18.2 Asymmetric Information: The Market for Lemons and Adverse Selection

We now discuss asymmetric information and the market for lemons as well as the problem of adverse selection in the insurance market.

Asymmetric Information and the Market for Lemons

Often one party to a transaction (i.e., the seller or the buyer of a product or service) has more information than the other party regarding the quality of the product or service. This is a case of **asymmetric information.** An example of the problems created by asymmetric information is the market for "lemons" (i.e., defective products, such as used cars, that will require a great deal of costly repairs and are not worth their price), discussed by Ackerlof.[10]

For example, sellers of used cars know exactly the quality of the cars that they are selling while prospective buyers do not. As a result, the market price for used cars will depend on the quality of the average used car available for sale. As such, the owners of "lemons" would then tend to receive a higher price than their cars are worth, while the owners of high-quality used cars would tend to get a lower price than their cars are worth. The owners of high-quality used cars would therefore withdraw their cars from the market, thus lowering the average quality and price of the remaining cars available for sale. Sellers of the now above-average quality cars withdraw their cars from the market, further reducing the quality and price of the remaining used cars offered for sale. The process continues until only the lowest-quality cars are sold in the market at the appropriate very low price. Thus, the end result is that low-quality cars drive high-quality cars out of the market. This is known as **adverse selection.**

The problem of adverse selection that arises from asymmetric information can be overcome or reduced by the acquisition of more information by the party lacking it. For example, in the used-car market, a prospective buyer can have the car evaluated at an independent automotive service center, or the used-car dealer can provide guarantees for the cars they sell. With more information on the quality of used cars, buyers would be willing to pay a higher price for higher-quality cars, and the problem of adverse selection can be reduced. More generally, brand names (such as Bayer aspirin), chain retailers (such as Sears, McDonald's, and Hilton), and professional licensing (of doctors, lawyers, beauticians, etc.) are important methods of ensuring the quality of products and services, and thus reduce the degree of asymmetric information and the resulting problem of adverse selection. Travelers are often willing to pay higher prices for nationally advertised products and services than for competitive local products, because they do not know the quality of local products and services. This is why tourists often pay more for products and services than residents. Sometimes, higher prices are themselves taken as an indication of higher quality.[11]

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[10] G.A. Ackerlof, "The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism," *Quarterly Journal of Economics,* August 1970, pp. 488–500.

[11] See J. E. Stiglitz, "The Causes and Consequences of the Dependence of Quality on Price," *Journal of Economic Literature,* March 1987, pp. 1–48.

The Insurance Market and Adverse Selection

The problem of adverse selection arises not only in the market for used cars, but in any market characterized by asymmetric information. This is certainly the case for the insurance market. Here, the individual knows much more about the state of her health than an insurance company can ever find out, even with a medical examination. As a result, when an insurance company sets the insurance premium for the average individual (i.e., an individual of average health), unhealthy people are more likely to purchase insurance than healthy people. Because of this adverse selection problem, the insurance company is forced to raise the insurance premium, thus making it even less advantageous for healthy individuals to purchase insurance. This increases even more the proportion of unhealthy people in the pool of insured people, thus requiring still higher insurance premiums. In the end, insurance premiums would have to be so high that even unhealthy people would stop buying insurance. Why buy insurance if the premium is as high as the cost of personally paying for an illness?

The problem of adverse selection arises in the market for any other type of insurance (i.e., for accidents, fire, floods, and so on). In each case, only above-average risk people buy insurance, and this forces insurance companies to raise their premiums. The worsening adverse selection problem can lead to insurance premiums being so high that in the end no one would buy insurance. The same occurs in the market for credit. Since credit card companies and banks must charge the same interest rate to all borrowers, they attract more low- than high-quality borrowers (i.e., more borrowers who either do not repay their debts or repay their debts late). This forces up the interest rate, which increases even more the proportion of low-quality borrowers, until interest rates would have to be so high that it would not pay even for low-quality borrowers to borrow.

