THE ECONOMICS OF
MONEY, BANKING, AND FINANCIAL MARKETS

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Chapter 9

AN ECONOMIC ANALYSIS OF FINANCIAL STRUCTURE

PREVIEW A healthy and vibrant economy requires a financial system that moves funds from people who save to people who have productive investment opportunities. But how does the financial system make sure that your hard-earned savings get channeled to Paula the Productive Investor rather than to Benny the Bum?

This chapter answers that question by providing an economic analysis of how our financial structure is designed to promote economic efficiency. The analysis focuses on a few simple but powerful economic concepts that enable us to explain features of our financial markets such as why financial contracts are written as they are, why financial intermediaries are more important than securities markets for getting funds to borrowers, and why financial crises occur and have such severe consequences for the health of the economy.

BASIC PUZZLES ABOUT FINANCIAL STRUCTURE THROUGHOUT THE WORLD

The financial system is complex in structure and function throughout the world. There are many different types of institutions: banks, insurance companies, mutual funds, stock and bond markets, and so on—all of which are regulated by government. The financial system channels billions of dollars per year from savers to people with productive investment opportunities. If we take a close look at financial structure all over the world, we find eight basic puzzles that we need to solve in order to understand how the financial system works.

The pie chart in Figure 1 indicates how American businesses financed their activities using external funds (those obtained from outside the business itself) in the period 1970–1985. The *loans* category is made up primarily of bank loans, but it also includes loans made by other financial intermediaries; the *bonds* category includes marketable debt securities such as corporate bonds and commercial paper; *stock* consists of stock market shares; and *other* includes other loans such as government loans, loans by foreigners, and trade debt (loans made by

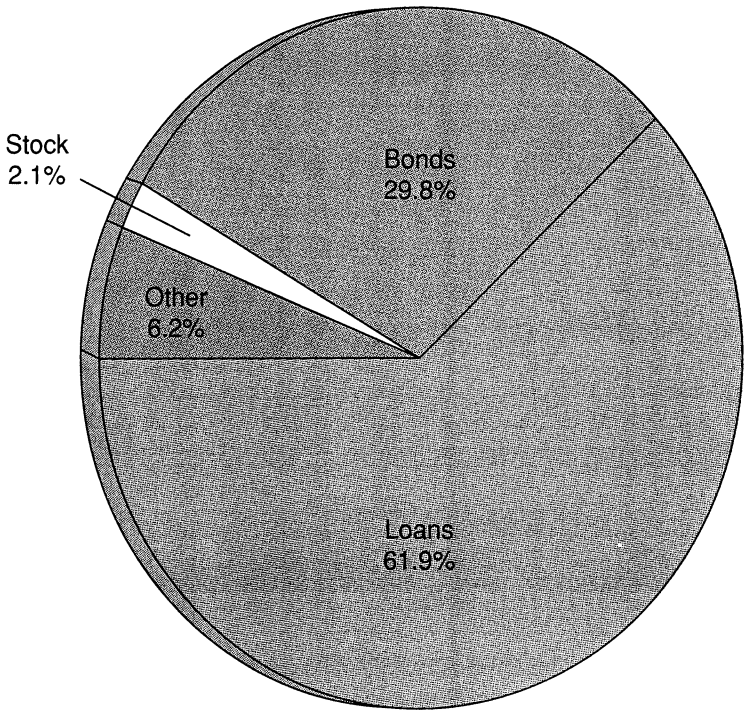

FIGURE 1 Sources of External Funds for Nonfinancial Businesses in the United States
The categories of external funds are as follows: *Loans* is made up primarily of bank loans, but it also includes loans made by other financial intermediaries. *Bonds* includes marketable debt securities such as corporate bonds and commercial paper. *Stock* consists of stock market shares. *Other* includes other loans such as government loans, loans by foreigners, and trade debt (loans made by businesses to other businesses when they purchase goods). *Source:* Colin Mayer, "Financial Systems, Corporate Finance, and Economic Development," in *Asymmetric Information, Corporate Finance, and Investment,* ed. R. Glenn Hubbard (Chicago: University of Chicago Press, 1990), p. 312.

businesses to other businesses when they purchase goods). Figure 2 uses the same classifications as Figure 1 and compares the U.S. data to those of five other industrialized countries.

Now let us explore the eight financial puzzles.

1. Stocks are not the most important source of financing for businesses. Because so much attention in the media is focused on the stock market, many people have the impression that stocks are the most important sources of financing for American corporations. However, as we can see from the pie chart in Figure 1, the stock market accounted for only a small fraction of the external financing of American businesses in the 1970–1985 period, 2.1%.[1] (Indeed, since

[1]The 2.1% figure for the percentage of external financing provided by stocks is based on the flows of external funds to corporations. However, this flow figure is somewhat misleading because when a share of stock is issued, it raises funds permanently, whereas when a bond is issued, it raises funds only temporarily until they are paid back at maturity. To see this, suppose that a firm raises $1000 by selling a share of stock and another $1000 by selling a $1000 one-year bond. In the case of the stock issue, the firm can hold on to the $1000 it raised this way, but to hold on to the $1000 it raised

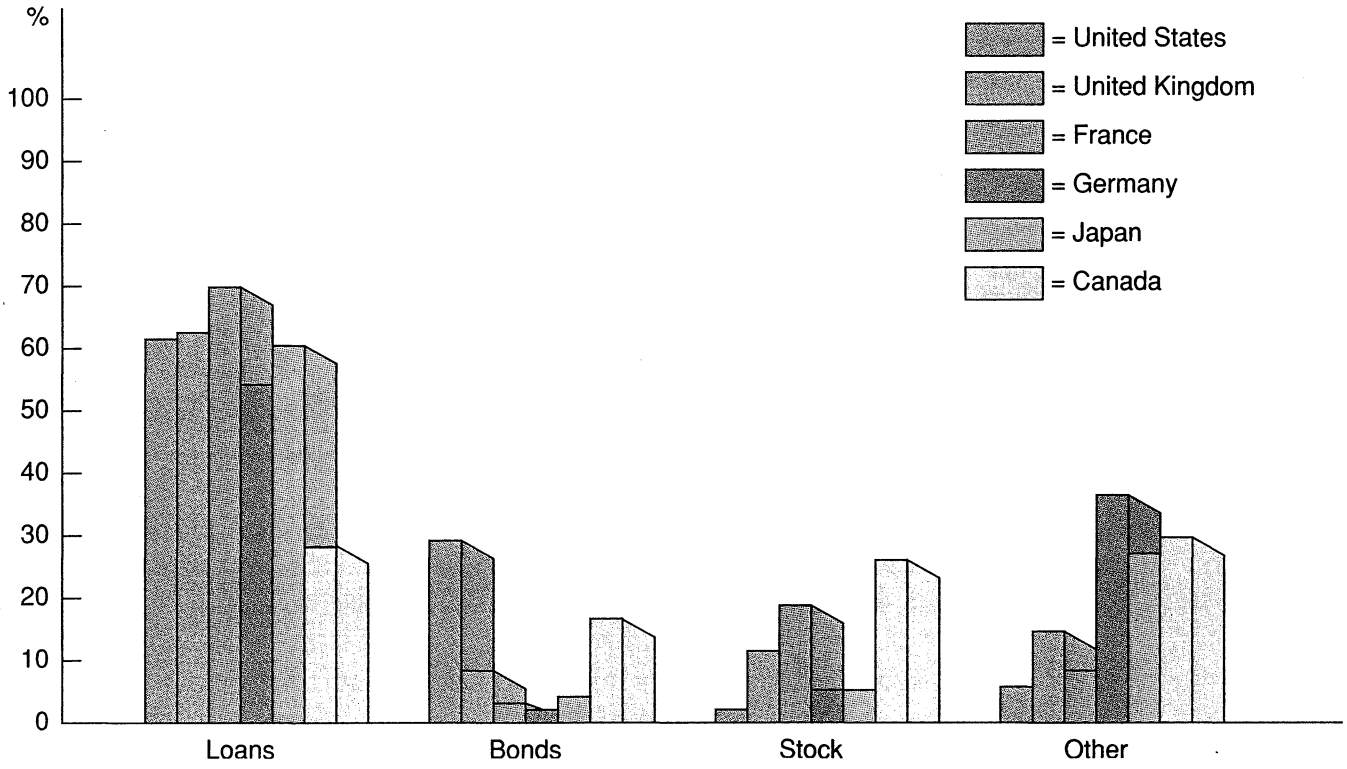

FIGURE 2 Sources of External Funds for Nonfinancial Businesses: A Comparison of the United States and Five Other Industrialized Countries

The categories of external funds are the same as in Figure 1. *Sources:* U.S. figures from Figure 1; others from Colin Mayer, "Financial Systems, Corporate Finance, and Economic Development," in *Asymmetric Information, Corporate Finance, and Investment,* ed. R. Glenn Hubbard (Chicago: University of Chicago Press, 1990), p. 312.

