chapter 2

>>Economic Models: Trade-Offs and Trade

TUNNEL VISION

In 1901 Wilbur and Orville Wright built something that would change the world. No, not the airplane—their successful flight at Kitty Hawk would come two years later. What made the Wright brothers true visionaries was their wind tunnel, an apparatus that let them experiment with many different designs for wings and control surfaces. These experiments gave them the knowledge that would make heavier-than-air flight possible.

Landov Photos

Clearly, the Wright brothers believed in their model.

A miniature airplane sitting motionless in a wind tunnel isn't the same thing as an actual aircraft in flight. But it is a very useful model of a flying plane—a simplified representation of the real thing that can be used to answer crucial questions, such as how much lift a given wing shape will generate at a given airspeed.

Needless to say, testing an airplane design in a wind tunnel is cheaper and safer than building a full-scale version and hoping it will fly. More generally, models play a crucial role in almost all scientific research—economics very much included.

In fact, you could say that economic theory consists mainly of a collection of models, a series of simplified representations of economic reality that allow us to understand a variety of economic issues. In this chapter, we will look at three economic models that are crucially important in their own right and also illustrate why such models are so useful. We'll conclude with a look at how economists actually use models in their work.

What you will learn in this chapter:

- Why **models**—simplified representations of reality—play a crucial role in economics
- Three simple but important models: the **production possibility frontier, comparative advantage,** and the **circular-flow diagram**
- The difference between **positive economics,** which tries to describe the economy and predict its behavior, and **normative economics,** which tries to prescribe economic policy
- When economists agree and why they sometimes disagree

Models in Economics: Some Important Examples

A **model** is a simplified representation of a real situation that is used to better understand real-life situations.

A **model** is any simplified representation of reality that is used to better understand real-life situations. But how do we create a simplified representation of an economic situation?

One possibility—an economist's equivalent of a wind tunnel—is to find or create a real but simplified economy. For example, economists interested in the economic role of money have studied the system of exchange that developed in World War II prison camps, in which cigarettes became a universally accepted form of payment even among prisoners who didn't smoke.

Another possibility is to simulate the workings of the economy on a computer. For example, when changes in tax law are proposed, government officials use tax models—large computer programs—to assess how the proposed changes would affect different types of people.

The **other things equal assumption** means that all other relevant factors remain unchanged.

The importance of models is that they allow economists to focus on the effects of only one change at a time. That is, they allow us to hold everything else constant and study how one change affects the overall economic outcome. So the **other things equal assumption,** which means that all other relevant factors remain unchanged, is an important assumption when building economic models.

FOR INQUIRING MINDS

MODELS FOR MONEY

What's an economic model worth, anyway? In some cases, quite a lot of money.

Although many economic models are developed for purely scientific purposes, others are developed to help governments make economic policies. And there is a growing business in developing economic models to help corporations make decisions.

Who models for money? All economic consultants—of which there are probably thousands in Canada—use models and data in their analysis. But very few firms go so far as to build a complete model of the Canadian economy and then use that model to predict future trends, offer advice based on their models, or develop custom models for business and government clients. There are about five operations that do this in Canada—the biggest of which is a firm called "Informetrica", which employs around 20 full-time professionals.

One particularly lucrative branch of economics is finance theory, which helps investors figure out what assets, such as shares in a company, are worth. Finance theorists often become highly paid "rocket scientists" at big Bay Street firms because financial models demand a high level of technical expertise.

Unfortunately, the most famous business application of finance theory came spectacularly to grief in the United States. In 1994 a group of Wall Street traders teamed up with famous finance theorists—including two Nobel prize winners—to form Long-Term Capital Management (LTCM), a fund that used sophisticated financial models to invest the money of wealthy clients. At first, the fund did very well. But in 1998 bad news from all over the world—with countries as disparate as Russia, Japan, and Brazil in trouble at the same time—inflicted huge losses on LTCM's investments. For a few anxious days, many people feared not only that the fund would collapse but also that it would bring many other companies down with it. Thanks in part to a rescue operation organized by government officials, this did not happen; but LTCM was closed a few months later, with some of its investors losing most of the money they had put in.

What went wrong? Partly it was bad luck. But experienced hands also faulted the economists at LTCM for taking too many risks. Their models said that a run of bad news like the one that actually happened was extremely unlikely—but a sensible economist knows that sometimes even the best model misses important possibilities.

But you can't always find or create a small-scale version of the whole economy, and a computer program is only as good as the data it uses. (Programmers have a saying: garbage in, garbage out.) For many purposes the most effective form of economic modeling is the construction of "thought experiments": simplified, hypothetical versions of real-life situations.

In Chapter 1 we illustrated the concept of equilibrium with the example of how customers at a supermarket would rearrange themselves when a new cash register opens. Though we didn't say it, this was an example of a simple model—an imaginary supermarket, in which many details were ignored (what are the customers buying?—never mind)—that could be used to answer a "what if" question: what if another cash register were opened?

As the cash register story showed, it is often possible to describe and analyze a useful economic model in plain English. However, because much of economics involves changes in quantities—in the price of a product, the number of units produced, or the number of workers employed in its production—economists often find that using some mathematics helps clarify an issue. In particular, a numerical example, a simple equation, or—especially—a graph can be the key to understanding an economic concept.

Whatever the form it takes, a good economic model can be a tremendous aid to understanding. The best way to make this point is to consider some simple but important economic models and what they tell us. First, we will look at the *production possibility frontier,* a model that helps economists think about the trade-offs every economy faces. Then we will turn to *comparative advantage,* a model that clarifies the principle of gains from trade—trade both between individuals and between countries. Finally, we'll examine the *circular-flow model,* which helps economists analyze the monetary transactions taking place in the economy as a whole.

In discussing these models, we make considerable use of graphs to represent mathematical relationships. Such graphs will play an important role throughout this book. If you are already familiar with the use of graphs, the material that follows should not present any problem. If you are not, this would be a good time to turn to the appendix of this chapter, which provides a brief introduction to the use of graphs in economics.

Trade-offs: The Production Possibility Frontier

The hit movie *Cast Away,* starring Tom Hanks, was an update of the classic story of Robinson Crusoe, the hero of Daniel Defoe's eighteenth-century novel. Mr. Hanks played the sole survivor of a plane crash, stranded on a remote island. As in the original story of Robinson Crusoe, the character played by Mr. Hanks had limited resources: the natural resources of the island, a few items he managed to salvage from the plane, and, of course, his own time and effort. With only these resources, he had to make a life. In effect, he became a one-man economy.

The first principle of economics we introduced in Chapter 1 was that resources are scarce, and that as a result any economy—whether it contains one person or millions of people—faces trade-offs. For example, if a castaway devotes resources to catching fish, he cannot use those same resources to gather coconuts.

To think about the trade-offs that face any economy, economists often use the model known as the **production possibility frontier**. The idea behind this model is to improve our understanding of trade-offs by considering a simplified economy that produces only two goods. This simplification enables us to show the trade-off graphically.

The **production possibility frontier** illustrates the trade-offs facing an economy that produces only two goods. It shows the maximum quantity of one good that can be produced for any given quantity produced of the other.

What to do? Even a castaway faces trade-offs.

Figure 2-1 shows a hypothetical production possibility frontier for Tom, a castaway alone on an island, who must make a trade-off between production of fish and production of coconuts. The frontier—the curve in the diagram—shows the maximum number of fish Tom can catch during a week *given* the quantity of coconuts he gathers, and vice versa. That is, it answers questions of the form, "What is the maximum number of fish Tom can catch if he also gathers 20 (or 25, or 30) coconuts?" (We'll explain the bowed-out shape of the curve in Figure 2-1 shortly, after we've seen how to interpret the production possibility frontier.)

There is a crucial distinction between points *inside* or *on* the curve (the shaded area) and *outside* the curve. If a production point lies inside or on the frontier—like the point labelled *C*, at which Tom catches 20 fish and gathers 20 coconuts—it is feasible. After all, the frontier tells us that if Tom catches 20 fish, he could also gather a maximum of 25 coconuts, so he could certainly gather 20 coconuts. On the other hand, a production point that lies outside the frontier—such as the hypothetical production point shown in the figure as point *D*, where Tom catches 40 fish and gathers 30 coconuts—isn't feasible. (In this case, Tom could catch 40 fish and gather no coconuts, *or* he could gather 30 coconuts and catch no fish, but he can't do both.)

In Figure 2-1 the production possibility frontier intersects the horizontal axis at 40 fish. This means that if Tom devoted all his resources to catching fish, he would catch 40 fish per week but would have no resources left over to gather coconuts. The production possibility frontier intersects the vertical axis at 30 coconuts; this means that if Tom devoted all his resources to gathering coconuts, he could gather 30 coconuts per week but would have no resources left over to catch fish.

