Ten Lectures on Markets and Prices

Lecture 1

The Economic Problem

I. What is Economics?

Economics is the study of how societies, individuals, and households allocate scarce resources to satisfy competing ends or objectives. In this class, our main focus will be on how this “economic problem” is solved in a market economy, by the price mechanism. But the tools that we develop are much more broadly applicable. They can be used to understand how resources are allocated within firms, within households, or in non-market economies. The particular class of tools we study falls under the heading microeconomics, which is meant to distinguish the study of markets and prices from the study of much broader aggregates – such as national income, employment and the price level – which are covered in macroeconomics.

The economic approach to studying social issues and business problems is founded on a core proposition: People respond to incentives. If the costs of engaging some activity rise, people will do less of it. If the rewards of some activity increase, people will do more of it. With some embellishment later on, this is the central feature of what is sometimes called “the economic approach to human behavior.” But such is the hubris of economists that we really don’t think the theory is limited to humans.

The lectures that follow develop and apply economic analysis to a broad range of practical questions. How do households and organizations make decisions? How do individuals allocate lifecycle income to consumption or saving at different ages? What determines the prices of the goods and services we produce and consume? How do taxes affect economic activity? For a given size of government, what structure of taxes raises revenue at least cost to economic activity? What determines the distribution of income among members of society, and why has income inequality increased? What is the value of living longer, or healthier, lives, and why has the cost of medical care risen so much in developed countries? What factors drive economic growth and improvements in living standards? What types of public policies would deal with global warming in the most efficient way? These and many other questions can be answered with a relatively small set of “tools.” Our task is to develop those tools and learn how to use them.
II. Economic Models and Assumptions: Some Postulates about the World

All economic analysis, indeed all thinking, involves models. A model is a simplification of reality that helps us to understand something complex. Suppose you wanted to help a child to understand aircraft carriers. You can go to the toy store and buy a model of an aircraft carrier. It isn’t a real aircraft carrier: It’s made of plastic, the planes don’t fly, and it weighs a bit less than the real thing. It won’t defend you. But the model – a vast and “unrealistic” simplification of reality – helps the kid understand what real aircraft carriers are like, what they do and how they work. If the model helps you understand the things you need to know, without adding unnecessary complexity or detail, then it is a “good” model.

Economic models are like that. They are “unrealistic” simplifications of the world that help us to understand the way the world works. A principle oddly called “Occam’s Razor” gives us a rule for choosing between models: Between two models with identical predictions or implications about what we would like to know, the simpler one—not the more “realistic” one—is better. In other words, we judge a model by the power of its predictions, not by the realism of its assumptions. All models are unrealistic; that’s why they are called models. So lesson number one is that it isn’t wise to criticize an economic model as unrealistic; it is meant to be so, and if it is a good model that very unrealism is a virtue that makes the model useful.

Economic thinking always starts with some simplifying assumptions. These will differ from one situation to another, depending on the problem we want to solve or the thing we want to understand. But four common assumptions, or postulates, underlie the economic problem:

Postulate 1: Scarcity
Scarcity means that society’s resources are limited; so it’s impossible for us to have all of the things we would like to have, in the amounts we would like to have them. Without scarcity there is no economic problem, for all of our wants and desires would be fulfilled.

Postulate 2: Choice
The fact of scarcity forces choice upon us. We desire a multitude of things, and if we would like to have more of some thing, A, we must accept less of some other thing, B.

Postulate 3: Individual Optimizing Behavior
We assume that relevant actors (individuals, or the households and firms they comprise) make decisions with a goal in mind, and their decisions are meant to achieve that goal. Sometimes we can loosely think of this goal as “happiness,” but to make this sound more scientific economists call it “utility.” They like to say that economic actors make decisions that “maximize utility.”

Notice the emphasis on individuals in this postulate. Our reason for studying individual actors rather than groups is entirely practical: we have good theories of how individuals behave, while theories of group decision making do not work as well. So we use what works best. That doesn’t mean that we only analyze individuals, though. We aggregate the behavior of individual actors to analyze markets and whole economies made up of “maximizing agents.”