1984, American corporations have generally stopped issuing shares to finance their activities; instead they have purchased large numbers of shares, meaning that the stock market has actually been a *negative* source of corporate finance in recent years.) Similarly small figures apply in the other countries presented in Figure 2 as well. Why is the stock market less important than other sources of financing in the United States and other countries?

2. Issuing marketable securities is not the primary way in which businesses finance their operations. Figure 1 shows that bonds are a far more important source of financing than stocks in the United States (29.8% versus 2.1%). However, stocks and bonds combined (31.9%), which make up the total share of marketable securities, still supply less than one-third of the external funds corporations need to finance their activities. The fact that issuing marketable securities is not the most important source of financing is true elsewhere

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through debt, it has to issue a new $1000 bond every year. If we look at the flow of funds to corporations over a 15-year period, as in Figure 1, the firm will have raised $1000 with a stock issue only once in the 15-year period, while it will have raised $1000 with debt 15 times, once in each of the 15 years. Thus it will look like debt is 15 times more important than stocks in raising funds, even though our example indicates that they are actually equally important for the firm.

in the world as well. Indeed, as we see in Figure 2, most countries, with the exception of Canada, have a much smaller share of external financing supplied by marketable securities than the United States. Why don't businesses use marketable securities more extensively to finance their activities?

3. Indirect finance, which involves the activities of financial intermediaries, is many times more important than direct finance, in which businesses raise funds directly from lenders in financial markets. Direct finance involves the sale to households of marketable securities such as stocks and bonds. The 31.9% share of stocks and bonds as a source of external financing for American businesses actually greatly overstates the importance of direct finance in our financial system. Since 1970, less than 5% of newly issued corporate bonds and commercial paper and around 50% of stocks have been sold directly to American households. The rest of these securities have been bought primarily by financial intermediaries such as insurance companies, pension funds, and mutual funds. These figures indicate that direct finance is used in less than 5% of the external funding of American business. Because in most countries marketable securities are an even less important source of finance than in the United States, direct finance is also far less important than indirect finance in the rest of the world. Why are financial intermediaries and indirect finance so important in financial markets?

4. Banks are the most important source of external funds used to finance businesses. As we can see in Figures 1 and 2, the primary sources of external funds for businesses throughout the world are loans (61.9% in the United States). Most of these loans are bank loans, so the data suggest that banks have the most important role in financing business activities. An extraordinary fact that surprises most people is that in an average year in the United States, 25 times more funds are raised with bank loans than with stocks. What makes banks so important to the workings of the financial system?

5. The financial system is among the most heavily regulated sectors of the economy. You learned in Chapter 2 that the financial system is heavily regulated, not only in the United States but in all other developed countries as well. Governments regulate financial markets primarily to promote the provision of information and to ensure the soundness of the financial system. Why are financial markets so extensively regulated throughout the world?

6. Only large, well-established corporations have access to securities markets to finance their activities. Individuals and smaller businesses that are not well established almost never raise funds by issuing marketable securities. Instead, they obtain their financing from banks. Why do only large, well-known corporations have the ability to raise funds in securities markets?

7. Collateral is a prevalent feature of debt contracts for both households and businesses. **Collateral** is property that is pledged to the lender to guarantee payment in the event that the borrower should be unable to make debt payments. Collateralized debt (which is also known as **secured debt** to contrast it with **unsecured debt,** which is not collateralized) is the predominant form of household debt and is widely used in business borrowing as well. The

majority of household debt in the United States consists of collateralized loans: Your automobile is collateral for your auto loan, and your house is collateral for your mortgage. Commercial and farm mortgages, for which property is pledged as collateral, make up one-quarter of borrowing by nonfinancial businesses; corporate bonds and other bank loans also often involve pledges of collateral. Why is collateral such an important feature of debt contracts?

8. Debt contracts are typically extremely complicated legal documents that place substantial restrictions on the behavior of the borrower. Many students think about a debt contract as a simple IOU that can be written on a single piece of paper. The reality of debt contracts is far different, however. In all countries, bond or loan contracts are typically long legal documents with provisions (called **restrictive covenants**) that restrict and specify certain activities that the borrower can engage in. Restrictive covenants are not just a feature of debt contracts for businesses; for example, personal automobile loan and home mortgage contracts have restrictive covenants that require the borrower to maintain sufficient insurance on the automobile or house purchased with the loan. Why are debt contracts so complex and restrictive?

As you might recall from Chapter 2, an important feature of financial markets is that they have substantial transactions and information costs. An economic analysis of how these costs affect financial markets provides us with solutions to the eight puzzles, which in turn provide us with a much deeper understanding of how our financial system works. In the next section we examine the impact of transactions costs on the structure of our financial system. Then we turn to how information costs affect financial structure.

TRANSACTIONS COSTS

Transactions costs are a major problem in financial markets. An example will make this clear.

How Transactions Costs Influence Financial Structure

Say you have $5000 you would like to invest, and you think about investing in the stock market. Because you have only $5000, you can buy only a small number of shares. The stockbroker tells you that your purchase is so small that the brokerage commission for buying the stock you picked will be a large percentage of the purchase price of the shares. If instead you decide to buy a bond, the problem is even worse because the smallest denomination for some bonds you might want to buy is as much as $10,000 and you do not have that much to invest. Indeed, the broker may not even be interested in your business at all because the small size of your account doesn't make spending time on it worthwhile. You are disappointed and realize that you will not be able to use financial

markets to earn a return on your hard-earned savings. You can take some consolation, however, in the fact that you are not alone in being stymied by high transactions costs. This is a fact of life for most of us: Most American households never own any securities.

You also face another problem because of transactions costs. Because you have only a small amount of funds available, you can make only a restricted number of investments. That is, you have to put all your eggs in one basket, and your inability to diversify will subject you to a lot of risk.

How Financial Intermediaries Reduce Transactions Costs

This example of the problems posed by transactions costs and the example outlined in Chapter 2 when legal costs kept you from making a loan to Carl the Carpenter illustrate that small savers like you are frozen out of financial markets and are unable to benefit from them. Fortunately, financial intermediaries, an important part of the financial structure, have evolved to reduce transactions costs and allow small savers and borrowers to benefit from the existence of financial markets.

Economies of Scale One solution to the problem of high transactions costs is to bundle the funds of many investors together so that they can take advantage of *economies of scale,* the reduction in transactions costs per dollar of investment as the size (scale) of transactions increases. By bundling investors' funds together, transactions costs for each individual investor are far smaller. Economies of scale exist because the total cost of carrying out a transaction in financial markets increases only a little as the size of the transaction grows. For example, the cost of arranging a purchase of 10,000 shares of stock is not much greater than the cost of arranging a purchase of 50 shares of stock.