The figure also shows less extreme trade-offs. For example, if Tom decides to catch 20 fish, he is able to gather 25 coconuts; this production choice is illustrated by point *A* in Figure 2-1. If Tom decides to catch 30 fish, he can gather at most only 20 coconuts, as shown by point *B*.

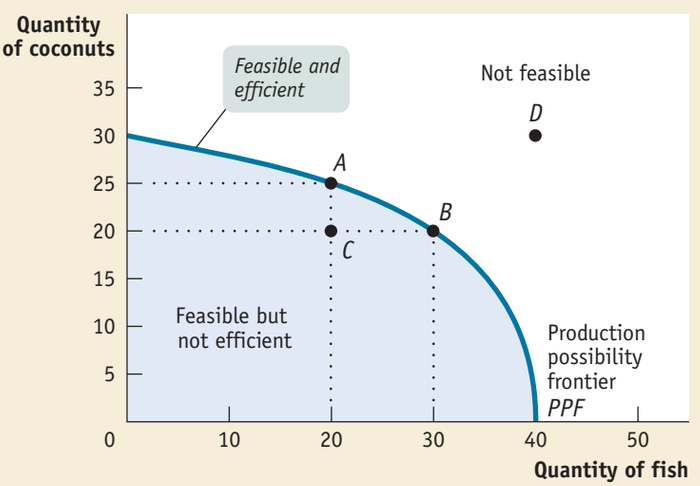
Thinking in terms of a production possibility frontier simplifies the complexities of reality. The real-world economy produces millions of different goods. Even a castaway on an island would produce more than two different items (for example, he would need clothing and housing as well as food). But in this model we imagine an economy that produces only two goods.

If we simplify reality, however, the production possibility frontier helps us understand some aspects of the real economy better than we could without the model.

Figure 2-1

The Production Possibility Frontier

The production possibility frontier illustrates the trade-offs facing an economy that produces two goods. It shows the maximum quantity of one good that can be produced given the quantity of the other good produced. Here, the maximum number of coconuts that Tom can gather depends on the number of fish he catches, and vice versa. His feasible production is shown by the area *inside or on* the curve. Production at point *C* is feasible but not efficient. Points *A* and *B* are feasible and efficient, but point *D* is not feasible. >web...



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The **production possibility frontier** illustrates the trade-offs facing an economy that produces only two goods. It shows the maximum quantity of one good that can be produced for any given quantity produced of the other.

First of all, the production possibility frontier is a good way to illustrate the general economic concept of *efficiency*. Recall from Chapter 1 that an economy is *efficient* if there are no missed opportunities—if there is no way to make some people better off without making other people worse off. A key element of efficiency is that there are no missed opportunities in production—there is no way to produce more of one good without producing less of other goods.

As long as Tom is on the production possibility frontier, his production is efficient. At point *A*, the 25 coconuts he gathers are the maximum number he can get *given* that he has chosen to catch 20 fish; at point *B*, the 20 coconuts he gathers are the maximum he can get *given* his choice to catch 30 fish; and so on.

But suppose that for some reason Tom was at point *C*, producing 20 fish and 20 coconuts. Then this one-person economy would definitely be *inefficient*: it could be producing more of both goods.

The production possibility frontier is also useful as a reminder of the fundamental point that the true cost of any good is not just the amount of money it costs to buy, but everything else in addition to money that must be given up in order to get that good—the *opportunity cost*. If Tom were to catch 30 fish instead of 20, he would be able to gather only 20 coconuts instead of 25. So the opportunity cost of those 10 extra fish is the 5 coconuts not gathered. And if 10 extra fish have an opportunity cost of 5 coconuts, each one fish has an opportunity cost of $5/10 = 0.5$ coconuts.

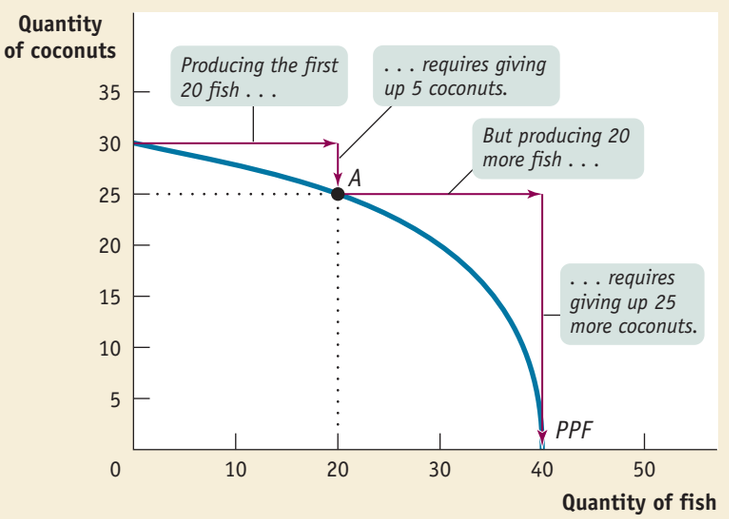
We can now explain the bowed-out shape of the production possibility frontier we saw in Figure 2-1: it reflects an assumption about how opportunity costs change as the mix of output changes. Figure 2-2 shows the same production possibility frontier as Figure 2-1. The arrows in Figure 2-2 illustrate the fact that with this bowed-out production possibility frontier, Tom faces *increasing opportunity cost*: the more fish he catches the more coconuts he has to give up to catch an additional fish, and vice versa. For example, to go from producing zero fish to producing 20 fish, he has to give up 5 coconuts. That is, the opportunity cost of those 20 fish is 5 coconuts. But to increase his fish production to 40—that is, to produce an additional 20 fish—he must give up 25 more coconuts, a much higher opportunity cost.

Economists believe that opportunity costs are usually increasing. The reason is that when only a small amount of a good is produced, the economy can use resources that are especially well suited for that production. For example, if an econ-

Figure 2-2

Increasing Opportunity Cost

The bowed-out shape of the production possibility frontier reflects increasing opportunity cost. In this example, to produce the first 20 fish, Tom must give up 5 coconuts. But to produce an additional 20 fish, he must give up 25 more coconuts. >web...



omy grows only a small amount of corn, that corn can be grown in places where the soil and climate are perfect for corn growing, but less suitable for growing anything else, like wheat. So growing that corn involves giving up only a small amount of potential wheat production. If the economy grows a lot of corn, however, land that isn't so great for corn and would have been well suited for wheat must be pressed into service, so the additional corn production will involve sacrificing considerably more wheat production.

Finally, the production possibility frontier helps us understand what it means to talk about *economic growth*. We introduced the concept of economic growth in the Introduction, defining it as *the growing ability of the economy to produce goods and services*. As we saw, economic growth is one of the fundamental features of the real economy. But are we really justified in saying that the economy has grown? After all, although the Canadian economy produces more of many things than it did a century ago, it produces less of other things—for example, horse-drawn carriages. Production of many goods, in other words, is actually down. So how can we say for sure that the economy as a whole has grown?

The answer, illustrated in Figure 2-3, is that economic growth means an *expansion of the economy's production possibilities*: the economy *can* produce more of everything. For example, if Tom's production is initially at point *A* (20 fish and 25 coconuts), economic growth means that he could move to point *E* (25 fish and 30 coconuts). *E* lies outside the original frontier; so in the production possibility frontier model, growth is shown as an outward shift of the frontier.

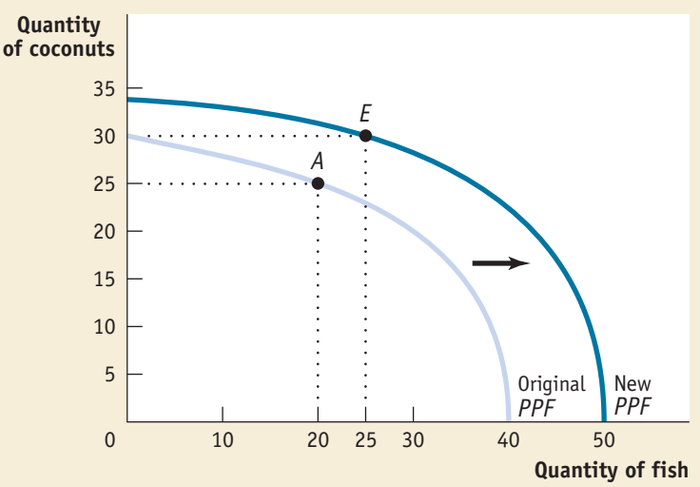
What the economy actually produces depends on the choices people make. After his production possibilities expand, Tom might not actually choose to produce both more fish and more coconuts—he might choose to increase production of only one good, or he might even choose to produce less of one good. But even if, for some reason, he chooses to produce either fewer coconuts or fewer fish than before, we would still say that his economy has grown—because he *could* have produced more of everything.

