

## Nonwage and Asset Income: Rents, Profits, and Interest

The first man to fence in a piece of land, saying “This is mine,”  
and who found people simple enough to believe him,  
was the real founder of civil society.

—Jean-Jacques Rousseau

The four traditional categories of income are wages, rent, profits, and interest. Wages, discussed in Chapter 16, are determined by economic factors (the forces of supply and demand), with strong influences by political and social forces which often restrict entry or hold wages at non-market-clearing levels.

The same holds true for nonwage income: rent, profits, and interest. These forms of income are determined by the forces of supply and demand. But, as I have emphasized throughout the book, supply and demand are not necessarily the end of the story. Supply and demand determine price and income, given an institutional structure that includes **property rights** (*the rights given to people to use specified property as they see fit*) and the **contractual legal system** (*the set of laws that govern economic behavior*) of the society. If you change property rights, you change the distribution of income. Thus, in a larger sense, supply and demand don't determine the distribution of income; the distribution of property rights does.

The system of property rights and the contractual legal system that underlie the U.S. economy evolved over many years. Many people believe that property rights were unfairly distributed to begin with; if you believe that, you'll also believe that the distribution of income and the returns to those property rights are unfair. In other words, you can favor markets but object to the underlying property rights. Many political fights about income distribution concern fights over property rights, not fights over the use of markets.

Such distributional fights have been going on for a long time. In feudal times much of the land was held communally; it belonged to everyone, or at least everyone used it. It was common land—a communally held resource. As the economy evolved into a market economy, that land was appropriated by individuals, and these individuals became landholders who could determine the use of the land and could receive rent for allowing other individuals to use that land. Supply and demand can explain how much rent will accrue to a landholder; it cannot explain the initial set of property rights.

The type of issues raised by looking at the underlying property rights are in large part academic for Western societies. The property rights that exist, and the

### AFTER READING THIS CHAPTER, YOU SHOULD BE ABLE TO:

- Define *rent* and explain why landowners will bear the entire burden of a tax on land.
- Explain rent seeking and its relationship to property rights.
- Differentiate between normal profits and economic profits.
- Summarize the reasons an entrepreneur searches out market niches.
- Define *interest* and demonstrate how it is used in determining present value.
- Use the annuity rule and the rule of 72 to determine present value.
- Explain the marginal productivity theory of income distribution.

Although zoning laws modify property rights, you're not going to see someone introducing a new set of property rights in the United States.

contractual legal system under which markets operate, are given. You're not going to see somebody going out and introducing a new alternative set of property rights in which the ownership of property is transferred to someone else. The government may impose shifts at the margin; for example, new **zoning laws** (*laws that set limits on the use of one's property*) will modify property rights and create fights about whether society has the right to impose such laws. But there will be no wholesale change in property rights. That's why most economic thinking simply takes property rights as given.

But taking property rights as given isn't a reasonable assumption for the developing countries or the formerly socialist countries now in the process of establishing markets. Hernando DeSoto, in *The Mystery of Capital*, argues that in countries where property rights are determined by physical possession, instead of transferable legal rights, individuals cannot get loans using property rights as collateral and once they take possession cannot transfer the property to others who could put it into more productive uses. When property rights are determined by physical possession instead of legal ownership, the financial economy cannot function efficiently. To unleash the economic potential of these assets, developing and transitional economies must decide what structure of property rights they want. Who should be given what was previously government land and property? Who should own the factories? Do those societies want land to be given to individuals in perpetuity, or do they want it given to individuals for, say, 100 years? As these questions have been raised, economists have redirected their analysis to look more closely at the underlying legal and philosophical basis of supply and demand. As they do so they are extending and modifying the economic theory of income distribution, as we'll discuss shortly.

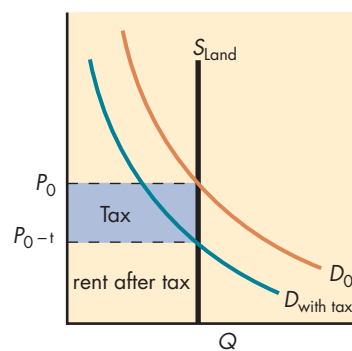
Despite the redirection of economist's analysis away from the traditional categories, it's helpful to consider the three traditional income categories besides wages (rent, profits, and interest) because doing so provides useful insight into forces that make our economy work and that determine who gets what.

## Rent

Rent is the income from a factor of production that is in fixed supply.

Rent is the income from a factor of production that is in fixed supply. Traditionally rent was associated with land, which was assumed to be a totally fixed factor of production. When the supply of a factor is fixed, all we need to know to determine what the price of land (rent) will be is the amount of land there is and the demand curve. Figure 1 shows how the price of land is determined. In it you can see that since the supply of land is perfectly inelastic, the level of demand determines the rent on land.

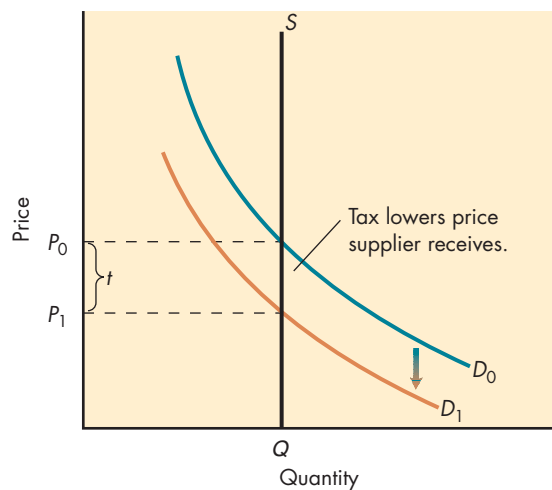
As long as land is perfectly inelastic in supply, landowners will pay the entire burden of a tax on land, as in the graph below.