The presence of economies of scale in financial markets helps explain why financial intermediaries developed and are such an important part of our financial structure. The clearest example of a financial intermediary that arose because of economies of scale is a mutual fund. A *mutual fund* is a financial intermediary that sells shares to individuals and then invests the proceeds in bonds or stocks. Because it buys large blocks of stocks or bonds, a mutual fund can take advantage of lower transactions costs. These cost savings are then passed on to individual investors after the mutual fund has taken its cut in the form of management fees for administering their accounts. An additional benefit for individual investors is that a mutual fund is large enough to purchase a widely diversified portfolio of securities. The increased diversification for individual investors reduces their risk, thus making them better off.

Economies of scale are also important in lowering the costs of things such as computer technology that financial institutions need to accomplish their tasks. Once a large mutual fund has invested a lot of money in setting up a telecommunications system, for example, it can be used for a huge number of transactions at a low cost per transaction.

Expertise Financial intermediaries also arise because they are better able to develop expertise to lower transactions costs. Mutual funds, banks, and other financial intermediaries develop expertise in computer technology so that they can cheaply provide convenient services such as toll-free numbers that allow you to check on how well your investments are doing or the ability to write checks on your account.

An important outcome of a financial intermediary's low transactions costs is that they allow a financial intermediary to provide its customers with *liquidity services,* services that make it easier for customers to conduct transactions. Money market mutual funds, for example, allow shareholders to write checks that enable them to pay their bills easily while at the same time paying them high interest rates.

ASYMMETRIC INFORMATION: ADVERSE SELECTION AND MORAL HAZARD

The presence of transactions costs in financial markets explains in part why financial intermediaries and indirect finance play such an important role in financial markets (puzzle 3). To understand financial structure more fully, however, we turn to the role of information in financial markets.[2]

Asymmetric information—one party's having insufficient knowledge about the other party involved in a transaction to make accurate decisions—is an important aspect of financial markets. For example, managers of a corporation know whether they are honest or have better information about how well their business is doing than the stockholders do. The presence of asymmetric information leads to adverse selection and moral hazard problems, which were introduced in Chapter 2.

Adverse selection is an asymmetric information problem that occurs *before* the transaction occurs: Potential bad credit risks are the ones who most actively seek out loans. Thus the parties who are the most likely to produce an undesirable outcome are most likely to want to engage in the transaction. For example, big risk takers or outright crooks might be the most eager to take out a loan because they know that they are unlikely to pay it back. Because adverse selection increases the chances that a loan might be made to a bad credit risk, lenders may decide not to make any loans even though there are good credit risks in the marketplace.

Moral hazard arises *after* the transaction occurs: The lender runs the risk that the borrower will engage in activities that are undesirable from the lender's point of view because they make it less likely that the loan will be paid back. For example, once borrowers have obtained a loan, they may take on big risks (which have possible high returns but also run a greater risk of default) because

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[2]An excellent survey of the literature on information and financial structure that expands on the topics discussed in the rest of this chapter is contained in Mark Gertler, "Financial Structure and Aggregate Economic Activity: An Overview," *Journal of Money, Credit and Banking* 20 (1988): 559–588.

they are playing with someone else's money. Because moral hazard lowers the probability that the loan will be repaid, lenders may decide that they would rather not make a loan.

THE LEMONS PROBLEM: HOW ADVERSE SELECTION INFLUENCES FINANCIAL STRUCTURE

A particular characterization of the adverse selection problem and how it interferes with the efficient functioning of a market was outlined in a famous article by George Akerlof. It is referred to as the "lemons problem" because it resembles the problem created by lemons in the used-car market.[3] Potential buyers of used cars are frequently unable to assess the quality of the car; that is, they can't tell whether a particular used car is a good car that will run well or a lemon that will continually give them grief. The price that a buyer pays must therefore reflect the *average* quality of the cars in the market, somewhere between the low value of a lemon and the high value of a good car.

The owner of a used car, by contrast, is more likely to know whether the car is a peach or a lemon. If the car is a lemon, the owner is more than happy to sell it at the price the buyer is willing to pay, which, being somewhere between the value of a lemon and a good car, is greater than the lemon's value. However, if the car is a peach, the owner knows that the car is undervalued by the price the buyer is willing to pay, and so the owner may not want to sell it. As a result of this adverse selection, very few good used cars will come to the market. Because the average quality of a used car available in the market will be low and because very few people want to buy a lemon, there will be few sales. The used-car market will then function poorly, if at all.

Lemons in the Stock and Bond Markets

A similar lemons problem arises in securities markets, that is, the debt (bond) and equity (stock) markets. Suppose that our friend Irving the Investor, a potential buyer of securities such as common stock, can't distinguish between good firms with high expected profits and low risk and bad firms with low expected profits and high risk. In this situation, Irving will be willing to pay only a price that reflects the *average* quality of firms issuing securities—a price that lies between the value of securities from bad firms and the value of those from good firms. If the owners or managers of a good firm have better information than Irv-

[3]George Akerlof, "The Market for 'Lemons': Quality, Uncertainty and the Market Mechanism," *Quarterly Journal of Economics* 84 (1970): 488–500. Two important papers that have applied the lemons problem analysis to financial markets are Stewart Myers and N. S. Majluf, "Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have," *Journal of Financial Economics* 13 (1984): 187–221, and Bruce Greenwald, Joseph E. Stiglitz, and Andrew Weiss, "Information Imperfections in the Capital Market and Macroeconomic Fluctuations," *American Economic Review* 74 (1984): 194–199.

ing and *know* that they are a good firm, they know that their securities are undervalued and will not want to sell them to Irving at the price he is willing to pay. The only firms willing to sell Irving securities will be bad firms (because the price is higher than the securities are worth). Our friend Irving is not stupid; he does not want to hold securities in bad firms, and hence he will decide not to purchase securities in the market. In an outcome similar to that in the used-car market, this securities market will not work very well because few firms will sell securities in it to raise capital.

The analysis is similar if Irving considers purchasing a corporate debt instrument in the bond market rather than an equity share. Irving will buy a bond only if its interest rate is high enough to compensate him for the average default risk of the good and bad firms trying to sell the debt. The knowledgeable owners of a good firm realize that they will be paying a higher interest rate than they should, and so they are unlikely to want to borrow in this market. Only the bad firms will be willing to borrow, and because investors like Irving are not eager to buy bonds issued by bad firms, they will probably not buy any bonds at all. Few bonds are likely to sell in this market, and so it will not be a good source of financing.

The analysis we have just conducted explains puzzle 2—why marketable securities are not the primary source of financing for businesses in any country in the world. It also partly explains puzzle 1—why stocks are not the most important source of financing for American businesses. The presence of the lemons problem keeps securities markets such as the stock and bond markets from being effective in channeling funds from savers to borrowers.

Solutions to Adverse Selection Problems

In the absence of asymmetric information, the lemons problem goes away. If buyers know as much about the quality of used cars as sellers so that all involved can tell a good car from a bad one, buyers will be willing to pay full value for good used cars. Because the owners of good used cars can now get a fair price, they will be willing to sell them in the market. The market will have many transactions and will do its intended job: channeling good cars to people who want them.

Similarly, if purchasers of securities can distinguish good firms from bad, they will pay the full value of securities issued by good firms, and good firms will sell their securities in the market. The securities market will then be able to move funds to the good firms that have the most productive investment opportunities.

Private Production and Sale of Information The solution to the adverse selection problem in financial markets is to eliminate asymmetric information by furnishing people supplying funds with full details about the individuals or firms seeking to finance their investment activities. One way to get this material to saver-lenders is to have private companies collect and produce information that distinguishes good from bad firms and then sell it to purchasers of securities. In the United States, companies such as Standard and Poor's, Moody's, and Value Line gather

information on firms' balance sheet positions and investment activities, publish these data, and sell them to subscribers (individuals, libraries, and financial intermediaries involved in purchasing securities).