The production possibility frontier is a very simplified model of an economy. Yet it teaches us important lessons about real-life economies. It gives us our first clear sense of a key element of economy efficiency, it illustrates the concept of opportunity cost, and it makes it clear what economic growth is all about.

Figure 2-3

Economic Growth

Economic growth results in an *outward shift* of the production possibility frontier because production possibilities are expanded. The economy can now produce more of everything. For example, if production is initially at point *A* (20 fish and 25 coconuts), it could move to point *E* (25 fish and 30 coconuts).



Comparative Advantage and Gains from Trade

Among the nine principles of economics described in Chapter 1 was that of *gains from trade*—the mutual gains that individuals can achieve by specializing in doing different things and trading with one another. Our second illustration of an economic model is one particularly useful model of gains from trade—trade based on *comparative advantage*.

Let's stick with Tom stranded on his island, but let's now suppose that a second castaway, *Dumb and Dumber*'s Lloyd, is washed ashore. Can they benefit from trading with each other?

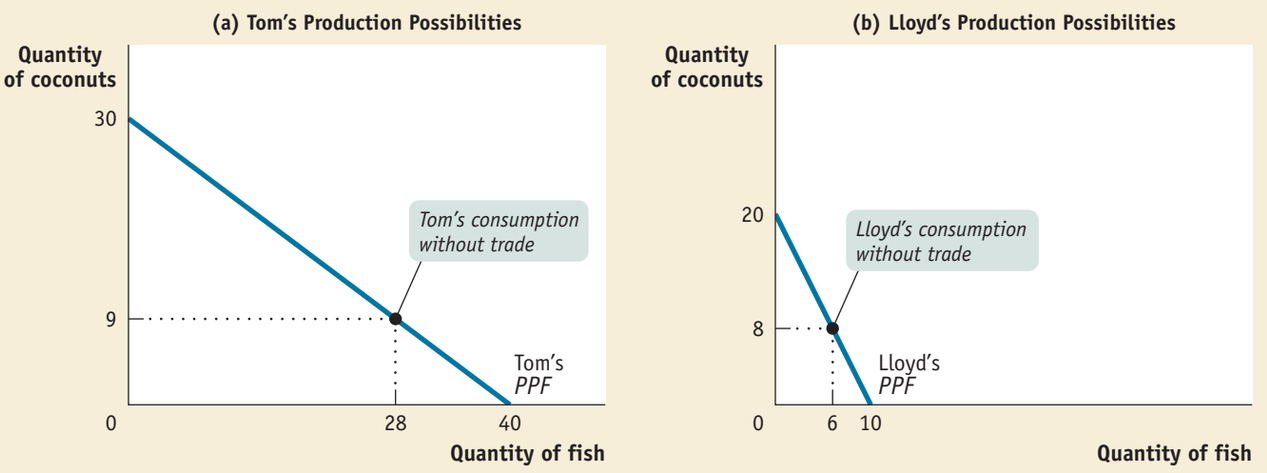
It's obvious that there are potential gains from trade if the two castaways do different things particularly well. For example, if Tom is a skilled fisherman while Lloyd is very good at climbing trees, clearly it makes sense for Tom to catch fish and Lloyd to gather coconuts—and for the two men to trade the products of their efforts.

But one of the most important insights in all of economics is that there are gains from trade even if one of the trading parties isn't especially good at anything. Suppose, for example, that Lloyd is less well suited to primitive life than Tom; he's not nearly as good at catching fish, and compared to Tom even his coconut gathering leaves something to be desired. Nonetheless, what we'll see is that both Tom and Lloyd can live better by trading with each other than either could alone.

For the purposes of this example, let's slightly redraw Tom's production possibilities represented by the production possibility frontier in panel a. of Figure 2-4. According to this diagram, Tom could catch at most 40 fish, but only if he gathered no coconuts, and could gather 30 coconuts, but only if he caught no fish, as before.

In Figure 2-4, we have replaced the curved production possibility frontier of Figure 2-1 with a straight line. Why do this, when we've already seen that economists regard a bowed-out production possibility frontier as normal? The answer is that it simplifies our discussion—and as we have explained, modeling is all about simplification. The principle of comparative advantage doesn't depend on the assumption of straight-line production possibility frontiers, but it is easier to explain with that assumption.

Figure 2-4 Production Possibilities for Two Castaways



Here, each of the two castaways has a constant opportunity cost of fish and a straight-line production possibility frontier: In Tom's case, each fish always has an opportunity cost of ¾ of a coconut. In Lloyd's case, each fish always has an opportunity cost of 2 coconuts. >web...

The straight-line production possibility frontier in panel (a) of Figure 2-4 has a constant *slope* of −¾. (The appendix to this chapter explains how to calculate the slope of a line.) That is, for every 4 additional fish that Tom chooses to catch, he gathers 3 fewer coconuts. So Tom's opportunity cost of a fish is ¾ of a coconut regardless of how many or how few fish he catches. In contrast, a production possibility frontier is curved when the opportunity cost of a good changes according to how much of the good has already been produced.

For example, you can see from Figure 2-2 that if Tom starts at the point of having caught zero fish and gathers 30 coconuts, his opportunity cost of catching 20 fish is 5 coconuts. But once he has already caught 20 fish, the opportunity cost of an additional 20 fish increases to 25 coconuts.

Panel (b) of Figure 2-4 shows Lloyd's production possibilities. Like Tom's, Lloyd's production possibility frontier is a straight line, implying a constant opportunity cost of fish in terms of coconuts. His production possibility frontier has a constant slope of −2. Lloyd is less productive all around: at most he can produce 10 fish or 20 coconuts. But he is particularly bad at fishing; whereas Tom sacrifices ¾ of a coconut per fish caught, for Lloyd the opportunity cost of a fish is 2 whole coconuts. Table 2-1 summarizes the two castaways' opportunity costs for fish and coconuts.

TABLE 2-1

Tom's and Lloyd's Opportunity Costs of Fish and Coconuts

	Tom's Opportunity Cost	Lloyd's Opportunity Cost
One fish	¾ coconut	2 coconuts
One coconut	⅔ fish	½ fish

Now, Tom and Lloyd could go their separate ways, each living on his own side of the island, catching his own fish and gathering his own coconuts. Let's suppose that they start out that way and make the consumption choices shown in Figure 2-4: in the absence of trade, Tom consumes 28 fish and 9 coconuts per week, while Lloyd consumes 6 fish and 8 coconuts.

But is this the best they can do? No, it isn't. Given that the two castaways have different opportunity costs, they can make a deal that makes both of them better off.

Table 2-2 shows how such a deal works: Tom specializes in the production of fish, catching 40 per week, and gives 10 fish to Lloyd. Meanwhile, Lloyd specializes in the production of coconuts, gathering 20 per week, and gives 10 coconuts to Tom. The result is shown in Figure 2-5. Tom now consumes more of both goods than before: instead of 28 fish and 9 coconuts, he consumes 30 fish and 10 coconuts. And Lloyd also consumes more, going from 6 fish and 8 coconuts to 10 fish and 10 coconuts. As Table 2-2 also shows, both Tom and Lloyd experience gains from trade: Tom's consumption of fish increases by two, and his consumption of coconuts increases by one. Lloyd's consumption of fish increases by four, and his consumption of coconuts by two.

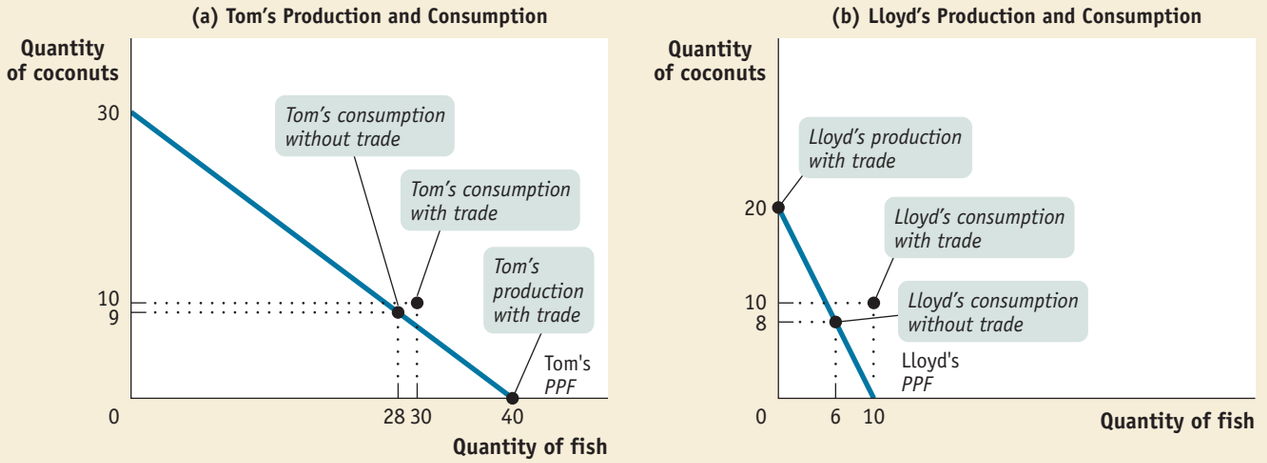
So both castaways are better off when they each specialize in what they are good at and trade. It's a good idea for Tom to catch the fish for both of them because his opportunity cost of a fish is only ¾ of a coconut not gathered, versus 2 coconuts for Lloyd. Correspondingly, it's a good idea for Lloyd to gather coconuts for the both of them.

