

## CHAPTER 1

# INTRODUCTION

Let me tell you a story about Arthur Wellesley, the first Duke of Wellington. Everyone knows he led the British Army in their combined attack against Napoleon in the battle of Waterloo. However, did you know Wellesley had no formal military training? In fact, he didn't even want to be a soldier, he wanted to be a politician. Wellesley was the second son of a moderately wealthy family. Most of the family resources were devoted to his older brother who was groomed from birth to be Prime Minister, and so the family problem was: what to do with Arthur? The solution was found in 1787 when the family purchased an ensign commission for him in the army. Today one joins the military voluntarily and receives a wage. The Wellesley family actually *paid* to have their son become a junior officer. However, Arthur never showed up for work. Not discouraged, the family bought him better and better commissions, so that by 1794 he'd moved up seven ranks to the position of colonel in charge of his own regiment. To that point he'd seen no military action and had received no military training. Unfortunately for Arthur, as colonel he had no choice but to assume responsibility and report for duty. His first attempts at leadership were against Napoleon in the low countries where he was quickly and soundly thrashed, but managed to find his way home. Later he was assigned to the Spanish peninsula to again fight Napoleon. This time his ability to form alliances and an innate sense of logistics eventually allowed him to oust the French Emperor. Of course, the story ends happily with the ultimate victory at Waterloo, the peerage, the prime-ministership, and all the fame and wealth that went with it.

What's so striking about this story is that someone would pay to be a soldier. What's even more striking is that virtually all of the officers in the British Army (and the other armies of Europe) purchased their commissions. Any Tom, Dick, or Arthur who wanted to lead an army only needed a few thousand pounds, and away they could go. What a strange institution. Strange as well, was that in the navies of Europe, one *never* purchased an officer's commission. There, a complicated set of patronage appointments were made, so that someone like Horatio Nelson could rise to the rank of admiral so quickly he never learned to sail very well. *Why do you think commissions were sold in the army but not in the navy?*

Sticking with the nautical theme, let me tell you another story. Admiral Sir Clodisley Shovell was leading five ships home from victory over the French near Gibraltar in 1707, when he encountered severe fog. Consulting his officers, he determined they were safely in open sea. However, on board was an ordinary seaman who had been keeping a record of the ship's position. Out of concern for his own safety, the seaman approached the Admiral to warn him of the shore close by. Admiral Shovell had the man hanged on the spot! Several hours later, four of the five ships ran into the Scilly Isles off the tip of England and 2000 troops (including the Admiral) were lost. *A tragic story, but why do you think they hung the poor sailor who was trying to save the ship?*

The problem for Admiral Shovell, and for any other sailor prior to the nineteenth century, was he couldn't tell where he was. Ever since the ancient Greeks, men at sea were able to tell what their latitude was by the position of the sun. But even by the time of Admiral Shovell they still had no way of knowing their longitude. The problem of longitude was perhaps the greatest scientific puzzle of the eighteenth century. Many of the greatest minds worried about it and tried to solve it. In fact, in 1714 the British Parliament set a prize of £20,000, a King's ransom, for anyone who could find a reliable method to determine the position of a ship at sea. The solution fell to a humble clock maker

John Harrison, who devoted his life to building four separate frictionless clocks, the last of which eventually became known as the Chronometer. The chronometer is a very precise clock, and works to determine longitude because once one knows the exact time at home and the exact time at sea, it is easy to figure out how far away home is. John Harrison's solution was so unusual, so bold, so ... unscientific that it took him over forty years to claim his prize. But there is no denying the fact he wouldn't have even tried to invent anything without the prize incentive. *Why did the king offer a prize? Why didn't he set up a university and pay people to invent a Chronometer?*

Now here are two personal questions: *Do you find any of these questions interesting? Do you think of any of them as economic?* If you think these questions are interesting, then you're probably going to find this book interesting. If you think these questions are obviously economic, then you're probably too smart for this book and you should be reading something more advanced. If you like these types of questions, but can't understand how they relate to "Economics" then you're the person this book is aimed at.

### 1.1 What is Economics?

Everyone seems to have an incorrect notion of what an economist is. To test this hypothesis go ask a grocer, a barber, or your mother what an economist does. They'll probably tell you "they figure out what the interest rate should be"; or "they study the business community." If you talk to my wife she'll tell you they're people who talk about money but never have any. The problem is, most of our understanding about economics comes from either the business page of the newspaper or from watching "economists" talk about the stock market on TV programs. From these sources we conclude i) economists have an answer for everything; ii) they only worry about financial markets, GNP, interest rates, inflation, and government debt; iii) economics involves a lot of facts that are hard to remember ... but probably easy to look up; and iv) economics is pretty darn boring!

What is economics? It's not any of those things just mentioned. What is economics? Here it is:

*Economics is a particular way of thinking about behavior.*

Notice I didn't say it was a way of thinking about "market" behavior, or "rational" behavior — economics is about any type of behavior, and it applies to *every* aspect of our life. Economics addresses issues like: why did the divorce rate increase so much in the 1970s and 80s? Why do firms use coupons, rather than just lower their prices and save printing costs? Why do we think only children (those without siblings) are more "spoiled" than children with lots of siblings? Why can't parents sell their children? Why can't anyone sell their kidney or their driver's license? Why does Canada import oil and produce oil at the same time? Why are auto parts the largest export from Canada to the U.S. and yet also the largest import? Why would some firms be non-profit and how do they stay in business? Why were some people allowed to duel with pistols while others would be charged with murder for the same activity? Why were the American and Canadian frontiers settled with homesteads rather than land sales? Some of these questions may appear more economic than others, but that's just because you're biased to thinking economics is only about the business section of the newspaper when, in fact, it covers the entire thing.

## 1.2 The Economic Way of Thinking

If economics is a way of thinking about behavior, what is the nature of the economic way of thinking? A key feature of economic thinking is its formality; that is, economic thinking is constrained by a number of *explicit* assumptions that have come to be known as *economic principles*. These economic principles force us to see and interpret the world a certain way. Just like the case of the wife, who was married to a man who thought he was dead. The wife took the man to doctor after doctor, but no one could convince the man he was alive. Finally, one doctor asked the man: “does a dead man bleed?” “No” was the reply. Upon hearing this the doctor took his scalpel and cut the man’s finger, which of course, started to bleed a great deal. “What do you know,” cried the man “dead men do bleed!”

The dead man had a theory about himself: he thought he was dead. This theory influenced how he interpreted the events around him. Likewise, in economics, our model based on economic principles influences how we see the world. Many people think this, in and of itself, makes economics special, but in fact, it really just makes it a religion ... like all of the other sciences. That might sound like a ridiculous thing to say, so let me defend it a bit.<sup>1</sup>

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<sup>1</sup> In an email exchange on the SFU campus, a member of the faculty from the physics department stated the following:

In every introductory level course I teach in physics or astronomy I inform my students, among other things, that I am an atheist. I feel that definition of my frame of reference is necessary because knowledge of that frame may usefully inform a student’s understanding of some things I will have to say while teaching, since I have the idea of Natural Law in the sciences which makes me intolerant, for example, of claims for miraculous events. I tell my astronomy students that when I ask, for instance, for the age of the Earth, I will expect a number nearer to 4.5 billion years than to six thousand. I emphasize that they need not *believe* what they write on my examinations, but I really do expect the doctrinally correct answer to be given. They must be able to explain the bases in radioactive clocks for these claims in a coherent manner even though they do in reality buy the rantings of some “Creation Scientists” who can explain them away. Moreover I tell them that I will not waste class time (but that I am willing to waste some limited out of class time) debating relative merits of our two world views. I do all of these things without the qualification of having taken even a single course in comparative religion and without ever having been an adherent to a religion, let alone a theologian qualified to discuss the nuances of transubstantiation or the unity of the Trinity.

That’s about as religious as a scientist can get. The passion and honesty varies from one academic to another, but we all believe that our particular paradigm is true ... otherwise, why would we devote our lives to it?

This book is about the set of assumptions called economic principles. Many of these assumptions are not observable or testable in any meaningful way, and ultimately economists accept them by faith (some economists don't really believe them, and you have to wonder why they ever became economists!). These principles, when put together, form a basic *economic model*, which in turn is what economists use to analyze everything from why vegetables are cheap in the summer, to why mules were used in southern U.S. agriculture but not in the north. Economists believe this model, ... they have faith in it. This is what's meant by "economics is a religion." If this were a book on sociology, biology, or any other subject, it would simply be about a different set of beliefs. Again, this isn't the least bit unusual, because ...

*Everyone uses "models" to function in life.*

It is important to realize everyone operates with some type of "model" in mind. It's like the three scientists (a physicist, biologist, and mathematician) who were watching a building when two people went in and three came out. "We must have made a measurement error" said the physicist. "No" replied the biologist, "there must have been some reproduction." "Well I don't know what's going on," said the mathematician, "but if one more person enters the building it will be empty." Everyone interprets the world around them through a set of beliefs, and these beliefs we call a "model."

It would be impossible to interact with other humans or nature without some model to guide us. We all have a pretty decent model of local moving bodies. So much so I venture we all can imagine what happens if you jump in front of a bus moving 50 miles per hour! When it comes to explaining the way people behave, there is no shortage of models either. The sociologist, psychologist, and other social scientists all have different models. Feminists, marxists, and other "ists" have different models. And, of course, Joe Blow down at the local diner probably has a pretty explicit model of behavior as well. If everyone thinks with various types of models in mind, then the question comes up: what model should we think with? Hopefully, after reading this book you'll agree the economic model, or way of thinking, is particularly useful.

The point of having a good model is it makes us better thinkers. Consider the following riddle: *A cow starts walking along a mountain path at 9AM one morning, and eventually makes its way to the top of the mountain by 6PM the same day. The exhausted cow lays down for the night, but starts out early the next morning at 8:30AM and is down at the bottom by 2:00PM. Is there a spot on the path where the cow was at the same time each day?*

Hmmmm. That seems difficult to think about, and your first reaction is probably only by *chance* would such an unlikely event occur. But let's use a simple model to figure this out. Consider the graph below in Figure 1-1.

On the vertical axis is plotted the elevation of the mountain; on the horizontal axis is the time of day. The upward sloping line represents the trip on the first day, while the downward sloping line shows the trip on the second day. Clearly there is one spot where the two lines cross. This represents the same elevation and time for each day. Riddle solved!

However, the power of the model becomes clear when we extend it a little bit. What would happen if the cow didn't continuously go up the hill? Suppose the cow went up, then down, and

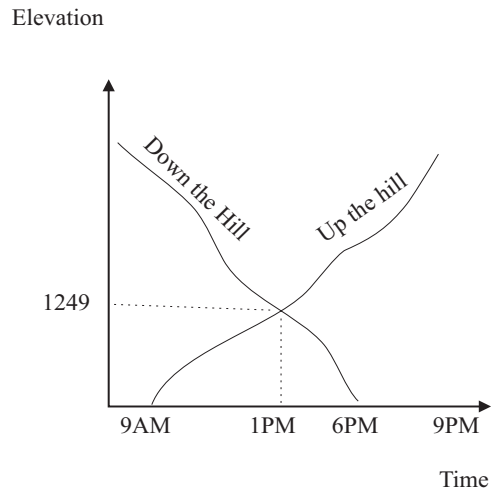


Figure 1-1  
A Model of A Cow Going Up a Mountain

then back up again? Would there still be a spot the cow was at the same time each day? Would there be more than one spot?

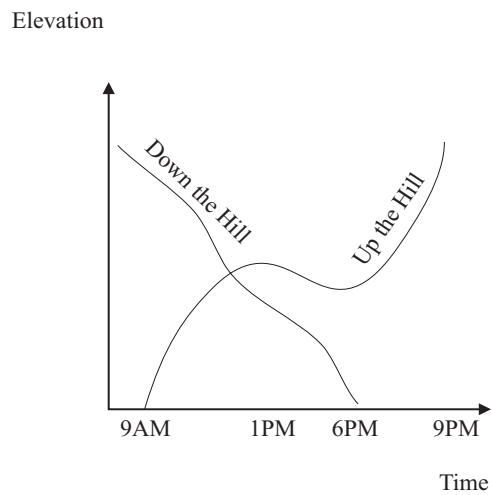


Figure 1-2  
A Model of A Cow Going Up and Down and Up a Mountain

Figure 1-2 shows this simple change might make no difference to the answer. In Figure 1-2 there is still just one time of day when the cow is at the same elevation. However, if you can visualize it, it is also clear the upward sloping line *could* cross three times at most, meaning there could be three locations that satisfy the riddle. The point is, a simple little graph makes a seemingly intractable problem suddenly very easy to come to terms with.

The “cow on the mountain model” has a number of characteristics which make it attractive. The model is formal, testable, simple, and is consistent with the general facts of the world (that is, we didn’t have the cow fly to the top!). In economics we’d like our model to be characterized by these features as well. These features are what make economics a ... science. Laying out our assumptions so they can be examined, creating models that can actually be tested and refuted, and coming up with theories which we believe are true, is all part of the scientific process. So sure, economics is a religion because we accept a lot of concepts on faith, but it is also scientific because we test our models and rely on logic to sift through the competing theories of explanation. Let’s think a little more about these scientific characteristics.

### 1. Formality can be helpful.

A formal model is explicit about the assumptions it makes ... the model “lays all of its cards” on the table, so to speak. This doesn’t mean the model is automatically great, or true, or useful. It just means we want to be honest about what we’re assuming. By being honest with our assumptions, we’ll have a better idea of where our model needs fixing when it fails to explain some behavior. There is a famous, in fact it is the most famous, joke about economists. The joke starts with three men stranded on an island with a can of beans and no can opener. The first man, a steel worker, proposes they open the can of beans with a rock. The second man, a physicist, suggests they magnify the sun’s rays with his eye glasses until the can explodes. The third man, an economist, starts off his proposal by saying: “first, let’s assume we have a can opener.” Economists are constantly criticized for the assumptions they make, especially assumptions that seem unrealistic.<sup>2</sup> Everyone makes assumptions in life, just like the steel worker and the physicist, but like the economist on the island, we’re going to be explicit about our assumptions.

### 2. Our model should be testable.

Aristotle had a beautiful model to explain the movement of planets: the earth was the center of the universe and all the heavenly bodies moved around the earth in perfect circles. It is a beautiful model, just as you can see in Figure 1-3.

There was just one little problem with this beautiful model, ... it was wrong! By wrong I mean it made predictions that didn’t come to pass. Based on the model astronomers would predict the sun should be a point A in the sky, when it ended up at point B. What to do?

Having a model fail happens all the time because models are just simple representations of the world around us. Think about it. If a model was as complex as the world it was describing, it wouldn’t be much use. Aristotle’s model is extremely simple and was adequate for some purposes, but unfortunately it was false and of no use for navigation. But being false isn’t such a bad thing. In fact, it is a good thing if you’re interested in learning about something: a false model tells you what doesn’t work. Knowing what doesn’t work isn’t the same as knowing the truth, but it’s better than

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<sup>2</sup> There is a long tradition in economics of defending unrealistic assumptions in economics. For example, it is true that unrealistic or even false assumptions can still lead to true conclusions. However, in this book I want to convince you most assumptions we’ll make are true.

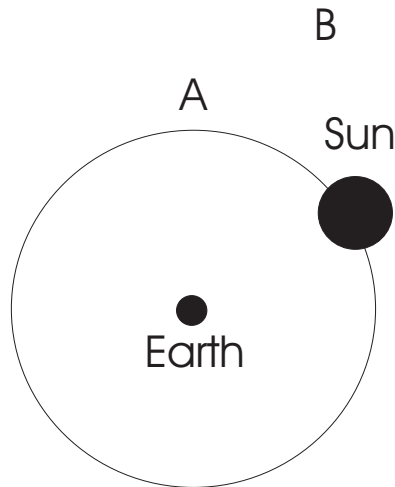


Figure 1-3  
Aristotle's Model of Heavenly Bodies

nothing. When a model is capable of being shown wrong, we say it is *testable*. Aristotle's model of the planets, though simple, was also testable.<sup>3</sup>

Having a testable model is one of our goals. Having a model fail, however, is a real bummer. Especially when you've spent half a lifetime investing in learning about the model. When models fail, the "scientist", "economist", or "Joe Blow down at the diner", is faced with a choice. They can either take the high road and reject the model, or they can take the low road and "insulate" their model from testing. Early astronomers insulated Aristotle's model by saying bodies like the sun moved in smaller epi-circles along the larger circular path. When this didn't work out, they simply added more epi-circles. You can see the result in Figure 1-4:

No doubt this was known as the snowman theory of planetary motion. Though insulating a model from testing might comfort the model user, it ultimately is a useless exercise, and one that doesn't fool anyone in the long run. Perhaps you've heard the story of the college president who wants to improve the reputation of his school. He's told the best way to do this is to create a few elite departments. One advisor suggests it would be good to work on the mathematics department because it won't be too expensive, all they need is a pencil, some paper and a wastebasket. A second advisor suggests it would be even better to work on the economics department, since they don't even need wastebaskets!