The system of private production and sale of information does not completely solve the adverse selection problem in securities markets, however, because of the so-called **free-rider problem.** The free-rider problem occurs when people who do not pay for information take advantage of the information that other people have paid for. The free-rider problem suggests that the private sale of information will be only a partial solution to the lemons problem. To see why, suppose that you have just purchased information that tells you which firms are good and which are bad. You believe that this purchase is worthwhile because you can make up the cost of acquiring this information, and then some, by purchasing the securities of good firms that are undervalued. However, when our savvy (free-riding) investor Irving sees you buying certain securities, he buys right along with you, even though he has not paid for any information. If many other investors act as Irving does, the increased demand for the undervalued good securities will cause their low price to be bid up immediately to reflect the securities' true value. As a result of all these free riders, you can no longer buy the securities for less than their true value. Now because you will not gain any extra profits from purchasing the information, you realize that you never should have paid for this information in the first place. If other investors come to the same realization, private firms and individuals may not be able to sell enough of this information to make it worth their while to gather and produce it. The weakened ability of private firms to profit from selling information will mean that less information is produced in the marketplace, and so adverse selection (the lemons problem) will still interfere with the efficient functioning of securities markets.

Government Regulation The free-rider problem prevents the private market from producing enough information to eliminate all the asymmetric information that leads to adverse selection. Could financial markets benefit from government intervention? The government could, for instance, produce information to help investors distinguish good from bad firms and provide it to the public free of charge. This solution, however, would involve the government in releasing negative information about firms, a practice that might be politically difficult. A second possibility (and one followed by the United States and most governments throughout the world) is for the government to regulate securities markets in a way that encourages firms to reveal honest information about themselves so that investors can determine how good or bad the firms are. In the United States, the Securities and Exchange Commission (SEC) is the government agency that requires firms selling their securities in public markets to adhere to standard accounting principles and to disclose information about their sales, assets, and earnings. Similar regulations are found in other countries.

The asymmetric information problem of adverse selection in financial markets helps explain why financial markets are among the most heavily regulated sectors in the economy (puzzle 5). Government regulation to increase informa-

tion for investors is needed to reduce the adverse selection problem, which interferes with the efficient functioning of securities (stock and bond) markets.

Although government regulation lessens the adverse selection problem, it does not eliminate it. Even when firms provide information to the public about their sales, assets, or earnings, they *still* have more information than investors: There is a lot more to knowing the quality of a firm than is provided by statistics. Furthermore, bad firms have an incentive to make themselves look like good firms because this would enable them to fetch a higher price for their securities. Bad firms will slant the information they are required to transmit to the public, thus making it harder for investors to sort out the good firms from the bad.

Financial Intermediation So far we have seen that private production of information and government regulation to encourage provision of information do not eliminate the adverse selection problem in financial markets. How, then, can the financial structure help promote the flow of funds to people with productive investment opportunities when there is asymmetric information? A clue is provided by the structure of the used-car market.

An important feature of the used-car market is that most used cars are not sold directly by one individual to another. An individual considering buying a used car might pay for privately produced information by subscribing to a magazine like *Consumer Reports* to find out if a particular make of car has a good repair record. Nevertheless, reading *Consumer Reports* does not solve the adverse selection problem because even if a particular make of car has a good reputation, the actual car someone is trying to sell could be a lemon. The prospective buyer might also bring the used car to a mechanic for a once-over. But what if the prospective buyer doesn't know a mechanic who can be trusted or if the mechanic would charge a high fee to evaluate the car?

Because these roadblocks make it hard for individuals to acquire enough information about used cars, most used cars are not sold directly by one individual to another. Instead, they are sold by an intermediary, a used-car dealer who purchases used cars from individuals and resells them to other individuals. Used-car dealers produce information in the market by becoming experts in determining whether a car is a peach or a lemon. Once they know that a car is good, they can sell it with some form of a guarantee: either a guarantee that is explicit, such as a warranty, or an implicit guarantee in which they stand by their reputation for honesty. People are more likely to purchase a used car because of a dealer's guarantee, and the dealer is able to make a profit on the production of information about automobile quality by being able to sell the used car at a higher price than the dealer paid for it. If dealers purchase and then resell cars on which they have produced information, they avoid the problem of other people free-riding on the information they produced.

Just as used-car dealers help solve adverse selection problems in the automobile market, financial intermediaries play a similar role in financial markets. A financial intermediary such as a bank becomes an expert in the production of information about firms so that it can sort out good credit risks from bad ones. Then it can acquire funds from depositors and lend them to the good firms. Be-

cause the bank is able to lend mostly to good firms, it is able to earn a higher return on its loans than the interest it has to pay to its depositors. As a result, the bank earns a profit, which allows it to engage in this information production activity.

An important element in the ability of the bank to profit from the information it produces is that it avoids the free-rider problem by primarily making private loans rather than by purchasing securities that are traded in the open market. Because a private loan is not traded, other investors cannot watch what the bank is doing and bid up the loan's price to the point that the bank receives no compensation for the information it has produced. The bank's role as an intermediary that holds mostly nontraded loans is the key to its success in reducing asymmetric information in financial markets.

Our analysis of adverse selection indicates that financial intermediaries in general, and banks in particular because they hold a large fraction of nontraded loans, should play a greater role in moving funds to corporations than securities markets do. Our analysis thus explains puzzles 3 and 4: why indirect finance is so much more important than direct finance and why banks are the most important source of external funds for financing businesses.

Our analysis of adverse selection also explains which firms are more likely to obtain funds from banks and financial intermediaries rather than from the securities markets. The better known a corporation is, the more information about its activities is available in the marketplace. Thus it is easier for investors to evaluate the quality of the corporation and determine whether it is a good firm or a bad one. Because investors have fewer worries about adverse selection with well-known corporations, they will be willing to invest directly in their securities. Hence we have an explanation for puzzle 6: The larger and more mature a corporation is, the more information investors have about it, and the more likely it is that the corporation can raise funds in securities markets.

Collateral and Net Worth Adverse selection interferes with the functioning of financial markets only if a lender suffers a loss when a borrower is unable to make loan payments and thereby defaults. Collateral, property promised to the lender if the borrower defaults, reduces the consequences of adverse selection because it reduces the lender's losses in the event of a default. If a borrower defaults on a loan, the lender can sell the collateral and use the proceeds to make up for the losses on the loan. For example, if you fail to make your mortgage payments, the lender can take title to your house, auction it off, and use the receipts to pay off the loan. Lenders are thus more willing to make loans secured by collateral, and borrowers are willing to supply collateral because the reduced risk for the lender makes it more likely they will get the loan in the first place and perhaps at a better loan rate. The presence of adverse selection in credit markets thus provides an explanation for why collateral is an important feature of debt contracts (puzzle 7).

Net worth (also called **equity capital**), the difference between a firm's assets (what it owns or is owed) and its liabilities (what it owes), can perform a

similar role to collateral. If a firm has a high net worth, then even if it engages in investments that cause it to have negative profits and so defaults on its debt payments, the lender can take title to the firm's net worth, sell it off, and use the proceeds to recoup some of the losses from the loan. In addition, the more net worth a firm has in the first place, the less likely it is to default because the firm has a cushion of assets that it can use to pay off its loans. Hence when firms seeking credit have high net worth, the consequences of adverse selection are less important and lenders are more willing to make loans. This analysis lies behind the often-heard lament, "Only the people who don't need money can borrow it!"

Summary So far we have used the concept of adverse selection to explain seven of the eight puzzles about financial structure introduced earlier: The first four emphasize the importance of financial intermediaries and the relative unimportance of securities markets for the financing of corporations; the fifth, that financial markets are among the most heavily regulated sectors of the economy; the sixth, that only large, well-established corporations have access to securities markets; and the seventh, that collateral is an important feature of debt contracts. In the next section we will see that the other asymmetric information concept of moral hazard provides additional reasons for the importance of financial intermediaries and the relative unimportance of securities markets for the financing of corporations, the prevalence of government regulation, and the importance of collateral in debt contracts. In addition, the concept of moral hazard can be used to explain our final puzzle (puzzle 8) of why debt contracts are complicated legal documents that place substantial restrictions on the behavior of the borrower.