## The Effect of a Tax on Land

To check whether you understand the concept of rent, let's try a couple of questions. Say the government places a tax on the user of land. What will that tax do to the quantity of land supplied? What will that tax do to the price of the land? And who will end up bearing the burden of that tax? (Before proceeding, think, and try to answer these questions.)

The answers you should have given are that the quantity of land supplied will not change; the price of the land will not change, and the owner of the land will bear the entire burden of the tax even though the user of the land will actually pay the tax. In terms of Figure 1, the tax shifts the demand curve for land down from  $D_0$  to  $D_1$ . Now the user simply pays part of the rental payment ( $t$ ) to the government. So if the landowner had been getting \$100 per year in rent, after a tax of \$30 per year the landowner would get only \$70 per year. This follows immediately from the diagram: Given the quantity of land supplied, demanders will pay no more than the equilibrium price. By assumption,

**FIGURE 1** Rent

A tax on any factor with a perfectly inelastic supply will fall only on the supplier. A tax of  $t$  will shift the demand curve down from  $D_0$  to  $D_1$ , leaving the after-tax price that the demander pays constant at  $P_0$  but lowering the after-tax price that the supplier receives by  $t$ —from  $P_0$  to  $P_1$ .

suppliers will supply the same amount of land regardless of the price they receive, so they must bear the entire burden of the tax. If they didn't, the price of land would have to rise and it cannot; demanders won't pay more for that quantity.

If you've followed the analysis, the preceding conclusion was obvious, but now let's extend it to the real world. Say the government increases the property tax. Should people who rent apartments worry that such a tax is going to raise rents? The analysis tells us no, they shouldn't; in reality, they do worry about it a lot. Part of the reason is that the assumptions don't fit reality. The supply of land isn't perfectly inelastic; new land can be created by landfills and a variety of methods can convert useless land to useful land. The supply of apartments is even more elastic since rental apartments have other uses. So the consumers are partially right.

But the model is partially right, too, because even taking these provisos into account, most economists see the supply of apartments as rather inelastic. And as long as the supply of apartments is less elastic than the demand for apartments, more of the property tax will fall on the apartment owner and most of an increase in the property tax won't be passed on to the consumer. It can look as if it's being passed on since actual rents are determined only at periodic intervals, and often the actual rent paid can deviate from the supply/demand-determined rent. Property owners often find it convenient to blame raises in rent on increased costs, even though they would have increased rent even if taxes had not risen. Blaming the government is much easier than saying, "Look, apartments are in tight supply. Somebody else will pay me more, so I'm increasing your rent."

The inelastic supply of land and the knowledge that ultimately most of the tax on land will be paid by the owner has led to a number of taxing proposals. One such proposal was put forward by Henry George, who argued that the government should replace all other taxes with a land tax. His proposal enjoyed significant political influence in the late 19th century; an economic institute dedicated to his ideas still exists today.

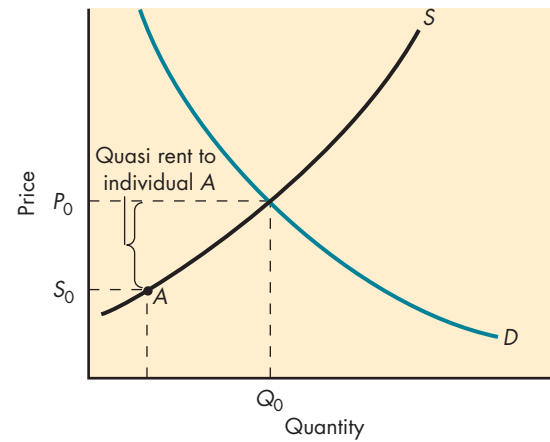
## Quasi Rents

The concept of rent was extended in the 1900s to include any payment to a resource above its opportunity cost—that is, above the amount it would receive in its next-best use. This broader concept of rent is shown in Figure 2. In it you can see that the supply

**Q.1** If the demand for a good is perfectly elastic and the supply is elastic, who will bear the burden of a tax on the good paid by consumers, and why?

**FIGURE 2** Quasi Rent

Quasi rent is the payment to a supplier above his or her opportunity cost. In this example an individual represented by point A on the supply curve would be willing to supply the good at  $S_0$  but the market equilibrium price is  $P_0$ . The difference  $P_0 - S_0$  is his or her quasi rent.



curve is upward sloping. Equilibrium is at price  $P_0$  and quantity  $Q_0$ . Consider a person on the supply curve at point A. That person will receive price  $P_0$ , but would have been willing to supply his or her resource at  $S_0$ . The difference,  $P_0 - S_0$ , is the person's rent. (To distinguish this difference from pure rent, in which the opportunity cost of supplying the factor is zero, sometimes the difference is called *producer surplus* or **quasi rent**—any payment to a resource above the amount that the resource would receive in its next-best use.)

Let's consider an example: Shaquille O'Neal. The demand for his services as a basketball player is high so he earns a multimillion dollar salary. His salary likely significantly exceeds his opportunity cost (the wage he could get at the next-best job). The difference between the two would be the quasi rent component of his salary.