We are now prepared for our most important postulate, which follows, in part, from the others:
**Postulate 4: Substitution**

“Substitution” means that people are actually willing to make the choices that scarcity requires. More specifically, the substitution postulate says that between any two goods (things you want), call them $A$ and $B$, you are willing to give up some amount of good $A$ in order to get an increase in good $B$. That is, you are willing to substitute $B$ for $A$.

The substitution postulate sounds innocent enough. But think about it. It says you are willing to give up some amount of good $A$ in order to get more of good $B$, no matter what $A$ and $B$ are. Do you believe that? (Hint: I do.)

**Question 1.1:** Suppose that good $A$ is “your life” or “your health” and the additional amount of good $B$ is “one banana.” Are you willing to give up some life (and what does that mean?) in order to get a banana?

The Substitution Postulate is crucial to all that follows. It is the foundation of the economic theory of “value.” Economists are not deeply philosophical when it comes to pondering the value of things—we think that your value of some thing is appropriately measured by how much other stuff you are willing to sacrifice in order to get it. Then your value of a unit of good $B$ is measured by how much of good $A$ you’re willing to sacrifice to get a unit of $B$—substitution. Later we will see how money fits into this definition, so that the value of something is how much (money) people are willing to pay for it.

**III. Implications of Scarcity: The Economic Problem**

We can give a useful illustration of scarcity and the economic problem through a (very) simple model. Think of an economy that can produce two “goods,” call them $X$ and $Y$.

**Definition: Economic Good**

An economic good is something that an individual would like to have more of.

Notice that this definition is purposefully abstract. A “good” could be a physical product like beer or bowling balls, or something less tangible like a nice view, good weather, status or flattery. And of course there are “bads” like garbage on your lawn, pollution or loud neighbors, but we can always turn the analysis of a “bad” into a corresponding analysis of a good by appropriately defining things. Pollution is a “bad” so less pollution is a good. Loud neighbors are a “bad” so making them be quiet is a good. And so on.

In Figure 1, the quantity of good $X$ is shown on the horizontal axis and the quantity of good $Y$ is shown on the vertical. Given its limited (scarce) resources—land labor, knowledge, energy and the like—and technology, the amounts of $X$ and $Y$ that society can produce are also limited. The **Production Possibilities Frontier** (PPF) shows the largest amount of $Y$ that society can produce, with given resources, for any given production of $X$. Symmetrically, points on the PPF also show the largest quantity of $X$ that can be produced for a given quantity of $Y$. 
Aside on measuring quantities: In economics, it is crucial to understand the difference between *stocks* and *flows*. The stock of a thing is the total amount of the thing in existence. Thus we can speak of the *stock* of oil in the world, the *stock* of housing in the United States, or the *stock* of cows on German dairy farms. In contrast, a *flow* is a measure of production or consumption within a specified period of time. So we can speak of the *flow* of oil consumption per month (which reduces the stock) or the *flow* of new housing construction per year (which typically increases the stock). For most of this course the quantities we will be concerned with are rates of consumption or production *per unit of time*; that is, they are flows. So when we label axes like those in Figure 1, we should implicitly understand that (for example) the horizontal axis measures “quantity of $X$ per unit time.” For example, $X$ could measure milk production per week or the number of laptop computers per year.

Suppose that $X$ is bread and $Y$ is wine, and that bread and wine are the only two goods that society can produce with its available resources. Then points on the PPF represent the largest amount of wine ($Y$) that can be produced for a given amount of bread ($X$). For example, if society produces $X_0$ loaves of bread per year the largest possible annual production of wine is $Y_0$, so point $A$ is one point on the PPF. Of course society could also have less wine for the same quantity of bread, as at point $C$, so point $C$ is *inside* the PPF. Alternatively, if this society were to produce $X_1$ loaves of bread the largest amount of wine it could produce is $Y_1$, represented by combination $B$ in the figure. So points $A$ and $B$ are two points on the PPF.