HOW MORAL HAZARD AFFECTS THE CHOICE BETWEEN DEBT AND EQUITY CONTRACTS

Moral hazard is the asymmetric information problem that occurs after the financial transaction takes place, when the seller of a security may have incentives to hide information and engage in activities that are undesirable for the purchaser of the security. Moral hazard has important consequences for whether a firm finds it easier to raise funds with debt rather than equity contracts.

Moral Hazard in Equity Contracts: The Principal-Agent Problem

Equity contracts, such as common stock, are claims to a share in the profits and assets of a business. Equity contracts are subject to a particular type of moral hazard called the **principal-agent problem.** When managers own only a small fraction of the firm they work for, the stockholders who own most of the firm's equity (called the *principals*) are separate from the managers of the firm, who are the *agents* of the owners. This separation of ownership and control involves

moral hazard in that the managers in control (the agents) may act in their own interest rather than in the interest of the stockholder-owners (the principals) because the managers have less incentive to maximize profits than the stockholder-owners do.

To understand the principal-agent problem more fully, suppose that your friend Steve asks you to become a silent partner in his ice-cream store. The store requires an investment of $10,000 to set up, but Steve has only $1000. So you purchase an equity stake (stock shares) for $9000, which entitles you to 90% of the ownership of the firm, while Steve owns only 10%. If Steve works hard to make tasty ice cream, keeps the store clean, smiles at all the customers, and hustles to wait on tables quickly, after all expenses (including Steve's salary), the store will have $50,000 in profits per year, of which Steve receives 10% ($5000) and you receive 90% ($45,000).

But if Steve doesn't provide quick and friendly service to his customers, uses the $50,000 in income to buy artwork for his office, and even sneaks off to the beach while he should be at the store, the store will not earn any profit. Steve can only earn the additional $5000 (his 10% share of the profits) over his salary if he works hard and forgoes unproductive investments (such as art for his office). Steve might decide that the extra $5000 just isn't enough to make him want to expend the effort to be a good manager; he might decide that it would be worth his while only if he earned an extra $10,000. If Steve feels this way, he does not have enough incentive to be a good manager and will end up with a beautiful office, a good tan, and a store that doesn't show any profits. Because the store won't show any profits, Steve's decision not to act in your interest will cost you $45,000 (your 90% of the profits if he had chosen to be a good manager instead).

The moral hazard arising from the principal-agent problem might be even worse if Steve were not totally honest. Because his ice-cream store is a cash business, Steve has the incentive to pocket $50,000 in cash and tell you that the profits were zero. He now gets a return of $50,000, but you get nothing.

Further indications that the principal-agent problem created by equity contracts can be severe are provided by examples of managers who build luxurious offices for themselves or drive high-priced corporate automobiles. Besides pursuing personal benefits, managers might also pursue corporate strategies (such as the acquisition of other firms) that enhance their personal power but do not increase the corporation's profitability.

The principal-agent problem would not arise if the owners of a firm had complete information about what the managers were up to and could prevent wasteful expenditures or fraud. The principal-agent problem, which is an example of moral hazard, arises only because a manager, like Steve, has more information about his activities than the stockholder does—that is, there is asymmetric information. The principal-agent problem would also not arise if Steve alone owned the store and there were no separation of ownership and control. If this were the case, Steve's hard work and avoidance of unproductive investments would yield him a profit (and extra income) of $50,000, an amount that would make it worth his while to be a good manager.

Solutions to the Principal-Agent Problem

Production of Information: Monitoring You have seen that the principal-agent problem arises because managers have more information about their activities and actual profits than stockholders do. One way for stockholders to reduce this moral hazard problem is for them to engage in a particular type of information production, the monitoring of the firm's activities: auditing the firm frequently and checking on what the management is doing. The problem is that the monitoring process can be expensive in terms of time and money, as reflected in the name economists give it, **costly state verification.** Costly state verification makes the equity contract less desirable, and it explains, in part, why equity is not a more important element in our financial structure.

As with adverse selection, the free-rider problem decreases the amount of information production that would reduce the moral hazard (principal-agent) problem. In this example, the free-rider problem decreases monitoring. If you know that other stockholders are paying to monitor the activities of the company you hold shares in, you can take a free ride on their activities. Then you can use the money you save by not engaging in monitoring to vacation on a Caribbean island. If you can do this, though, so can other stockholders. Perhaps all the stockholders will go to the islands, and no one will spend any resources on monitoring the firm. The moral hazard problem for shares of common stock will then be severe, making it hard for firms to issue them to raise capital.

Government Regulation to Increase Information As with adverse selection, the government has an incentive to try to reduce the moral hazard problem created by asymmetric information. Governments everywhere have laws to force firms to adhere to standard accounting principles that make profit verification easier. They also pass laws to impose stiff criminal penalties on people who commit the fraud of hiding and stealing profits. However, these measures can only be partly effective. Catching this kind of fraud is not easy; fraudulent managers have the incentive to make it very hard for government agencies to find or prove fraud.

Financial Intermediation Financial intermediaries have the ability to avoid the free-rider problem in the face of moral hazard. One financial intermediary that helps reduce the moral hazard arising from the principal-agent problem is the **venture capital firm.** Venture capital firms pool the resources of their partners and use the funds to help budding entrepreneurs start new businesses. In exchange for the use of the venture capital, the firm receives an equity share in the new business. Because verification of earnings and profits is so important in eliminating moral hazard, venture capital firms usually insist on having several of their own people participate as members of the managing body of the firm, the board of directors, so that they can keep a close watch on the firm's activities. When a venture capital firm supplies start-up funds, the equity in the firm is not marketable to anyone *but* the venture capital firm. Thus other investors are unable to free-ride on the verification activities of the venture capital firm. As a result of

this arrangement, the venture capital firm is able to garner the full benefits of its verification activities and is given the appropriate incentives to minimize the moral hazard problem.

Debt Contracts Moral hazard arises with an equity contract, which is a claim on profits in all situations, whether the firm is making or losing money. If a contract could be structured so that moral hazard would exist only in certain situations, there would be a reduced need to monitor managers, and the contract would be more attractive than the equity contract. The debt contract has exactly these attributes because it is a contractual agreement by the borrower to pay the lender *fixed* dollar amounts at periodic intervals. When the firm has high profits, the lender receives the contractual payments and does not need to know the exact profits of the firm. If the managers are hiding profits or are pursuing activities that are personally beneficial but don't increase profitability, the lender doesn't care as long as these activities do not interfere with the ability of the firm to make its debt payments on time. Only when the firm cannot meet its debt payments, thereby being in a state of default, is there a need for the lender to verify the state of the firm's profits. Only in this situation do lenders involved in debt contracts need to act more like equity holders; now they need to know how much income the firm has in order to get their fair share.

The advantage of a less frequent need to monitor the firm, and thus a lower cost of state verification, helps explain why debt contracts are used more frequently than equity contracts to raise capital. The concept of moral hazard thus helps explain puzzle 1, why stocks are not the most important source of financing for businesses.[4]

HOW MORAL HAZARD INFLUENCES FINANCIAL STRUCTURE IN DEBT MARKETS

Even with the advantages just described, debt contracts are still subject to moral hazard. Because a debt contract requires the borrowers to pay out a fixed amount and lets them keep any profits above this amount, the borrowers have an incentive to take on investment projects that are riskier than the lenders would like.