A good model is one that potentially could end up in the wastebasket. It is ultimately of no

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<sup>3</sup> We don't want to get too involved in high fooltin' philosophy, but you probably know we can never tell if a model is True. To know if a model is actually true would require an infinite amount of knowledge which we will never have. A model can work and work and work, and though our confidence in it builds, the failure may just be around the corner. This is what is known as the "problem of induction".

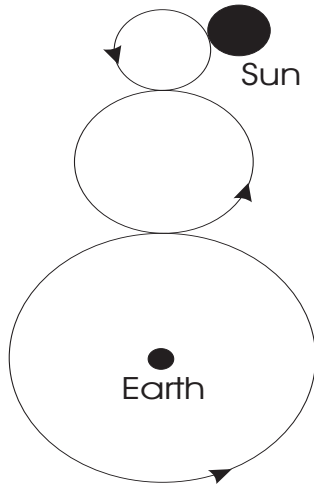


Figure 1-4  
Aristotle's Untestable Model of Heavenly Bodies

use to say “it will either rain tomorrow or it won’t”. We want to shut this back door and have models make predictions that potentially could be wrong. These types of models are useful.

*A testable model is a useful model.*

### 3. Simple Models are Better Than Complicated Models.

Other things being equal, we want a model to be simple and easy to use. The nice feature of the “cow on the mountain” model is it is so easy to think about and modify. The ugly feature of the “epi-circle” theory of planetary motion is it is so difficult to calculate where a planet should be. If we have two theories predict the same thing, but one is much more complicated than the other, then we want to pick the simpler one. Remember, a model is made for a purpose; we’re ultimately trying to think systematically about social behavior. It’s hard enough to do, so if we can do it with a simple model, then that’s the road we want to take. Besides, if it isn’t simple, how can we impress our boss at the annual Christmas party?

### 4. People are Fundamentally the Same

In 1776 modern economics got its start with the publication of Adam Smith’s *The Wealth of Nations*. In it he stated:

The difference of natural talents in different men is, in reality, much less than we are aware of; and the very different genius which appears to distinguish men of different professions, when grown up to maturity, is not upon many



occasions so much the cause as the effect of the division of labour. The difference between the most dissimilar characters, between a philosopher and a common street porter, for example, seems to arise not so much from nature as from habit, custom, and education. When they came into the world, and for the first six or eight years of their existence, they were perhaps very much alike, and neither their parents nor playfellows could perceive any remarkable difference. About that age, or soon after, they come to be employed in very different occupations. The difference of talents comes then to be taken notice of, and widens by degrees, till at last the vanity of the philosopher is willing to acknowledge scarce any resemblance.

[Book 1 Chapter 2]

Since that time economic models have been characterized by a particular view of mankind: *human beings are fundamentally the same across time and space*. This doesn't mean everyone is exactly the same. Rather it means our motives and natures are the same. More specifically, we're characterized by the economic principles we will be elaborating throughout this book. Hence, when an economist comes across a fact like the British use cloth napkins at dinner time, while most North Americans use paper napkins, he does not say "well, the British are just different than the North Americans. They're 'uppity', they like cloth, and they aren't smart enough to know the advantages of paper." Rather, the economist naturally thinks that since people in Britain and North America are fundamentally the same, it must be something in their local circumstances that manifests in the different choices over mouth wiping material.

John Stuart Mill, another early economist put it this way:

Of all vulgar modes of escaping from the consideration of the effect of social and moral influences on the human mind, the most vulgar is that of attributing the diversities of conduct and character to inherent natural differences.

[Book 2, Chapter 9]

Economists don't think the Swiss are genetically great watch makers, the German's born great engineers, or the Japanese naturally industrious. Rather, the economist views all people as having similar natures that obey certain economic principles. When people are placed in different situations with different opportunities, then they behave differently.

This basic assumption often puts economists at odds with certain groups of people, and in bed with others. In recent times feminists and aboriginals often have a hard time with economic principles because of the reluctance of economists to assume men and women or natives and non-natives are fundamentally different in terms of their preferences and what motivates them. On the other hand, in the 19<sup>th</sup> century Evangelical Christians formed a coalition with economists (like J.S. Mill) because they also believed all individuals are similar in nature. This latter partnership, in fact, gave economics the name of the *dismal science*.<sup>4</sup>

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<sup>4</sup> The history of the phrase dismal science, along with the connection with the anti-slavery movement is found in David M. Levy, *How the Dismal Science Got Its Name: Classical Economics*

The story is quite interesting. Most people think the phrase “dismal science” comes from the common perception of Malthus. Thomas Malthus was a 19th century economist who believed population growth would outstrip the production of food, and as a result famine would eventually reign — dismal indeed. As it turns out, the phrase dismal science comes from a description of economics by Thomas Carlyle, a 19th century essayist. Carlyle was upset with economists like John Stuart Mill who, though not a Christian, had aligned himself with them in the anti-slavery movement. Carlyle, felt blacks were equivalent to cattle and therefore felt slavery was justified. Carlyle made the “dismal science” statement in an 1849 essay called “An Occasional Discourse on the Negro Question.” In it he states:

Truly, my philanthropic friends, Exeter Hall Philanthropy is wonderful; and the Social Science — not a “gay science,” but a rueful — which finds the secret of this universe in “supply-and-demand,” and reduces the duty of human governors to that of letting men alone, is also wonderful. Not a “gay science,” I should say, like some we have heard of; no, a dreary, desolate, and indeed quite abject and distressing one; what we might call, by way of eminence, *the dismal science*. These two, Exeter Hall Philanthropy and the Dismal Science, led by any sacred cause of Black Emancipation, or the like, to fall in love and make a wedding of it, — will give birth to progenies and prodigies; dark extensive moon-calves, unnameable abortions, wide-coiled monstrosities, such as the world has not seen hitherto! [emphasis added]

Exeter Hall was the center of the Christian anti-slave movement. Carlyle was complaining that economists, with their notions of similarity of men, were in tow with the Christians who opposed slavery. And he was right, they were a coalition. The economists, as we will see, viewed all people as greedy. The Christians viewed all people as sinners. Either way, they both treated all people as fundamentally the same.

Today, issues of explicit slavery are no longer an issue. But the issue of treating all people the same still is. When faced with observations of different behavior — either across time, across space, or across cultures — we do not want our arguments based on assumptions that people are different in fundamental ways. We’re all human, and as humans we are all characterized by certain traits.

### 1.3 Economic Principles

So what is the *economic* model? What are these assumptions I’ve been alluding to? At this point all I’ll do is list some of them — I’m not even going to spell them out. As you read through the book, refer back to Table 1-1 and see if it starts to make more sense.

ASSUMPTIONS	CONSTRAINTS		
Maximization	Prices		
Substitution	Income		
Demand	Customs	⇒	Predictions
Cost	Laws		
Etc.	Etc.		

Table 1-1  
The Economic Model

In the left hand column we have our assumptions, which from now on we're going to call *economic principles*. These are a collection of ideas that ultimately we'll accept on faith as true. Over the course of the book I'll try to convince you they are true by appealing to your own experiences, evidence others have gathered, and any other rhetorical tool I can muster, but eventually you'll have to accept or reject them on your own ... there is no absolute measure of their truthfulness. In the middle column are listed a number of "constraints". These facts of life are generally observable, and include such things as prices, incomes, laws, peer pressure, and the like. Constraints interact with our principles and together they produce a prediction which we hope explains something we're interested in.

You might be starting to think that economics is rather mechanical. Sure, you have to accept some fundamental principles on faith, but after that you just build a model and away you go. Quite often engineering and other physical science students struggle with economics, and they are puzzled because they realize that on the surface economic models are quite simple mechanically. "Surely if I can do differential equations in a dynamic setting, I can breeze through an economics course" they think. Their error, however, is to ignore the last aspect of economic thinking. Economics is part religion. Economics is part science. But economics is also part art. It takes talent and intuition to play with the ideas we call economic principles. Each idea by itself is quite simple, but they fit together in many different ways. Like a piano with 88 simple keys, an economic argument in the hands of a master makes beautiful music. Many of the questions at the back of each chapter are designed to develop economic intuition. In the words of Dr. Evil of Austin Power fame, "stroke them, pet them, but do not eat them mini-me." Think about these questions, discuss them with other students, roll them over in your mind. In doing that, you will not only learn what the economic principles are, you'll learn how to use them and how to think ... about almost anything!

#### 1.4 The Roadmap

This book is organized in three parts. Part I goes through each one of the economic principles, the basic budget constraint, production, exchange, and equilibrium. Together these concepts make up the basic *neoclassical model* of economics. This model is the basic tool used by every economist to understand the volume of trade and the terms or prices trade takes place at. It is basic, but don't be fooled, it is very powerful. Part II examines some standard complications to the basic model. It looks at choice over time, labor markets, non-competitive markets, and competition policy. Finally, Part III introduces a different type of question: how does trade get organized? This last question introduces us to the concept of transaction costs, and completes the introduction to economic principles. There is an appendix to this chapter to help you out on some of the arithmetic

of the book. Glance at it now just to see some of the issues covered. When you come to the topics later in the book, you can come back to the appendix if you need some help.

**REVIEW QUESTIONS**

1. A traditional definition of economics is “The study of the allocation of scarce resources among competing means.” How does this relate to the definition provided in this chapter?
2. What is the difference between a “model” and a “theory”?
3. Is there anything unscientific about making assumptions and assuming they are true?
4. What does it mean to say a theory is “falsifiable,” “testable,” “operational”?
5. In the chapter it was argued that people are assumed to be fundamentally the same. How can economists hold to such a notion when people are so different? That is, some are short, others tall. Some people are women, others are men. In what dimensions do we assume people are the same?
6. Why do you think Admiral Shovell had the sailor hung for keeping track of his position?
7. As you begin to learn how to think like an economist, it is important to keep in mind how different this approach is to other fields in social science. Roger Schank, a psychologist and computer scientist, stated the following regarding choices.

I do not believe that people are capable of rational thought when it comes to making decisions in their own lives. People believe they are behaving rationally and have thought things out, of course, but when major decisions are made — who to marry, where to live, what career to pursue, what college to attend, people’s minds simply cannot cope with the complexity. When they try to rationally analyze potential options, their unconscious, emotional thoughts take over and make the choice for them.

What does the economist mean by “rational”? How do you think economists deal with “unconscious, emotional thoughts”?

### Review Question Answers

1. *The definition given in this chapter is much more general, but entirely consistent with this more traditional definition. Almost all human behavior is about “allocating” something. When you decide what to purchase at a store you’re allocating your income (which is scarce) across a set of goods. When you play football, you’re allocating time (which is scarce) to that sport instead of some other activity. We’ll see in the next chapter that scarcity and competition are implications of our first economic principle: maximization.*
2. *Generally speaking, we think of a theory as “couched” within a model. We have a theory of gravity, but in order to test it we need to build a model. The model may be physical or theoretical, but the model contains a number of assumptions which must be satisfied for a proper test of the theory. For example, in a few chapters we’ll have introduced something called “the law of demand.” We can think of that as a theory. But in order to test this theory we’ll need to know what prices and income are. We’ll have to understand the context in which it is being applied. All of these extra things are part of the model. This is, in part, what makes testing theories so difficult. When a test fails, did it fail because the model wasn’t right (e.g., we assumed income was 100k, when in fact it was actually 50k) or was the theory itself flawed. In this book we will be fairly loose with the distinction between model and theory.*
3. *Not at all. In fact, every body of knowledge necessarily rests on a set of assumptions.*
4. *All of these things refer to a situation where the model could be wrong. If we have a theory that predicts it may or may not snow tomorrow, then that theory is true by definition. It is a tautology. Such a theory is not testable, operational, or falsifiable.*
5. *The economist means that everyone is the same in terms of the principles of behavior. For example, in the next chapter we will assume that everyone is greedy. The economist assumes everyone is that way, regardless of their skin color, religion, sex, location, or age. The economist does not assume that everyone faces the same constraints in life, or that people are identical in every respect.*
6. *In the age of sail, when death at sea was common, food was poor, and living conditions left something to be desired, mutiny was an ever present reality. One of the key methods of preventing mutiny, was to have only those in command aware of the tools of navigation. If the ordinary seamen could determine where they were, then they could find safe refuge. By keeping the seamen ignorant of location, the navies of the world raised the cost of mutiny.*
7. *By “rational” the economist only means people make consistent choices. This means economists believe people have preferences. They believe people can rank bundles of goods. That is, I can tell you if I like a movie and popcorn more or less than a Starbucks coffee or a Tim Hortons donut. Economists don’t have anything to say about “unconscious, emotional thoughts.” They play no role in an economic model.*

## CHAPTER 2

# MAXIMIZATION

What motivates people? What makes us do the things we do? Is it some type of emotion like love or hatred, some sense of higher calling like altruism or religious faith, or are we hard wired in some instinctive way? For an economist there is only one source of motivation: greed. Adam Smith, in the *Wealth of Nations* put it most famously in the following words:

But man has almost constant occasion for the help of his brethren, and it is in vain for him to expect it from their benevolence only. He will be more likely to prevail if he can interest their self-love in his favour, and show them that it is for their own advantage to do for him what he requires of them. Whoever offers to another a bargain of any kind, proposes to do this. Give me that which I want, and you shall have this which you want, is the meaning of every such offer; and it is in this manner that we obtain from one another the far greater part of those good offices which we stand in need of. It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages.

[Book 1, Chapter 1]

Today economists call this “self-love” maximization, but that’s almost a marketing strategy to tone things down a bit. The bottom line is that economists view all behavior as effort to improve one’s “situation” or “well being”. Economists have a word to describe this well being: *utility*. Individuals get utility from things they value, whether friends, food, or fun. When economists say that people are maximizers (greedy) they mean people try to get as much utility as possible.

### PRINCIPLE #1

**Maximization:** *All individuals are always motivated by greed.*

What a depressing way to start a theory of human behavior. In fact, if you meet anyone who rejects the economic way of thinking, 9 times out of 10 they reject it because they simply can’t accept this as a universal motivation. It’s either the greed aspect of maximization they don’t like, or its the “all” and “always” parts. It’s bad enough that economists think people are greedy, but why must it be so ubiquitous? Even a lot of economists tone things down a bit and often say that people are “self-interested” not greedy. By self-interest some economists simply mean greed, which means at best its a politically correct distinction without a difference. Others think of self-interest as including actions like altruism, which means it includes literally everything and so at worst “self-interest” is a subtle way of opening up the back door of non-testability. We’re going to be honest and upfront and call maximization for what it really is: greed. Don’t despair, though, economics is about *explaining*

behavior, not condoning actions or suggesting hedonistic lifestyles. Keep in mind that what we're after is a model that's good at helping us understand the world around us, and if that means starting with a "darker" motivation, so be it.

Let's start thinking about maximization by considering what it is not. Maximization doesn't mean that people are always smart or correct. Thomas Watson, chairman of IBM in 1943 was a great business man, worried about maximizing the profit of his fledgling computer company all the time, but he also said "I think there is a world market for maybe five computers." Bill Gates, now one of the richest men in the world, no doubt still remembers his 1981 remark that "640K ought to be enough [memory] for anybody." And H. M. Warner, part owner of Warner Brothers and no stranger to making money, once quipped in 1927 "who the hell wants to hear actors talk?" Individuals are greedy, and though that greed might drive them to learn, experiment, and think about an issue, there's no guarantee they'll be right. Smart and dumb people are greedy. Quite often, as students go on in economics and come face to face with some tough mathematical maximization problem, they come to believe that only smart people can solve such problems. It just ain't so.

Greed also doesn't mean that "more is always preferred to less". To say that people always want more of some good is to say that they are never satisfied ... they're nonsatiated. Quite often economists make this assumption just to make their technical models work better, but it isn't a necessary tool in our tool box, and certainly shouldn't be confused with maximization. You can probably think of lots of things that you don't want more of, but that doesn't mean you're not selfish.