This broader concept of rent applies to all types of income. For example, wage income can include a considerable rent component, as can profits and interest. As long as a supply curve is upward sloping, some suppliers are receiving some rent.<sup>1</sup>

### Rent Seeking and Institutional Constraints

The broadened definition of rent led to the insight that if individuals could somehow restrict supply, the rent they received would be higher. **Rent seeking** is the name given to the restricting of supply in order to increase the price suppliers receive. It is an attempt to change the institutional structure and hence the underlying property rights. The concept of rent seeking ties back into our earlier discussion of property rights. If you own something, you can get a rent for owning it. Thus, rent seeking is an attempt to create either ownership rights or institutional structures that favor you. Rent seeking is an activity in which self-interest doesn't necessarily lead to societal interest. The property rights you get might simply take away property rights from another person.

Of course, it is a legitimate activity for people to try to structure property rights to benefit themselves. Sometimes it can have positive social consequences, so there's no

**Q.2** How does a quasi rent differ from a rent?

**Rent seeking** is the restricting of supply in order to increase its price. It is an attempt to change the institutional structure and hence the underlying property rights.

There's no easy answer about what is the appropriate social policy to deal with rent seeking.

<sup>1</sup>One could also say that as long as the demand curve is downward sloping, some demander is receiving rent. One doesn't say that, however. The difference between what a demander would be willing to pay and what the demander actually pays is called *consumer surplus*. As was discussed in earlier chapters, consumer surplus is the demand-side equivalent of rent.

## Where to Find a Market Niche



## APPLYING the Tools

Many kinds of market niches exist, and competition works because people search out these market niches and exploit them. In doing so, they eliminate the niches. That's what competition is.

The most likely place to find a temporary market niche may be at your current job. Say you're working for a construction firm and notice that the firm is having trouble reaching high places where it needs to work. The firm doesn't often work on high places, so it isn't worthwhile for it to buy an aerial lift truck; but when it does need to work up high, it could save enormous amounts of time and money if it had such a lift. You check out other construction firms and find they're in a similar situation. You quit your job, buy an aerial lift truck, and start your own firm, renting out your services. For a while, at least, you'll have a market niche.

That is the strategy I followed with this book. Most of the other introductory economics textbooks I read were staid

and boring. I believed there was room in the market for a book with pizzazz—a book in which the author wouldn't be afraid to allow his true style to show through. This book exists in part because of market incentives that led me to exploit a market niche. It's the invisible hand at work.

But market incentives aren't the only reason I wrote this book. I wrote this book because I didn't like the way I was taught introductory economics. Given my ego, I thought I could do better—that I could make economics come alive. The desire to "do it right" was the most important reason I wrote this book. (That isn't to say that the expectation of profit didn't play a role.)

The lesson is simple: To understand the economy it's important to remember that, while the profit motive drives people, so too do other motives.

easy answer about what is the appropriate social policy to deal with rent seeking. All rent seeking isn't bad, but there's no simple way to separate the bad from the good.

Let's consider a final hypothetical example, from the biotechnology field, which demonstrates one of the problems in making value judgments about rent seeking. Say a firm has created a new organism (a new life form) that eats nuclear waste and transforms it into humus soil. (OK, so I'm a dreamer; it could happen.) The firm will likely spend enormous amounts of money on trying to ensure that it will "own" that life form, because otherwise it won't make any income from it. In other words it will engage in rent seeking. But the rent seeking has a positive side. Unless a firm can expect to own the life form, it is unlikely to expend money on developing such a life form. Society may well be better off if property rights in such life forms exist.



**Q<sub>3</sub>** Rent seeking causes waste. Should rent seeking be prohibited?

## Profit

A second component of nonwage income is profit. **Profit** is a return on entrepreneurial activity and risk taking. As discussed in earlier chapters, profits are generally divided into normal profits and economic profits. **Normal profits** are payments to entrepreneurs as the return on their risk taking. They are an amount that an entrepreneur could get if he or she supplied entrepreneurship to the market. It is the marginal entrepreneur—the entrepreneur whose opportunity cost equals his or her expected gain—who receives a normal profit. Others receive a quasi rent in addition to profit.

Because normal profits include returns on risk taking, profits aren't normally normal. Sometimes normal profits are high; sometimes they're nonexistent; and sometimes they're negative (that is, there are losses). However, it is expected, not actual, profits that guide the entrepreneur.

Normal profits are the amount that an entrepreneur can get by supplying entrepreneurship to the market. Economic profits are the entrepreneur's return above and beyond normal profits.

### Profit, Entrepreneurship, and Disequilibrium Adjustment

Economic profits are the driving force of the invisible hand.

**Economic profits** are a return on entrepreneurship above and beyond normal profits. Economic profits are a sign of disequilibrium and are a signal to other entrepreneurs that it may be worthwhile to enter that market. Economic profits are the driving force of the invisible hand. The expectation of economic profit leads to innovation and creates incentives for entrepreneurs to enter into new markets. As entrepreneurs enter, they drive the price to an equilibrium price and eliminate economic profits. In this way the expectations of profits are the dynamic force in the economy, unleashing the competitive forces that will eliminate the profits.

To drive this important point home, let's relate this discussion of profit to our earlier analysis. One of the lessons you have learned (or should have learned) from the theoretical analysis of supply and demand is that competition drives the price in a market down to equal average total costs. In the long run, perfectly competitive suppliers make normal returns on their investments—that is, zero economic profits. To remind you of that point, I show a perfectly competitive firm in long-run equilibrium in Figure 3(a).

Equilibrium isn't something that just exists. It's brought about by competition—by other suppliers entering into the market. Entrepreneurs avoid highly competitive markets that are in equilibrium. Why? Because there aren't a whole lot of profits to be made in such markets. What they look for are not-so-competitive markets—markets in disequilibrium with price greater than average cost. In disequilibrium, you can make a lot of profits. Consider Figure 3(b). It represents a market in disequilibrium. Notice that the price is  $P_0$  but the costs per unit are only  $C_0$ , which means that the supplier makes an economic profit represented by the shaded rectangle.