TABLE 2-2

How the Castaways Gain from Trade

		Without Trade		With Trade		Gains from Trade
		Production	Consumption	Production	Consumption	
Tom	Fish	28	28	40	30	+2
	Coconuts	9	9	0	10	+1
Lloyd	Fish	6	6	0	10	+4
	Coconuts	8	8	20	10	+2

Figure 2-5 Comparative Advantage and Gains From Trade



By specializing and trading, the two castaways can produce and consume more of both goods. Tom specializes in catching fish, his comparative advantage, and Lloyd' who has an *absolute* disadvantage in both goods but a *comparative* advantage in coconuts—specializes in gathering coconuts. The result is that each castaway can consume more of both goods than either could without trade.

Or we could put it the other way around: Because Tom is so good at catching fish, his opportunity cost of gathering coconuts is high: ⅔ fish not caught for every coconut gathered. Because Lloyd is a pretty poor fisherman, his opportunity cost of gathering coconuts is much less, only ½ fish per coconut.

What we would say in this case is that Tom has a **comparative advantage** in catching fish and Lloyd has a comparative advantage in gathering coconuts. An individual has a comparative advantage in producing something if the opportunity cost of that production is lower for that individual than for other people. In other words, Lloyd has a comparative advantage over Tom in producing a particular good or service if Lloyd's opportunity cost of producing that good or service is less than Tom's. The story of Tom and Lloyd clearly simplifies reality. Yet it teaches us some very important lessons that apply to the real economy too.

An individual has a **comparative advantage** in producing a good or service if the opportunity cost of producing the good is lower for that individual than for other people.

First, the model provides a clear illustration of the gains from trade: by agreeing to specialize and provide goods to each other, Tom and Lloyd can produce more, and therefore both are better off than if they tried to be self-sufficient.

Second, the model demonstrates a very important point that is often overlooked in real-world arguments: as long as people have different opportunity costs, *everyone has a comparative advantage in something, and everyone has a comparative disadvantage in something*.

Notice that in our example Tom is actually better than Lloyd at producing both goods: Tom can catch more fish in a week, and he can also gather more coconuts. That is, Tom has an **absolute advantage** in both activities: he can produce more output with a given amount of input (in this case, his time) than Lloyd. You might therefore be tempted to think that Tom has nothing to gain from trading with the less competent Lloyd.

An individual has an **absolute advantage** in an activity if he or she can do it better than other people. Having an absolute advantage is not the same thing as having a comparative advantage.

But we've just seen that Tom can indeed benefit from a deal with Lloyd, because *comparative*, not *absolute*, advantage is the basis for mutual gain. It doesn't matter that it takes Lloyd more time to gather a coconut; what matters is that for him the opportunity cost of that coconut in terms of fish is lower. So Lloyd, despite his absolute disadvantage, even in coconuts, has a comparative advantage in coconut gathering.

PITFALLS

MISUNDERSTANDING COMPARATIVE ADVANTAGE

Students do it, pundits do it, and politicians do it all the time: they confuse *comparative* advantage with *absolute* advantage. For example, one can often hear dire warnings that unless we improve our productivity, Canada will be unable to compete in the new global economy—as if we would be unable to export anything, and would lose all those export-related jobs.

Those commentators confuse *absolute* and *comparative* advantage. It is true that if our competitors were better at everything than we were, then we would have no *absolute* advantage in anything. But we would still have a *comparative* advantage, and other countries would still benefit from trading with us.

Just as Lloyd is able to benefit from trade with Tom (and vice versa) despite the fact that Tom is better at everything, nations can still gain from trade even if they are less productive in all industries than the countries they trade with.

Low productivity growth would have important ramifications for our ability to sustain high standards of living. But it would not affect our ability to trade with other countries.

If comparative advantage were relevant only to castaways, it might not be that interesting. In fact, however, the idea of comparative advantage applies to many activities in the economy. Perhaps its most important application is to trade—not between individuals, but between countries. So let's look briefly at how the model of comparative advantage helps in understanding both the causes and the effects of international trade.

Comparative Advantage and International Trade

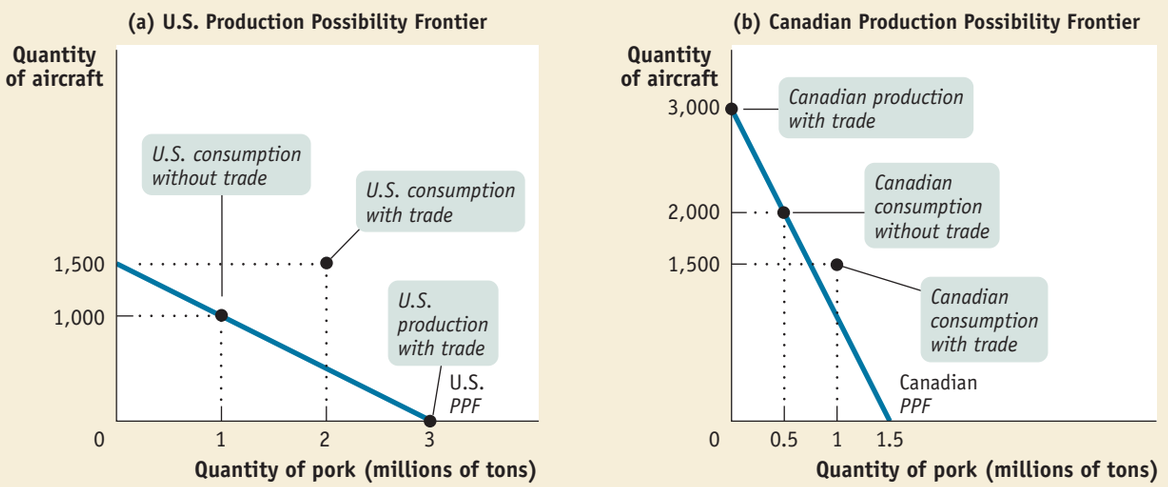
Look at the label on a manufactured good sold in Canada, and there's a good chance you will find that it was produced in some other country—in China, Japan, or the United States. On the other side, many Canadian industries export a large fraction of their output (this is particularly true of agriculture and forestry products, automotive products, machinery, and equipment).

Should all this international exchange of goods and services be celebrated, or is it cause for concern? Sometimes the desirability of international trade is questioned—especially by those working in an industry that is suffering from intense foreign competition. The public pressure can be intense enough that politicians acquiesce to these demands for protection. Thus, recently the United States erected trade barriers against the importation of Canadian softwood in an effort to protect its softwood lumber industry.

Economists, however, have a very positive view of international trade. Why? Because they view it in terms of comparative advantage.

Figure 2-6 shows, with a simple example, how international trade can be interpreted in terms of comparative advantage. Although the

Figure 2-6 Comparative Advantage and International Trade



In this hypothetical example, Canada and the United States produce only two goods: pork and aircraft. Aircraft are measured on the vertical axis and pork on the horizontal axis. Panel (a) shows the U.S. production possibility frontier. It is relatively flat, implying that the United States has a comparative advantage in pork production. Panel (b) shows the Canadian production possibility frontier. It is relatively steep, implying that Canada has a comparative advantage in aircraft production. Just like two individuals, both countries gain from specialization and trade. >web...

example as constructed is hypothetical, it is based on an actual pattern of international trade: Canadian exports of aircraft to the United States and American exports of pork to Canada. Panels a. and b. of Figure 2-6 illustrate hypothetical production possibility frontiers for the United States and Canada, with pork measured on the horizontal axis and aircraft measured on the vertical axis. The U.S. production possibility frontier is flatter than the Canadian frontier, implying that the United States has a comparative advantage in pork, while Canada has a comparative advantage in aircraft.

Although the consumption points in Figure 2-6 are hypothetical, they illustrate a general principle: just like the example of Tom and Lloyd, the United States and Canada can both achieve mutual gains from trade. If the United States concentrates on producing pork and ships some of its output to Canada, while Canada concentrates on aircraft and ships some of its output to the United States, both countries can consume more than if they insisted on being self-sufficient.