As we have drawn things, if the society represented in Figure 1 produces more bread then the largest amount of wine it can have is correspondingly reduced. Graphically, this means that point $B$ lies to the southeast of point $A$, so a line connecting them slopes down. This “tradeoff” is implied by the scarcity postulate: with limited resources, if we want more $X$ we must accept less $Y$. Of course, the tradeoff doesn’t have to be a straight line, as illustrated in Figure 2a.
Connecting all the possible combinations that maximize wine production for a given quantity of bread, we trace out a smooth and downward-sloping production possibilities frontier. The downward slope of the PPF is implied by scarcity, but I also drew it so that the slope gets steeper at higher quantities of X (lower quantities of Y). What does that mean? We will return to this question shortly.

Figure 2a
A Production Possibilities Frontier

Aside on Economic Growth: By definition, the PPF shows the boundary of consumption opportunities available to society, given society’s resources and technology. “Resources” includes things like physical capital (buildings, machines, roads and other durable assets), human capital (labor, and the skills embodied in people), raw materials, energy sources, and so on. “Technology” refers to society’s knowledge and ability to turn those resources into desirable things, X and Y. Economic Growth occurs when the PPF shifts outward—as shown in Figure 2b, which can occur for two basic reasons. First, society may obtain or accumulate more resources, which allow it to produce more. Second, technological progress may allow an economy to produce more stuff for a given amount of resources. Isolating and estimating these sources of economic growth is called growth accounting, which is important for understanding the spread of prosperity and why incomes in some countries grow more rapidly than others. We shall have more to say about growth accounting later in the course.
Economic growth occurs when the PPF shifts outward.

**Figure 2b**
Economic Growth Shifts the PPF Outward

**Cost**

The PPF allows us to define the notion of “cost.” In economics, costs are always measured by foregone alternatives, which we call *opportunity costs*. The opportunity cost of an action is the value of the *highest valued foregone alternative* to that action. In other words, to determine the opportunity cost of action \( A \), say spending the day at the beach, I need to ask myself: “If I didn’t do \( A \), what would be my next best choice?” If I had to give up a round of golf in order to spend a day at the beach, then the cost of a day at the beach is the golf round I sacrificed. (We will bring money into the picture later.) In terms of the PPF in Figure 1, the opportunity cost of moving from \( X_0 \) to \( X_1 \) loaves of bread per year is the annual amount of wine, \( Y_0 - Y_1 \), that society must do without. We use the notation \( \Delta X = X_1 - X_0 \) to denote the *change* in \( X \) from \( X_0 \) to \( X_1 \), where \( \Delta \) is the capital Greek letter “delta.” So the opportunity cost of \( \Delta X = X_1 - X_0 \) loaves of bread is \( -\Delta Y = Y_0 - Y_1 \) bottles of wine, where \( \Delta X \) is the *change* in the quantity of \( X \). If we average over the \( \Delta X \) additional loaves of bread, the average opportunity cost per loaf is

\[
AC(\Delta X) = -\frac{\Delta Y}{\Delta X} = \frac{Y_0 - Y_1}{X_1 - X_0}
\]
which is the amount of wine that must be sacrificed per loaf of bread in moving from $X_0$ to $X_1$ loaves per year. Graphically, $AC$ is minus the slope, $-\Delta Y/\Delta X$, of a line connecting points $A$ and $B$ in Figure 1.

As some of you may remember from calculus, if we let $X_1$ get “really close” to $X_0$, so the change $\Delta X$ is very small, then $\Delta Y$ also gets small. In the limit we can express $-\frac{\Delta Y}{\Delta X}$ as $-\frac{dY}{dX}$, which is simply the slope of the PPF at a particular point (more precisely, the slope of a line that is tangent to the PPF at a given point). This leads to a new and (very) important concept, called marginal cost. The marginal cost of $X$ is the cost of producing a small increment of $X$. Intuitively, you may think of marginal cost as the cost of producing one additional unit—a marginal addition to the quantity of $X$. As all costs are opportunity costs, the marginal cost of $X$ must be expressed in terms of the number of units of $Y$ foregone. Graphically, marginal cost is simply the slope of the PPF at a given point, like $A$.