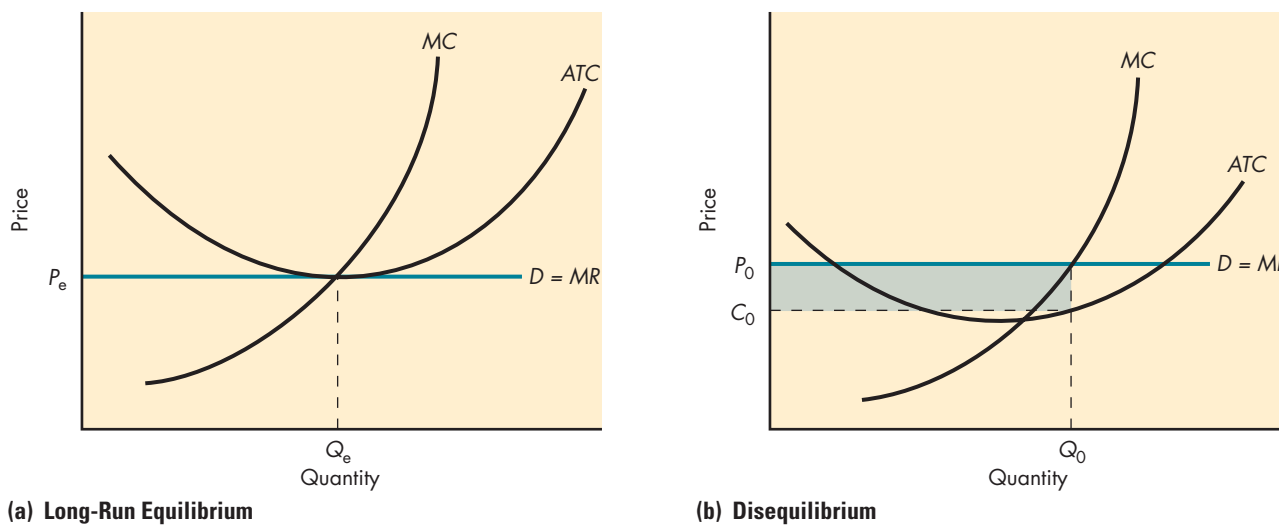
### Market Niches, Profit, and Rent

An entrepreneur seeks market niches because within those niches lie economic profits.

What kind of markets are in disequilibrium? Ones in which competition isn't working or is working slowly. A **market niche** is an area in which competition is not working.

**FIGURE 3 (A AND B)** Long-Run Equilibrium and Disequilibrium

In a competitive market, all profit is competed away in long-run equilibrium as it is in (a):  $P = MC = ATC$ . When there is a market niche, profit can remain and price can deviate from  $ATC$ , leaving profit of the shaded area in (b).



Entrepreneurs search for market niches. The best type of market niche to have is a monopoly, in which you're the sole supplier and you face no competition.

Such pure monopolies are rare, but temporary disequilibrium is not rare. In fact, the competitive conditions that push economic profit all the way down to zero often don't exist. For example, if no one knows you're making a profit, competitors won't enter the market to drive the price down; a disequilibrium can continue indefinitely. Bright entrepreneurs who have found a profitable market niche don't advertise the fact.

Often after an entrepreneur has made an innovation and is enjoying his above-normal economic profits, his income can look a lot like rent. This leads some people to think that society can simply tax it away with no consequence; the entrepreneur's actions won't change. That's true—if one considers those above-normal profits without historical perspective. But with historical perspective, there is a major difference. One of the driving forces behind the entrepreneur was probably the expectation of future profit. That's an important reason why she did her entrepreneurial thing.

It's true that after she's done her entrepreneurial thing, if you take what she got for doing it away from her, it won't change the past. But it will most likely change the future. Other entrepreneurs will draw the inference that their profits will be taken away from them and they won't do their entrepreneurial thing. But entrepreneurial activity is what drives the economy to equilibrium and leads to many of the innovations. If entrepreneurial incentives are removed, society may well be worse off.

**Q<sub>4</sub>** You're at a party of suppliers. Ms. A is telling everyone how wonderful her business is; Ms. B is saying nothing. You're thinking of entering either Ms. A's or Ms. B's business. Which should you investigate first? Why?

**Q<sub>5</sub>** Why is it often difficult to distinguish rent from profit?

## Interest

The third traditional component of nonwage income is interest. **Interest** is *the income paid to savers—individuals who produce now but don't consume now*. Instead they lend out the proceeds of their production, allowing others to invest or consume now. In return they get a promise to pay back that loan, together with whatever interest they negotiated. Whereas profits and rents accrue to the individuals who are supplying some resource to the economy, interest is what businesses and entrepreneurs pay to those who make loans to them. High profits encourage entrepreneurial action; high interest rates discourage it.

**Present value** is a method of translating a flow of future income or savings into its current worth. For example, say a smooth-talking, high-pressure salesperson is wining and dining you. "Isn't that amazing?" the salesman says. "My company will pay \$10 a year not only to you, but also to your great-great-great-grandchildren, and more, for 500 years—thousands of dollars in all. And I will sell this annuity—this promise to pay money at periodic intervals in the future—to you for a payment to me now of only \$800, but you must act fast. After tonight the price will rise to \$2,000."

Do you buy it? My rhetoric suggests that the answer should be no—but can you explain why? And what price *would* you be willing to pay?

