ECONOMISTS BUILD AND TEST THEORIES

An important component of the economic way of thinking is theorizing or building theories or models to explain and predict real-world events. This section discusses the nature and uses of theory.

What is a Theory?

Almost everyone, including you, builds and tests theories or models on a regular basis. (In this text, the words theory and model are used interchangeably.) Perhaps you thought only scientists and other people who have high-level mathematics at their fingertips built and tested theories. However, theory building and testing is not the domain of only the highly educated and mathematically proficient. Almost everyone builds and tests theories.

People build theories any time they do not know the answer to a question. Someone asks, "Why is the crime rate higher in the United States than in Belgium?" Or, "Why did Aaron's girlfriend break up with him?" Or, "Why does Professor Avalos give easier final exams than Professor Shaw even though they teach the same subject?" If you don't know the answer to a question, you are likely to build a theory so you can provide an answer.

What exactly is a theory? To an economist, a theory is an abstract representation of the world. In this context, abstract means to omit certain variables or factors when trying to explain or understand something. For example, suppose you were to draw a map for a friend, showing them how to get from his house to your house. You would draw a map that showed every single thing your friend would see on the trip from his house to yours, or would you simply draw the main roads and one or two landmarks? If you do the latter, you would be abstracting from reality; you would be omitting certain things.

You would abstract for two reasons. First, to get your friend from his house to yours, you don't need to include everything on your map. Simply noting main roads may be enough. Second, if you did note everything on your map, your friend might get confused. Giving too much detail could be as bad as giving too little.

When economists build a theory or model, they do the same thing you do when you draw a map. They abstract from reality; they leave out certain things. They focus on the major factors or variables that they believe will explain the phenomenon they are trying to understand.

Suppose a criminologist's objective is to explain why some people turn to crime. Before actually building the theory, he considers a number of variables that may explain why some people become criminals. These variables include (1) the ease of getting a gun, (2) parental childrearing practices, (3) the neighborhood a person grew up in, (4) whether a person was abused as a child, (5) family education, (6) the type of friends a person has, (7) a person's IQ, (8) climate, and (9) a person's diet.

The criminologist may think that some of these variables greatly affect the chance that a person will become a criminal, some affect it only slightly, and others do not affect it at all. For example, a person's diet may have only a 0.0001 percent effect on the person becoming a criminal. But whether or not a person was abused as a child may have a 30 percent effect.

A theory emphasizes only those variables that the theorist believes are the main or critical variables that explain an activity or event. Thus, if the criminologist in our example thinks that parental childrearing practices and family education are likely to explain much more about criminal behavior than the other variables, then his (abstract) theory will focus on these two variables and will ignore the other variables.

All theories are abstractions from reality. But it doesn't follow that (abstract) theories cannot explain reality. The objective in theory building is to ignore those variables that are essentially irrelevant to the case at hand, so that it becomes easier to isolate the important variables that the untrained observer would probably miss.

In the course of reading this text, you will come across numerous theories. Some of these theories are explained in words, and others are graphically represented. For example, Chapter 3 presents the theory of supply and demand. First, the parts of the theory are explained. Then the theory is represented graphically in terms of a supply curve and a demand curve.
Building and Testing a Theory

The same basic procedure for building and testing a theory is used in all scientific work, whether the discipline is biology, chemistry, or economics. Exhibit 3 summarizes the approach outlined next.

1. **Decide what it is you want to explain or predict.** For example, you may want to explain or predict interest rates, the exchange rate between the U.S. dollar and the Japanese yen, or another concept.

2. **Identify the variables that you believe are important to what you want to explain or predict.** Variables are magnitudes that can change. For example, price is a variable. One day the price of a good may be $10, and a week later it may be $12. An economist who wants to explain or predict the buying behavior of consumers may build his "theory of buying behavior" on the variable price.

3. **State the assumptions of the theory.** An assumption is a critical or key element of a theory. It is a statement that one supposes to be true. The difference between an assumption and a fact is that a fact represents objective truth. It is a fact that you are reading this book at this moment; no one doubts this. With an assumption, objective truth does not necessarily exist; there is room for doubt. An economist may make the assumption that the owners of business firms have only one motive—to earn as much profit as possible. But, of course, this may not be the truth. The owners of business firms may not be motivated only by profits, or they may not be motivated by profits at all. The next section discusses the importance of realistic assumptions in building and testing a theory.

4. **State the hypothesis.** A hypothesis is a conditional statement specifying how two variables are related. Typically, hypotheses follow the "if-then" form. For example, if you smoke cigarettes, then you will increase your probability of getting lung cancer. In effect, the hypothesis is a prediction of what will happen to one thing (e.g., to your lungs) when something else changes (you smoke cigarettes).