**Definition: Marginal Cost**

The marginal cost of $X$ is the cost of producing an additional unit of $X$, expressed in units of other goods foregone. With two goods, we can express the marginal cost of $X$ in terms of $Y$ as (minus) the slope of the Production Possibilities Frontier at a particular point:

$$MC_{X,Y} = -\left.\frac{dY}{dX}\right|_{\text{PPF}}$$

Marginal cost simply expresses the rate at which we must sacrifice units of $Y$ in order to obtain additional units of $X$.

**Diminishing Returns and Rising Marginal Cost**

Figure 2a showed a PPF that is concave to (bending away from) the origin. We didn’t have to draw it that way. We could have made it a straight line, like in Figure 1, or even convex (bending toward the origin). The shape of the PPF reflects an additional assumption about how the marginal cost of $X$ changes with the quantity of $X$ produced. To see this, Figure 3a shows a concave PPF and the corresponding marginal cost curve for $X$ obtained from it.

The marginal cost curve is obtained by graphing the quantity of $X$ on the horizontal axis against the slope of the PPF (marginal cost) corresponding to that quantity. In the case of a concave PPF, marginal cost increases with $X$ because the PPF gets steeper at higher quantities of $X$. For example, marginal cost (the slope of the PPF) is higher at quantity $X_B$ than at quantity $X_A$, where $X_B > X_A$. So marginal cost slopes up when the PPF is concave, as in Figure 3a. A straight line PPF, shown in Figure 3b, implies that marginal cost is constant; that is, marginal cost is independent of the quantity of $X$ produced because the slope of the PPF is the same at all points. Finally, if the PPF is convex, as shown in Figure 3c, then marginal cost declines with $X$. Then the greater the quantity of $X$ produced the lower is the cost of producing a bit more.
Which of these is a more reasonable description of the world? The intuition of business students typically favors Figure 3c—declining marginal cost—based on a vague notion of “economies of scale.” That is, students often believe that “unit costs” will decline with the quantity produced. In contrast, economists would typically (but not always) favor Figure 3a, rising marginal cost, as a more reasonable description of technological possibilities for most of the goods we produce and consume, at least at the quantities we produce and consume them. Why is this? Intuitively, if each producer’s marginal cost were everywhere declining with quantity, then we would expect that most industries would consist of a single very large, very efficient seller – large firms would have a cost advantage over smaller ones. But most industries contain many sellers, which we will see is an implication of marginal costs curves that (eventually) slope up. (Yes, there are very important exceptions, and we will discuss them much later). So for now we shall assume that marginal cost curves are upward sloping. In fact, this is an implication of an idea that even most non-economists have heard of: the law of diminishing returns, which says (in a nutshell) that marginal cost must eventually begin to rise with quantity. We will have a lot more to say about this when we discuss costs and production in Lecture 4.

Figure 3a: Concave PPF Implies Rising Marginal Cost
Figure 3b: Straight Line PPF Implies Constant Marginal Cost
Figure 3c: Convex PPF Implies Falling Marginal Cost

**IV. Economic Efficiency**

One of our main concerns in this course is whether a particular economic entity—a society, a firm, a family, or an individual—has used available resources in the most valuable way. When resources *are* put to their most valuable uses, we shall say that the allocation of resources is *efficient*.

What does “most valuable use” mean? Long ago an economist and sociologist named Vilfredo Pareto offered the following definition, which we shall use:

**Definition: Economic Efficiency (Pareto Optimality)**

An allocation of society’s resources is efficient if there is no other allocation that would make someone better off without harming others.

