunity cost is greater than the marginal benefits.

There are two issues raised by this analysis. **The first is the issue of measurement.** Since the main benefit of pollution control is improved health, we need some measure of this. Not only do we need to know how much health is improved, we also need to know what the value of this improvement is. If reducing pollutants by 5% reduces the probability of lung cancer by 2%, what is this 2% reduction worth? Can the worth even be measured? The same is true for the increased aesthetic enjoyment. How do we measure the value of an improved view? Can it even be measured? We shall consider some of these issues later. **The second is the issue of distribution.** The people who benefit from pollution control may be very different from the people who will absorb the cost. This has great effects on the political process.

Test Your Understanding

Consider how you would use the procedure for rational decision making in each of the following situations. Then write briefly what you have concluded.

1. A family must decide how many children to have.
2. You have taken a quiz and received a grade of 3 out of a possible 10 points (F). You are allowed to take a second version of the quiz. If you do so, you can raise your grade to a maximum of 7 out of 10 (C) as long as your score on the second quiz is at least 7. Since you scored poorly on the first version, you will need to study carefully. There are 570 maximum possible points in the course. Will you take the second version of the quiz? Why?
3. You are driving home from Phoenix. You stop at a Denny's in a small town for dinner. You have never been in this small town before and are not likely to ever be there again. Your dinner is fine and so is the service. Your bill is \$10. Use the procedures for rational decision-making to determine whether or not you will leave a tip for the person who waited on your table.

Practice Quiz for Classes 1 and 2

1. The **fundamental economic problem** faced by all societies is:
 - a. unemployment
 - b. inequality
 - c. scarcity
 - d. poverty
2. Which of the following is **NOT** a factor of production?
 - a. natural resources
 - b. labor
 - c. capital goods
 - d. money
3. "**Capitalism**" refers to:
 - a. the use of markets
 - b. private ownership of capital goods
 - c. government ownership of capital goods
 - d. private ownership of homes & cars

4. There are **three fundamental questions** every society must answer. Which of the following is/are one of these questions?
- What goods and services are to be produced?
 - How are the goods and services to be produced?
 - Who will get the goods and services that are produced?
 - All of the above
5. If you were working full-time now, you could earn \$40,000 per year. Instead, you are working part-time while going to school. In your current part-time job, you earn \$10,000 per year. At your school, the annual cost of tuition, books, and other fees is \$3,000. The **opportunity cost** of completing your education is:
- \$3,000
 - \$10,000
 - \$13,000
 - \$33,000
 - \$53,000
6. You have taken this quiz and received a grade of 3 out of a possible 10 points (F). You are allowed to take a second version of this quiz. If you score 7 or more, you can raise your score to a 7 (C). You will need to study for the second version. In making a **rational decision** as to whether or not to retake the test, you should
- always retake the quiz
 - consider only the marginal benefits from of retaking the quiz (four extra points)
 - consider only the marginal opportunity costs from taking the quiz (the time spent studying and taking the quiz)
 - consider both the marginal benefits and the marginal opportunity costs of retaking the quiz
7. As we go from Unit #1 to Unit #2 to Unit #3, the **marginal benefit** could do any of the following **except**:
- rise
 - fall
 - stay the same
8. As we go from Unit #1 to Unit #2 to Unit #3, the **marginal opportunity cost** will
- rise
 - fall
 - stay the same
9. **“Economic Man”** is considered to be
- rational
 - self-interested
 - a maximizer
 - all of the above
10. Which of the following is a **capital good**?
- the chair you are sitting in
 - the teacher in front of your class
 - the natural gas used to heat the room you are in
 - the person who conceived the idea for the business and put it together

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