Moreover, these mutual gains don't depend on each country being better at producing one kind of good. Even if one country has, say, higher output per person-hour in both industries—that is, even if one country has an absolute advantage in both industries—there are still mutual gains from trade.

But how does trade actually take place in market interactions? This brings us to our final model, the circular-flow diagram, which helps economists analyze the transactions that take place in a market economy.

Transactions: The Circular-Flow Diagram

The little economy created by Tom and Lloyd on their island lacks many features of the economy modern Canadians live in. For one thing, though millions of Canadians are self-employed, most workers are employed by someone else, usually in a company with hundreds of employees. Also, Tom and Lloyd engage in only the simplest of economic transactions, **barter**, in which an individual trades a good or service he or she has directly for a good or service he or she wants. In the modern economy, simple barter is rare: usually people trade goods or services for money—pieces of coloured paper with no inherent value—then trade those pieces of coloured paper for the goods or services they want. That is, they sell goods or services and buy other goods or services.

Trade takes the form of **barter** when people directly exchange goods or services that they have for goods or services that they want.

And they both sell and buy a lot of different things. The Canadian economy is a vastly complex entity, with more than 15 million workers employed by tens of thousands of companies, producing a vast array of different goods and services. Yet you can learn some very important things about the economy by considering the simple representation shown in Figure 2-7, the **circular-flow diagram.** This diagram represents the transactions that take place in an economy by two kinds of flows around a circle: flows of physical things like goods, services, labour, or raw materials in one direction, and flows of money that pay for these physical things in the opposite direction. In this case the physical flows are shown in yellow, the money flows in green.

The **circular-flow diagram** is a model that represents the transactions in an economy by flows around a circle.

The simplest circular-flow diagram models an economy that contains only two kinds of "inhabitants": **households** and **firms**. A household consists of either an individual or a group of people (usually, but not necessarily, a family) that share their income. A firm is an organization (usually, but not necessarily, a corporation) that produces goods and services for sale—and that employs members of households.

A **household** is a person or a group of people that share their income.

A **firm** is an organization that produces goods and services for sale.

As you can see in Figure 2-7, there are two kinds of markets in this model economy. On one side (here the left side) there are **markets for goods and services** in which households buy the goods and services they want from firms. This produces a flow of goods and services to households and a return flow of money to firms.

Firms sell goods and services that they produce to households in **markets for goods and services**.

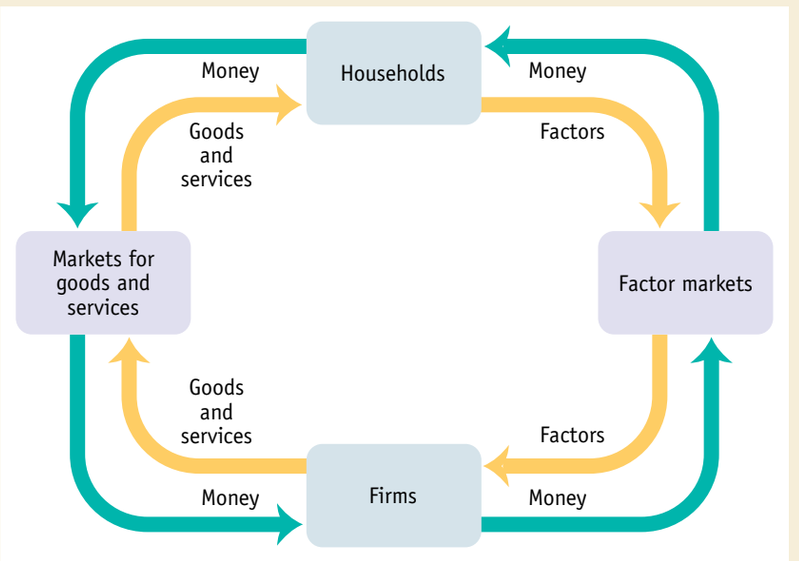
On the other side, there are **factor markets**. A **factor of production** is a resource used to produce goods and services. Economists usually use the term *factor of production* to refer to a resource that is not used up in production. For example, workers use sewing machines to convert cloth into shirts; the workers and the

Firms buy the resources they need to produce—**factors of production**—in **factor markets**.

Figure 2-7

The Circular-Flow Diagram

This model represents the flows of money and goods and services in the economy. In the markets for goods and services, households purchase goods and services from firms, generating a flow of money to the firms and a flow of goods and services to the households. The money flows back to households as firms purchase factors of production from the households in factor markets.



sewing machines are factors of production, but the cloth is not. Broadly speaking, the main factors of production are land, labour, and capital. Land is a resource supplied by nature; labour is the work of human beings; and capital refers to 'created' resources such as machines and buildings. Of course, each of these is really a category rather than a single factor: land in northern Quebec is quite different from land in southern Ontario. And just as it is possible to invest capital in improving the productivity of land, so it is possible to invest in improving the productivity of labour. Such investment—through education and skill acquisition—creates 'human capital', and results in enhancing the productivity of the labour force.

The factor market most of us know best is the *labour market,* in which workers are paid for their time. Besides labour, we can think of households as owning and selling the other factors of production to firms. For example, when a corporation pays dividends to its stockholders, who are members of households, it is in effect paying them for the use of the machines and buildings that ultimately belong to those investors.

In what sense is Figure 2-7 a model? That is, in what sense is it a *simplified* representation of reality? The answer is that this picture ignores a number of real-world complications. A few examples:

- In the real world, the distinction between firms and households isn't always that clear-cut. Consider a small, family-run business—a farm, a shop, a small hotel. Is this a firm or a household? A more complete picture would include a separate box for family businesses.
- Many of the sales firms make are not to households but to other firms; for example, steel companies sell mainly to other companies such as auto manufacturers, not to households. A more complete picture would include these flows of goods and money within the business sector.
- The figure doesn't show the government, which in the real world diverts quite a lot of money out of the circular flow in the form of taxes but also injects a lot of money back into the flow in the form of spending.

Figure 2-7, in other words, is by no means a complete picture either of all the types of "inhabitants" of the real economy or of all the flows of money and physical items that take place among these inhabitants.

Despite its simplicity, the circular-flow diagram, like any good economic model, is a very useful aid to thinking about the economy.

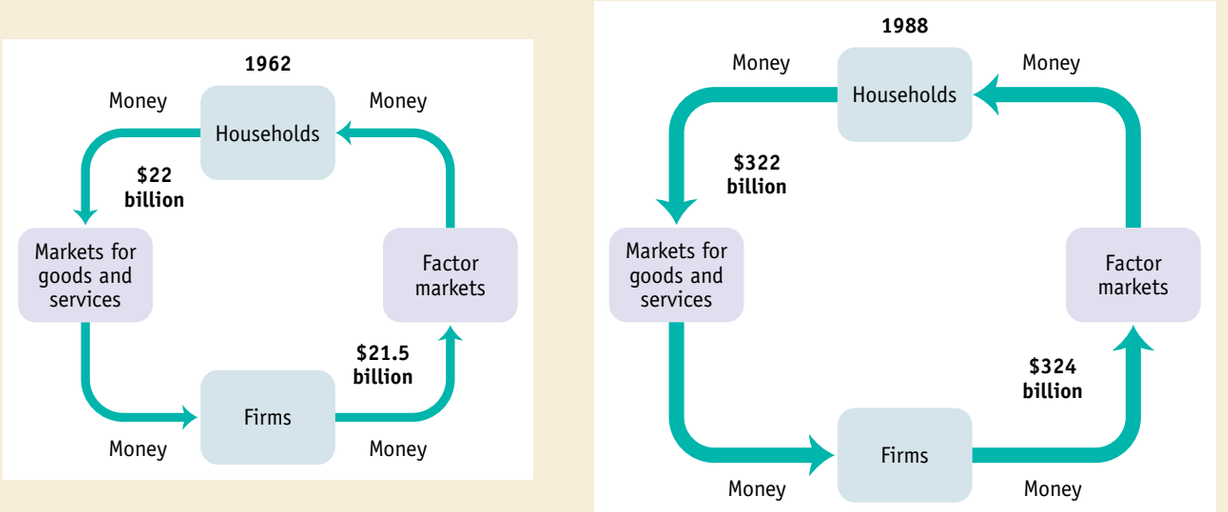
For example, a circular-flow diagram can help us understand how the economy manages to provide jobs for a growing population. To illustrate, consider the huge expansion in the Canadian labour force—the number of people who want to work—between the early 1960s and the late 1980s. This increase was partly caused by the 15-year baby boom that followed World War II; the first "baby boomers" began looking for jobs in the early 1960s, and the last of them went to work in the late 1980s. In addition, social changes led a much higher fraction of women to seek paid work outside the home. As a result, between 1962 and 1988 the number of Canadians employed or seeking jobs increased by 110%.