This is a pretty abstract concept, especially when applied to an economy with hundreds of millions of individuals who produce and consume a multitude of goods and services. And on the surface it doesn’t seem all that useful: How could we possibly specify conditions that would tell us that there is no way to benefit even one person – say a barber in Kansas – without harming even one of the rest of us? We will get to that, and find that the analysis is not nearly so daunting as it might first appear.
This definition of efficiency is also useful from a managerial perspective. Think of yourself as managing a large (or small) business organization. Your job is to allocate the business’s resources such as its capital and employees in order to achieve a goal—say maximizing shareholder value. If by changing the way you do things—say by shortening the workweek or providing stronger incentives to the sales force—you can increase shareholder wealth without harming employees, then the change enhances efficiency. Similarly, if some hypothetical change in procedures would make employees better off without harming shareholder wealth, then that change would also enhance efficiency. In other words, an efficient organization satisfies Pareto’s definition.

Embedded in this definition is the notion of “better off,” which implies that we will eventually have to say something about peoples’ preferences for goods like X and Y, and how willing people are to sacrifice units of Y to get units of X. We can make a start, however, by noting that X and Y are both economic goods, which means that people would like to have more of them.

Look at Figure 4, which reproduces the (concave, rising marginal cost) production possibilities frontier that we discussed above. Suppose that society is producing and consuming $X_0$ loaves of bread and $Y_2$ bottles of wine per year, shown as point A. (Notice that we have said nothing about the allocation of the bread and wine among members of society, or even how many members there are. Maybe the distribution is very equal, with everyone getting the same amounts, and maybe it’s not.) We now ask: Is there some other allocation of society’s resources that would make some individual better off without harming others? Yes. Since point A is inside the PPF, we know that society can have more wine without sacrificing any bread; for example, society could produce as much as $Y_0 - Y_2$ additional bottles of wine while keeping its annual production of bread at $X_0$, represented as point B in the Figure. Now think about what can be done with the additional wine. We could give all of it to Moe, who will have more wine and no less bread than before. So Moe is better off. No other member of society has less bread or wine than before, so (barring Moe-envy) they are no worse off than before. We made Moe better off without harming anyone else, so the allocation (use) of resources that yielded combination A in Figure 4 cannot be economically efficient. This argument applies to any combination that is inside the PPF because for such combinations we can always get more of one good without sacrificing any of the other. So we conclude that points inside the PPF cannot be economically efficient.

But what of a point like $B=(X_0, Y_0)$ that lies on the PPF? Is B economically efficient? Or might C, with more bread and less wine, be superior to B? It is no longer sufficient to know that individuals would like to have more of each good: At B it is impossible to get more bread ($\Delta X > 0$) without sacrificing some wine ($\Delta Y < 0$), or conversely it is impossible to get more wine without sacrificing some bread. In order to compare points like B to alternatives like C—both of which lie on the PPF—we have to say something about peoples’ willingness to sacrifice wine to get bread – that is, how much they value additional loaves of bread.
To make some headway on this question, let’s simplify even further. Suppose that our bread and wine economy has only one consumer, Moe, much like Robinson Crusoe on his island. (We will obviously generalize this later). Moe likes bread and wine, which he produces for his own enjoyment, and our substitution postulate tells us that he is willing to give up some wine in order to get another loaf of bread. Of course he is also willing to give up some bread in order to get more wine. The question is: How much?

In economics, cost and value are always measured in terms of other goods that are given up. Above, we saw that the marginal cost of $X$ is the amount of $Y$ that must be sacrificed in order to get another unit of $X$. (The operative word there is must). We define value in much the same way. A person’s marginal value of $X$ is the largest amount of $Y$ that person is willing to sacrifice in order to get another unit of $X$. (The operative words there are willing to).

**Definition: Marginal Value (Willingness to Pay)**

The marginal value of $X$ in terms of $Y$, denoted $MV_{X,Y}$, is the largest amount of $Y$ that a person is willing to sacrifice in order to obtain one more unit of $X$.

So Moe’s marginal value of an additional loaf of bread is the largest quantity of wine that he would willingly sacrifice in order to get the additional loaf. It is the amount of wine he would
“pay” for one more loaf. Conversely his marginal value of wine is the largest amount of bread he would willingly “pay” to get another bottle of wine.

Let’s put some numbers on these concepts. Table 1 shows some hypothetical values of marginal value and marginal cost for the combinations B, C and D in Figure 4.