To decide how much an annuity is worth, you need some way of valuing that \$10 per year. *You can't simply add up the \$10 five hundred times*. Doing so is wrong. Instead you must *discount* all future dollars by the interest rate in the economy. Discounting is required because a dollar in the future is not worth a dollar now.

If you have \$1 now, you can take that dollar, put it in the bank, and in a year you will have that dollar plus interest. If the interest rate you can get from the bank is 5 percent, that dollar will grow to \$1.05 a year from now. That means also that if the interest rate in the economy is 5 percent, if you have 95¢ now, in a year it will be worth \$.9975 ( $5\% \times \$1 = \$.0475$ ). Reversing the reasoning, \$1 one year in the future is worth 95¢ today. So the present value of \$1 one year in the future at a 5 percent interest rate is 95¢.

**Interest** is the income paid to savers—individuals who produce now but do not consume now.

**Present value** is a method of translating a flow of future income or savings into its current worth.

Interest plays an essential role in the present value formula.

A dollar *two* years from now is worth even less today. Carry out that same reasoning and you'll find that if the interest rate is 5 percent, \$1 two years from now is worth approximately 90¢ today. Why? Because you could take 90¢ now, put it in the bank at 5 percent interest, and in two years have \$1.

### The Present Value Formula

Carrying out such reasoning for every case would be a real pain. But luckily, there's a formula and a table that can be used to determine the present value (PV) of future income. The formula is:

**Q-6** An 8 percent bond will pay you \$1,080 one year from now. The interest rate in the economy is 10 percent. How much is that bond worth now?

$$PV = A_1/(1 + i) + A_2/(1 + i)^2 + A_3/(1 + i)^3 + \dots + A_n/(1 + i)^n$$

where

$A_n$  = the amount of money received  $n$  periods in the future

$i$  = the interest rate in the economy (assumed constant).

Solving this formula for any time period longer than one or two years is complicated. To deal with it, people either use a business computer or a present-value table like that in Figure 4.

Figure 4(a) gives the present value of a single dollar at some time in the future at various interest rates. Notice a couple of things about the chart. First, the further into the future one goes, the lower the present value. Second, the higher the interest rate, the lower the present value. At a 12 percent interest rate, \$1 fifty years from now has a present value of essentially zero.

**FIGURE 4 (A AND B)** Sample Present Value and Annuity Tables

Year	Interest Rate						
	3%	4%	6%	9%	12%	15%	18%
1	\$0.97	\$0.96	\$0.94	\$0.92	\$0.89	\$0.87	\$0.85
2	0.94	0.92	0.89	0.84	0.80	0.76	0.72
3	0.92	0.89	0.84	0.77	0.71	0.66	0.61
4	0.89	0.85	0.79	0.71	0.64	0.57	0.52
5	0.86	0.82	0.75	0.65	0.57	0.50	0.44
6	0.84	0.79	0.70	0.60	0.51	0.43	0.37
7	0.81	0.76	0.67	0.55	0.45	0.38	0.31
8	0.79	0.73	0.63	0.50	0.40	0.33	0.27
9	0.77	0.70	0.59	0.46	0.36	0.28	0.23
10	0.74	0.68	0.56	0.42	0.32	0.25	0.19
15	0.64	0.56	0.42	0.27	0.18	0.12	0.08
20	0.55	0.46	0.31	0.18	0.10	0.06	0.04
30	0.41	0.31	0.17	0.08	0.03	0.02	0.01
40	0.31	0.21	0.10	0.03	0.01	0.00	0.00
50	0.23	0.14	0.05	0.01	0.00	0.00	0.00

**(a) Present Value Table (value now of \$1 to be received  $x$  years in the future)**

The present value table converts a future amount into a present amount.

Number of Years	Interest Rate						
	3%	4%	6%	9%	12%	15%	18%
1	\$ 0.97	\$ 0.96	\$ 0.94	\$ 0.92	\$0.89	\$0.87	\$0.85
2	1.91	1.89	1.83	1.76	1.69	1.63	1.57
3	2.83	2.78	2.67	2.53	2.40	2.28	2.17
4	3.72	3.63	3.47	3.24	3.04	2.85	2.69
5	4.58	4.45	4.21	3.89	3.60	3.35	3.13
6	5.42	5.24	4.92	4.49	4.11	3.78	3.50
7	6.23	6.00	5.58	5.03	4.56	4.16	3.81
8	7.02	6.73	6.21	5.53	4.97	4.49	4.08
9	7.79	7.44	6.80	6.00	5.33	4.77	4.30
10	8.53	8.11	7.36	6.42	5.65	5.02	4.49
15	11.94	11.12	9.71	8.06	6.81	5.85	5.09
20	14.88	13.59	11.47	9.13	7.47	6.26	5.35
30	19.60	17.29	13.76	10.27	8.06	6.57	5.52
40	23.11	19.79	15.05	10.76	8.24	6.64	5.55
50	25.73	21.48	15.76	10.96	8.30	6.66	5.55

**(b) Annuity Table (value now of \$1 per year to be received for  $x$  years)**

The annuity table converts a known stream of income into a present amount.

Figure 4(b) is an annuity table; it tells us how much a constant stream of income for a specific number of years is worth. Notice that as the interest rate rises, the value of an annuity falls. At an 18 percent interest rate, \$1 per year for 50 years has a present value of \$5.55. To get the value of amounts other than \$1, one simply multiplies the entry in the table by the amount. For example, \$10 per year for 50 years at 18 percent interest is  $10 \times \$5.55$ , or \$55.50.