That's a lot of new job seekers. But luckily, the number of jobs also expanded during the same period, by almost exactly the same percentage.

Or was it luck? The circular-flow diagram helps us understand why the number of jobs available grew along with the expansion of the labour force. Figure 2-8 compares the money flows around the circle for the Canadian economy in 1962 and 1988. Both the money paid to households and the money spent by households increased enormously over the period—and that was no accident. As more people went to work—that is, as more labour was sold in the factor markets—households had more income to spend. They used that increased income to buy more goods and services in the market for goods and services. And in order to produce these goods and services, firms had to hire more workers!

So, despite being an extremely simple model of the economy, the circular-flow diagram helps us to understand some important facts about the real Canadian economy. The number of jobs isn't fixed, the model tells us, because it depends on how much households spend; and the amount households spend depends on how many people are working. It is, in other words, no accident that the economy somehow creates enough jobs even when the working population grows rapidly.

Figure 2-8 **Money Flows in the Canadian Economy in 1962 and in 1988**



The arrows show the flows of money from firms to households and from households to firms in two years, 1962 and 1988. Notice that the numbers don't quite match—that's because there are other groups in the economy (government and foreigners) not included. Still, the figure suggests how the economy was able to find jobs for a rapidly growing labour force: the increased incomes of households made possible greater spending, which in turn was returned to households via the factor markets.

Robert Nickelsberg/Getty Images

Although less productive than Canadian workers, Bengali workers have a comparative advantage in clothing production.

economics in action

Rich Nation, Poor Nation

Try taking off your clothes—at a suitable time and in a suitable place, of course—and take a look at the labels inside that say where they were made. It's a very good bet that much, if not most, of your clothing was manufactured overseas, in a country that is much poorer than Canada—say, in El Salvador, Sri Lanka, or Bangladesh.

Why are these countries so much poorer than we are? The immediate reason is that their economies are much less *productive*—firms in these countries are just not able to produce as much from a given quantity of resources as comparable firms in Canada or other wealthy countries. Why countries differ so much in productivity is a deep question—indeed, one of the main questions that preoccupy economists. But in any case, the difference in productivity is a fact.

But if the economies of these countries are so much less productive than ours, how is it that they make so much of our clothing? Why don't we do it for ourselves?

The answer is "comparative advantage." Just about every industry in Bangladesh is much less productive than the corresponding industry in Canada. But the productivity difference between rich and poor countries varies across goods; it is very large in the production of sophisticated goods like aircraft but not that large in the production of simpler goods like clothing.

The point is that Bangladesh, though it is at an absolute disadvantage compared with Canada in almost everything, has a comparative advantage in clothing production. This means that both Canada and Bangladesh are able to consume more because they specialize in producing different things, with Bangladesh supplying our clothing and Canada supplying Bangladesh with more sophisticated goods. ■

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>>QUICK REVIEW

- Most economic *models* are "thought experiments" or simplified representations of reality, which rely on the *other things equal assumption*.
- An important economic model is the *production possibility frontier*, which illustrates the concepts of efficiency, opportunity cost, and economic growth.
- *Comparative advantage* is a model that explains the source of gains from trade but is often confused with *absolute advantage*. Every person and every country has a comparative advantage in something, giving rise to gains from trade.
- In the simplest economies people *barter* rather than trade with money as in a modern economy. The *circular-flow diagram* is a model representing transactions within the economy as flows of goods and services, *factors of production*, and money between *households* and *firms*. These transactions occur in *markets for goods and services* and *factor markets*.

>>CHECK YOUR UNDERSTANDING 2-1

1. True or false? Explain your answer.
   a. An increase in the amount of resources available to Tom for use in producing coconuts and fish does not change his production possibility frontier.
   b. A technological change that allows Tom to catch more fish for any amount of coconuts gathered results in a change in his production possibility frontier.
   c. The production possibility frontier is useful because it illustrates how much of one good an economy must give up to get more of another good regardless of whether resources are being used efficiently.

2. In Italy, an automobile can be produced by 8 workers in one day and a washing machine by 3 workers in one day. In Canada, an automobile can be produced by 6 workers in one day and a washing machine by 2 workers in one day.
   a. Which country has an absolute advantage in the production of automobiles? In washing machines?
   b. Which country has a comparative advantage in the production of washing machines? In automobiles?
   c. What pattern of specialization results in the greatest gains from trade between the two countries?

3. Use the circular-flow diagram to explain how an increase in the amount of money spent by households results in an increase in the number of jobs in the economy. Describe in words what the circular-flow model predicts.

Solutions appear at back of book.

Using Models

Economics, we have now learned, is mainly a matter of creating models that draw on a set of basic principles but add some more specific assumptions that allow the modeller to apply those principles to a particular situation. But what do economists actually *do* with their models?

Positive versus Normative Economics

Imagine that you are an economic adviser to the Premier of your province. What kinds of questions might the Premier ask you to answer?

Well, here are three possible questions:

1. How much revenue will the provincial fuel tax yield next year?
2. How much would that revenue increase if the tax were raised 20 percent?
3. Should the government increase the tax, bearing in mind that the tax increase will raise much-needed revenue and reduce traffic and air pollution—but may impose some financial hardship on frequent commuters, will adversely affect the trucking industry, and may discourage tourism?

There is a big difference between the first two questions and the third one. The first two are questions about facts. Your forecast of next year's tax collection will be proved right or wrong when the numbers actually come in. Your estimate of the impact of a change in the tax is a little harder to check—revenue depends on other factors besides the tax rate, and it may be hard to disentangle the causes of any change in revenue. Still, in principle there is only one right answer.

But the question of whether the government should raise the fuel tax may not have a "right" answer—two people who agree on the effects of a higher fuel tax could still disagree about whether raising the tax is a good idea. For example, someone who walks to work probably won't care much about the increased commuting costs but may care about the reduced traffic and noise pollution. On the other hand, a regular commuter may have the opposite priorities.

This example highlights a key distinction between two roles of economic analysis. Analysis that tries to answer questions about the way the world works, which have definite right and wrong answers, is known as **positive economics**. In contrast, analysis that involves saying how the world *should* work is known as **normative economics**. To put it another way, positive economics is about description, normative economics is about prescription.

Positive economics is the branch of economic analysis that describes the way the economy actually works. **Normative economics** makes prescriptions about the way the economy *should* work.

Positive economics occupies most of the time and effort of the economics profession. And models play a crucial role in almost all positive economics. The Canadian government uses computer models to assess proposed changes in national tax policy, and many provincial governments have similar models to assess the effects of their own tax policies.

It's worth noting that there is a subtle but important difference between the first and second questions we imagined the Premier asking. Question 1 asked for a simple prediction about next year's revenue—a **forecast**. Question 2 was a "what if" question, asking how revenue would change if the tax were to change. Economists are often called upon to answer both types of questions, but models are especially useful for answering "what if" questions.

A **forecast** is a simple prediction of the future.

The answers to such questions often serve as a guide to policy, but they are still predictions, not prescriptions. That is, they tell you what will happen if a policy is changed; they don't tell you whether that result is good or not. Suppose that your economic model tells you that the government's proposed increase in fuel taxes will raise inner city property values but will hurt those people who must use their cars to commute to work. Does that make this proposed tax increase a good idea or a bad one? It depends on whom you ask. As we've just seen, someone who is very concerned

about the environmental pollution caused by automobiles may support the increase. But someone who is very concerned with the welfare of drivers will feel differently. That's a value judgement—it's not a question of economic analysis.

Still, economists often do end up giving policy advice. That is, they do engage in normative economics. How can they do this when there may be no "right" answer?

One answer is that economists are also citizens, and we all have our opinions. But economic analysis can often be used to show that some policies are clearly better than others, regardless of anyone's opinions.

Suppose that policy A makes everyone better off than policy B, or at least makes some people better off without making anyone else worse off. Then A is clearly more efficient than B. That's not a value judgement: we're talking about how best to achieve a goal, not about the goal itself.

For example, two different policies have been used to help low-income families obtain housing: rent control, which limits the rents landlords are allowed to charge, and rent subsidies, which provide families with additional money to pay rents. Almost all economists agree that subsidies are the more efficient policy. (In Chapter 4 we'll see why this is so.) And so the great majority of economists, whatever their personal politics, favour subsidies over rent control.