Insurance companies try to overcome or reduce the problem of adverse selection by requiring medical checkups, charging different premiums for different age groups and occupations, and offering different rates of coinsurance, amounts of deductibility, length of contracts, and so on. These limit the variation in risk within each group and reduce the problem of adverse selection. Because there will always be some variability in risk within each group, however, the problem of adverse selection cannot be entirely eliminated in this way. The only way to avoid the problem entirely is to provide compulsory insurance to all the people in the group. Individuals facing somewhat lower risks than the group average will then get a slightly worse deal, while individuals facing somewhat higher risks will get a slightly better deal (in relation to the equal premium that each group member must pay). Indeed, this is an argument in favor of universal, government-provided, compulsory health insurance and no-fault auto insurance. On the other hand, credit companies significantly reduce the adverse selection problem that they face by sharing "credit histories" with other credit companies. Although such sharing of credit histories is justifiably attacked as an invasion of privacy, it does allow the credit market to operate and keep interest charges to acceptably low levels.

MARKET SIGNALING

The problem of adverse selection resulting from asymmetric information can be resolved or greatly reduced by **market signaling.**[12] If sellers of higher-quality products, lower-risk

[12] A. M. Spence, *Market Signaling* (Cambridge, MA: Harvard University Press, 1974); and A. M. Spence, "Job Market Signaling," *Quarterly Journal of Economics*, August 1973, pp. 355–379.

individuals, better-quality borrowers, or more productive workers can somehow inform or send signals of their superior quality, lower risk, or greater productivity to potential buyers of the products, insurance companies, credit companies, and employers, then the problem of adverse selection can, for the most part, be overcome. Individuals would then be able to identify high-quality products; insurance and credit companies would be able to distinguish between low and high-risk individuals and firms; and firms would be able to identify higher-productivity workers. As a result, sellers of higher-quality products would be able to sell their products at commensurately higher prices; lower-risk individuals could be charged lower insurance premiums; better-quality borrowers would have more access to credit; and higher-productivity workers could be paid higher wages. Such market signaling can thus overcome the problem of adverse selection.

A firm can signal the higher quality of its products to potential customers by adopting brand names, by offering guarantees and warranties, and by a policy of exchanging defective items. A similar function is performed by franchising (such as McDonald's) and the existence of national retail outlets (such as Sears) that do not produce the goods they sell themselves, but select products from other firms and on which they put their brand name as an assurance of quality. The seller, in effect, is saying "I am so confident of the quality of my products that I am willing to put my name on them and guarantee them." The high rate of product returns and need to service low-quality merchandise would make it too costly for sellers of low-quality products to offer such guarantees and warranties. The acceptance of coinsurance and deductibles by an individual or firm similarly sends a powerful message to insurance companies indicating that they are good risks. The credit history of a potential borrower (indicating that he or she has repaid past debts in full and on time) also sends a strong signal to credit companies that he or she is a good credit risk.

Education serves as a powerful signaling device regarding the productivity of potential employees. That is, higher levels of educational accomplishments (such as years of schooling, degrees awarded, grade-point average achieved, etc.) not only represent an investment in human capital but also serve as a powerful signal to an employer of the greater productivity of a potential employee. After all, the individual had the intelligence and perseverance to complete college. A less intelligent and/or a less motivated person is usually not able to do so, or it might cost her so much more (for example, it may take five or six years rather than four years to get a college degree) as not to pay for her to get a college education even if she could. Thus, a college degree provides a powerful signal that its holder is in general a more productive individual than a person without a degree. Even if education did not in fact increase productivity, it would still serve as an important signal to employers of the greater *innate* ability and higher productivity of a potential employee.[13]

A firm could fire an employee if it subsequently found that the employee's productivity was too low. But this is usually difficult (the firm would have to show due cause) and expensive (the firm might have to give severance pay). In any event, it usually takes a great deal of on-the-job training before the firm can correctly evaluate the productivity of a new employee. Thus, firms are eager to determine as accurately as possible the productivity of a potential employee before he or she is hired. There is empirical evidence to suggest that education does in fact provide such an important signaling device. Liu and Wong found that while firms pay higher *initial* salaries to holders of educational certificates (such as college degrees) than to non–certificate holders, employees' salaries subsequently depend on their

[13] See K. J. Arrow, "Higher Education as a Filter," *Journal of Public Economics*, July 1973, pp. 193–216.

actual on-the-job productivity.[14] Thus, the firm relies on the market signal provided by education when it first hires an employee, for lack of a better signaling device, but then relies on actual performance after it has had adequate opportunity to determine the employee's true productivity on the job.