Greed is the bedrock assumption for economists. It's what makes an argument "economic" and what makes economists so unpopular with others at a cocktail party. For an economist there is no other motivation for individual behavior. For example, a non-economic argument could be one based on *altruism*. Altruism, practically by definition, is non greedy behavior. When the general public observes Mother Teresa spending her life working with orphans and lepers they see a woman behaving altruistically, someone who unselfishly gives of herself to others. The economist is more skeptical. They see someone doing the best they can under a given set of circumstances, and someone who achieved a great deal of fame in the process (not to mention the Nobel money). Arguing over whether Mother Teresa was an altruist or not is ultimately futile since any given behavior is consistent with greed or altruism; that is, in and of themselves, both motivations are unobservable. For example, when someone walks to the middle of a high bridge and jumps off, were they maximizing? Anyone can say "yes, the gains to jumping were greater than the costs." And when someone helps another, it is easy to offer an explanation that somehow the return to helping is greater than the cost.<sup>1</sup> Still, this is the first economic principle, so if it is directly unobservable, why would economists want it?

Maximization is held so strongly by economists because it has several implications that are so strongly observed in the world around us. These include scarcity, exchange, and equilibrium. All of these concepts will be developed in this book, but they merit some introduction now.

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<sup>1</sup> In biology, the theory of evolution is based on maximization. Biologists have no problem coming up with maximizing explanations for all types of apparently "altruistic" behavior shown by one species to another.



## 2.1 Scarcity

People confuse scarcity with rarity all of the time. When something is rare, it simply means that it is in short supply — there isn't much of it around. Lots of things are rare: sunshine in November in Vancouver or Dublin is rare; the anthrax virus is rare; multiple murders by strangers with hockey sticks are very rare. To be scarce means more than to be rare. To be scarce means that more people want a good than is available, when the good is free.<sup>2</sup> When a good is scarce it might also be rare, but it doesn't have to be. If you live in Seattle, Washington, tickets to the Washington Huskies football games are scarce, but they aren't that rare (the stadium holds almost 80,000 people). If you live in Manchester, England, the same could be said about Manchester United soccer matches (Old Trafford stadium seats about 68,000 people). Likewise, just because something is rare, doesn't mean that it is scarce. The anthrax virus is rare, but since no one wants it, it is not scarce.

*Scarcity exists when the price of a good is zero and people want more than is available.*

Scarcity is a result of greed. When everyone is greedy — always striving to improve their utility — and when the world is a place of relatively fixed endowments where goods are produced by the sweat of the brow, scarcity is just a fact of life. If people were just content with what they had, or if the disaster in the garden of Eden had never happened, we wouldn't live in a world of scarcity ... there would be ample for everyone.

Scarcity has several implications that we're all familiar with. Since the world is full of scarcity, there just isn't enough of everything to go around, and what's more ... there never will be enough. This is the paradox of the western world. The west lives in a society with abundant riches. Our streets aren't paved with gold, but compared to many places on earth, Westerners are the kings and queens of consumers. And yet, are we more content than others? Hardly. Do we have "enough" yet? No. As a student, you've probably had a thought like "if I could just make \$50,000 a year, I'd be laughing." Or maybe the number is \$100,000, or perhaps even a million dollars. When I was a student, I remember \$30,000 was a wage one could aspire to. Alas, it doesn't matter what the number is you pick, when you get there you only want a bigger number. And it doesn't stop with money. The kids never behave well enough, appreciate their parents enough, the wife is never (fill in the blank) enough. It's never enough. You know it, and that's maximization at work in your life.

One of the facts of life that results from scarcity is that we are faced with making choices. Since there is never enough of things we want, both as a society and individually, the only way we can get more of one thing is to give up something else. If I want more income to buy a new car, then I have to give up some of my spare time in order to work more. If the government of British Columbia decides to spend more money on health care, then it means less money is available for education and other government services. Milton Friedman made this fact famous when he said "there's no such thing as a free lunch", and he was right; it is unavoidable.

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<sup>2</sup> We'll see later on that this means scarce goods always have a positive price.

## 2.2 Equilibrium

The most difficult implication to understand about maximization is equilibrium. By equilibrium economists mean a situation where no one wants to change their behavior. Consumers settle on a bundle of goods to buy, firms settle on prices to charge and quantities to produce, families settle on a specific number of children, etc. As we'll see in later chapters an equilibrium will always be reached when individuals and firms maximize. People finish trading and producing when all of the potential gains from doing so are exploited. To put it crudely, and to borrow a gambling metaphor, no money is left on the table when there's an equilibrium. The reason is quite simple: if people get together to increase wealth, and they don't fully exploit every opportunity to do so, then they haven't maximized.

One of the easiest examples to understand equilibrium is rush hour traffic. When someone leaves their office to head home in the evening, there are often several ways home. At the very least, if they are taking the freeway home, then there are several lanes on the freeway, all leading in the same direction. Which lane should be taken?

Well, in equilibrium, it doesn't matter which lane you take. When you enter the freeway, suppose the left lane is traveling faster. As a maximizer you'll want to get home as quickly as possible, just like everyone else, so you switch into the left lane. However, by switching you slow that lane down a little and increase the speed of the right lane. If there is still a difference in speed someone else will do the same thing and move into the left lane. Again the speed in the left lane slows a little and the right lane speeds up. The end result, the equilibrium, occurs when each lane is moving at the same speed. When all the lanes are moving at the same speed, there are no more gains from switching ("trading") lanes: all the gains from trading lanes have been exploited. As a result, when you enter the freeway, it doesn't matter which lane you take, they'll all get you home at the same time.

### *"The Margin"*

Economists often analyze equilibrium with a concept called "the margin". In the above example an economist might say: "there's no marginal benefit to changing lanes in equilibrium." What this means is that the marginal or incremental lane changer is indifferent between changing lanes and staying put.

<p><b>Indifference:</b> <i>letting someone else choose for you.</i></p>
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Someone who is indifferent between two options is neither better nor worse off with either option. There once was a lazy, but quick thinking, lad who was down on his luck. He decided to go to his rich uncle for a loan. "I don't give my money away" declared the rich uncle, "but I'll tell you what. I have a man come by and cut my grass for \$20. I'll give you \$25 for the same job." "Let the man keep the job," said the poor nephew, "but I'll take the \$5." Now that's exploiting the concept of indifference.

Once we understand the marginal person in traffic, it makes sense to talk about the “intra-marginal person.” This is the person for whom there is some gains from trading lanes. Suppose that everyone is in the right lane on the freeway heading home. The first person to switch to the left lane is certainly better off. So is the second, third, and fourth driver. Perhaps the two lanes don’t equalize in speed until the 3033rd driver moves over. The first 3032 drivers are “intra-marginal”, while the 3033rd driver was the marginal one. For the marginal driver, the gains from moving over to the other lane just equal the costs. As a result that driver is *indifferent* between driving in either lane. We will see this concept over and over again.

*Using Economics to Make Lots and Lots of Money*

Unfortunately, the concept of equilibrium that results from maximization, has one nasty little implication. There is no way a student of economics can use an economic model to “save the world” or more hedonistically “make abnormal profits.” Let’s start with the concept of making a lot of money, piles of money, ... without working too hard for it. If you go to any party over the next couple of weeks and tell someone that you’re taking an economics class, you’ll almost be guaranteed to have someone ask: “what do you think will happen to the interest rate next week?” or “is now the time to get back into technology stocks?” The question might vary a little (what’s a good mutual fund to invest in, what’s going to happen to GNP or the inflation rate), but the drift will be the same. Everyone thinks that if we could just “understand” the economy we’d all be rich.

And why shouldn’t people think this way, since everyday we’re bombarded with pitchmen telling us that they’re rich because they do understand how the world works. We turn on the TV and we see show after show with “professionals” telling us everything about the future, from politics to real estate prices. Whether it’s Tommy Vu or Wall Street Week the story is the same. In fact, let’s take two examples.

Figure 2-1 is the cover of a 69 page booklet that arrived in my mailbox . Inside you read about Ken Roberts, investor/author/publisher, who asks the question: “In the next 10 years: where are home prices headed? where are car prices headed? ... where are medical costs headed?” If we want, we “can learn how to make money no matter what is happening in the world.” Inside are testimonials from “real people” about how they’ve managed to turn \$400 into \$4000 in just a few weeks, and how investing the Ken Roberts way has given financial freedom to so many. In fact, Jan R. of Arkansas writes: “...I never thought I would be close to [my father]. You have brought us together ... Thanks a million times over.” A fortune, peace of mind, and even reconciliation, and all you have to do is pay \$195 for the manual and course! Inside, Mr. Roberts gives a hint at some of the valuable lessons you’ll learn. Page after page contains pictures of stock market price graphs with little arrows showing you where he bought and where he sold. It turns out, that in order to make money, all you have to do is buy low and sell high! Amazing, why didn’t I think of that?

When faced with the likes of Mr. Robert’s booklet, the skeptical economist asks: “why is Mr. Roberts willing to sell me such information for a mere \$195?” Could it be that Mr. Roberts actually makes his money selling books rather than pick up easy money on Wall Street? The principle of maximization, with its implication of equilibrium tells us, of course you won’t get rich with Mr. Roberts.

Its not just that there are no \$500 bills lying around Wall Street, unfortunately, there aren’t any easy grades lying around either. Figure 2-2 shows a leaflet that was distributed around campus

# The World's Most Powerful Money Manual & Course

The story is fascinating. The facts are phenomenal. Unless you have all the money you want or are scheduled for a life-saving operation, you have nothing more important to do than read this manual. It will take you about 30 minutes. And by the end of the day, you'll be showing it to your spouse, your friends, and your next-door neighbor.

**IMPORTANT:** This is not junk mail. Inside are names, dates, and facts you can put to use right now — as you're reading — to learn how to become truly independent.

Figure 2-1  
Making Money Without Trying

a few years ago, stating something similar to Ken Robert's investment strategy. For a mere \$25 a student can obtain an easy "A" (the equivalent of a first in Britain). Although I didn't purchase the Ken Robert manual, I did buy the cheating book by Michael Moore, ... just in case. As expected, it offered just enough information that the author couldn't be arrested. The first 39 pages claim that cheating is OK because: everyone does it; nobody finks; professors don't care; university is a rip off anyway; and you have to cheat in life, so you might as well practice now. The last half of the book is devoted to how to copy answers from the person beside you. It contains real gems like: sit by a friend, develop hand signals, and wear a hat. Like Mr. Roberts, there's no real secret here either.

To make "easy" money, obtain a "free" A grade, or get the girl/boyfriend of your dreams without trying is to earn an above normal rate of return, and in equilibrium, these do not exist. It would be like getting on the freeway tonight and being the only person in your city to notice that no one is the left lane.

We must be skeptical of anyone suggesting they have a sure way of making money. The thing is, if anyone is in possession of such knowledge, why aren't they using it themselves? Why does Mr. Roberts let us in on his little investment secret for a mere \$195? If his claims are true he could be infinitely wealthy by exploiting the knowledge himself. It just doesn't make any sense. When someone gives you advice about how to make money, that's probably what it is worth ... nothing. At the very least, you should check out their own asset position before you take any action.

Perhaps you're wise enough to know that forms in the mail announcing you've just won a million dollars if only you'll send \$20 to claim your prize, are bogus. But are you wise enough to know that no one at your university can give you this type of information as well ... not even your local economics professor? If any economist knew the price of corn next week, he'd have a Faustian knowledge that would lead him to infinite riches, and he sure as shootin' wouldn't tell you.

Harold Demsetz, a great economist at UCLA, learned this lesson the hard way. In telling the story of how he left the University of Chicago for UCLA he states:

The second reason for moving to UCLA was financial. I had joined a small group of business school colleagues in the purchase of long-term treasuries. We were speculating heavily, having put up only 5 percent of the price of the bonds. The rate of growth of the money supply had turned down. Being strong believers in monetary theory, we expected the economy and interest rates to turn down also. Interest rates did not fall immediately, or for a very long time after our purchase. I found myself sending margin to my broker as frequently as one feeds a pet dog. My proverbial "shirt" was lost. Reuben Kessel dryly observed that we still have a lot to learn about interest rates. Were Reuben still alive, he would be pleased to learn that my understanding of interest rates has improved considerable. Now, I lose a much smaller fraction of my wealth speculating on changes in these rates (which are sure to come).

[p. 9, 1988]<sup>3</sup>

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<sup>3</sup> Harold Demsetz, *Ownership, Control, and the Firm* (New York: Basil Blackwell, 1988).

# Cheating 101:

## The benefits and fundamentals of earning the "Easy A."



Finally a helpful book for students has been written exploring the benefits and techniques for cheating. Learn the best and safest methods of ensuring good grades with the least amount of effort. This innovative work addresses cheating as a realistic issue on campus and helps students examine the best routes for academic short-cuts in classes that are anything but educational and important. Take charge of useless time wasted studying. Read how the best win in the classroom and conquer meaningless exams and term papers.

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This is the opportunity you have been looking for! Don't let it pass you by. Grab a pen now and order the book that is taking North American campuses by storm and start enjoying University.

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Vancouver, B.C.  
V5W 4B5

Figure 2-2  
Cheating 101

Perhaps I still haven't convinced you yet. Of course people like Mr. Roberts and Mr. Moore are not to be trusted, and Mr. Demsetz, well he's just one guy. If you want to make money you have to really know what you're talking about. If you still think like that, consider the case of Long Term Capital Management. This was a company started by Wall street insider John Meriwether, and two Nobel prize winning economists: Robert Merton and Myron Scholes. LTCM managed to get people to invest 4.8 billion dollars with them. They would use this money to buy up to 160 billion dollars worth of stocks and bonds, plus derivatives (fancy word for fancy financial contracts) worth 1 trillion dollars on paper. That's trillion, not billion. LTCM was the poster child for hedge fund companies in the mid 1990s. People were dumping money at the front door of headquarters just to get a piece of the action. And what was the action? LTCM was attempting to capitalize on tiny spreads in financial markets around the world. They were, according to one executive, "picking up nickels and dimes off the sidewalks."

LTCM might work as follows. Suppose there were two United States treasury bills, one that matures in 29 years another that matures in 30 years. Suppose also that a difference in yield exists between the two bonds, perhaps 50¢. What LTCM did was bet that this difference would disappear, since the two bonds are essentially the same. They would bet by selling short on the low yielding bond and buying the high yielding one. On a 1 million dollar bet they would make \$5000 ... hardly anything to write home about. But wait, with 4.8 billion in the bank, they took out loans in the form of margins. They would buy the 1 million worth of bonds with only \$10,000 on margin. Now the \$5000 is a 50% return.

Alas, it turned out there not only aren't \$500 dollar bills on the sidewalk, there weren't any nickels and dimes either. Instead of converging, many of these spreads started to diverge. LTCM lost money, banks started to call the margins, and 4.8 billion quickly became 600 million. With almost 1 trillion in derivatives, the Federal Reserve Bank actually stepped in and bailed LTCM out. Even Nobel prize winners can lose money ... big time.

### *Using Economics to Save the World*

Perhaps you're not interested in making money. Perhaps you're more idealistic and you want to save the world ... or at least work in the urban planning department of your local city. Can economics tell you what type of social programs are best for your area? Whether or not rent controls on apartments are a good thing or a bad thing? What the optimal rule for the Bank of Canada is for the money supply? Many economists would say "Yes!!". Alas, we cannot, at least not if we're going to stick with our principle of maximization.

When the economist assumes that everyone is always greedy then, as mentioned, all gains from trade are maximized. If they weren't then the individuals didn't maximize and something is seriously wrong with our logic. Our model will always be based on the idea that individuals have done the best they can. How then, can an economist come along and say that he knows a better way? It is impossible.<sup>4</sup>

Not that a little faulty logic has ever stopped economists from continually doing this. In fact,

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<sup>4</sup> This seems to explain why business students generally hate economics. The business major rejects the notion of equilibrium. Every business major thinks they'll invent a great mouse trap, they never assume that the best trap is already invented.

the profession is littered with stories of policies gone wrong, with often tragic outcomes. There is an old joke of an engineer, a doctor, and an economist all arriving at the gates of Heaven only to find out that the one spot available is being allocated to the person with the oldest profession. “That’s me!” says the doctor. “Eve was created from Adam through a surgical procedure.” “Hold on,” said the engineer. “God created the Heavens and Earth from chaos, and that was an engineering act, so I get to go in.” “Not so fast,” said the economist. “Where do you think the chaos came from?”. Economists get the policy wrong all the time because their model is not designed to do policy implications. The economic model is designed to explain behavior, not tell people what to do. When people behave inconsistently with what an economic model says they should do, then it’s time to scrap the model, not tell people to change their behavior!

### 2.3 Why Believe in Maximization?

If maximization can’t make abnormal rates of return nor save the world, why keep the maximization assumption? On what grounds do economists hold such faith to it? The word “maximization” also makes it sound as if people are calculating machines, constantly assessing the costs and benefits of everything. Just by introspection we know that this doesn’t seem right. When I got up this morning I poured myself a bowl of Raisin Bran, just like I do most mornings. I didn’t think about it in any calculating way. I didn’t try to maximize any function or perform a complicated optimization problem.