As you can see, the interest rate in the economy is a key to present value. *You must know the interest rate to know the value of money over time.* The higher the current (and assumed constant) interest rate, the more a given amount of money in the present will be worth in the future. Or alternatively, the higher the current interest rate, the less a given amount of money in the future will be worth in the present.

You must know the interest rate to know the value of money over time.

### Some Rules of Thumb for Determining Present Value

Sometimes you don't have a present-value table or a business computer handy. For those times, there are a few rules of thumb and simplified formulas for which you don't need either a present-value table or a calculator. Let's consider two of them: the infinite annuity rule and the rule of 72.

**The Annuity Rule** To find the present value of an annuity that will pay \$1 for an infinite number of years in the future when the interest rate is 5 percent, we simply divide \$1 by 5 percent (.05). Doing so gives us \$20. So at 5 percent, \$1 a year paid to you forever has a present value of \$20. The **annuity rule** is that *the present value of any annuity is the annual income it yields divided by the interest rate.* Our general annuity rule for any annuity is expressed as:

$PV = X/i$  states the annuity rule: Present value of any annuity is the annual income it yields divided by the interest rate.

$$PV = X/i$$

That is, the present value of an infinite flow of income,  $X$ , is that income divided by the interest rate,  $i$ .

Most of the time, people don't offer to sell you annuities for the infinite future. A typical annuity runs for 30, 40, or 50 years. However, the annuity rule is still useful. As you can see from the present-value table, in 30 years at a 9 percent interest rate, the present value of \$1 isn't much (it's 8¢), so we can use this infinite flow formula as an approximation of long-lasting, but less than infinite, flows of future income. We simply subtract a little bit from what we get with our formula. The longer the time period, the less we subtract. For example, say you are wondering what \$200 a year for 40 years is worth when the interest rate is 8 percent. Dividing \$200 by .08 gives \$2,500, so we know the annuity must be worth a bit less than \$2,500. (It's actually worth \$2,411.)

**Q-7** You are to receive \$100 a year for the next 30 years. How much is it worth now if the current interest rate in the economy is 3 percent? (Use annuity table.)

The annuity rule allows us to answer the question posed at the beginning of this section: How much is \$10 a year for 500 years worth right now? The answer is that it depends on the interest rate you could earn on a specified amount of money now. If the interest rate is 10 percent, the maximum you should be willing to pay for that 500-year \$10 annuity is \$100:

$$\$10/.10 = \$100$$

If the interest rate is 5 percent, the most you should pay is \$200 ( $\$10/.05 = \$200$ ). So now you know why you should have said no to that supersalesman who offered it to you for \$800 unless the interest rate is close to 1 percent.

**The Rule of 72** A second rule of thumb for determining present values of shorter time periods is the **rule of 72**, which states:

*The number of years it takes for a certain amount to double in value is equal to 72 divided by the rate of interest.*

The **Rule of 72** states that 72 divided by the interest rate is the number of years in which a certain amount of money will double in value.

## The Press and Present Value

## APPLYING the Tools



The failure to understand the concept of present value often shows up in the popular press. Here are three examples.

Headline: **COURT SETTLEMENT IS \$40,000,000**

Inside story: The money will be paid out over a 40-year period.

Actual value: \$11,925,000 (8 percent interest rate).

Headline: **DISABLED WIDOW WINS \$25 MILLION LOTTERY**

Inside story: The money will be paid over 20 years.

Actual value: \$13,254,499 (8 percent interest rate).

Headline: **BOND ISSUE TO COST TAXPAYERS \$68 MILLION**

Inside story: The \$68 million is the total of interest and principal payments. The interest is paid yearly; the principal won't be paid back to the bond purchasers until 30 years from now.

Actual cost: \$20,000,000 (8 percent interest rate).

Such stories are common. Be on the lookout for them as you read the newspaper or watch the evening news.



**Q-8** You are to receive \$400 10 years from now. About how much is it worth now? (The interest rate is 3 percent.)

Say, for example, that the interest rate is 4 percent. How long will it take for your \$100 to become \$200? Dividing 72 by 4 gives 18 so the answer is 18 years. Conversely, the present value of \$200 at a 4 percent interest rate 18 years in the future is about \$100. (Actually it's \$102.67.)

Alternatively, say that you will receive \$1,000 in 10 years. Is it worth paying \$500 for that amount now if the interest rate is 9 percent? Using the rule of 72, we know that at a 9 percent interest rate it will take about eight years for \$500 to double:

$$72/9 = 8$$

so the future value of \$500 in 10 years is more than \$1,000. It's probably about \$1,200. (Actually it's \$1,184.) So if the interest rate in the economy is 9 percent, it's not worth paying \$500 now in order to get that \$1,000 in 10 years. By investing that same \$500 today at 9 percent, you can have \$1,184 in 10 years.

### The Importance of Present Value

Many business decisions require such present-value calculations. In almost any business, you'll be looking at flows of income in the future and comparing them to present costs or to other flows of money in the future. That's why understanding present value is a necessary tool.

### The Marginal Productivity Theory of Income Distribution

We've completed our brief survey of rent, profit, and interest. Let's now consider how these categories of income combine with wage income to fit into a theory of income distribution.

The traditional economic theory of the distribution of income is **marginal productivity theory**, which states that *factors are paid their marginal revenue product (what they contribute at the margin to revenue)*. We saw how marginal revenue product of labor was determined in Chapter 16. In marginal productivity theory, that same reasoning is used to explain the income going to the other three factors. If that factor is entrepreneurship, then the income the person receives can be called *profit*; if that factor is a fixed factor,

Marginal productivity theory states that factors of production are paid their marginal revenue product.

the income the person receives can be called *rent*; if the factor is current production that is not consumed, the income that person receives can be called *interest*. Marginal productivity theory essentially says that supply and demand determine who gets what.