18.4 The Problem of Moral Hazard

Another problem that arises in the insurance market is that of **moral hazard.** This refers to the increase in the probability of an illness, fire, or other accident when an individual is insured than when he or she is not. With insurance, the loss from an illness, fire, or other accident is shifted from the individual to the insurance company. Therefore, the individual will take fewer precautions to avoid the illness, fire, or other accident, and when a loss does occur he or she may tend to inflate the amount of the loss. For example, with medical insurance, an individual may spend less on preventive health care (thus increasing the probability of getting ill); and if he or she does become ill, will tend to spend more on treatment than if he or she had no insurance. With auto insurance, an individual may drive more recklessly (thus increasing the probability of a car accident) and then may be likely to exaggerate the injury and inflate the property damage suffered if the driver does get into an accident. Similarly, with fire insurance, a firm may take fewer reasonable precautions (such as the installation of a fire-detector system, thereby increasing the probability of a fire) than in the absence of fire insurance; and then the firm is likely to inflate the property damage suffered if a fire does occur. Indeed, the probability of a fire is high if the property is insured for an amount greater than the real value of the property.

If the problem of moral hazard is not reduced or somehow contained, it could lead to unacceptably high insurance rates and costs and thus defeat the very purpose of insurance. The socially valid purpose of insurance is to share *given* risks of a large loss among many economic units. But if the ability to buy insurance increases total risks and claimed losses, then insurance is no longer efficient and may not even be possible. One method by which insurance companies try to overcome the problem of moral hazard is by specifying the precautions that an individual or firm must take as a condition for buying insurance. For example, the insurance company might require yearly physical checkups as a condition for continuing to provide health insurance to an individual, increase insurance premiums for drivers involved in accidents, and require the installation of a fire detector before providing fire insurance to a firm. By doing this, the insurance company tries to limit the possibility of illness, accident, or fire, and thereby reduce the number and amount of possible claims it will face.

Another method used by insurance companies to overcome or reduce the problem of moral hazard is **coinsurance.** This refers to insuring only part of the possible loss or value of the property being insured. The idea is that if the individual or firm shares a significant portion of a potential loss with the insurance company, the individual or firm will be more prudent and will take more precautions to avoid losses from illness or accidents. Although we have examined moral hazard in connection with the insurance market, the problem of moral hazard arises whenever an externality is present (i.e., any time an economic agent can shift some of its costs to others). This is clearly shown in Examples 18–2 and 18–3.

[14] P. W. Liu and C. Wong, "Educational Screening by Certificates: An Empirical Test," *Economic Inquiry*, January 1984, pp. 72–83.

EXAMPLE 18–2

Increased Disability Payments Reduce Labor Force Participation

The Social Security program that pays disability benefits to individuals who are able to prove that they are unable to work is a socially useful program. Nevertheless, it may have resulted in a moral hazard problem by encouraging some individuals, who would otherwise be working despite their disability, to withdraw from the job market when receiving disability benefits. For example, an individual who is injured in a non-job-related accident and is unable to walk could train to be an accountant or to hold another sedentary occupation, but that individual may choose instead to remain unemployed and live on disability benefits. There are, of course, many forms of disability that would prevent an individual from doing *any* type of work, but this is not always the case.

Some indirect evidence exists that providing disability benefits since the early 1950s and raising them over time has led to a moral hazard problem. For example, the labor nonparticipation rate for men between the ages of 45 and 54 increased from nearly 4% in 1950 to more than 14% in 1993 at the same time that the Social Security disability-recipiency rate for men in the same age group increased from zero to about 5.3%. The nonparticipation rate refers to the proportion of people in a particular age group who are neither working nor seeking employment because of all causes (disability and other). On the other hand, the Social Security disability-recipiency rate refers to the proportion of people in a particular age group who are neither working nor seeking employment because of a disability.

Providing disability benefits and increasing them over time, thus, seems to have resulted in a moral hazard problem. There are, of course, other reasons besides disability that might have led to the large increase in the nonparticipation rate since the 1950s. However, the sharp and parallel increase in the two rates over time leads to the suspicion that a moral hazard problem was also at work. By providing disincentives for work, U.S. welfare programs also seem to have led to the same situation. In fact, when the welfare reform of 1996 ended welfare as entitlements, available to all persons who qualified, and required recipients to seek work as a condition for continued assistance, the number of people on welfare fell sharply.