*Economists believe in maximization because it works.*

The first reason why economists believe that individuals are motivated by greed is because it seems to generally explain so much behavior. For example, we’ve already seen that greed provides an explanation for scarcity. As we go through this book, we’ll see that the principle of maximization helps us understand trade, pricing, and institutions. When something works, it’s wise to pay attention to it.

Understanding the world around us isn’t simply a matter of philosophical interest. Economists can make a pretty decent living as consultants because understanding markets is a valuable skill. Firms want to know what the characteristics of the demand for their products are. Governments want advice on the distributional effects of economic policies. And legal firms want economic advice in anti-trust law cases that involve complicated pricing practices. Thus, if the principle of maximization is the correct way to think about the world, we want to use it even if it doesn’t save the world or produce abnormal rates of return.

*Economists believe in maximization because it is the only type of behavior that survives.*

A more subtle grounds for accepting the principle of maximization is that if people did not maximize then they wouldn’t survive. Greed has a survivability characteristic similar to the concept of natural



selection. Most biologists believe that any animal that has a characteristic that allows it to out compete other animals will tend to survive and proliferate until eventually it is the only type of animal left. Likewise, individuals compete with other individuals, both at an individual and firm level. Those individuals that behave in a maximizing way survive and proliferate. Those that do not die out. In the end all we are left with are individuals that are maximizers.<sup>5</sup> Let's start with some silly examples and work up to some more serious ones.

Consider the cartoon shown in Figure 2-4. The humor in the cartoon comes from the fact that Zog and his buddy are about to be eaten. This is non-maximizing behavior if ever there was any. Suppose that there was another pair who just happened to stand outside the trap when using it. They stood outside not because they thought about it, but just by some fluke they stood outside. That pair would end up surviving, and if they continued to stand outside the trap when using it, and why wouldn't they ... they aren't thinking about it, they would continue to survive and would show their children where to stand as well. Since only maximizing strategies survive, the only thing we observe is trappers standing outside their traps. The rest get eaten or starve to death, just like poor old Zog.

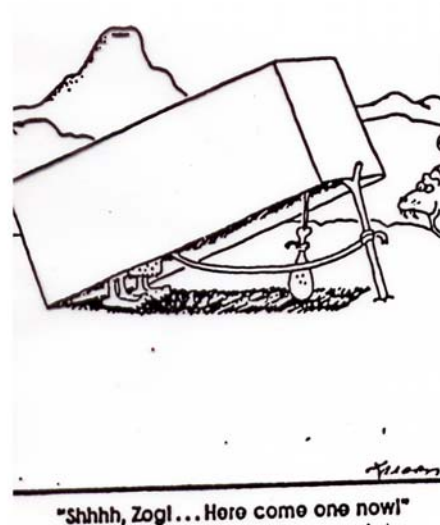


Figure 2-4  
How Not to Catch a Tiger

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<sup>5</sup> This argument was first articulated by Armen Alchian in "Uncertainty, Evolution, and Economic Theory" *Journal of Political Economy* (1950).

The point is, maximizing behavior survives whether you are aware of what you're doing or not. Lots of people are successful in life, even though they don't know why what they do is successful. Perhaps you recall seeing a movie called *Phar Lap*. It was the story of an unbeatable Australian horse, named Phar Lap appropriately enough, who was owned by a trainer with a strange view of how to train horses. This trainer thought that the best way to condition a horse was to work it to the point of death. If the horse stopped working, then he'd beat the crap out of it. As it turned out, when he owned Phar Lap he won every race, and he would brag to others about his superior methods of training. Once he sold Phar Lap, he went broke because all of his other horses died in the training program. The maximizing strategy of winning a horse race in Australia at the time was to own Phar Lap. The fact that the trainer didn't understand this didn't make him less successful. Just because you're rich and successful doesn't mean you're smart, it only means you're doing the maximizing strategy ... a fact of life poor faculty members remind themselves of every morning.

We should not reject the principle of maximization because in our hearts we don't think of ourselves as greedy, opportunistic, cold calculating machines. Nor should we reject it because no one in our lives admit to maximizing anything. We are the people who survived, and what we're doing is the maximizing strategy whether we know it or not. I can safely predict that everyone reading this book has eaten nutritious food over the past thirty days. I can predict this because only those who did so would be alive right now to read the book. Those who starved themselves, or those who started to consume gasoline instead of water, simply are not around. Likewise, when an economist looks at a firm, he is confident that the firm is maximizing its profit, whether the firm's owner is aware of it or not. Had the firm not maximized profits, it would have gone out of business ... driven out by other firms that were doing the maximizing strategy. Since maximization is the only strategy that survives, economists assume that all individuals are maximizers. It is a little like the first law of biology: If your parents didn't have any children, then you probably won't have any either.

*What is being maximized*

We've talked a great deal about the process of maximization and what it implies. But what are people maximizing? Economists use a funny word to capture the object of a consumer's maximization: utility. Every time you consume any bundle of goods, you get utility or satisfaction from that bundle. Consumers try to get as much utility as possible. When we discuss firms, the object of maximization is more observable: profit. profit is simply the difference between revenues and costs.

*Consumers maximize utility, firms maximize profits.*

## 2.4 The Panglossian Dilemma

Taking maximization seriously leads to a conclusion that many simply find unacceptable: everything must be optimal ... in its own way. When selfish individuals go about to produce and exchange in such a way that all gains from trade are maximized, then no better outcome is possible. If a better outcome was possible, then the individuals didn't maximize and we have a contradiction.

Have you ever complained about something? Perhaps you wish that there was a pizza restaurant closer to your home. "Darn!" you're always saying, "I wish there was a closer pizza restaurant

near my home.” People complain all of the time and this would suggest that the world is not optimal. Well, the question is: why don’t you invest in a restaurant? Perhaps you say “no one will lend me the money.” But why will the banks, your friends, and your parents not lend you the money? Is it because you cannot guarantee that you will pay it back and there is some cost of risk in opening up a restaurant? If so, then this cost must be factored in and now perhaps the restaurant doesn’t look like such a good investment.

To say that the world is optimal doesn’t mean that the world is perfect or that we cannot imagine a better world. It simply means that the world we live in is the best we can do under the circumstances. If you don’t agree with this, then you’re an entrepreneur, not an economist, and you should go make your fortune.

## 2.5 Summary

The principle of maximization is the first and most fundamental idea in economics. Every economic model, no matter how simple or complicated, assumes people are maximizing. So important is this idea that without it an argument simply is not economic. As we’ve seen, maximization has a number of implications. We live in a world of scarcity. If goods were freely available, we would demand more than is supplied. Furthermore, we live in an equilibrium. Markets out of equilibrium are markets where the gains from trade are not maximized. Equilibrium means that economic knowledge can only earn a normal rate of return — it cannot lead to easy fortunes or solutions to economic problems. Finally, the principle leads to the counter intuitive result that the world is optimal.

**REVIEW QUESTIONS**

1. What is the difference between assuming people are maximizers and assuming are never satiated (ie. more is preferred to less)?
2. Is there any behavior at all, which we can confirm is not the result of maximizing behavior? In other words, is maximization, by itself, testable?
3. If something is scarce, is it a good? If something is a good, is it scarce?
4. Why is “choice” the result of scarcity?
5. What is the difference between “intra-marginal” and “marginal”?
6. Why would maximization survive over other forms of motivation?
7. A physicist once said “It seems to me that given this model of economics every greedy economist should be wealthy, since he knows the switches and levers.” Why does the physicist not understand the proper role of economic theory?
8. A student sent his professor the following email:

I just finished your Economics course, and you discussed at the beginning of the semester how you can never find money just laying around, because the people before you had already found it and taken it for themselves....I just wanted to let you know that while Christmas shopping today at the mall ... I stumbled across a \$20 bill just laying in the middle of the food court floor!!! Being the maximizer I am, of course, I picked it up. Perhaps, if you're lucky...you CAN find money just laying around!

What does this story highlight about the nature of our *equilibrium* model?

## PROBLEMS

1. Alexander Pope once wrote: *In spite of pride; in erring reason's spite, One truth is clear; whatever is, is right.* Is Pope's conclusion consistent with the principle of maximization?
2. John Kennedy once stated *Some men look around and ask why? I dream of things that could never be, and ask why not?* Why does the principle of maximization force economists to ask "why", rather than ask "why not"?
3. I had a neighbor one time who planted an entire orchard of fruit trees at a 45 degree angle under the theory that they would bear more fruit. What common observation would make an economist skeptical of such a claim? As it turned out, all of his trees died, but he could have been a genius who really did discover how to increase fruit yields. What does this suggest about the economists ability to judge innovations in general?
4. The practice of open grazing in the Western United States was discovered when cattlemen let their cattle loose during the civil war during their absence. On returning to the ranch many discovered that their cattle had gained more weight on the open range than they had on closed fields. Does this accidental discovery of a new ranching method mean that the farmers were not maximizing their wealth before the discovery?
5. A classic scene in Old West movies has the old prospector running into town yelling "Gold! Gold! I've discovered Gold!" Given the principle of maximization, what's wrong with this scene?
6. There used to be a car called the "Sterling" that ran a series of advertisements that used successful people as their pitchmen. In one commercial a man is sitting on a stool and he says "I met him in the Hotel Astoria when he was just a scrawny kid, he didn't look like much, but I saw a champion." Then the camera moves away and we read "Angelo Dundee, trainer of Mohammed Ali". Then it comes back to Mr. Dundee who then tells us to buy the Sterling. The message of the commercial is pretty clear: Dundee was a great trainer, able to see talent in Mr. Ali, so he must be able to see talent in the car. Is it necessarily true that Dundee must have been a great trainer?
7. The whole world knows how a small handful of men were able to hijack four airplanes on September 11, 2001 and use them as bombs to kill thousands of people. Explain how a small number of hijackers use the principle of maximization to gain control over 40 to 60 people?
8. On the fourth plane hijacked on September 11, 2001 the passengers, through the use of cell phones, found out that their plane would crash. Explain why this information made the principle of maximization work against the hijackers? Had the passengers been kept in the dark, what do you think would have happened to that plane? In future hijackings, what do you think hijackers will insist regarding the use of phones?
9. One of the most useful things one learns in economics is "Friedman's Law for Finding Men's Washrooms." This Law states: Men's rooms are adjacent, in one of the three dimensions, to ladies' rooms." Why is this an application of the principle of maximization?
10. In the early 1980's, when the Polish people had to stand in long lines in order to purchase

most consumer goods, the government ordered that every third place in line be reserved for pregnant women. This was presumably done to reduce their discomfort. What do you think happened to the number of pregnant women standing in line? What do you think happened to the number of pregnant women in Poland?

11. “When I go to McDonalds, I can buy as many Big Macs as I’d like. Therefore, they are not scarce.” True or False, explain your answer.
12. “Michael Jackson doesn’t face any scarcity because he’s rich” True, false, explain.
13. Are beautiful sunsets a scarce good? Briefly state why or why not.
14. Explain why newspaper machines expose all of the papers upon purchase, but candy machines dispense one item at a time.
15. It is a “well known fact” that the correlation between investor return and education level for stock brokers is negative — better brokers usually have less education. Is this consistent with the notion of maximization or a refutation of it? That is, do you think those brokers that went on to college would have been better brokers by not going?
16. Certain professions are very attractive to their members and very badly paid. Consider the stereotype of the starving artist. Is the association between job attractiveness and low pay accidental, or is there a logical connection? How is this related to which lane I should take home on the freeway in rush hour?
17. Two bedouins are arguing in the desert that their camel is the worst in all of Arabia. The fight goes on for some time before one of them thinks up the following bet. They will race their camels to an oasis two miles away, the last person to get there wins — his camel obviously being the slowest. The men mount their camels, and start the race. Several hours later, a wise man (who understood maximization) comes by and asks the men why they are sitting on their camels, going nowhere in the hot sun, when there is an oasis two miles away. The men get off, tell the wise man their problem. The wise man whispers two words to the men, and they immediately race off (on the camels) to the oasis. What did the wise man tell them?
18. “Socialism: Cooperation instead of competition” reads the bumper sticker. In what sense is competition a form of cooperation? What type of cooperation do you think is intended in the sticker? Is this a form of competition for scarce resources?

### Review Question Answers

1. *Maximization is a motivation. It is the reason why people do things — at least that’s what economists think. Nonsatiation, is just a matter of preferences, and many times it isn’t true. I might have some allocation in my life which is an absolute bliss point. If I ever reach this point, I would be in heaven. To have such a point would be a violation of “more is preferred to less.” But as a maximizer I would want to reach such a point! Thus there is no contradiction in being a satiated maximizer. However, in this book we’ll generally assume there’s always something individuals want more of.*
2. *I don’t think so, at least not until we can peer into the hearts of men and measure motivation. If you pick any type of behavior whatsoever, it is easy to come up with a maximizing explanation. If a person jumps into a blazing fire to save some people, we can say “he’s no altruist, he just wants to be famous ... pure greed.” Whether or not you find this plausible or not is beside the point. Maximization, just by itself, is not a testable theory. It is consistent with everything.*
3. *If something is scarce, then it must be a good. If it is scarce, then people want it, which is the definition of a good. If something is a good, it may not be scarce. Water is a good. But you may be in a situation where there is so much water, that it is not scarce.*
4. *When goods are scarce it means that there is more wanted than is available. This the definition of scarcity. Hence, a choice must be made over who gets how much of the good.*
5. *For this answer you should refer to the appendix to chapter 1.*
6. *To maximize is to do the best under the given circumstances. If you do less than the best, and someone else does better, then that person will out compete you. He’ll gather more food, make more weapons, and eventually overpower you in some dimension. If you do not copy the maximizing strategy you or your business will simply disappear and we won’t observe that type of behavior anymore. The principle of maximization is equivalent to the biological theory of “survival of the fittest.”*
7. *Economic theory is not a license to print money. Economic theory is used to explain human behavior. Even if economists did understand all there was to human behavior (and believe me, we’re a long way from that!) knowing the “switches and levers” doesn’t help you get rich any more than understanding physics helps you to be a great pool player. One of the implications of our model based on maximization is that the gains from trade are fully exploited. This means the economist cannot use the model to find non-exploited gains from trade. It is an unfortunate aspect of logic.*
8. *Our model says that in equilibrium there will be no money lying around on the floor of a mall. Our model doesn’t have much to say about how an equilibrium is reached, but in the context of money on the floor, we get to an equilibrium by having someone pick up the money. Clearly, this student was part of the equilibrium process. It was because of his actions there was no money on the floor in equilibrium.*

## Odd Numbered Problem Answers

1. *I think Pope comes close, but in the end it is not the same as the principle of maximization. Pope understands there is a hidden order to the world that overrides individual motivations and thinking, but maximization doesn't suggest anything about the "rightness" of an allocation. If we want to define "rightness" as "optimal", then they're the same, but this was not the intention of Pope or the interpretation of those who still read him.*
3. *This is a true story, and the neighbor was a biologist with a theory of different types of sap in fruit trees. The economist should be skeptical because driving past commercial orchards one never sees trees planted on an angle. Tree producers have a strong interest in finding the best environment for growing trees, and it seems reasonable they would have tried this procedure, even by accident over the past several thousands of years. Still, this could have been the proverbial "better mouse trap." It shows that economists have no tool to evaluate innovations. On the contrary, the principle of maximization tends to make us quite skeptical.*
5. *No one would spend their life hunting for gold and then give the information away. The scene only makes sense if the miner is pointing in the wrong direction.*
7. *Every hijacker makes it known that the first person to attempt a takeover will be killed. Often the hijackers make a demonstration that they are willing to kill by killing someone randomly. Collectively there is no way a group of hijackers could stand an assault by 40 to 60 people, but of course, no one wants to be the first one to attack. If there is no first person, there's no attack and the hijackers gain control. This is a major problem with getting infantry to fight in battles, and most infantry formations are designed to make sure the first mover is not at such a disadvantage.*
9. *Builders want to minimize costs, and one simple way to do this is to have male and female washrooms use the same set of pipes. This means the washrooms must be adjacent to each other in one dimension. A very useful implication when looking for a washroom in a foreign airport.*
11. *If Big Macs were not scarce, then they would be free. They are not free, therefore, they are scarce. This question can be used to get the students to start thinking about prices, price taking, demand, and supply, before any of these things are introduced.*
13. *Again, the student needs to think on his own about demand and supply. Anyone who's spent more than 2 weeks in Hawaii knows a nice sunset isn't very scarce after a while. Some people have no affection for sunsets, no matter how few they look at.*
15. *This observation makes it appear students who enter college get taught information which makes them a worse broker. However, this question is really about maximization and self selection. If, given the principle of maximization, an instructor can't teach anyone how to be a great stock broker, those who are naturally good at it will not go to college. If they are good at it and stay in the business, then you get the observed correlation.*
17. *Switch camels.*



## CHAPTER 15

# ECONOMIC PROPERTY RIGHTS AND TRANSACTION COSTS

Thus far we have examined a very simple but powerful model. One of the assumptions of our economic model has been that markets work for free. In such a world, individuals never leave mutual benefits unclaimed. To do so would be to go against the fundamental principle of maximization. Yet casual observation suggests that many important situations exist where this is not true. For example, when I go to restaurants, movies, and the grocery store, I quite often have to wait in line. You have no doubt experienced this yourself. Why does the price of a dinner not rise to eliminate the queue? Quite often a particular restaurant will habitually have a long line outside, and so we cannot argue that customers showed up unexpectedly. Not only this, but have you noticed that some people are unemployed? Why do wage rates not adjust to eliminate this surplus? And it is worse. As you read this book, at school or at home, look around you and see all of the capital that is unemployed! Chairs sit empty, books collect dust on the shelf, toilets are unused. In fact, during class time most of the toilets on campus are unemployed, but in between classes there is often a shortage! Why are there no markets, as described in earlier chapters, to eliminate these problems?