Modern economists are in the process of extending this functional theory. One extension is to look at the theory of income distribution more abstractly than did early Classical economists. Modern-day economists focus their analysis on what “unspecified” factors of production will be paid, not on what labor or capital or entrepreneurs will be paid. Whether an unspecified factor income is interest, rent, profit, or wages doesn’t matter to the analysis since the forces of supply and demand are the same in each case. Modern economists argue that what factors will be paid depends upon (1) the supply of that factor and (2) the derived demand for that factor, which in turn depends upon the marginal productivity of that factor. Thus, they still use the marginal productivity theory, but they use it more abstractly.

Modern-day economists stopped looking at the functional distribution of income among rent, profit, interest, and wages, and started to look at the issue more abstractly because the social reality had changed. The marginal productivity theory of the functional distribution of income was developed to reflect a social reality that had distinct classes of people. One class represented the workers; another represented a group of gentrified landowners who received rent; another represented a group of energetic industrialists; and the fourth represented a group who controlled much of the financial wealth of the society. The wage, rent, profit, and interest categories fit that social reality nicely.

Modern society is much more complicated and far less class-oriented, which means that the wage/rent/profit/interest components of income are often mixed. When the president of a huge corporation earns \$10,000,000 a year, few economists would see that as wage income. Even the terminology describing income forms that modern economists use is different. They often don’t talk about labor income as wage income. Instead they use the concept *human capital* for “labor” to emphasize the profit and rent components of wage income.

A second extension modern economists are making to the marginal productivity theory of the functional distribution of income is that they are looking behind it. Marginal productivity theory explains the distribution of income, *given property rights*. It does not explain why property rights are what they are. As we discussed in the beginning of this chapter, modern economists are going beyond the marginal productivity theory of income and are trying to explain why property rights are what they are. This doesn’t mean that modern economists don’t accept marginal productivity theory; it simply means that they are trying to get at a deeper understanding of the distribution of income.

## Conclusion

Despite the fact that modern economists are currently expanding the theory of income distribution and are viewing the traditional categories of factors as less important, there is still much to be gained from a knowledge of the traditional theory of income distribution. For example, it tells us that factors in inelastic supply will bear the burden of a large portion of any tax on users of that factor. Similarly it highlights some key elements of the economic forces that determine who gets what—how the forces of supply and demand work. The trick is to understand that and simultaneously to understand the role that political and social forces play in determining what the underlying property rights are, and how those forces interact with economic forces. These questions are high on modern economists’ research agendas. Their analysis of rent seeking will likely yield new insights in the years to come.

Q.9

It is only fair that a person is paid his or her marginal product. True or false? Why?



Society’s view of individuals who receive their income from investments has often been less than admiring, as seen in the 18th-century etching by Brichet of “The Financier.”

Bleichroeder Print Collection, Baker Library, Harvard Business School.

Modern economists call labor *human capital* to emphasize the profit and rent components of wage income.

Q.10

Why have economists moved away from studying the functional distribution of income?

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## Summary

- Rent is the income paid to a factor of production that is perfectly inelastic in supply.
- Rent seeking is an attempt to create ownership rights and institutional structures that favor you.
- Normal profits are payments to entrepreneurs and the return on their risk taking. Economic profits are a return on entrepreneurship above and beyond normal profits.
- Entrepreneurs search out market niches in order to earn above-normal profits. Successful search by entrepreneurs tends to eliminate those above-normal profits.
- Interest is the income paid to savers—individuals who produce now but do not consume now.
- The annuity rule and the rule of 72 are useful rules of thumb for determining present value.
- The marginal productivity theory of distribution is the theory that factors of production are paid their marginal revenue product.
- Property rights determine the distribution of income; supply and demand forces distribute income, given property rights.

## Key Terms

annuity rule (W-9)  
contractual legal system (W-1)  
economic profits (W-6)  
interest (W-7)

marginal productivity theory (W-10)  
market niche (W-6)  
normal profits (W-5)  
present value (W-7)

profit (W-5)  
property rights (W-1)  
quasi rent (W-4)  
rent (W-2)  
rent seeking (W-4)

rule of 72 (W-9)  
zoning laws (W-2)

## Questions for Thought and Review

1. List the four traditional categories of income and explain why they have become less important to modern economic analysis.
2. Some people argue that zoning laws are immoral. Based on your understanding of property rights, explain how they likely justify this position.
3. Differentiate normal profits from economic profits.
4. The U.S. Reindeer Act of 1937 gives exclusive rights to possess reindeer to the Inupiat and other native tribal people in Alaska. What's the probable effect of the law on the price of reindeer meat? On profits to those licensed to own reindeer? Is this law fair?
5. "In perfect competition no one would get rich quick, but the economy would stagnate." Evaluate this statement.
6. A salesperson calls you up and offers you \$100 a year for life. If the interest rate is 9 percent, how much should you be willing to pay for that annuity?
7. The same salesperson offers you a lump sum of \$20,000 in 30 years. How much should you be willing to pay? (The interest rate is still 9 percent.)
8. Define *human capital* and explain why modern economists' use of the term makes the functional distribution of income analysis less useful.
9. "If all people were paid their marginal product, there would be true justice in the economy." Evaluate this statement.
10. How can the absence of property rights hurt poor people instead of help them?