Table 1: Seeking the Efficient Allocation of Society’s Resources: Marginal Values and Marginal Costs for Figure 4 (Annual quantities of bread and wine)

<table>
<thead>
<tr>
<th>Combination</th>
<th>X (Bread)</th>
<th>Y (Wine)</th>
<th>MC_{X,Y}</th>
<th>MV_{X,Y}</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>X_0 = 200</td>
<td>Y_0 = 400</td>
<td>0.2 bottles/loaf</td>
<td>3.0 bottles/loaf</td>
</tr>
<tr>
<td>C</td>
<td>X_1 = 400</td>
<td>Y_1 = 340</td>
<td>1.0 bottles/loaf</td>
<td>1.0 bottles/loaf</td>
</tr>
<tr>
<td>D</td>
<td>X_2 = 500</td>
<td>Y_2 = 190</td>
<td>1.5 bottles/loaf</td>
<td>0.5 bottles/loaf</td>
</tr>
</tbody>
</table>

Combinations B, C and D are all on the PPF, so by our previous logic they are at least candidates to be economically efficient. Notice that the marginal cost of a loaf of bread increases with quantity, as implied by the shape of the PPF. Notice also that Moe’s marginal value of bread decreases with quantity: the more bread he has, the less he is willing to pay for another loaf. This is an important additional postulate about behavior, which we term diminishing marginal value.

Postulate 5: Diminishing Marginal Value (Declining Willingness to Pay)
For any good, X, the marginal value of X, MV_{X,Y}, declines with the quantity of X.

Diminishing marginal value is the foundation for the theory of demand, which we will develop in much greater detail in Lecture 3. But for now we just take it as a plausible assumption about peoples’ preferences: when you have a lot of a particular good, you are willing to pay less for an additional unit than when you have very little of it.

Question 1.2: Does a cocaine addict have diminishing marginal value of cocaine?

At combination B, the marginal cost of a loaf of bread (the slope of the PPF) is 0.2 bottles of wine: Moe must give up 0.2 bottles in order to get one loaf of bread. On the other hand, at combination B he is willing to give up 3 bottles for another loaf. Since Moe is willing to sacrifice (pay) 3 bottles for a loaf, but he only has to sacrifice 0.2 bottles, it follows that he would be better off consuming more bread and less wine – he gets something (bread) for less than what it is worth to him. Since Moe can be made better off, it follows that combination B is not economically efficient. Society’s resources can be put to more valuable use by producing more bread and less wine.

Now consider combination D. Were Moe at this combination, his cost of a loaf of bread would be 1.5 bottles of wine. His value of a loaf is only 0.5 bottles of wine. As marginal value of bread is less than marginal cost of obtaining it, Moe would be better off using his resources to
produce and consume more wine and less bread. So combination $D$ cannot be economically efficient because, again, Moe would be better off if he did something else.

As Moe produces and consumes less bread than at combination $D$ his marginal value of bread increases (because of diminishing marginal value), while his marginal cost of bread decreases (because of increasing marginal cost). It follows from the setup of this example that there is some attainable combination, such as $C$, where the marginal value of wine and the marginal cost of wine are the same. If Moe were to produce and consume slightly more bread than at combination $C$, marginal value would fall below marginal cost, so he would be worse off. If he were to produce and consume slightly less, the value of bread he gives up would be greater than the cost of producing it, so he would be worse off again. It follows that the condition needed for economic efficiency is that $\text{MV} = \text{MC}$ – marginal value equals marginal cost. Then, and only then, is it impossible to make Moe better off.

As we will see, this condition for efficiency generalizes to much more complicated situations than our simple bread and wine, one-person Moe-economy. It is the condition for efficiently allocating resources in an economy with millions of goods and millions of consumers, or in an organization that wants to marshal its resources to achieve a particular goal. We state the condition formally here, while leaving a thorough investigation of its meaning and significance for later in the course:

**The Condition for Economic Efficiency**

Resources are efficiently allocated when the marginal value of each good or service is equal to the marginal cost of producing it.