If you're thinking economically (and by now you should be), you should have no problem thinking up examples that refute our basic model. For example, individuals persistently drive their own cars to work, congesting the streets and highways, even though car pooling or rapid transit would reduce commute times dramatically. Tariffs are levied which raise the prices of domestic goods to an extent that often produces larger losses to consumers than the total gains to the protected industries. Pollution, health care, and the decimation of the Atlantic cod industry are all examples where pure price allocation is not (or was not) used.

It may appear from the examples just stated that "prices couldn't be used in cases like these". But if prices are free to use, why not? If you don't like that answer, consider cases where prices are explicitly and conscientiously not used. As much as you might try, you probably can't buy a grade in your economics class. The penalties are such that trade on this margin is usually eliminated. Not only can you not buy a grade, but you cannot sell your student card to one of your high school buddies. When your future boss tells you to do some task, you are unlikely to respond "what's it worth to you". Your father, if he is like mine, probably didn't bid for your labor services around the house. In firms and families, direction (being told what to do) is used more often than prices to allocate resources.

And so as we come to this last section of the book, we also come to the end of our simple model where information is free, the cost of transacting is zero, and ownership is always perfectly defined. In this chapter we'll begin to explore what happens when these assumptions are relaxed a little. The answer is quite fascinating, but first we must seek to understand the nature of a term called "transaction costs."

### 15.1 The Coase Theorem

So you think you understand the principles of economics? Let's see. Consider two worlds, both made up of farmers, ranchers, and no fences. Everything in the two worlds is exactly the same —

except one thing. In one world the rancher is liable for the damage his cattle cause as they trespass on the farmer's field. In the other world he is not liable. Both worlds are characterized by zero transaction costs; that is, it costs nothing for the farmer and the rancher to trade with one another. Would the number of cattle be different in either world?

Think about it. Would the production of cattle depend on who had the property right over where cattle should roam? This was the question posed by the Nobel economist Ronald Coase in 1960, and if you answered "No, it would not matter" then you're in very good company.

This is such an outrageous claim, it requires further development. To make the analysis more concrete, consider the data in Table 15-1. Column 1 indicates an amount of cattle produced, and column 2 indicates the marginal cost of producing each additional steer.

**Table 15-1**  
The Coase Cattle Example

(1)	(2)	(3)	(4)
Number of Steers	Marginal Private Cost	Marginal Crop Damage	Marginal Social Cost
1	\$100	\$100	\$200
2	150	100	250
3	200	100	300
4	250	100	350
5	300	100	400
6	350	100	450

The figures in column 2 indicate the "private" cost to the rancher of producing steers. These would include, for example, feed, cowboys, etc., meaning all the costs to the rancher of raising cattle to maturity and bringing them to market. According to the table, it costs the rancher \$100 to raise one steer, an additional \$150 to raise a second, \$200 more to raise a third, etc. Not included in these costs, however, are the damages imposed on the neighboring farmer. Each steer tramples \$100 worth of crops during its lifetime. These costs, which are "external" to the rancher, are often referred to as "externalities". Thus, the actual cost to society of raising 1 steer is not just the \$100 diverted from other uses by the rancher, but also the \$100 in crops that never get harvested, yielding a true marginal cost of \$250. The complete, actual cost to society of producing a good is generally referred to as its "social cost". Likewise, "marginal social cost" refers to the true, complete cost of producing an additional increment of the good. The "private" cost is really a misspecification of cost; it leaves out part of the true effects of producing this good: in particular, the costs imposed on someone else. We consider private costs because it often seems that producers do not in fact always bear all of the costs of their decisions.

*The total cost of producing a good, regardless of who bears this cost, is called the “social cost”*

Suppose now the market price of mature steers is \$300. How many steers will the rancher produce, and how does the answer depend, if at all, on the rancher’s liability for crop damage caused by his steers? Assume first that the rancher is liable for all such crop damage. In this case, the figures in column 4, marginal social cost, are also the rancher’s own marginal costs of production. For each steer produced, the rancher must compensate the farmer \$100 to cover the cost of the ruined crops. The rancher produces 3 steers under these constraints. Production is carried out until marginal cost rises to the market price. The rancher makes \$100 on the first steer, \$50 on the second, and zero on the third, but, as usual, we assume production is carried out to this limit. He receives total rents of \$150 on this production.

Suppose now the rancher is not liable for crop damage. In this case, the rancher does not have to compensate the farmer for the \$100 of crops each steer destroys. It appears the “private” marginal cost figures in column 2 will determine output. In that case, the rancher would produce 5 steers, where the private marginal cost equals the market price. Coase showed, however, that this conclusion depends on the assumption that the farmer and rancher are unable to negotiate a mutually beneficial contract with each other.

When the rancher produces a fourth steer, his rents are potentially \$50: the difference between the market price, \$300, and the private marginal cost of that steer, \$250. However, this steer produces a greater amount of damages, \$100, than the rents received. The farmer would benefit by \$100 if the steer were not produced; the rancher gains only \$50 from producing it. In this situation, where the loser loses more than the gainer gains, the loser can pay the gainer something greater than the potential gain and less than the potential loss, and the position of both parties will be improved. For example, if the rancher accepts a payment from the farmer of \$75 to not produce the fourth steer, then the farmer and the rancher each gain \$25. Similarly, since the rancher makes no rents on the sixth steer, any small payment from the farmer will induce him not to produce it, thereby saving the farmer almost \$100 in the process. If damages are being produced by someone’s actions, those costs must be weighed against the benefits of the actions. If the costs are larger than the benefits, the parties can contract with each other to avoid these losses. Assuming, therefore, that the cost of transactions is sufficiently low that the farmer and the rancher can negotiate, resource allocation is the same, regardless of the assignment of liability. In this example, the rancher produces 3 steers under either assignment of liability. The wealth of the farmer and rancher are of course affected by who has to pay whom. If the rancher is liable for crop damage, he is worse off and the farmer is better off than if the rancher were not liable. The production outcome is the same, however, in either case: 3 steers. This remarkable insight has been dubbed the Coase Theorem. It follows because, in the absence of transactions costs, the gains from trade must be exhausted. Inefficient outcomes violate the axioms of behavior.

**The Coase Theorem:** *The allocation of resources is independent of the distribution of property rights, when transaction costs are zero.*

Notice, however, that there is nothing the farmer can do to induce the rancher not to produce up to 3 steers. The gains from the rancher, e.g., \$200 for the first steer, exceed the crop damage. The farmer could offer the rancher \$100 to not produce the first steer, for example, but the offer will be rejected. More importantly, in terms of producing net benefits for consumers, it is appropriate that the offer be rejected. The market price of \$300, after all, measures consumers' marginal value of resources in the form of a steer. If the resource cost of producing that steer is only \$200, production of the steer raises the net value of resources by \$100 over their next best alternative, even including the crops that are inadvertently trampled. The efficient amount of "externalities" of damage to third parties is not likely to be zero. Sometimes the costs may be less than the benefits generated.

## 15.2 No-Fault Divorce and the Coase Theorem

If you're like most students, you probably think the Coase Theorem is obvious by now. Let's try another example and see how you fare. In 1969 California was the first state to switch to no-fault divorce. In 1985 South Dakota became the last state to switch to no-fault divorce. In Canada the entire country switched to no-fault divorce in 1968. In fact, most of the western world switched to no-fault divorce in the 1970s.

What is no-fault divorce? Well, prior to these laws, in order for a divorce to take place one party had to commit a "fault". These varied from state to state, but they usually included things like adultery, cruelty, criminal behavior, and other such things. One of the realities of fault divorce was that it was often hard to prove a fault had been committed, especially if the guilty party didn't wish to be caught. What tended to happen was that couples would agree to a fault and then perjure themselves in court. Why would someone agree to a fault? Because they are compensated, of course!

Suppose the husband wanted to leave the marriage. Under the old fault law he would have to "pay" his wife to agree to some fault. This payment often took the form of a certain percentage of the marital assets. For example, the wife might consent to a ground for divorce for full possession of the house, or custody of the children. The point is that the individual *most* wanting the divorce had to pay the individual who *least* wanted to divorce. We could say the "property right" over divorce belonged to the one who least wanted the divorce — in our example the wife.<sup>1</sup>

When the law switches to no-fault divorce, no grounds are required. It is enough that there are "irreconcilable differences", and these differences need only be established by *one* party. In our example, if the husband decides to end the marriage under a no-fault regime, he can just leave. If the wife wants him to stay then she must pay him! Hence the property right to divorce switches from the one who *least* wants a marriage to the one that *most* wants it.

This would appear to provide a nice Coase Theorem experiment. We have two worlds, one where the wife holds the property right, while in the other the husband holds the right. Let's ask

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<sup>1</sup> Most divorces are filed for by the wife. Who actually causes the divorce is a more difficult question to answer. The best estimates are that men and women seem to instigate divorce at the same rate. Of all divorces, about half appear to be "opportunistic", that is, where one party is trying to gain at the other's expense. Of these types of divorces, husbands tend to go after the financial resources of the marriage, while women tend to go after the children.

the Coase question: will the divorce rate be the same in those states where the law is fault as in those states where the law is no-fault? The answer is, according to the Coase theorem, there should be no difference. But can you see why? Consider Table 15-2.

	Husband	Wife
Married	\$50	\$50
Divorced	\$60	\$30

**Table 15-2**  
Joint Values Married and Divorced

Table 15-2 describes a situation where we have an efficient marriage. That is, the marriage is worth more (\$100) than the joint value of the divorce (\$90). This is a couple who should stay together given our notion that more is better than less. However, it is also a situation where the husband would prefer a divorce to marriage because his wealth is higher when divorced. For the wife, the opposite is true, she prefers being married.

Suppose the state that this couple lives in is a fault state. This means that the husband must pay his wife to agree to a divorce. What is the maximum he is willing to pay (ie. what is his marginal value for the divorce)? Ten dollars? Right. However, the wife will require at least \$20 to agree to a divorce. The husband is unwilling to pay this amount, the wife does not consent, and the efficient result happens — no divorce.

Now suppose this couple had lived in a no-fault state. Now the husband decides to leave and does not require his wife's permission. Will the wife be able to convince her husband to stay? Yes, indeed. She is willing to pay \$20 to have him stay, while he only requires \$10 to be convinced. The efficient result happens again, the husband remains and there is no divorce. To see if you understand this, switch the numbers around so that you have an inefficient marriage; that is, one where the joint value together is lower than the joint value apart. It should be easy for you to show that this couple always divorces, no matter what the law is. So the decision to divorce is independent of the distribution of property rights between the couple. Just like in the cattle example where liability did not matter, here the divorce law didn't matter. The outcome is the same, and it is always efficient. That's the Coase theorem.

The Coase theorem states that the allocation of resources is independent of the distribution of property rights. That means, when transaction costs are zero, it doesn't matter what laws we have, it doesn't matter what types of contracts we make or firms we work in. Every rule is irrelevant. Why? Because individuals respond to costs and benefits, and the rules of the game do not change these fundamental things.

If this is the Coase theorem, you may be thinking like many people think at this stage: "let's take that Nobel prize back!". It doesn't take a genius to realize that rules, laws, contracts, and organizations all matter a great deal. Yet this is the most important feature of the Coase theorem, namely that it is always wrong in practice! For you see, Coase did not stop writing after the

cattle/farmer example — he kept on going. The key to the Coase theorem is that it holds for when “transaction costs are zero,” which is never true in the world we live in. When they are positive, rules and property rights do matter. Hence, if we are to understand rules, laws, organizations, and all of these sorts of things that cannot be explained by our simple model we must understand transaction costs.

### 15.3 What are Transaction Costs?

Ironically, before we get started defining transaction costs, we need to define property rights.

**Economic Property Rights:** *are one’s ability to freely exercise a choice.*

The words “Property Rights” get bantered about quite a bit, and different disciplines tend to use the word quite differently. In particular, the legal profession has long used the words to define that body of law which applies to what they call “real property,” something like land, a car, or a book. Others talk about “human rights,” “natural rights” or even “power,” and they often have meanings which overlap with the economists notion of rights. So before we begin discussing property rights, perhaps we should consider the differences in interpretation.

Let’s consider the difference between legal property rights, natural rights, and economic property rights. Let’s define the former as the right *under the law* to freely exercise a choice.<sup>2</sup> We can define natural rights as the right under Nature or God to freely exercise a choice. These three definitions may have considerable overlap, and it is useful to consider the diagram in Figure 15-1 where each definition is represented by a circle.

Consider section A. Here are a set of choices where one has the economic, legal, and natural right to do something. That is, the person is able, allowed, and morally justified in making such a decision. Many things in life fall into this category. When you go to a store, buy a candy bar and eat it you have all these rights in line. Consider section B, however. Here you have the economic and legal right to do something, but not the natural right. Some might consider abortion to fall into this category. It is legal and available in most North American jurisdictions, but many would consider it a violation of the natural right to life. In section C an individual has the economic and natural rights, but not the legal ones. This might apply to some religious sect which believes in polygamy and is tolerated by the state (there is such a community in Southwestern British Columbia). They are able to have this type of polygamous marriage, they obviously feel it is right, but they do not

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<sup>2</sup> This definition would not satisfy many legal scholars. Some would add that legal property is a right to real things, belonging to one person against the whole world. For us we will focus on the distinction between *rights under the law* and *rights through possession*. Thus, I may have the legal property right to sell my car, but if it was stolen last night I no longer have any economic property right to the car.

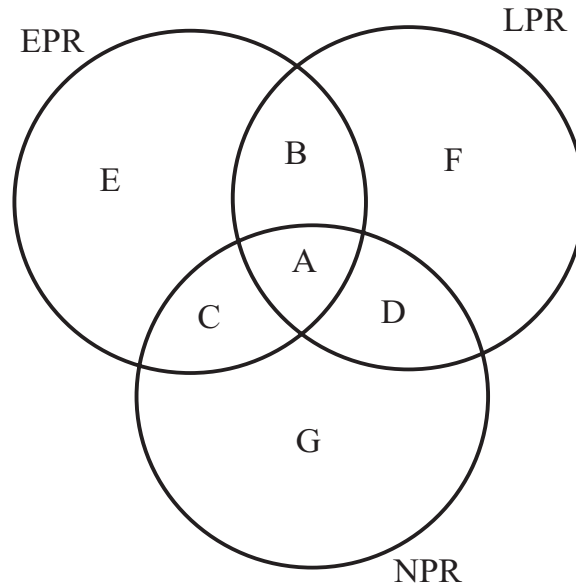


Figure 15-1  
Different Definitions of Property Rights

have the legal right to the behavior. How about section D? Can you think of an example of this type where you have the legal and natural right to do something, but not the economic right? You have the legal and natural right to walk through Central Park in New York City at 11:00PM, but if you try to do it you might find yourself robbed and prevented of the pleasure. Section E is quite opposite to this. This is where a thief has possession of some goods and is able to use it, even though it is not his legal or natural property. Section F might apply to abortions in Prince Edward Island. They are legal, but no hospitals perform them. Thus many would consider them a violation of natural law, and the inability to receive one means the economic right is missing. Now that you're getting the hang of it, can you think up some examples that would fit in section G?