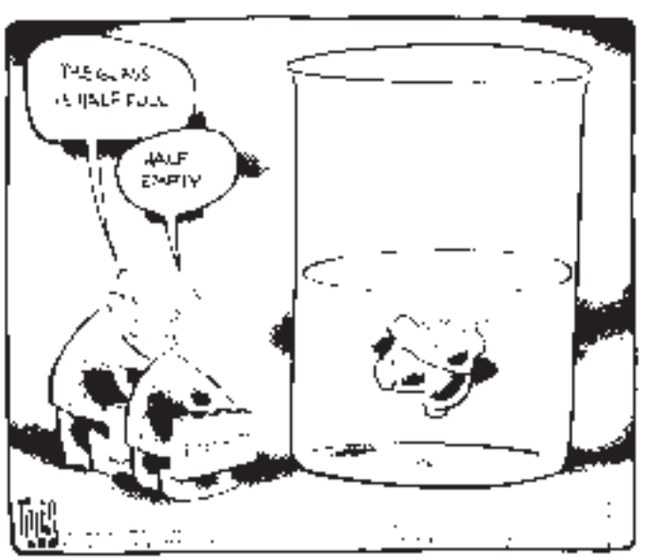
When policies can be clearly ranked in this way, economists generally agree. But it is no secret that economists sometimes disagree. Why does this happen?

When and Why Economists Disagree

Economists have a reputation for arguing with each other. Where does this reputation come from?

One important answer is that media coverage tends to exaggerate the real differences in views among economists. If nearly all economists agree on an issue—for example, the proposition that rent controls lead to housing shortages—reporters and editors are likely to conclude that there is no story worth covering, and so the professional consensus tends to go unreported. But when there is some issue on which prominent economists take opposing sides—for example, whether cutting taxes right now would help the economy—that does make a good news story. So you hear much more about the areas of disagreement within economics than you do about the large areas of agreement.

It is also worth remembering that economics is, unavoidably, often tied up in politics. On a number of issues powerful interest groups know what opinions they want to hear; they therefore have an incentive to find and promote economists who profess those opinions, giving these economists a prominence and visibility out of proportion to their support among their colleagues.



But although the appearance of disagreement among economists exceeds the reality, it remains true that economists often *do* disagree about important things. For example, some very respected economists argue strongly that the Canadian government should replace the income tax with a "consumption tax" (a value-added sales tax, which is the main source of government revenue in many European countries). Other equally respected economists disagree. Why this difference of opinion?

There are two main reasons. First, there may be a normative element to the disagreement. Replacing income taxes with consumption taxes would reduce taxes on interest income and stimulate savings. Everyone would benefit from this. But since the rich have more interest income than the poor, the rich would benefit the most. This redistribution of income to the rich *could* be offset using other government policies, such as sales tax rebates to the poor. But *would* it? Economists may disagree, on normative grounds, as to the desirability of the income redistribution; and they may further disagree on positive grounds as to the likelihood that the government would bring in other measures to offset the gains to the rich, such as sales tax rebates to the poor.

Suppose, however, that the government absolutely guaranteed that they would bring in offsetting policies, so that the shift from income taxes to consumption taxes would have no income redistribution effects. Why might economists still disagree over the desirability of such changes?

The answer is that because economists base their conclusions on models—which are simplified representations of reality—two economists can legitimately disagree about which simplifications are appropriate, and therefore arrive at different conclusions.

Economist *A* may rely on a model that focuses on the administrative costs of tax systems—that is, the costs of monitoring, processing papers, collecting the tax, and so on. He or she might then point to the well-known high costs of running a consumption tax, and argue against the change. But Economist *B* may think that the right way to approach the question is to ignore the administrative costs and focus on how the proposed law would change savings behaviour; he or she might point to studies that suggest that consumption taxes promote higher consumer saving, a desirable result.

Because the economists have used different models, that is, made different simplifying assumptions, they arrive at different conclusions. And so the two economists may find themselves on different sides.

Most such disputes are eventually resolved by the accumulation of evidence that shows which of the various models proposed by economists does a better job of fitting the facts. However, in economics as in any science it can take a long time before research settles important disputes—decades, in some cases. And since the economy is always changing, in ways that make old models invalid or raise new policy questions, there are always new issues on which economists disagree. The policy maker must then decide which economist to believe.

The important point is that economic analysis is a method, not a set of conclusions.

FOR INQUIRING MINDS

WHEN ECONOMISTS AGREE

"If all the economists in the world were laid end to end, they still couldn't reach a conclusion." So goes one popular economist joke. But do economists really disagree that much?

Not according to a classic survey of members of the American Economic Association, reported in the May 1992 issue of the *American Economic Review*. The authors asked respondents to agree or disagree with a number of statements about the economy; what they found was a high level of agreement among professional economists on many of the statements. At the top, with more than 90 percent of the economists agreeing, were "Tariffs and import quotas usually reduce general economic welfare" and "A ceiling on rents reduces the quantity and quality of housing available." What's striking about these two statements is that many non-economists disagree: tariffs and import quotas to keep out foreign-produced goods are favoured by many voters, and proposals to do away with rent control in cities like Toronto and Winnipeg have met fierce political opposition.

So is the stereotype of quarrelling economists a myth? Not entirely: economists do disagree quite a lot on some issues, especially in macroeconomics. But there is a large area of common ground.

economics in action

Economists in Government

Many economists are mainly engaged in teaching and research. But quite a few economists have a more direct hand in events.

As described in the For Inquiring Minds on page xxx[Models for Money], economists play a significant role in the business world, especially in the financial industry. But the most striking involvement of economists in the "real" world is their extensive participation in government.

This shouldn't be surprising: One of the most important functions of government is to make economic policy, and almost every government policy decision must take economic effects into consideration. So governments around the world employ economists in a variety of roles.

Economists work in almost every branch of the Canadian government. Consider the mandates of the departments dealing with aboriginal affairs, agriculture, environment, immigration, inter-provincial relations, natural resources, transportation, or science and technology! No matter what department comes to mind, there is a strong economic dimension involved. However, the strongest concentration of economists is likely to be found in the Department of Finance, which plans and prepares the federal government's budget, and analyzes and designs tax policies. This department also develops policies on international finance and helps design Canada's tariff policies.

It's also worth noting that economists play an especially important role in two international organizations headquartered in Washington, D.C.: the International Monetary Fund, which provides advice and loans to countries experiencing economic difficulties, and the World Bank, which provides advice and loans to promote long-term economic development.

Do all these economists in government disagree with each other all the time? Are their positions largely dictated by political affiliation? The answer to both questions is no. Although there are important disputes over economic issues in government, and politics inevitably plays some role, there is broad agreement among economists over many issues, and most economists in government try very hard to assess issues as objectively as possible. ■

>>QUICK REVIEW

- Economists do mostly *positive economics*, analysis of the way the world works, in which there are definite right and wrong answers and which involve making *forecasts*. But in *normative economics*, which makes prescriptions about how things ought to be, there are often no right answers and only value judgments.
- Economists do disagree—though not as much as legend has it—for two main reasons. One, they may disagree about which simplifications to make in a model. Two, economists may disagree—like everyone else—about values.

>>CHECK YOUR UNDERSTANDING 2-2

1. Which of the following statements is a positive statement? Which is a normative statement?
   a. Society should take measures to prevent people from engaging in dangerous personal behaviour.
   b. People who engage in dangerous personal behaviour impose higher costs on society through higher medical costs.

2. True or false? Explain your answer.
   a. Policy choice A and policy choice B attempt to achieve the same social goal. Policy choice A, however, results in a much less efficient use of resources than policy choice B. Therefore economists are more likely to agree on choosing policy choice B.
   b. When two economists disagree on the desirability of a policy, it's typically because one of them has made a mistake.
   c. Policymakers can always use economics to figure out which goals a society should try to achieve.

Solutions appear at back of book.

• A LOOK AHEAD •

This chapter has given you a first view of what it means to do economics, starting with the general idea of models as a way to make sense of a complicated world and then moving on to three simple introductory models.

To get a real sense of how economic analysis works, however, and to show just how useful such analysis can be, we need to move on to a more powerful model. In the next two chapters we will study the quintessential economic model, one that has an amazing ability to make sense of many policy issues, predict the effects of many forces, and change the way you look at the world. That model is known as "supply and demand".

SUMMARY

1. Almost all economics is based on **models,** "thought experiments" or simplified versions of reality, many of which use mathematical tools such as graphs. An important assumption in economic models is the **other things equal assumption,** which allows analysis of the effect of a change in one factor by holding all other relevant factors unchanged.
2. One important economic model is the **production possibility frontier.** It illustrates: opportunity cost (showing how much less of one good can be produced if more of the other good is produced); efficiency (an economy is efficient if it produces on the production possibility frontier); and economic growth (an expansion of the production possibility frontier).
3. Another important model is **comparative advantage,** which explains the source of gains from trade between individuals and countries. Everyone has a comparative advantage in something—some good or service in which that person has a lower opportunity cost than everyone else. But it is often confused with **absolute advantage,** an ability to produce a particular good or service better than anyone else. This confusion leads some to erroneously conclude that there are no gains from trade between people or countries.
4. In the simplest economies people **barter**—trade goods and services for one another—rather than trade them for money, as in a modern economy. The **circular-flow diagram** is a model representing transactions within the economy as flows of goods, services, and income between **households** and **firms**. These transactions occur in **markets for goods and services** and **factor markets,** markets for **factors of production** such as labor. It is useful in understanding how spending, production, employment, income, and growth are related in the economy.
5. Economists use economic models for both **positive economics,** which describes how the economy works, and for **normative economics,** which prescribes how the economy should work. Positive economics often involves making **forecasts.** Economists can determine correct answers for positive questions, but typically not for normative questions, which involve value judgments. The exceptions are when policies designed to achieve a certain prescription can be clearly ranked in terms of efficiency.
6. There are two main reasons economists disagree. One, they may disagree about which simplifications to make in a model. Two, economists may disagree—like everyone else—about values.