5. **Test the theory by comparing its predictions against real-world events.** Suppose an economist's theory predicts that as taxes are raised, there will be less saving in the economy. To test this theory, we look at the data on saving to see if the evidence supports the theory that produced that specific prediction.

6. **If the evidence supports the theory, then no further action is necessary, although it is a good idea to continue to examine the theory closely.** Suppose a theory predicts that orange prices will rise within two weeks of a cold snap in Florida. If this actually happens, then the evidence supports the theory. Notice that we say "supports the theory" rather than "proves the theory." To explain why, consider a theory that predicts that all swans are white. Researchers go out into the field and record the color of all the swans they see. Every swan they see is white. The evidence does not prove the theory is correct because there may be swans that are not white that the researchers did not see. How can the researchers be certain they saw all the swans? Thus, it is more accurate to say that the evidence supports the theory than to say it proves the theory.

7. **If the evidence rejects the theory, then either formulate a new theory or amend the old theory in terms of its variables, assumptions, and hypothesis.** For example, suppose a theory predicts that interest rates will rise within two months of an increase in the amount of money in circulation. If this does not happen, then it is time to either formulate a new theory or amend the old theory.
How Do We Judge Theories?

We judge theories by how well they predict. Some people forget this and try to judge a theory by its assumptions. They say that some economic theories are based on unrealistic assumptions. For example, economists assume that business firms try to maximize profits. Do all business firms try to do this every second of every day? Probably not; yet they might do it often enough to make it seem as if they do it all the time.

Economist Milton Friedman argues that the relevant question to ask about the assumptions of a theory is not whether they are descriptively "realistic," for they never are, but whether they are "sufficiently good approximations for the purpose in hand." And this question can be answered only by seeing whether the theory works, which means whether it yields sufficiently accurate predictions.

To illustrate, Friedman cites Newton's law of falling bodies, which assumes, unrealistically, that bodies fall in a vacuum. Does the theory predict well, even though it is based on an unrealistic assumption? For many falling bodies, such as a rubber ball dropped off a roof, it does. Friedman would argue that the theory is useful because it predicts well for numerous falling bodies, even though in the real world, bodies do not always fall in a vacuum. We could say that for many falling bodies it is as if they were falling in a vacuum. Friedman would say that the assumption of a vacuum is a "sufficiently good approximation for the purpose in hand."

Friedman's position can be summarized as follows: If the theory works, if the evidence supports the theory, then it is a good and useful theory and the assumptions of the theory, no matter what anyone might think of them, are a sufficiently good approximation for the purpose in hand. Some economists accept Friedman's position, along with all its implications. Other economists, many of them well respected, do not. As you will soon find out, there are not only numerous theories in economics but also numerous debates.

What to Ask a Theorist

Physicists, chemists, and economists aren't the only persons who build and test theories. Historians, sociologists, anthropologists, and many others build and test theories. In fact, as suggested earlier in this section, almost everyone builds theories (although not everyone tests theories).

Any time you listen to someone expound upon his or her theory, you should always ask a key question: If your theory is correct, what do you predict we will see in the world?

To illustrate, let's consider a very simple example. Suppose your history professor comes to class each day clean-shaven and dressed in slacks, shirt, tie, and sports jacket. Then one day, he comes to class unshaven and dressed in jeans and a somewhat wrinkled T-shirt. The difference in appearance is obvious. You turn to your friend who sits next to you in class and ask, "What do you think explains the difference in appearance and dress?"

Notice what you have asked: a question that does not have an obvious answer. Such questions are ripe for theory building. Your friend proposes an explanation. He says, "I think the professor forgot to set his alarm clock last night. He got up late this morning and didn't have time to shave or to dress the way he usually does. He just threw on the first clothes he found and rushed to class."

Your friend has advanced a theory of sorts. He has implicitly assumed that the professor wants to shave and dress in slacks, shirt, tie, and sports jacket but that some unusual event prevented him from doing so today.

Somehow, you don't think your friend's theory is correct. Instead, you think your history professor has decided to make a life change of some sort. He has decided to look more casual, to take life a little easier, to be less formal. You tell your friend what you think explains your professor's new behavior.
You, like your friend, have advanced a theory of sorts. Whose theory, if either, is correct? Now is the time for you to ask your friend, and your friend to ask you. *If your theory is correct, what do you predict we will see in the world?*

Your friend’s answer should be, “If my theory is correct, then the next time the professor comes to class, he will be clean-shaven and dressed in his old way—slacks, shirt, tie, and sports jacket.”

Your answer should be, “If my theory is correct, then the next time the professor comes to class, he will be unshaven and dressed as he is today—in jeans, T-shirt, and so on.”

The question—*If your theory is correct, what do you predict we will see in the world?*—gives us a way to figure out who might be closer to the truth when people disagree. It minimizes talk and maximizes the chances of establishing who is correct and who is incorrect.

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**Exhibit 3**

**Building and Testing a Theory**