For example, suppose that because you are concerned about the problem of verifying the profits of Steve's ice-cream store, you decide not to become an equity partner. Instead, you lend Steve the $9000 he needs to set up his business and have a debt contract that pays you an interest rate of 10%. As far as you are concerned, this is a surefire investment because there is a strong and steady demand for ice cream in your neighborhood. However, once you give Steve the funds, he might use them for purposes other than you intended. Instead of opening up the ice-cream store, Steve might use your $9000 loan to invest in

[4]Another factor that encourages the use of debt contracts rather than equity contracts in the United States is our tax code. Debt interest payments are a deductible expense for American firms, whereas dividend payments to equity shareholders are not.

chemical research equipment because he thinks he has a 1-in-10 chance of inventing a diet ice cream that tastes every bit as good as the premium brands but has no fat or calories.

Obviously, this is a very risky investment, but if Steve is successful, he will become a multimillionaire. He has a strong incentive to undertake the riskier investment because the gains to him would be so large if he succeeded. You would clearly be very unhappy if Steve used your loan for the riskier investment because if he were unsuccessful, which is highly likely, you would lose most, if not all, of the money you gave him. And if he were successful, you wouldn't share in his success—you would still get only a 10% return on the loan because the principal and interest payments are fixed. Because of the potential moral hazard (Steve might use your money to finance a very risky venture), you would probably not make the loan to Steve, even though an ice-cream store in the neighborhood is a good investment that would provide benefits for everyone.

Solutions to Moral Hazard in Debt Contracts

Net Worth When borrowers have more at stake because their net worth (the difference between their assets and their liabilities) is high, the risk of moral hazard—the temptation to act in a manner that lenders find objectionable—will be greatly reduced because the borrowers themselves have a lot to lose. Let's return to Steve and his ice-cream business. Suppose that the cost of setting up either the ice-cream store or the research equipment is $100,000 instead of $10,000. So Steve needs to put $91,000 of his own money into the business (instead of $1000) in addition to the $9000 supplied by your loan. Now if Steve is unsuccessful in inventing the no-calorie nonfat ice cream, he has a lot to lose, the $91,000 of net worth ($100,000 in assets minus the $9000 loan from you). He will think twice about undertaking the riskier investment and is more likely to invest in the ice-cream store, which is more of a sure thing. Hence when Steve has more of his own money (net worth) in the business, you are more likely to make him the loan.

One way of describing the solution that high net worth provides to the moral hazard problem is to say that it makes the debt contract **incentive-compatible;** that is, it aligns the incentives of the borrower with those of the lender. The greater the borrower's net worth, the greater the borrower's incentive to behave in the way that the lender expects and desires, the smaller is the moral hazard problem in the debt contract, and the easier it is for the firm to borrow. Conversely, when the borrower's net worth is lower, the moral hazard problem is greater, and it is harder for the firm to borrow.

Monitoring and Enforcement of Restrictive Covenants As the example of Steve and his ice-cream store shows, if you could make sure that Steve doesn't invest in anything riskier than the ice-cream store, it would be worth your while to make him the loan. You can ensure that Steve uses your money for the purpose *you* want it to be used for by writing provisions (restrictive covenants) into the debt contract that restrict his firm's activities. By monitoring Steve's activities to see

whether he is complying with the restrictive covenants and enforcing the covenants if he is not, you can make sure that he will not take on risks at your expense.

Restrictive covenants are directed at reducing moral hazard by either ruling out undesirable behavior or by encouraging desirable behavior. There are four types of restrictive covenants that achieve this objective:

1. Covenants can be designed to minimize moral hazard by keeping the borrower from engaging in the undesirable behavior of undertaking risky investment projects. Some such covenants mandate that a loan can be used only to finance specific activities, such as the purchase of particular equipment or inventories. Others restrict the borrowing firm from engaging in certain risky business activities, such as purchasing other businesses.

2. Restrictive covenants can encourage the borrower to engage in desirable activities that make it more likely that the loan will be paid off. One restrictive covenant of this type requires the breadwinner in a household to carry life insurance that pays off the mortgage upon that person's death. Restrictive covenants of this type for businesses focus on encouraging the borrowing firm to keep its net worth high because higher borrower net worth reduces moral hazard and makes it less likely that the lender will suffer losses. These restrictive covenants typically specify that the firm must maintain minimum holdings of certain assets relative to the firm's size.

3. Because collateral is an important protection for the lender, restrictive covenants can encourage the borrower to keep the collateral in good condition and make sure that it stays in the possession of the borrower. This is the type of covenant ordinary people encounter most often. Automobile loan contracts, for example, require the car owner to maintain a minimum amount of collision and theft insurance and prevent the sale of the car unless the loan is paid off. Similarly, the recipient of a home mortgage must have adequate insurance on the home and must pay off the mortgage when the property is sold.

4. Restrictive covenants also require a borrowing firm to provide information about its activities periodically in the form of quarterly accounting and income reports, thereby making it easier for the lender to monitor the firm and reduce moral hazard. This type of covenant may also stipulate that the lender has the right to audit and inspect the firm's books at any time.

We now see why debt contracts are often complicated legal documents with numerous restrictions on the borrower's behavior (puzzle 8): Debt contracts require complicated restrictive covenants to minimize moral hazard.

Financial Intermediation Although restrictive covenants help reduce the moral hazard problem, they do not eliminate it completely. It is almost impossible to write covenants that rule out *every* risk-taking activity. Furthermore, borrowers may be clever enough to find loopholes in restrictive covenants that make them ineffective.

Another problem with restrictive covenants is that they must be monitored and enforced. A restrictive covenant is meaningless if the borrower can violate it knowing that the lender won't check up or is unwilling to pay for legal recourse.

Because monitoring and enforcement of restrictive covenants are costly, the free-rider problem arises in the debt securities (bond) market just as it does in the stock market. If you know that other bondholders are monitoring and enforcing the restrictive covenants, you can free-ride on their monitoring and enforcement. But other bondholders can do the same thing, so the likely outcome is that not enough resources are devoted to monitoring and enforcing the restrictive covenants. Moral hazard therefore continues to be a severe problem for marketable debt.

As we have seen before, financial intermediaries, particularly banks, have the ability to avoid the free-rider problem as long as they primarily make private loans. Private loans are not traded, so no one else can free-ride on the intermediary's monitoring and enforcement of the restrictive covenants. The intermediary making private loans thus receives the benefits of monitoring and enforcement and will work to shrink the moral hazard problem inherent in debt contracts. The concept of moral hazard has provided us with additional reasons why financial intermediaries play a more important role in channeling funds from savers to borrowers than marketable securities do, as described in puzzles 1 through 4.

Summary

The presence of asymmetric information in financial markets leads to adverse selection and moral hazard problems that interfere with the efficient functioning of those markets. Solutions to these problems involve the private production and sale of information, government regulation to increase information in financial markets, the importance of collateral and net worth to debt contracts, and the use of monitoring and restrictive covenants. A key finding from our analysis is that the existence of the free-rider problem for traded securities such as stocks and bonds indicates that financial intermediaries, particularly banks, should play a greater role than securities markets in financing the activities of businesses. Economic analysis of the consequences of adverse selection and moral hazard has helped explain the basic features of our financial system and has provided solutions to the eight puzzles about our financial structure outlined at the beginning of this chapter.

APPLICATION

FINANCIAL CRISES AND AGGREGATE ECONOMIC ACTIVITY

Our economic analysis of the effects of adverse selection and moral hazard can help us understand **financial crises,** major disruptions in financial markets that are characterized by sharp declines in asset prices and the failures of many financial and nonfinancial firms. Financial crises have been common in most

countries throughout history. The United States has had major financial crises in 1819, 1837, 1857, 1873, 1884, 1893, 1907, and 1929–1933, but none since then.[5] Studying financial crises is worthwhile because they have led to severe economic downturns in the past and have the potential for doing so in the future.

Financial crises occur when adverse selection and moral hazard problems in financial markets increase so much that the markets are unable to channel funds efficiently from savers to people with productive investment opportunities. As a result of this inability of financial markets to function efficiently, economic activity contracts sharply.