Let's return to the discussion of economic property rights (I'm going to start dropping the term "economic"). A property right relates to making choices, and these choices can be over many dimensions. For example, you might decide to possess, use, or improve something, you might exclude others, destroy or sell, you might transform, donate, bequeath, lease, mortgage, consume, or develop, there is a very long list of decisions you could make with respect to something you consider "your property." A property right is *complete* if you are able to make all of the decisions with respect to the good. A property right is *perfect*, if on the demension you are choosing, there is no infringement on the choice you are making. The important thing to realize is that the degree of completeness and perfectness of property rights hinges on the *ability* to make choices. Quite often our ability to make choices is limited, and in these cases we would say our property rights are limited. If our choices are totally limited, then we have no property rights at all. Economic property rights are not an all-or-nothing affair.

It is interesting to think of how limited our property rights really are. We say things like "I own this house". But what happens when you decide to park three cars on blocks in the front yard, or build a ten foot high brick wall around the property, or dig for gold, or start up a soup kitchen? Very quickly you realize that there are many choices with respect to "your" house that you cannot

make, and as a result your property rights in that house are not complete.

Quite often property rights are limited by simple facts of nature. If I consumed some wood yesterday by burning it in my fireplace, my choices (hence property rights) over the wood today are severely limited — they are incomplete. More interestingly, my economic property rights are often incomplete because somebody else is the true holder of the rights. You cannot legally sell “your” student card because it legally belongs to the school. All laws and regulations ultimately distribute economic property rights to various individuals, and the simple truth is, none of us end up with all of them. Other times our rights are imperfect because it just doesn’t pay to enforce them. Every now and then one reads the bumper sticker “As a matter of fact, I do own the road”. Well, as a matter of observation, you don’t. Even on private roads, trespass is common, and to the extent you can use logging roads for your weekend pleasure without paying for it, you have the economic property right, not the forest company. When rights are too costly for anyone to own, the asset in question is said to be in the public domain.

*The Public Domain is the state where property rights do not exist*

There are two important points to be made with respect to property rights. First, when there are no property rights, there is no trade and no wealth. Think about this for a moment. What would a world be like without property rights? That would mean no one could make any decisions. No one would produce anything because as soon as it was made it would be stolen. No one would save for the same reason. It would be literal anarchy. This is one of the reasons why economic rights are so closely linked with legal rights. It is very difficult to trade when one person holds one type of right and someone else holds the other. I have a friend who had his car stolen. This is a situation where my friend has a legal right to the car, but the thief had the economic rights. (When the police found the car it was locked!) Imagine if the thief tried to sell the car back to my friend. The conversation might go something like this “Oh, hello, I’m the fellow who stole your car last night, and I’d like to sell it back for \$10,000. Just leave the money in small bills in a paper bag under the third bench at the park.” “Oh, well thanks for calling. Unfortunately I have hay fever and the park is really bad for me. Perhaps you could meet me at my house around 10:00 o’clock.” This is a transaction that’s not going to happen.

The second point regarding property rights is that at the other end of the spectrum, when they are complete and perfectly defined, the gains from trade are maximized. This is the Coase theorem again. And so we see there is a spectrum of rights ranging from zero to perfect completeness, and corresponding to this there are wealth levels that range from zero to some maximum. We live in a world that is at neither extreme. Individuals own property but never completely. This is shown in figure 15-2.

Given that wealth is always higher when property rights are better defined, however, it is always true that individuals prefer better defined rights to poorer ones, other things equal. As a result, individuals will make efforts to establish property rights, and once established, efforts will be made to maintain those rights. This finally leads to a definition of transaction costs.





Figure 15-2  
The Property Rights Spectrum

**Transaction Costs:** *The costs of establishing and maintaining property rights.*

These costs include the costs of protection, stealing, and any concomitant losses that result from such efforts. We see immediately that property rights are linked in a fundamental way to transaction costs. When property rights are perfectly defined, no effort is required to establish or protect them, and as a result transaction costs are zero. When transaction costs are prohibitive, no one would engage in them and property rights are zero. Finally, when transaction costs are positive, property rights will be incomplete.

#### 15.4 Back to the Coase Theorem

Now let's return to the no-fault divorce example. It is common knowledge, and it has been shown, that the divorce rate increased with the change in the law. Why might it have increased? What was wrong with the simple numbers in Table 15-2?

In the simple discussion above we assumed that the property rights of the wife and the husband were perfect because transaction costs were zero. Recall, however, that property rights are limited in the world we live in. For example, some states had property laws which stated the owner of a marital asset was the individual whose name was on the title. If a husband divorces after the law has changed, and the home and other major assets are in his name, then the wife may have no wealth to compensate the husband to stay. This would be true despite the wife having made some economic contribution to those assets. The law effectively allows the husband to take the wife's wealth. Positive transaction costs in this situation mean her property rights are incomplete, and this leads to the Coase theorem breaking down. Or as another example, perhaps the wife put her husband through medical school and was expecting a return on this investment. Until recently, courts did not recognize a medical diploma as property, and therefore it could not be divided at divorce. Again, when the law switches to no-fault, the wife might be unable to compensate her husband because her investment is in his head and there is no legal remedy to get it back. As a final example, the wife might have remained in the home and out of the workforce for the entire duration of the marriage, and at the time of divorce may have no liquid assets to compensate her husband. Transaction costs arise in this situation on the part of banks, which will unlikely provide a loan when human capital is the only collateral, since default is likely and slavery is illegal.

Thinking about transaction costs within a marriage reminds one of the story of the married couple who are driving along a highway at a steady forty miles per hour. The wife is behind the wheel when her husband suddenly looks across at her and speaks in a clear voice. “Darling,” he says. “I know we’ve been married for twenty years, but I want a divorce.” The wife says nothing, keeps looking at the road ahead, but slowly increases her speed to 45 mph. The husband speaks again. “I don’t want you to try and talk me out of it,” he says, “because I’ve been having an affair with your best friend, and she’s a far better lover than you are.” Again the wife stays quiet, but grips the steering wheel more tightly and slowly increases the speed to 55 mph. He then pushes his luck. “I want the house,” he says insistently. The car’s now up to 60. “I want the car, too,” he continues. 65 mph. “And,” he says, “I’ll have the bank accounts, all the credit cards and the boat.” The car slowly starts veering towards a massive concrete bridge. This makes him a wee bit nervous, so he asks her “Isn’t there anything you want?” The wife at last replies — in a quiet and controlled voice. “No, I’ve got everything I need.” she says. “Oh, really?” he inquires, “what have you got?” Just before they slam into the wall at 75 mph, the wife turns to him, smiles, and says ... “The airbag.”

This is what makes transaction costs so special: they are the only costs that break the Coase theorem down. Once they exist, it is no longer true that rules, laws, contracts, etc., no longer matter. They matter indeed. One young lady once wrote Miss Manners and asked her if she should move in with her boyfriend. She wrote “He tells me he loves me, and what’s in a piece of paper anyway”. Miss Manners wrote back simply “Gentle reader, tell your young friend that Miss Manners has a safety deposit box full of pieces of paper, and they matter a great deal”.

Earlier we noted that individuals maximized utility, and that firms maximized profits. None of this changes with the introduction of transaction costs. However, there is a slight modification in that individuals now maximize utility net of transaction costs, and firms maximize profits net of transaction costs. Firms, for example, are not indifferent to the *way* they pay their workers, because different methods of payment lead to different levels of output when it is costly to monitor employees. For example, wage workers take longer to do a given task than a piece rate worker. When firms are not indifferent to organizational forms, then they chose the one that helps to maximize profits. As a result, we have a theory of organizations.

And transaction cost economics is even broader than this. When condominium developers are designing the constitution for the apartments they want to sell, they are not indifferent to the laws they establish. Giving votes based on square footage, results in different behavior of the tenants, that one vote per person, or one vote per apartment. The developers pick those rules that allow them to charge the most for the homes. As a result, we have a theory of rules. And on and on. Transaction cost economics has been used to explain the nature of the common law, regulations, the nature of the firm, and just about every type of rule you can imagine.

This leads us to the last principle of economics:

#### PRINCIPLE #7

**Optimal Organization:** *All economic organization is designed to maximize the gains from trade net of transaction costs.*

For our purposes, this will amount to saying that all organizations are organized to minimize the transaction costs involved in the production of their enterprise.

### 15.5 What Causes Transaction Costs<sup>3</sup>

The underlying theme in understanding transaction costs is the notion of ignorance. Let's face it, if you knew everything, you wouldn't be reading this book ... or attending college. In life, knowledge is scarce and costly to come by. Negotiation, fraud, communication, and contract stipulation all come about because knowledge is incomplete and not common. However, information costs are not the same thing as a transaction cost. An information cost is the cost of obtaining information. For transaction costs to exist, it must be costly to acquire information about anything: goods, people, institutions.

This means information costs are a *necessary* condition for a transaction costs to exist. Information costs, to repeat, are not transaction costs. You might have no idea if it will rain tomorrow, and this is an information problem. That doesn't mean that you necessarily have a transaction cost problem. The acts of finding a trading partner, determining the correct good for a particular need, or searching for the "best price" are information costs, not transaction costs. All kinds of behavior seems to depend on information costs and not transaction costs. Unemployment, search, and clearance sales are all events that only require costly information.

It is necessary, however, to do more than assume costly information in order to generate transaction costs, because costly information merely makes for risky events. An additional assumption is required that enhances the problem of costly information. Goods are not simple, but are both *variable* and *alterable*.

	Alterable	Non-Alterable
Variable	Everything else	Earthquakes Hurricanes
Non-Variable	a rose	God

**Table 15-1**  
Variable and Alterable Goods

The distinction between variability and alterability can be thought of as those changes brought about by nature and by man. Consider the taxonomy of Table 1. God and the speed of light, for

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<sup>3</sup> This section is advanced and can be skipped without paying a price in following chapters.

example, do not vary in nature, nor are they alterable by man. The weather changes constantly, but despite accusations against the Russians and rain dancers, weather storms are probably independent of human manipulation. It is difficult to imagine something that does not vary in nature but that can be altered by man — although Gertrude Stein must have thought a rose fit this category.

The distinction is important. When goods are both variable and alterable (and, of course, information is not free), then cheating becomes possible. Consider the purchase of an apple. Suppose apples never varied in nature, but could be manipulated in some way — for example, hollowing out the apple and filling it with foam. Could a merchant sell a foam-filled apple and not be accused of cheating? No, because any change in the quality of the apple is, by assumption, blamed on the seller. Likewise, if apples came in all different shapes, sizes, and insides, but were impossible to alter, then no suspicion of cheating would exist. All bad apples would be attributed to nature. When both conditions exist, that is, when a bad apple may be produced by the weather or the seller — only then can cheating occur *without* detection. That it is so difficult to think of examples of goods that are non-variable or non-alterable tends to imply that the possibilities of cheating, and therefore transaction costs, are ubiquitous.

When a good contains attributes that are either alterable or variable, but does not contain both, then transaction costs are zero or negligible. Both alterability and variability are needed in order for transaction costs to arise, because these costs stem from the inability to attribute changes in product quality directly to random events or non-random exploitation. When nature and humans play a role in the ultimate quality of a good, then there is confusion on the part of the buyer over who is to blame for the differences in quality. Under these circumstances transaction costs can exist.

### 15.6 Private Property, Common Property, and Open Access

Let's use the discussion of property rights and transaction costs to examine three types of property found everywhere. Private property is a concept familiar to all of us. The owners of private property decide how an item is to be used, who is to use it, and what happens to the income or utility of the item. As we've mentioned in the discussion of the property rights spectrum, nothing is perfectly private, but there are many things in life we consider our private property. Common property is where access to a good or resource is limited to some group, but within the group no one has the right to exclude others. In an office, the workers may have equal access to the photocopy machine, the washroom, or the secretaries time, but someone off the street doesn't have access to these things. Open access is a situation where no one has the right or ability to exclude anyone. The high seas are an open access resource, as were the bison on the American frontier. Each one of these different property right regimes has different benefits in terms of the wealth they generate. However, each one has different transaction costs associated with them as well. Which one is chosen as the optimal form of ownership depends on which one maximizes the value net of these transaction costs. Let's consider each one in turn.

#### *Private Property*

Let's consider a famous example in economics. Suppose there is a lake with fish in it, and there is one boat available for fishing. A community lives on the edge of the lake, and the people make their living off the fish. When someone stands on shore to fish, they catch 4 fish in a day. But if they use the boat to fish, then the number of fish caught per person depends on the number of people

in the boat according to our normal production function. Every fisherman in the boat, therefore, contributes to the number of fish caught. The marginal and average product of fish caught is given in Figure 15-3. We've seen marginal products before, but we haven't talked about average products. The average product is just the total amount of fish caught divided by the number of people in the boat. If the people in the boat share the fish caught, then each will get the average product.

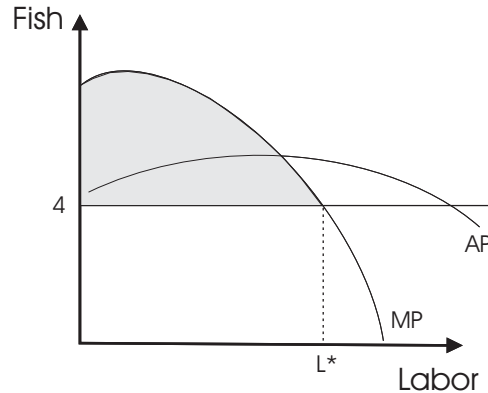


Figure 15-3  
Private Property for the Boat

When the boat is privately owned, the owner of the boat decides how many workers will be allowed on. We can think of the boat owner as hiring workers for the boat. Since workers can catch 4 fish on shore, the boat owner must pay each fisherman 4 fish to come fish on the boat. How many fishermen will be hired? We know the answer to this question is determined by where the marginal product just equals the wage. In this case the boat owner hires  $L^*$  fishermen. Notice when this is done, the surplus of fish, equal to the light grey shaded area, is maximized. We can think of this area as the value of the boat. If the boat were for sale, the boat owner could receive this area as its price, since that is how many extra fish are capable of being caught with the boat. Hence, ignoring any transaction costs, private property maximizes the wealth of the little village.

*Private property maximizes the gross value of the resource.*

### *Common Property*

Suppose now that no single person owns the boat, but the boat is owned in common by a small group of fishermen. These fishermen share the catch, and decide how many fishermen should enter the boat. Under these circumstances, the owners of the boat don't want to put men in the boat

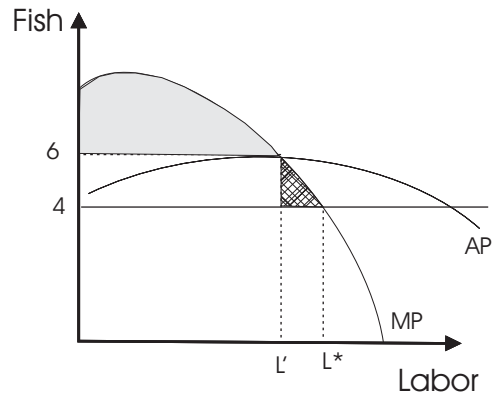


Figure 15-4  
Common Property for the Boat

until the wage equals the marginal product. What they want to do is maximize the *average product* because that's what each one of them gets. Figure 15-4 shows this situation.

Now the number of fishermen in the boat equals  $L'$ , not  $L^*$ . This reduction in the number of fishermen comes about because the fishermen want to maximize the average product. At this lower number of men, the average catch is 6 fish, not 4. This extra income for the fishermen comes from the value of the boat, which is now reduced to the light grey shaded area. But there is more than a transfer from capital to labor involved here. Because the number of fishermen has been reduced, along with the total catch, there is a deadweight loss associated with the common property ownership of the boat.

*Common property does not maximize the value of the resource*

### Open Access

With open access, no one owns the boat. Any one who wants to jump in and go fishing can do so. When this property right structure exists, people will enter the boat as long as the average number of fish they catch on the boat is equal to the number they can catch on shore, in this case 4 fish. Figure 15-5 shows this result, which is often called “the tragedy of the commons.”

Now too many people hop onto the boat. In fact,  $L''$  fishermen get on, and at this level the deadweight loss, equal to the crosshatched area, is large indeed. In fact, it turns out that the size of the deadweight loss is just equal to the value of the boat under private property. This means the value of the resource is driven to zero! The boat is worthless, which makes sense because incomes with the boat are the same as if there were no boat.