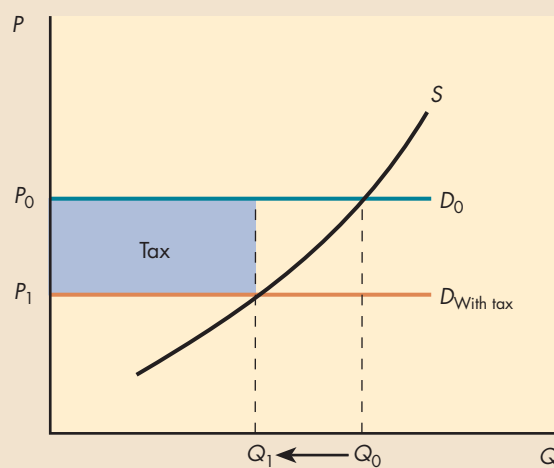
## Problems and Exercises

1. Demonstrate graphically how the price of land is determined.
  - a. Show the effect of a tax on that land.
  - b. Explain why that tax won't cause the price of land to rise.
  - c. Based on this analysis, would you support more extensive use of land and property taxes in the United States? Why?
2. What is the present value of a cash flow of \$200 per year forever (a perpetuity), assuming:

- The interest rate is 18 percent.  
 The interest rate is 12 percent.  
 The interest rate is 6 percent.
- Working with those same three interest rates, what are the future values of \$200 today in one year? How about in two years?
  - Working with those same three interest rates, how long will it take you to double your money?
- A team of scientific engineers has designed a new method of generating electricity and of desalinating water. It's a desert wind tower—a hollow cylinder 3,300 feet high. Sea water is pumped into the top of the tower, where it evaporates rapidly. As the air in the tower is cooled by the evaporation, it falls faster and faster (much like the downdraft of a chimney) and by the time it reaches the bottom of the tower it is going hundreds of miles per hour—fast enough to turn turbines. The cost of electricity from this process is predicted to be 2 cents per kilowatt hour—one-fourth the cost of generating electricity by oil. The evaporated water could also be condensed and used as fresh water, since the salt will have been removed.
    - If this concept proves feasible, what would likely happen to the value of desert land near an ocean?
    - What effect would it have on the price of oil?
    - If you were a major oil producing country, would you encourage development of this new technology? Why or why not?
  - In 2004, all the land in Japan had a total market value of \$10 trillion, while all the land in the United States had a total value of about \$7 trillion even though there is much more usable land in the United States than there is in Japan. How could there be this difference in total land value between the two countries?
  - In divorce cases, a common debate concerns whether an advanced degree should be considered marital property in which the academic advanced degree-holder's spouse should be given an interest.
    - What are the arguments in favor of seeing it as marital property?
    - What are the arguments against?

## Answers to Margin Questions

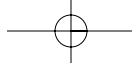
- If the demand for a product is perfectly elastic, suppliers must pay the burden of the tax, as in the accompanying diagram. The tax shifts the after-tax demand from  $D_0$  to  $D_{\text{with tax}}$ , causing quantity to decrease from  $Q_0$  to  $Q_1$  and the price suppliers receive to decrease from  $P_0$  to  $P_1$ . The tax revenue is shown in the shaded part of the diagram. As you can see, the tax revenue comes entirely out of producer surplus. The reason is that with a perfectly elastic demand curve there was no demander surplus to begin with. (W-3)



- Pure rent is a return to a factor whose supply is perfectly inelastic. Thus the opportunity cost of supplying such a

factor is zero. A quasi rent is the difference between the price a seller receives for a good and his or her opportunity cost of supplying that good in those cases when the opportunity cost is positive (i.e., when the supply curve is upward-sloping). (W-4)

- It depends. There's no easy answer to most policy questions, including this question about whether rent seeking should be prohibited. Certain rent seeking activities cause significant waste, but others lead to positive social consequences and changes in institutions. Thus, like most questions in the art of economics, whether rent seeking should be prohibited depends on the particular instances and historical circumstances. (W-5)
- The answer to the question of which business I should investigate first depends upon specific psychological knowledge of the individuals. Without specific knowledge, I would probably investigate Ms. B's business first. Successful market niches depend on information not being generally available; thus, I would interpret Ms. B's silence as suggesting that she is protecting her market niche—recognizing, of course, that the reality could be that she's about to go broke and for that reason simply doesn't want to discuss business. (W-7)
- It is often difficult to distinguish rent from profit because returns for activities are often spread out over long periods of time. For example, a textbook author may have spent an enormous amount of effort and time in developing a readable and fun text. The textbook then comes on



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the market and is highly successful. The author moves to the Bahamas and snorkels the rest of his or her life away, living off royalties from the textbook. Are those royalties rent, since they are received independent of the author's current effort, or profit—a return to the author's entrepreneurial effort? (W-7)

6. Substituting into the present value formula,  $PV = \$1,080/1.1$ , I find that the bond is worth \$982 now. (W-8)
7. Using Figure 4(b), the annuity table, I find that a dollar a year for 30 years with a 3 percent interest rate is worth \$19.60 now. Thus \$100 would be worth \$1,960. (W-9)
8. Using Figure 4(a), the present-value table, I see that at a 3 percent interest rate, \$1 ten years from now is worth 74¢ now, so \$400 ten years from now would be worth \$296 now. (W-10)

9. Marginal product does not necessarily have anything to do with fairness, so the answer to this question is “False.” Marginal product is simply a technical relationship; whether the person deserves the attributes that led to that marginal product is a normative question upon which the assessment of “fairness” depends. (W-11)
10. Economists have moved away from studying the functional distribution of income because the institutional and social structure of society has changed and those functional classes of income are no longer the distinguishing factors. Instead, economists tend to focus on socio-economic factors determining distribution of income, such as gender and minority status. (W-11)