Sources: Donald O. Parsons, "The Decline in Labor Force Participation," *Journal of Political Economy*, February 1980, pp. 117–134; "Disability Insurance and Male Labor-Force Participation," *Journal of Political Economy*, June 1984, pp. 542–549; Robert Moffitt, "Incentive Effects of the U.S. Welfare System: A Review," *Journal of Economic Literature*, March 1992, pp. 1–61; *U.S. Statistical Abstract* (Washington, D.C.: U.S. Government Printing Office, 2007) p. 357; "U.S. Disability Policy in a Changing World," *Journal of Economic Perspectives*, Winter 2002, pp. 213–224; "Welfare Reforms: Ten Years Later," *New York Times*, August 26, 2006, p. 9; and B. Madrian, "The U.S. Health Care System and labor Markets," *NBER Working Paper No. 11980*, January 2006; and S. Mitra, "The Reservation Wages of Social Security Disability Insurance Beneficiaries," *Social Security Bulletin*, Col. 67 (4), 2008, pp. 89–111.

EXAMPLE 18–3

Medicare and Medicaid and Moral Hazard

Medicare is a government program that covers most of the medical expenses of the elderly, while Medicaid covers practically all medical expenses of the poor. Both programs were enacted in the United States in 1965. While socially useful, Medicare and

Medicaid may lead to a moral hazard problem by encouraging more doctors' visits by the elderly and the poor, resulting in higher prices for medical services for the rest of the population. The effect of Medicare and Medicaid on the price and quantity of medical services consumed by people not covered by either program is analyzed in a simple manner in Figure 18.1. For simplicity, we assume that all medical costs of the elderly and the poor are covered by the programs and all medical services take the form of doctors' visits.

In the figure, D_c is the demand curve of medical services of the elderly and the poor before the subsidy or coverage under Medicare and Medicaid, while D_n is the demand curve of the rest of the population. $D_c + D_n = D_t$. The intersection of D_t and S (point E) defines the equilibrium price of \$15 per visit (and a total of 900 million visits) for the to-be covered group and for the noncovered group. At $P = \$15$, the elderly and the poor purchase 200 million doctors' visits per year, while the rest of the population consumes 700 million per year, for a total of 900 million visits for the entire population.

When the government covers the entire cost of the doctors' visits of the elderly and the poor, their demand curve becomes D'_c. This is vertical at the quantity purchased at zero price. That is, the covered group will demand 400 million visits per year regardless of price. $D'_c + D_n = D'_t$. The intersection of D'_t and S (point E') defines the new equilibrium price of \$20 for the noncovered group. The noncovered group now pays a higher price than before (\$20 per visit instead of \$15) and consumes a smaller quantity of medical services as indicated by D_n (600 million instead of the previous 700 million visits per year). The nonsubsidized group also pays the taxes to pay for the subsidy; the covered group, as well as doctors, receive the benefits. The conclusion of the foregoing analysis has been broadly borne out by the events that followed the adoption of Medicare and Medicaid. In short, Medicare and Medicaid led to a moral hazard problem.