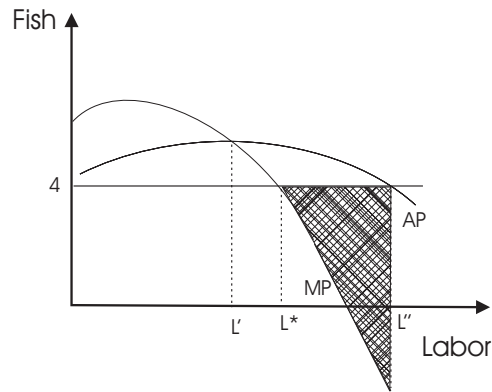


Figure 15-5  
Open Access for the Boat

*Open access drives the value of the resource to zero.*

### *The Optimal Property Right Rule*

If this were all there was to the story, then clearly private property would be the best of all possible worlds. Many believe this to be true. Yet when we look around, we see common property rights all over the place, and even open access property rights, though rarer, can be found. If we believe in maximization, and if we believe that private property is the best system, then how can we explain the choice of common property? People are leaving \$500 bills on the sidewalk again.

The reason why we observe all types of property right rules is that the transaction costs of each regime are not the same and they vary depending on the nature of the good. In the real world, owned goods must be protected, and these protection costs are costly. Since private property generates a lot of wealth societies are always trying to find inexpensive ways of enforcing private property. Courts and police are designed to protect private property, for example. For some goods though, the benefits of private ownership are small, and the costs might be enormous. When this is the case, common property often develops. Small groups band together to keep outsiders ... well, out. The groups are often designed to make sure any individual within the group doesn't treat the resource as open access. This usually amounts to making sure the group is homogeneous, or held together by some common bond.

The Swiss Alps are pastures high in the mountains and used for summer cattle grazing. These Alps are owned in common by the local village. Members of the village have access to the Alps and must follow rules for its use, but members of other villages do not have access. The Alps have been managed for centuries this way. Lobsters on the east coast of North America are harvested by groups of fishermen called "lobster gangs" (I'm not making that up!). These gangs police outside fishermen from interloping on their fishing grounds, and they share the catch within their grounds. When gold was discovered in California in 1849, the miners set up common fields in which a group would mine an area and band together to defend the mines. When private or state enforcement comes along, most of these common property regimes disappear. In the case of the California miners, when

U.S. marshals finally moved in the mines became private property. Until then, however, common property is one method of protecting a resources from becoming open access.

Open access occurs when it is simply too costly to keep anyone out of the resource. At one time, virtually the entire ocean was an open access resource. As navies developed, and as cannon fire from shore improved, countries laid claims to the water off their shores. At first countries established sovereignty over two miles; now it is common for countries to claim 200 miles off shore. Still, no country lays claim to the middle of the Pacific. As a result, the resources there are exploited to the limit and the value of fisheries there are close to zero. If the world wasn't the way it is, we could say that open access was inefficient. However, since it costs too much to defend private property at times, on occasion the best we can do is have open access.

*Homesteading: The Optimal Property Right Rule?*

During the first half of the 19th century a small, debt ridden, loosely held together, sparsely populated new country called the United States had a difficult problem to solve. On paper it claimed ownership to vast tracks of land to the west, yet this land was occupied by native Indians, Mexicans, British trappers, and a host of other minor interests. How were they to actually take possession?

At the very beginning of the 19<sup>th</sup> century the U.S. government sold public lands in the areas of Ohio, Kentucky and Tennessee, but they quickly switched over to a system of first come, first served called homesteading. A homestead was 160 acres that could be had by the first person to claim it, pay a small registration fee of \$10 and improve the land for five years. The advantage homesteading had over land sales was the settler had to occupy the land. Occupation was important because the government did not have the resources to defend the land against others claiming it.

Homesteading allocated the land on a "first come, first served" basis, and this forced individual settlers to show up early and claim the land. Someone purchasing land could buy it, and not show up to farm for many years when it is optimal to show up. A homesteader who waited to show up, would find his plot had long been taken by someone else who got there earlier. The advantage of homesteading was it got people onto the frontier in a hurry, and gave these people an incentive to defend the land against those also claiming possession.

When it came time for Canada to settle its western frontier the new country faced a similar problem, only this time the threat was not Mexicans or Indians, rather it was Americans moving north. Selling the land to private interests would not improve the Canadian claim to sovereignty on the prairies if there were no guns to back it up. Thus the Canadian government adopted the identical homesteading laws the U.S. had used to settle their frontier. By providing an incentive to settlers to "rush" to the prairies and stay to improve the land, the area was populated by Canadians who quite naturally kept the Americans out.

Homesteading was not free. Suppose the optimal time to arrive in say, Lone Spruce, Saskatchewan, in order to start farming was 1920. The problem for a young family living in Ontario in 1900 was that if they waited until 1920, the homestead would be gone, and so the settlers would plan to move out west a year early. Other potential farmers would think the same way and would plan on moving two years early. This process continues until it was just barely worth moving at all. By allocating the frontier this way both governments forced settlers to move too soon and wait for development to catch up. This meant many settlers waited years for railways, schools, and the rest of civilization. As one settler put it "there ain't no such thing as free land." Still, homesteading was the optimal thing to do in light of the threat of enemy invasion.



### 15.7 The Optimal Value of an Asset

Let's suppose, for sake of argument, that an asset can either be in the public domain, where open access reigns, or it can be held as private property. In other words, let's ignore the option of common property for a moment. We might ask two questions: what happens to the optimal ownership of an asset as the value of an asset increases, and is there an optimal value for an asset to be?

The first question was initially raised by Harold Demsetz who argued that private property rights are established when the benefits of establishment exceed the cost of establishment. Figure 15-6, captures this idea. On the horizontal axis is the zero transaction cost value of an asset, determined by underlying demand and supply conditions. This gross value is independent of transaction costs and is set by a competitive market. On the vertical axis are the dollar benefits and costs of ownership over the asset. Assuming ownership is complete, meaning the owner of the asset receives all of its value, the benefit of property rights is simply the  $45^\circ$  line. The total cost function in figure 15-5 gives the cost of establishing and maintaining property rights over the asset. In other words, this is the *transaction cost* function. This function incorporates *all* of the costs of ownership.

The vertical distance between the two lines represents the asset's actual value. That is, this is the amount of money someone would actually pay for the asset. For example, if the zero transaction cost value of an asset was  $V'$ , then the actual value would be given by distance AB. The critical point made by Demsetz and others was that, assuming these functions had an intersection, a critical zero transaction cost value,  $V^C$ , determines whether property rights exist or not. To the left of  $V^C$  the asset is in the public domain because the costs borne by those attempting to establish ownership exceed the benefits and wealth maximizers exert no rights to the asset. The asset remains in the public domain and has no value. To the right of  $V^C$  private property exists.

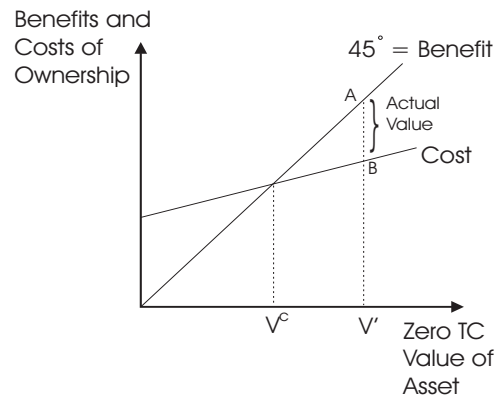


Figure 15-6  
The Optimal Ownership with Linear Costs

The key implication from figure 15-6 is that as an asset's value increases from zero — that is, as we move from left to right in the figure — at some point it becomes worthwhile to protect the asset and it moves from open access to private property. History is full of examples of this happening. The western frontier was, for the most part, an open access resource in the first half

of the 19<sup>th</sup> century. Settlers would move out to the frontier and lay claim to the land, but often interlopers would come along and ignore these claims. Sometimes the outcomes were tragic, like the near extinction of the bison. Other times fights broke out, like the disputes between cattle and sheep ranchers. As the value of the frontier increased over the century, protection of private claims increased. Eventually barbed wire was invented, and this allowed a cheap way to fence off claims. Violence on the frontier fell, as did over grazing and other misallocations of resources.

### *Non-linear Transaction Costs*

In figure 15-6 the transaction cost function is linear, but this violates our principle of diminishing marginal products. It would be more realistic to assume marginal costs of protection are increasing. The more valuable an asset is, the more it costs at the margin to protect it. Making this modest change in the model leads to several predictions. First, it is still the case that for low valued assets, as their zero transaction cost value exogenously increases they are likely to move from the public domain to private ownership. In other words, in the neighborhood of  $V^L$  in figure 15-7 the original Demsetz prediction still holds. A second observation is just as apparent. It is possible that assets may have zero transaction cost values that are so high the transaction costs of ownership again exceed the benefits and the asset reverts back to the public domain. Hence, paradoxically, in principle the public domain may contain extremely valuable (in a zero transaction cost sense) and extremely low valued assets. Pebbles on the side of the road are low valued and in the public domain. Practical examples of high valued assets in the public domain are rare, but an example of the “urban legend” variety, is of an owner of a convertible who leaves his top down when parking on public streets because he does not want the top damaged by a thief. This would place the valuable interior of his car in the public domain. A third implication from the model is that there exists a finite optimal second-best value of an asset,  $V^*$ .

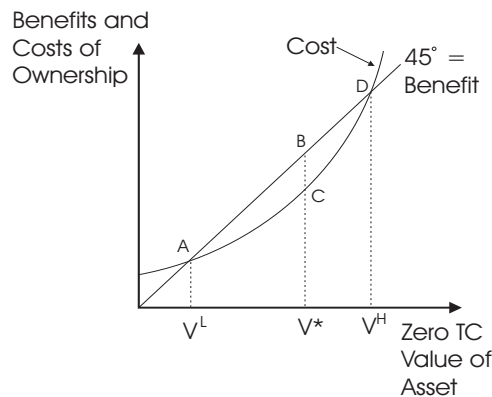


Figure 15-7

### The Optimal Ownership with Non-Linear Costs

Wealth maximizers do not like assets in the public domain. When assets are in the public domain because they are too costly to protect given their high zero transaction cost value, there are two general solutions available. The first is to innovate on the transaction cost margin. As shown in Figure 15-8, a fall in transaction costs brought about by an innovation in policing technology allows the high valued asset to be removed from the public domain. This type of innovation is common. For example, the innovation of barbed wire mentioned above brought vast amounts of land in the

arid west out of open grazing to enclosed pasture. Another example from the old west comes from innovations in western water law. Historically, ownership of fresh water was limited to use rights in England and the Eastern U.S. These poorly developed rights reflected the low value of water in wet climates. In the arid western states, however, water is an extremely valuable resource. Hence changes in the law developed to create a low transaction cost legal framework for trading water rights. A modern example of protection innovation is the new DVD technology. Although DVD provides a higher quality video and audio output, the driving force behind its development was the ability to prevent pirated copies of the contents through various encryption devices. DVD's are capable of a "Regional Lock" that prevents a DVD from North America being used in any of five other world regions. DVD's carry extra signals, called Macrovision, that prevent the contents being copied to video tape. DVDs also contain a "content scrambling system" that encrypts data and requires a reader decoding key. Ironically, all of these measures were "broken" rather quickly and "patches" can easily be downloaded from the Web to avoid them. History is full of examples of innovations that reduce transaction costs, and therefore, increase net wealth. However, innovation takes time, and its success is always uncertain. In the short run another option may be more profitable.

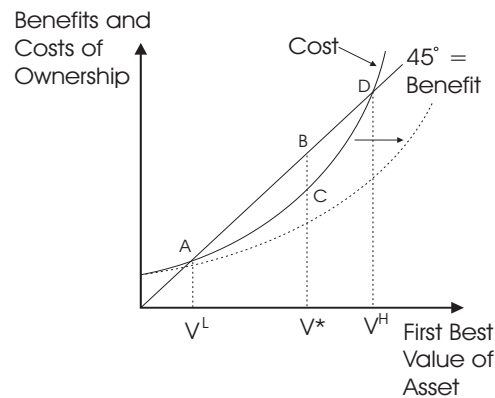


Figure 15-8

Changes in the Transaction Cost Function

A second solution to removing assets from the high zero transaction cost valued end of the public domain is to lower their *gross value*. Lowering the gross value makes the asset less attractive to theft, and given the non-linear transaction costs, the costs of enforcing the property right falls by more than the value of the property right. The net result is private ownership and a positive second-best value. The asset should be reduced in value to the level of  $V^*$  in figure 15-7, where the second best value is maximized. Here we can focus on the dramatic case of actual wealth destruction, but a more common practice is simply hiding or disguising wealth. Wealth can be hidden through non-conspicuous consumption, trade-secrets, and off-shore holdings. Apparently it was not uncommon during the Renaissance, when public protection of private wealth was minimal, for elaborate palaces to be constructed behind a ghetto facade. It is critical to note that this type of behavior is different from efforts at protection that raise *both* gross and net values. For example, we are *not* referring to cases such as putting locks on doors, "the club" on car steering wheels, or security strips in currency. We're talking about actually destroying some gross wealth to make the net wealth higher. Let's turn to two examples to show there are many examples in life where the cost of maintaining a property right are higher than a good's value.

*The Rhino's Horn.*

Let's begin with the example of the rhinoceros because it provides such a stark and simple example of the model. The wild rhinoceros is valued for many attributes, not the least of which is its horn. The horn is essentially made of compressed hair (keratin), and is similar in makeup to a human fingernail. The horn continually grows, and achieves its shape from constant sharpening. Although the horn is used to decorate ceremonial dagger handles in the Middle East, its chief use is in Far East medicine where it is ground into a powder for the relief of fevers.

Generally speaking the governments of Africa manage rhinos as a common property resource in conservation areas and on public lands. In North America, where legal property rights to land are well developed and where state regulation is often enforced, many migratory and wild specie attributes are owned by private landowners, conservation groups, or local, state, and federal governments. In some parts of Africa, most notably South Africa, there are large private reserves for mammals such as rhinos. Over the entire continent, however, rhinos are generally managed as open access.

Since the 1970s there has been an international ban on the trade of rhino horn, making it costly to develop private ranges to farm the animal. In light of the ban a black market trade in horns has developed, which has encouraged poaching. As a consequence rhinoceros populations fell considerably between 1970 to 1990 as poachers killed rhinos for the valuable horn. For example, Black Rhinos numbered between 65,000-100,000 in 1970 and today population estimates are between 3,000-4000. Similar reductions have occurred in other rhino species both in Africa and Asia.

To date no one has developed a method or technology to lower the transaction cost function for rhinos. Given the nature of the beast they require vast amounts of territory and are difficult to relocate to safe places. Rhinos require special bacteria to digest food and relocation means that new bacteria must develop when there are small changes in diet. The time lag involved means that rhinos often "starve" to death when moved. However, a solution has been found that appears to be working — dehorning. Dehorning involves the drugging of the rhino and sawing off the horn just above the skin line. The horn eventually grows back and the procedure is repeated every 18–24 months. Dehorning, like having fingernails cut, does not hurt the rhino, nor does it appear to seriously reduce the rhinos ability to forage, defend, or breed. Apparently rhinos often lose their horns in the wild with no major side effects. This is quite different from detusking elephants, whose tusk is essentially a tooth and full of nerves. Although removal of tusks has been done to elephants to reduce poaching, because it destroys other attributes of the animal, it has been less successful.

There is no question that removing a rhino's horn lowers the value of the rhino. However, given that the poacher only values the horn and that the state values the rhino for other attributes (tourism, biodiversity, etc.), removal of the horn lowers the cost of enforcement by much more than the fall in the gross value. The result is an increase in the net value of the rhino. Although it is still early in the program, it appears the policy has reduced poaching. Reports are that dehorning essentially eliminated poaching in northwest Namibia when it was first introduced. Dehorning lowers the gross value of the rhino by systematically eliminating the attribute that the thief values highly.

### *Built in Obsolescence*

On March 3, 1998 the USDA in partnership with Delta and Pine Land, a small Louisiana cotton seed company, announced a new patent for the control of germination in seeds. Monsanto, the largest seller of genetically modified seeds in the world, later purchased Delta and Pine Land and acquired the patent. Called the "terminator gene" the modification essentially makes plants sterile and unable to germinate. Almost immediately there was a massive public campaign against

the use of such technology and in 1999 Monsanto announced that it would not commercially use the terminator gene, although it reserved the right to use it in the future.

From a neoclassical perspective the terminator gene presents itself as an economic puzzle: a case of built in obsolescence if ever there was one. The gene itself does not increase output or change the plant in anyway. Its sole purpose is to prevent reproduction and the storage of seed. Forcing farmers to buy seed that lasts only one period over seed that can perpetuate itself only lowers the price of the seed. Since seed is costly to produce, destroying the reproduction capabilities of the plant can only reduce profits — at least in a zero transaction cost world.