Notice that our condition for efficiency required that we consider both costs (“supply”) as represented by the Production Possibilities Frontier, and Moe’s preferences (“demand”) as represented by his willingness to substitute one good for another. So contrary to the popular vernacular, or perhaps the way physical scientists would define efficiency, economic efficiency is not merely about costs, doing things cheaply or producing the largest possible amount of something. For example, we could feed society at much lower “cost” if all of us ate only soybeans, but evidently that is not the existence we prefer. It isn’t economically efficient, even if it would be “cheap” in some limited sense.

Looking ahead, the definition of efficiency and the above condition for achieving it will be our benchmark for evaluating institutions and policies that affect the allocation of resources. We will pay particular attention to conditions under which markets are efficient, and we will carefully analyze the implications of situations when they are not. Using our benchmark, we will investigate the impact of different market structures (e.g. competition vs. monopoly), the costs and benefits of government policies (e.g. taxes, subsidies, and regulation of business), the effects of private and imperfect information, and the role of social institutions (e.g. the formation of laws and the structure of property rights).
V. The Allocation of Society’s Resources

We have outlined the economic problem in its broadest and simplest possible form. In the following weeks we will study this problem in much greater detail. Along the way we will study four broad questions that must be “answered” by any mechanism (e.g. markets, social planners, or dictators) used for allocating resources:

1. *How?* How should goods and services be produced? What inputs should be used, and in what proportions should we use them? This is basically a technological (or production) question.
2. *What?* Among all the possible things that society can produce, what goods should be produced, and in what quantities should we produce them?
3. *For whom?* Once things have been produced, who gets them and by what mechanism?
4. *When?* What is the timing of production and consumption? How much should be sacrificed today in order to have more in the future?

The first three questions are typical for a course like this one. The fourth question – when?—is of particular interest in an economics course taught to business students, for it involves the tradeoff between current and future availability of goods, the notions of capital and investment, and the way that assets are valued and priced. We will take this up in Topic 8.

VI. A Final Note on Methodology in Economics

In this course we will concern ourselves with what is typically referred to as *Positive Economics*, which means that we wish to make predictions about real world outcomes: If A occurs then B follows. For example, if the price of some good rises (event A) then people will want to consume less of it (event B). Typically, the analysis itself entails no judgment about whether event B is good or bad, though we may all have our particular views. For example, we may find that certain events increase the inequality of personal incomes. Some of us may find that undesirable, others may not care one way or another, and still others may think greater inequality to be a good thing. We won’t be concerned with the normative judgment of whether greater inequality is “good” or “bad”. Instead we will be concerned with the ability of our analysis to predict the forces that lead to greater or smaller inequality.

Key Points to Remember

1. The *Production Possibilities Frontier* shows the combinations of goods that can actually be produced with society’s limited resources.

2. In economics, the cost of some action A always means *opportunity cost*; the highest valued foregone alternative. The *marginal cost of good X in terms of good Y*, MC<sub>X,Y</sub> shows the least amount of Y that must be sacrificed to get an additional unit of X. It is the slope of a line that is tangent to the PPF at a given point. MC<sub>x,y</sub> can be increasing, decreasing, or constant as X increases, depending on the shape of the PPF. *Diminishing*
returns means that the MC_{x,y} is increasing as X increases.

3. The marginal value of X in terms of Y is the largest amount of Y that a person is willing to sacrifice in order to get another unit of X. Diminishing Marginal Value is a postulate about behavior – the larger the amount of X a person possesses, the smaller the amount of Y she is willing to sacrifice in order to obtain another unit of X.