KEY TERMS

Model p. xx
Other things equal assumption p. xx
Production possibility frontier p. xx
Comparative advantage p. xx
Absolute advantage p. xx
Barter p. xx
Circular-flow diagram p. xx
Household p. xx
Firm p. xx
Markets for goods and services p. xx
Factor markets p. xx
Factors of production p. xx
Positive economics p. xx
Normative economics p. xx
Forecast p. xx

PROBLEMS

1. Atlantis is a small, isolated island in the South Atlantic. The population grows potatoes and catches fresh fish. The accompanying table shows the maximum annual output combinations of potatoes and fish that can be produced. Obviously, given their limited resources and available technology, as they use more of their resources for potato production, there are fewer resources available for catching fish.

Maximum annual output options	Quantity of potatoes (pounds)	Quantity of fresh fish (pounds)
A	1,000	0
B	800	300
C	600	500
D	400	600
E	200	650
F	0	675

a. Draw a production possibility frontier illustrating these options, showing points A–F.

b. Can Atlantis produce 500 pounds of fish and 800 pounds of potatoes? Explain. Where would this point lie relative to the production possibility frontier?

c. What is the opportunity cost of expanding the annual output of potatoes from 600 to 800 pounds?

d. What is the opportunity cost of increasing the annual output of potatoes from 200 to 400 pounds?

e. Can you explain why the answers to c and d above are not the same? What does this imply about the slope of the production possibility frontier?

2. In the ancient country of Roma, only two goods, spaghetti and meatballs, are produced. There are two tribes in Roma, the Tivoli and the Frivoli. By themselves, the Tivoli tribe each month can produce either 30 pounds of spaghetti and no meatballs, or 50 pounds of meatballs and no spaghetti, or any combination in between. The Frivoli, by themselves, each month could produce 40 pounds of spaghetti and no meatballs, or 30 pounds of meatballs and no spaghetti, or any combination in between.

a. Assume that all production possibility frontiers are straight lines. Draw one diagram showing the monthly production possibility frontier for the Tivoli and another diagram showing the monthly production possibility frontier for the Frivoli. Show how you calculated them.

b. Which tribe has the comparative advantage in spaghetti production? In meatball production?

In 100 A.D. the Frivoli discover a new technique for making meatballs that doubles the quantity of meatballs they can produce monthly.

c. Draw the new monthly production possibility frontier for the Frivoli.

d. After the innovation, which tribe now has the absolute advantage in producing meatballs? In producing spaghetti? Which has the comparative advantage in meatball production? In spaghetti production?

3. Peter Pundit, an economics reporter, states that the European Union is increasing its productivity very rapidly in all the major industries. He claims that this productivity advance is so rapid that output from the EU in these industries will soon exceed that of Canada and, as a result, Canada will no longer benefit from trade with the EU.

a. Do you think Peter Pundit is correct or not? If not, what do you think is the source of his mistake?

b. If the EU and Canada continue to trade, what do you think characterizes the goods that the EU exports to Canada? What characterizes the goods that Canada exports to the EU?

4. You are in charge of allocating members of your dormitory to the dormitory baseball and basketball teams. You are down to the last four people, where two must be allocated to baseball and two to basketball. The following table gives each person's batting average and free-throw average. Explain how you would use the concept of comparative advantage to allocate the players. Begin by establishing each player's opportunity cost of free throws in terms of batting averages.

Name	Batting average	Free-throw average
Kelley	70%	60%
Jackie	50%	50%
Curt	10%	30%
Gerry	80%	70%

Why is it likely that the other basketball players will be unhappy about this arrangement, but the other baseball players will be satisfied? Nonetheless, why would an economist say that this is an efficient way to allocate players for your dormitory sports teams?

5. The economy of Atlantis has developed, and the inhabitants now use money in the form of cowry shells. Draw a circular-flow diagram showing households and firms. Firms produce potatoes and fish, and households buy potatoes and fish. Households also provide the land and labour to firms. Identify where in the flows of cowry shells or physical things (goods and services, or resources) each of the following impacts would occur. Describe how this impact spreads around the circle.

a. A devastating hurricane floods many of the potato fields.

b. There is a very productive fishing season with very large numbers of fish caught.

c. The residents of Atlantis discover the Macarena and spend several days a month at dancing festivals.

6. An economist might say that universities "produce" education, using faculty members and students as inputs. According to this line of reasoning, education is then "consumed" by households. Construct a circular-flow diagram like the one found in this chapter to represent the sector of the economy devoted to university education: universities represent firms, and households both consume education and provide faculty and students to universities. What are the relevant markets in this model? What is being bought and sold in each direction? What would happen in the model if the government decided to subsidize 50% of all university students' tuition?

7. Your dormitory roommate plays loud music most of the time, while you would prefer more peace and quiet. You suggest that she buy some earphones. She responds that although she would be happy to use earphones, she has many other things that she would prefer to spend her money on right now. You discuss this situation with a friend who is an economics major. The following exchange takes place:

She: How much would it cost to buy earphones?
You: $15.
She: How much do you value having some peace and quiet for the rest of the semester?
You: $30.

She: It is efficient for you to buy the earphones and give them to your roommate. You gain more than you lose; the benefit exceeds the cost. You should do that.

You: It just isn't fair that I have to pay for the earphones when I'm not the one making the noise.

a. Which parts of this conversation contain positive statements and which parts contain normative statements?

b. Compose an argument supporting your viewpoint that your roommate should be the one to change her behaviour. Similarly, compose an argument from the viewpoint of your roommate that you should be the one to buy the earphones. If your dormitory has a policy which gives residents unlimited rights to play music, whose argument is likely to win? If your dormitory has a rule in which a person must stop playing music whenever a roommate complains, whose argument is likely to win?

8. A representative of the Canadian clothing industry recently made the following statement: "Workers in Asia often work in sweatshop conditions earning only pennies an hour. Canadian workers are more productive and as a result earn higher wages. In order to preserve the dignity of the Canadian workplace, the government ought to enact legislation banning imports of low-wage Asian clothing."

a. Which parts of this quote are positive statements? Which parts are normative statements?

b. Is the policy that is being advocated consistent with the preceding statements about the wages and productivities of Canadian and Asian workers?

c. Would such a policy make some Canadians better off without making any other Canadians worse off? That is, would this policy be efficient from the viewpoint of all Canadians?

d. Would low-wage Asian workers benefit or be hurt by such a policy?

9. Are the following statements true or false? Explain your answer.

a. "When people must pay higher taxes on their wage earnings, it discourages their incentive to work" is a positive statement.

b. "We should lower taxes to encourage more work" is a positive statement.

c. Economics can never be used to completely decide upon what society ought to do.

d. "The system of public education in this country generates greater benefits to society than the cost of running the system" is a normative statement.

e. All disagreements among economists are generated by the media.

10. Evaluate the following statement: "It is easier to build an economic model that accurately reflects events that have already occurred than to build an economic model to forecast future events." Do you think that this is true or not? Why? What does this imply about the difficulties of building good economic models?

11. Economists who work for the government are often called upon to make policy recommendations. Why do you think it is important for the public to be able to differentiate normative statements from positive statements in these recommendations?

12. The mayor of Ottawa is worried about a potential epidemic of deadly influenza this winter. She asks her economic adviser the following series of questions. Categorize these questions according to whether they require the economic advisor to make a positive assessment or a normative assessment.

a. How much vaccine will be in stock in the city by the end of November?

b. If we offer to pay 10% more per dose to the pharmaceutical companies providing the vaccines, will they provide additional doses?

c. If there is a shortage of vaccine in the city, who should we vaccinate first—the elderly or the very young? (Assume that a person from one group has an equal likelihood of dying from influenza as a person from the other group.)

d. If the city charges $25 per shot, how many people will pay?

e. If the city charges $25 per shot, it will make a profit of $10 per shot, money that can go to pay for inoculating poor people. Should the city engage in such a scheme?

13. Assess the following statement: "If economists just had enough data, they could solve all policy questions in a way that maximizes the social good. There would be no need for divisive political debates, such as whether the government should provide free daycare."

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