Factors Causing Financial Crises

Five factors in the economic environment can lead to the substantial worsening of adverse selection and moral hazard problems in financial markets, which then cause a financial crisis: increases in interest rates, stock market declines, unanticipated declines in the aggregate price level, increases in uncertainty, and bank panics.

Increases in Interest Rates As we saw earlier, individuals and firms with the riskiest investment projects are exactly those who are willing to pay the highest interest rates. If market interest rates are driven up sufficiently because of increased demand for credit or because of a decline in the money supply, good credit risks are less likely to want to borrow while bad credit risks are still willing to borrow. Because of the resulting increase in adverse selection, lenders will no longer want to make loans. The substantial decline in lending will lead to a substantial decline in investment and aggregate economic activity.

Stock Market Declines A sharp decline in the stock market can increase adverse selection and moral hazard problems in financial markets and provoke a financial crisis. A decline in the stock market means that the net worth of corporations has fallen because share prices are the valuation of a corporation's net worth. The decline in net worth as a result of a stock market decline makes lenders less willing to lend because, as we have seen, the net worth of a firm plays a role similar to that of collateral. When the value of collateral declines, it provides less protection to lenders, meaning that losses on loans are likely to be more severe. Because lenders are now less protected against the consequences

[5]Although we in the United States have not experienced any financial crises since the Great Depression, we have had several close calls—the October 1987 stock market crash, for example. An important reason why we have escaped financial crises is the timely action of the Federal Reserve to prevent them during episodes like that of October 1987. We look at the issue of the Fed's role in preventing financial crises in Chapter 20.

of adverse selection, they decrease their lending, which in turn causes investment and aggregate output to decline.

In addition, the decline in corporate net worth as a result of a stock market decline increases moral hazard by providing incentives for borrowing firms to make risky investments, as they now have less to lose if their investments go sour. The resulting increase in moral hazard makes lending less attractive—another reason why a stock market decline and hence a decline in net worth leads to decreased lending and economic activity.

Unanticipated Declines in the Aggregate Price Level Unanticipated declines in the aggregate price level also decrease the net worth of firms. Because debt payments are contractually fixed in nominal terms, an unanticipated decline in the price level raises the value of firms' liabilities in *real* terms (increases the burden of the debt) but does not raise the real value of firms' assets. The result is that net worth in *real* terms (the difference between assets and liabilities in *real* terms) declines. A sharp drop in the price level, therefore, causes a substantial decline in real net worth and an increase in adverse selection and moral hazard problems facing lenders. An unanticipated decline in the aggregate price level thus leads to a drop in lending and economic activity.

Increases in Uncertainty A dramatic increase in uncertainty in financial markets, due perhaps to the failure of a prominent financial or nonfinancial institution, a recession, or a stock market crash, makes it harder for lenders to screen good from bad credit risks. The resulting inability of lenders to solve the adverse selection problem makes them less willing to lend, which leads to a decline in lending, investment, and aggregate activity.

Bank Panics Banks perform an important financial intermediation role by engaging in information-producing activities that facilitate productive investment for the economy. Consequently, a financial crisis in which many banks go out of business (called a **bank panic**) reduces the amount of financial intermediation undertaken by banks and so leads to a decline in investment and aggregate economic activity. A decrease in the number of banks during a financial crisis also decreases the supply of funds to borrowers, which in turn leads to higher interest rates. Since a rise in interest rates also increases adverse selection in credit markets, bank panics further intensify the decrease in economic activity through this channel as well.

Anatomy of a Financial Crisis

Now that we have examined the five factors that can produce serious disruptions in financial markets, we are ready to look at the anatomy of a financial crisis.

STUDY GUIDE

To understand fully what takes place in a financial crisis, make sure that you can state the reasons why each of the five factors—increases in interest rates, stock market declines, unanticipated declines in the aggregate price level, increases in uncertainty, and bank panics—increases adverse selection and moral hazard problems, which in turn lead to a decline in economic activity. To help you with the topic to which we turn next, you might want to refer to Figure 3, a diagram that traces the sequence of events in a financial crisis.

Most financial crises in the United States have begun with a sharp rise in interest rates, a steep stock market decline, and an increase in uncertainty resulting from a failure of major financial or nonfinancial firms (the Ohio Life Insurance & Trust Company in 1857, the Northern Pacific Railroad and Jay Cooke & Company in 1873, Grant & Ward in 1884, the National Cordage Company in 1893, the Knickerbocker Trust Company in 1907, and the Bank of the United States in 1930). During these crises, the increase in uncertainty, the rise in interest rates, and the stock market decline increased the severity of adverse selection problems in credit markets; the stock market decline also increased moral hazard problems. The rise in adverse selection and moral hazard problems then made it less attractive for lenders to lend and led to a decline in investment and aggregate economic activity.

Because of the worsening business conditions and uncertainty about their bank's health (perhaps banks would go broke), depositors began to withdraw their funds from banks. As we will see in Chapter 17, such massive withdrawals of deposits led to bank panics. The resulting decline in the number of banks raised interest rates even further and decreased the amount of financial intermediation by banks. Worsening of the problems created by adverse selection and moral hazard led to further economic contraction.

Finally, there was a sorting out of insolvent (truly bankrupt) firms from healthy firms by bankruptcy proceedings. The same process occurred for banks, often with the help of public and private authorities. Once this sorting out was complete, uncertainty in financial markets declined, the stock market underwent a recovery, and interest rates fell. The overall result was that adverse selection and moral hazard problems diminished and the financial crisis subsided. With the financial markets able to operate well again, the stage was set for the recovery of the economy.

If, however, the economic downturn led to a sharp decline in prices, the recovery process was short-circuited. In this situation, a process called **debt deflation** occurred in which a substantial decline in the price level set in, leading to a further deterioration in firms' net worth because of the increased burden of indebtedness. When debt deflation set in, the adverse selection and moral hazard problems continued to increase so that lending, investment spending, and aggregate economic activity remained depressed for a long time. The most significant financial crisis that included debt deflation was the Great Depression, the worst economic contraction in U.S. history (see Box 1).