4. Economic efficiency means that society’s resources are used in the most valuable possible way. This requires that the marginal value of each good equal the marginal cost of obtaining it.
Some Problems:

1. Robinson lives alone on a desert isle, where he harvests coconuts and fish for his own consumption. His daily production possibilities are described in the following Table. The Table also includes information on Robinson’s marginal value of coconuts at various quantities.

   a. What is the shape of the production possibilities frontier?
   b. For each quantity of coconuts, calculate the marginal cost of coconuts in terms of fish and fill in the appropriate cells in the Table. Graph marginal cost of coconuts against the quantity of coconuts produced.
   c. On the same graph as in part b, graph Robinson’s marginal value of coconuts against the quantity of coconuts consumed. Beginning from complete specialization in fish production (20 fish, 0 coconuts), carefully explain whether it is worthwhile for Robinson to harvest a coconut. Should he harvest a second coconut? What is the optimal (efficient) quantity of fish and coconuts for Robinson to produce and consume? Why?
   d. At the quantity of fish and coconuts that solves part c, is Robinson better off than when he produced and consumed only fish? How do you know?
   e. Suppose you wanted to measure Robinson’s gain from producing and consuming coconuts. Devise a measure of Robinson’s gain from producing and consuming the first coconut. (Hint: How much is he willing to pay for the first coconut, and what does it cost him to produce it?) In what units did you measure this gain? What is his gain from producing and consuming a second coconut? A third? Compared to a situation in which Robinson produced and consumed no coconuts, how much better off is Robinson when he consumes the optimal quantities that you solved for in part c? (What is the value of his total gain from producing and consuming the optimal quantity of coconuts?)

<table>
<thead>
<tr>
<th>Production Possibilities</th>
<th>Marginal Cost &amp; Marginal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fish</td>
</tr>
<tr>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

2. One day, Robinson’s companion Friday washes up on the island. Friday is hopelessly inept at fishing, but he is able to gather 8 coconuts per day. They decide that Robinson will devote his time to catching fish (he catches 40) and Friday will harvest coconuts (he
gathers 8). Now Friday and Robinson must allocate the fish and coconuts between them. Friday’s marginal value of coconuts is as follows:

<table>
<thead>
<tr>
<th>Coconuts</th>
<th>MV_{C,F}</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

So when Friday has 8 coconuts, the last one is worth only 1 fish to him and when he has no coconuts the first coconut is worth 8 fish to him.

a. If Robinson has 40 fish and no coconuts, and Friday has 8 coconuts and no fish, can one of them be made better off without harming the other? How do you know?

b. Suppose that Friday and Robinson agree to trade fish for coconuts at a “price” of 5 fish/coconut. How many coconuts would Friday wish to sell? After selling this quantity, what is Friday’s marginal value of a coconut? How many would Robinson like to buy? After buying this quantity, what is Robinson’s marginal value of a coconut?

c. After Robinson and Friday have bought and sold the quantities of coconuts described in part b, can one of them be made better off without harming the other? How do you know?

d. From part c, can you describe a condition for determining when the distribution of fish and coconuts between Robinson and Friday is economically efficient?

3. In “Let Them Eat Pollution,” (in your packet) a memo written by Laurence Summers (formerly the president of Harvard and economic advisor to Barack Obama) while at the World Bank argues that citizens of both rich and poor countries would be better off if toxic wastes were shipped from rich countries to poor ones, and that such shipments are worthy of policy consideration by the World Bank. This would be true even if the waste products harmed the health of citizens of poor countries.

In “Let Them Sweat,” (also in the packet) columnist Nicholas Kristof argues that “sweatshop” labor in poor countries – such as Nike shoe factories – benefit both the people who work in the factories and the people who consume the products produced there.
Evaluate the economic arguments in each of these articles. Is the basic argument the same? Do you agree with Summers and Kristof that residents of poor countries are worse off if we refuse to trade with them at prices that they would accept? Why? What of residents of rich countries?

4. In September of 2005 Hurricane Katrina caused death and havoc along the Gulf Coast of the United States. A substantial portion of U.S. gasoline supplies passes through the Gulf, and much refining capacity was damaged or destroyed. Gasoline prices reached $3.50 per gallon at various places in the U.S., while commentators and politicians decried “price gouging” by greedy oil companies and station owners. Similar price increases were observed for building materials (southern pine lumber is grown in the area). And in the disaster area prices for such goods as fresh bottled water or a hotel room shot up, as those with the goods sold them for what they could.

Comment on such “price gouging.” What role does it play, either positive or negative? Would the world be more efficient if no one raised prices? What do you mean by efficient?