The problem for producers of genetically modified seed is that the seeds become stolen and future crops are not captured by the current price. “Seed pirates” are a common problem in third world countries, but the case of a Saskatchewan farmer, though trivial in terms of the revenue to Monsanto, demonstrates the magnitude of the problem. Percy Schmeiser, age 68, lives in Bruno, a small town close to Saskatoon, where he has farmed all of his life. He recently was found guilty by the Federal Court of Canada where he was accused of stealing 320 acres worth of “Round-Up ready canola”.<sup>4</sup> Mr. Schmeiser, despite having a field of Monsanto product, never paid Monsanto the \$37/ha annual fee for growing it, and claimed the seeds floated onto his property from passing grain trucks. Most remarkable about the case was the extent to which Monsanto had gone to protect its property. Monsanto employees entered the farm without permission to take crop samples for genetic testing; they obtained permission from local flour mills to test Schmeiser’s seeds that had been left at the mill for cleaning; and they tried to hire the flour mill owner to report on other local farmers that might be cheating. All of this for a farmer growing a 1/2 section of canola. Clearly, the problem with genetic crops is that they are “too valuable” and encourage theft.

Contracts with farmers to forgo storage and private sales, along with inspection of crops, and tours of flour mills are expensive. The lowering of the first best value of the seed by introducing sterility is not a corporate trick to exploit farmers, but a method to increase the second-best value of the crop by reducing the transaction costs of protection. Interestingly enough, outcries in the press against the use of the terminator gene have not come from farmers using Monsanto seeds, but from farmers who do not use it (many in the third world). One wonders at how many of these farmers, like Mr. Schmeiser, actually are using stolen seed? Although it is yet to be seen if the strategy is feasible, by having a seed that cannot reproduce, problems of theft over future crops are eliminated.

The terminator gene provides an excellent example of attributes that are valuable to seed pirates, but not the legitimate farmers who purchase the seed. Assuming there are some economies of scale in growing and storing seeds, an “honest” farmer who pays for his Monsanto seed would prefer to buy one time seeds each year from Monsanto, rather than produce and store seeds himself. On the other hand, seed pirates highly value a seed’s germination qualities. Without the ability to replicate, stolen seeds are only worth the bread they can make. Monsanto did not willy-nilly lower the value of its seed. Rather it lowered the value by eliminating the attribute that was valued more by the thief than by the farmer.

The general issue with the terminator gene is one of built-in obsolescence. Built-in obsolescence may not be as rare as neoclassical textbooks claim it is. By lowering the value of a product the

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<sup>4</sup> Round-Up is a Monsanto product that farmers use to kill weeds. The Court ruled on March 27, 2001.

benefits of theft are also reduced. Lowering the value in a way that targets the thief increases net value. Consider the case of computer software. A frequent complaint about such software is that there is “excessive upgrading”; that is, producers of software are inefficiently inventing upgrades that consumers would prefer not be invented given the cost.

But there may be another reason. Software for computers is extremely easy to steal and the better the product the more likely the chance that it will be pirated. One strategy to protect the investment of the firm is to continually issue upgrades, or to postpone improvements, *even if the improvements are currently known!* Learning how to use a new upgrade or being incompatible with other users are costs of not upgrading. By offering legal owners of the software easy and cheap upgrades the software company lowers the value of theft of the early versions.

An interesting example comes from one of the most popular typesetting packages for scientific writing.  $\text{\TeX}$ , was released by Donald Knuth into the public domain virtually complete in the 1970s. At the time  $\text{\TeX}$  was capable of producing mathematical expressions, tables, and publisher quality typesetting that privately owned word processor packages only developed in the 1990s. Word processing packages that came later, and that have been notorious for failures and constant upgrades cannot be explained by a lack of knowledge over how to program mathematical expressions, tables, or other features that were in the public domain. Rather, the inferior products and constant upgrades reduced the amount of stolen software revenue and increased profits. Software companies lowered the cost of upgrades to legitimate users by offering lower prices for registered users, with manuals, and phone support.

## 15.8 Summary

This chapter has introduced you to a much more complicated model than the neoclassical model of the first 14 chapters. A standard assumption about the neoclassical model is that markets work for free. This assumption is adequate for most applications, especially in the analysis of price movements and changes in the volume of trade. However, since prices allocate goods freely, there is no room for other types of mechanisms to organize exchange and production. Yet even a casual look around not only suggests markets do not work for free, but other institutions are used to allocate resources as well. The start to understanding organizations is to understand the concept of transaction costs. Transaction costs are a special type of cost: they are the cost of establishing and maintaining ownership over an asset, a stream of income, or anything else you might value.

When transaction costs are zero, any distribution of property rights lead to the same efficient outcome. This is the Coase Theorem. When transaction costs are not zero, then every distribution of property rights lead to a different outcome and the one that provides the most wealth is the optimal organization. This model was applied to different types of ownership. Private property is valuable because it provides the right incentives to use resources, but also requires private protection. Common property and open access are alternative methods of ownership that provide worse incentives, but mitigate protection costs. We also saw that as an asset increases in value it is more likely to be owned. However, given that extremely valuable assets might be too costly to protect, there is an optimal value of assets. In the next chapter we take this transaction cost notion of optimal ownership and apply it to firms.

### REVIEW QUESTIONS

1. Is a fence a transaction cost?
2. What is the point of the Coase Theorem?
3. Are property rights human rights? Are human rights property rights?
4. In feminist theories there is the concept of “power.” How might this fit into the discussion of property rights offered here?
5. If mother nature didn’t exist, would there be transaction costs?
6. A squash partner always leaves his dirty old boots outside the court when he plays. Every time he comes out and says “Look, my boots are still here, that shows you once again how honest people are. I just don’t see how you can believe people are always greedy.” What is an alternative explanation for the lack of theft?
7. Barbed wire was invented by Joseph F. Glidden in 1874, and it was an immediate commercial success because it allowed cattle ranchers to cheaply fence vast areas of land. Can you think of some ways barb wire changed ordinary production costs and how it changed transaction costs?

## PROBLEMS

1. When something is stolen ransom seems like the obvious thing for the thief to always do. The original owner must be the high marginal valued user of the good, so why not sell it back? Can you think of why children tend to be ransomed rather than automobiles?
2. A common explanation for the breakdown of the Coase theorem is that the husband may simply beat his wife to accepting the poorer circumstance. How is this also a problem of transaction costs and incomplete property rights?
3. The golden rule states that “we should do unto others, as we would like others do unto us”. Is this a low or a high transaction cost rule for social interactions? Briefly explain.
4. In a world of zero transaction costs, what will the effect of changing liability for accidents be due to the amount of safety equipment in a coal mine? That is, suppose initially workers are responsible for accidents, but courts later switch this to employers being responsible. Explain your answer briefly.
5. Why might a gallery owner who sells a painting create more economic surplus than the artist who painted it? (Provide a supply and demand graph in your answer).
6. Would there not be any violence in a world of zero transaction costs?
7. Why did the bison die out, but cattle didn't?
8. Why do shopping centers often provide free parking — even to people who don't shop in the stores?
9. Using the ideas we learned in the “neoclassical model” what would be the best thing to send to an area that has been devastated by a flood or other similar tragedy? Why? Using the ideas from this chapter; that is, considering that the world is always characterized by positive transaction costs, why do we seldom send the good you just mentioned to victims of natural disasters? What do we tend to send instead and why?
10. In Europe, if you go to a public washroom, most of the time you have to pay for the toilet paper or pay some form of user fee. This never happens in North America. Why?
11. Everyone in my house loves pumpkin pie, and there is often an argument at the dinner table over who got the biggest piece. The solution was to use the simple rule that one child gets to cut the pieces of pie, while the other children get to decide which piece they want. What economic principle is being exploited here? Can you think of a problem that results from this allocation rule?
12. If it was illegal for anyone to own pigs, what would happen to the price of pork?
13. What would be an example of a transaction cost in using money? Do your examples explain why gold was so commonly used as money? (Hint: Think about why diamonds were seldom used as money.)



14. Why did domestic turkey's survive, but wild turkey's became practically extinct, given that the latter is much smarter than the former?
15. Seattle is made up of many small communities. One of these communities, Innes Arden, was on a hill overlooking the Puget Sound, and was developed in the 1950s by the Boeing company for its executives. At one point there were over 30 court cases pending — all of them over the height of trees. Supposedly trees planted 50 years ago were now blocking views. Why was the Coase theorem not working here? That is, (and you should be able to answer this in one sentence) why were the neighbors not bargaining over the trees? If the views were worth more than the trees, then the trees should come down. If they were not, then the trees should stand. Eventually one of the cases was settled in court. What do you suppose happened to the remaining 29 cases when the first case was decided?
16. Consider the following four cases:
  - a. A man speeds and wipes out a fence of yours worth \$100. The man gets fined.
  - b. A man steals \$100 from your house, is caught, and thrown in jail.
  - c. A man plants a tree on his property that blocks your view and reduces the value of your property by \$100. The police just tell you to take him to court.
  - d. A man opens a business just like yours and draws \$100 worth of customers away. The man gets a pat on the back.

In each case you lose \$100, yet the social rules used to respond to each loss is different. Questions:

- i) Why is there no penalty in (d)?
  - ii) In (a) and (b) laws were broken. Why might some crimes have fines and others internment? (Don't say that everyone speeds).
  - iii) Why does the Coase theorem not apply in (c)?
17. Many economists have argued that there is a property right problem with the fisheries. Since no one owns the fish, more than an optimal level of effort is applied to the fishery, and the rents from fishing are driven to zero. Now, consider retailing. A retailer is just like a fisherman, he fishes for customers. Since entry into retailing is open to anyone, there is too much retailing — just as there is too much fishing. Do you agree? Why or why not?
  18. Why would a local residential community often have flower beds or other physical interruptions in street intersections that slow down traffic?
  19. When you look around most of the furniture on a university campus, especially the furniture in the public spaces, it isn't very comfortable, and it certainly isn't very pretty. This is a common aspect of most public furniture. Why would this be?

20. What is the relationship between transaction costs, sunk costs, and opportunity costs?
21. During the Klondike gold rush of 1898, thousands of people flooded the small tent city of Dawson, Yukon in an attempt to find gold. Since there was no civilization on the spot only 2 years earlier, the town lacked any currency. Goods were traded for gold. Consider the following quote on the problems of using gold as a medium of exchange, taken from Pierre Berton's book *Klondike*.

... the great medium of exchange continued to be gold dust, and because of its uncertain quality a continual tug-of-war was maintained between merchant and customer. Most men used the so-called "commercial dust," heavily laced with black sand, to pay their bills. As the bank valued this commercial dust at only eleven dollars an ounce, a customer using it to buy groceries or whiskey could reckon that he was saving five dollars an ounce, since the normal price of clean Klondike gold ran around sixteen dollars — and the tradesmen tacitly accepted all dust at this price. This profit was increased by some who judiciously salted their pokes with fine brass filings. On the other hand, the bartenders and commercial businessmen weighed the dust carelessly, so that a poke worth one hundred dollars was usually empty after seventy dollars' worth of purchases were made. Thus, as was often the case in the Klondike, the gain was largely ephemeral.

- a. From this quote, what are some examples of transaction cost behavior?
- b. Throughout history, gold has been used as a medium of exchange. Why do you think other commodities were not used as a medium of exchange? Why do you think paper fiat currency replaced gold? Is there a transaction cost problem with paper money?
- c. If the miners were cheating the sellers by using padded gold dust, and the sellers were cheating the miners with loose measurements, does that mean in the end we obtain an outcome equivalent to one where there was no cheating going on?

## Review Question Answers

1. *Yes. In our world, where property rights are not perfect, a fence is certainly a transaction cost. We put them up to protect what we own.*
2. *Coase was trying to argue that the neoclassical model leads to what we call the “Coase Theorem.” He did not suggest that this is how the world is. Rather, he was arguing that since property rights do matter, we must look towards transaction costs to explain why they matter.*
3. *I believe property rights include human rights. Historically human rights were synonymous with natural rights: the right to life, free speech, liberty. More recently they have included such things as rights to education and minimal standards of living. To the extent one is able to obtain these things, they are economic property rights. To the extent they are defined under law they are legal rights.*
4. *“Power” and “economic property rights” would appear to be the same thing.*
5. *No, at least nothing of significance. If there were no nature, then there really can be no confusion over outcomes and actions. We would always be able to trace back why we were cheated, and as a result, there would be no cheating.*
6. *Who wants a pair of used ugly boots.*
7. *First, barbed wire lowered labor costs since fewer people were required to supervise the daily activity of cattle. Second it lowered the cost of keeping weight on cattle because the cattle roamed less. Wandering cattle use up calories. Third it lowered the cost of protecting cattle from cattle thieves. However, the major savings came from reduced fighting between ranchers over open grazing fields and water sources. On the open range rangers would have to be present to keep other herds away from grazing and water resources. The reduced time spent protecting cattle was devoted towards husbandry. Thus most development of cattle breeds takes place with fenced in cattle, not cattle on the open range.*

## Odd Numbered Problem Answers

1. *The problem with selling it back is the original owner knows the good is stolen. When the economic property rights are separated from the legal rights, trade is very difficult. In the case of children, the next best offer will be extremely low, probably zero. So there is an incentive to sell them back to the original parents.*
3. *If everyone were to obey it, it would lower transaction costs. The problem is one wolf in the fold can destroy a lot of sheep. So unless we can identify and trust people to follow this strategy, it is a high cost rule.*
5. *Bringing buyers and sellers together is valuable. This value could be greater than the good being traded. In Figure 15-5, the artist on his own has a cost of  $p_2 - p_1$  per unit to bring customers together. At this high cost, only  $q'$  units of art are sold. The dealer's costs might be  $p_4 - p_3$ , at which trade increases to  $q''$ .*

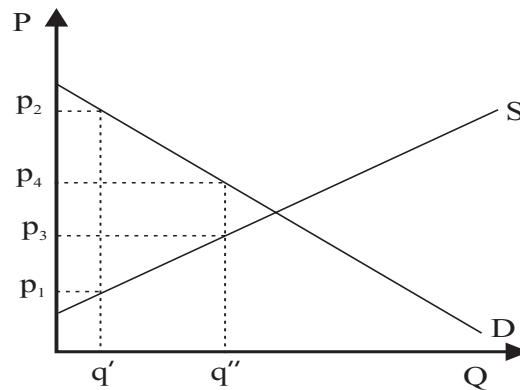


Figure 15-5

7. *The bison were controlled as common property by the Indians for their valuable robes. This meant killing them in the fall. The early hunters also exploited them for their robes. Later, the bison became valued for their leather hides and were killed in the summer while they were in large herds. Because cattle also provided leather, there was no price change as the bison were falling in number, and no great incentive to privatize them. The bison hunt soon became open access. Bison were also hindered by the fact no one in the 19th century really knew how to raise bison in captivity, and attempts to raise them as cattle were huge failures. Thus the lack of knowledge and incentive lead to no ownership over bison and over exploitation. With cattle the opposite was true. They were domesticated, valuable, and privately owned. As a result they were not exploited the extinction.*
9. *The standard economic response would be to send money. The people in trouble know better what they need than we do, so we should provide cash. We don't send cash, however, because it is too easy to steal, and often doesn't get to the people who need it. Therefore, aid is almost always in the form of goods.*

11. *It exploits maximization. The problem is too much time is spent in measurement. This isn't such a big deal with dessert, but it becomes a big problem with other valuable goods. As a result, this method is not used for expensive goods.*
13. *The big cost is in verifying the quality, that is, in measuring the money. Diamonds are very hard to measure, and therefore have always made a poor currency. Gold is relatively easy to measure and difficult to fake.*
15. *The Coase theorem couldn't work because it was not clear who had the property right to the view. Once the first case was settled, the other cases negotiated.*
17. *The problem with the analogy is that customers are not fish. They only buy when it makes them better off. Too much retailing would be punished by consumers and so it doesn't happen.*
19. *This is the same answer as in number 18. They lower the value of the furniture to prevent theft.*
21.
  - a. *Using sand and brass to increase the volume of material in lieu of gold is a form of cheating on the part of miners. No doubt they would claim less sand was in the mixture than was actually there. The brass would never be claimed, and it was used to hide in the gold. This problem is cheaply eliminated by the use of proper assay equipment, but in the early days of the Klondike rush, it was not available. The slippery methods of measurement on the part of the merchants is another transaction cost problem.*
  - b. *A medium of exchange must be easy to measure, because the commodity must be measured for each exchange. Basically gold was used as a medium of exchange because it was the lowest cost commodity to measure. Still, it was not perfect, and fiat money replaced it. The problem with fiat money is counterfeiting ... another transaction cost problem.*
  - c. *Both sides know the other side is going to try to cheat. Both sides take efforts to police this behavior. This raises the cost of the exchange and lowers the amounts traded. Hence, both sides would be better off if there was no transaction cost problem.*