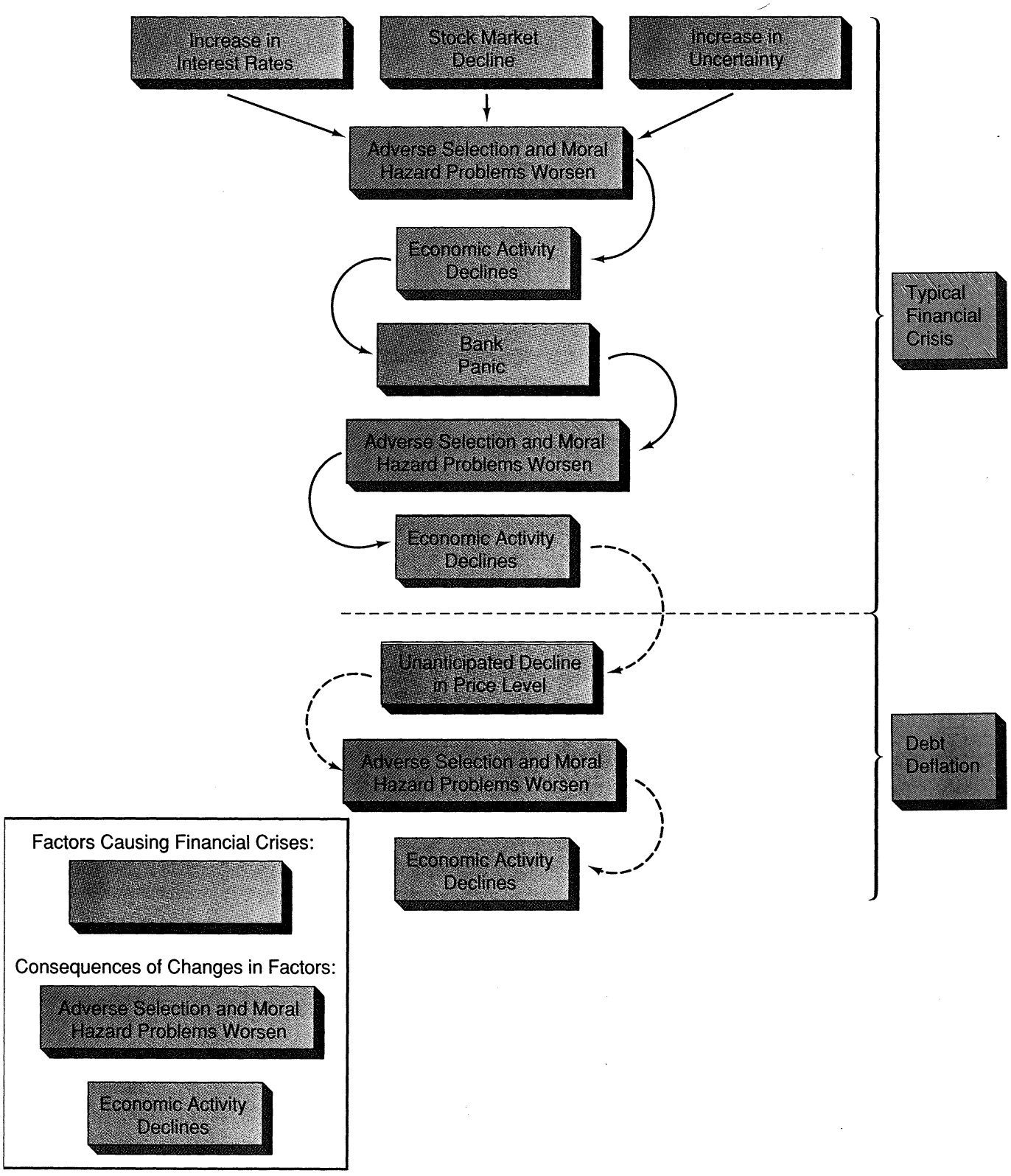

FIGURE 3 Anatomy of a Financial Crisis
The solid arrows trace the sequence of events in a typical financial crisis; the dotted arrows show the additional set of events that occur if the crisis develops into a debt deflation.

Box 1

CASE STUDY OF A FINANCIAL CRISIS: THE GREAT DEPRESSION

Federal Reserve officials viewed the stock market boom of 1928 and 1929, during which stock prices doubled, as excessive speculation. To curb it, they pursued a tight monetary policy to raise interest rates. The Fed got more than it bargained for with the stock market crash in October 1929.

Although the 1929 crash had a great impact on the minds of a whole generation, most people forget that by the middle of 1930, more than half of the stock market decline had been reversed. What might have been a normal recession turned into something far different, however, with adverse shocks to the agricultural sector, a continuing decline in the stock market after the middle of 1930, and a sequence of bank failures from October 1930 until March 1933 in which over one-third of the banks in the United States went out of business (events described in more detail in Chapter 17).

The continuing decline in stock prices after mid-1930 (by mid-1932 stocks had declined to 10% of their value at the 1929 peak) and the increase in uncertainty from the unsettled business conditions created by the economic contraction made adverse selection and moral hazard problems worse in the credit markets. The loss of one-third of the banks reduced the amount of financial intermediation. This intensified adverse selection and moral hazard problems, thereby decreasing the ability of financial markets to channel funds to firms with productive investment opportunities. As our analysis predicts, the amount of outstanding commercial loans fell by half from 1929 to 1933, and investment spending collapsed, declining by 90% from its 1929 level.

The short-circuiting of the process that kept the economy from recovering quickly, which it does in most recessions, occurred because of a fall in the price level by 25% in the 1930–1933 period. This huge decline in prices triggered a debt deflation in which net worth fell because of the increased burden of indebtedness borne by firms. The decline in net worth and the resulting increase in adverse selection and moral hazard problems in the credit markets led to a prolonged economic contraction in which unemployment rose to 25% of the labor force. The financial crisis in the Great Depression was the worst ever experienced in the United States, and it explains why this economic contraction was also the most severe one ever experienced in the nation.*

*See Ben Bernanke, "Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression," *American Economic Review* 73 (1983): 257–276, for a discussion of the role of asymmetric information problems in the Great Depression period.

SUMMARY

1. There are eight basic puzzles about our financial structure. The first four emphasize the importance of financial intermediaries and the relative unimportance of securities markets for the financing of corporations; the fifth recognizes that financial markets are among the most heavily regulated sectors of the economy; the sixth states that only large, well-established corporations have access to securities markets; the seventh indicates that collateral is an important feature of debt contracts; and the eighth presents debt contracts as complicated legal documents that place substantial restrictions on the behavior of the borrower.
2. Transactions costs freeze many small savers and borrowers out of direct involvement with financial markets. Financial intermediaries can take advantage of economies of scale and are better able to develop expertise to lower transactions costs, thus enabling their savers and borrowers to benefit from the existence of financial markets.
3. Asymmetric information results in two problems: adverse selection, which occurs before the transaction, and moral hazard, which occurs after the transaction. Adverse selection refers to the fact that bad credit risks are the ones most likely to seek loans, and moral hazard refers to the risk of the borrower's engaging in activities that are undesirable from the lender's point of view.
4. Adverse selection interferes with the efficient functioning of financial markets. Solutions to the adverse selection problem include private production and sale of information, government regulation to increase information, financial intermediation, and collateral and net worth. The free-rider problem occurs when people who do not pay for information take advantage of information that other people have paid for. This problem explains why financial intermediaries, particularly banks, play a more important role in financing the activities of businesses than securities markets do.
5. Moral hazard in equity contracts is known as the principal-agent problem because managers (the agents) have less incentive to maximize profits than stockholders (the principals). The principal-agent problem explains why debt contracts are so much more prevalent in financial markets than equity contracts. Solutions to the principal-agent problem include monitoring, government regulation to increase information, and financial intermediation.
6. Solutions to the moral hazard problem in debt contracts include net worth, monitoring and enforcement of restrictive covenants, and financial intermediaries.
7. Financial crises are major disruptions in financial markets. They are caused by increases in adverse selection and moral hazard problems that prevent financial markets from channeling funds to people with productive investment opportunities, leading to a sharp contraction in economic activity. The five factors that lead to financial crises are increases in interest rates, stock market declines, unanticipated declines in the aggregate price level, increases in uncertainty, and bank panics.

KEY TERMS

collateral
secured debt
unsecured debt
restrictive covenants
free-rider problem
net worth (equity capital)
principal-agent problem
costly state verification
venture capital firm
incentive-compatible
financial crises
bank panic
debt deflation

QUESTIONS AND PROBLEMS

1. How can economies of scale help explain the existence of financial intermediaries?
*2. Describe two ways in which financial intermediaries help lower transactions costs in the economy.
3. Would moral hazard and adverse selection still arise in financial markets if information were not asymmetric? Explain.
*4. How do standard accounting principles required by the government help financial markets work more efficiently?
5. Do you think the lemons problem would be more severe for stocks traded on the New York Stock Exchange or those traded over-the-counter? Explain.
*6. Which firms are most likely to use bank financing rather than to issue bonds or stocks to finance their activities? Why?
7. How can the existence of asymmetric information provide a rationale for government regulation of financial markets?
*8. Would you be more willing to lend to a friend who has put all of her life savings into her business than if she had not done so? Why?
9. Rich people often worry that someone will marry them for their money. Is this a problem of adverse selection?
*10. The more collateral backing a loan, the less the lender has to worry about adverse selection." Is this statement true, false, or uncertain? Explain.
11. How does the free-rider problem aggravate adverse selection and moral hazard problems in financial markets?
*12. Explain how the separation of ownership and control in American corporations might lead to poor management.
13. Is a financial crisis more likely to occur when the economy is experiencing deflation or inflation? Explain.
*14. How can a stock market crash provoke a financial crisis?
*15. How can a sharp rise in interest rates provoke a financial crisis?