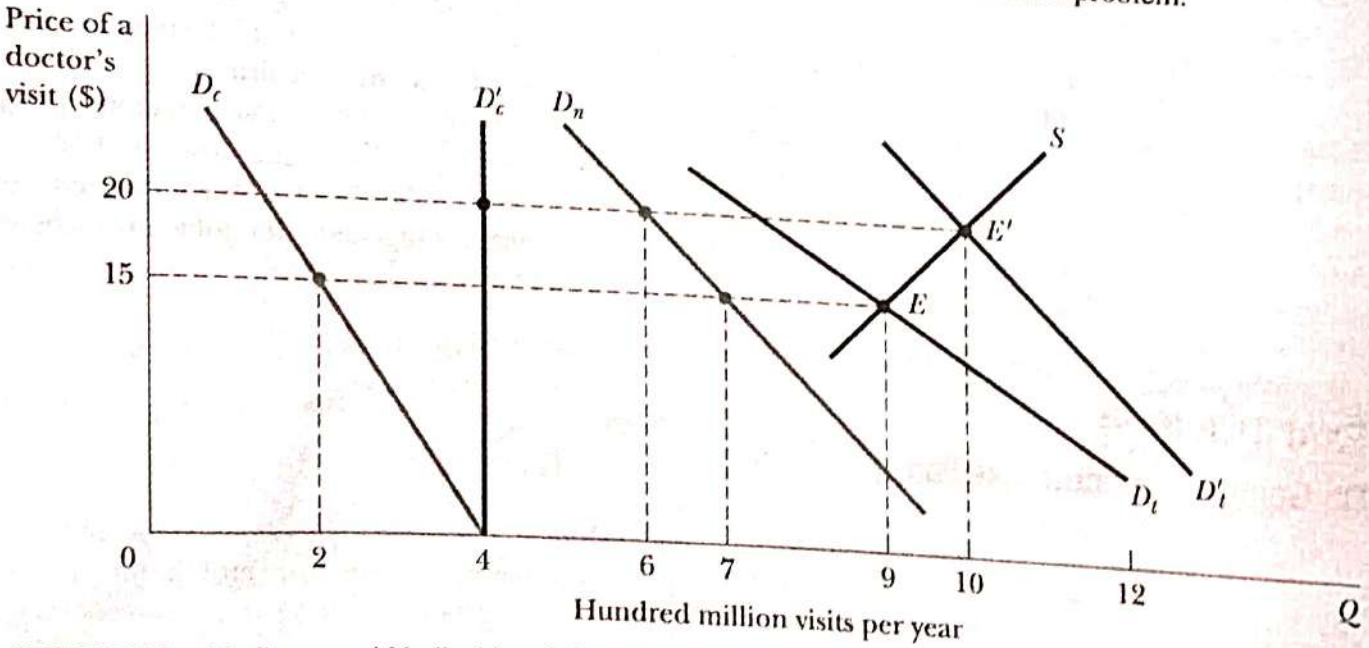

FIGURE 18.1 Medicare and Medicaid and the Price of Medical Services D_c is the demand curve of medical services of the elderly and the poor before the subsidy, while D_n is the demand curve of the rest of the population. $D_c + D_n = D_t$. With D_t and S, $P = \$15$ (point E). The to-be-covered group purchases 200 million visits and the others 700 million. When the government covers the entire cost of the doctors' visits of the elderly and the poor, their demand curve becomes D'_c. $D'_c + D_n = D'_t$. Then $P = \$20$ and $Q = 600$ million (point E') for the noncovered group.

18.5 THE PRINCIPAL-AGENT PROBLEM

A firm's managers act as the *agents* for the owners or stockholders (legally referred to as the *principals*) of the firm. Because of this separation of ownership from control in the modern corporation, a **principal-agent problem** arises.[15] This problem refers to the fact that while the owners of the firm want to maximize the total profits or the present value of the firm, the managers or agents want to maximize their own personal interests, such as their salaries, tenure, influence, and reputation.[16] The principal-agent problem often becomes evident in the case of takeover bids for a firm by another firm. Although the owners or stockholders of the firm may benefit from the takeover if it raises the value of the firm's stock, the managers may oppose it for fear of losing their jobs in the reorganization of the firm that may follow the takeover.

One way of overcoming the principal-agent problem and ensuring that the firm's managers act in the stockholders' interests is by providing managers with **golden parachutes.** These are large financial settlements paid out by a firm to its managers if they are forced out or choose to leave as a result of the firm being taken over. With golden parachutes, the firm is in essence buying the firm managers' approval for the takeover. Even though golden parachutes may cost a firm millions of dollars, they may be more than justified by the sharp increase in the value of the firm that might result from a takeover. Note that a principal-agent problem may also arise in the acquiring firm. Specifically, the agents or managers of a firm may initiate and carry out a takeover bid more for personal gain (in the form of higher salaries, more secure tenure, and the enhanced reputation and prestige in directing the resulting larger corporation) than to further the stockholders' interest. In fact, the managers of the acquiring firm may be carried away by their egos and bid too much for the firm being acquired.

More generally (and independently of takeovers) a firm can overcome the principal-agent problem by offering big bonuses to its top managers based on the firm's long-term performance and profitability or a generous deferred-compensation package, which provides relatively low compensation at the beginning and very high compensation in the future. Such incentives would induce managers to stay with the firm and strive for its long-term success. In the case of public enterprises such as a public-transportation agency, or in a nonprofit enterprise such as a hospital, an inept manager can be voted out or removed.

As Example 18–4 shows, trying to overcome the principal-agent problem between owners or stockholders (principals) and managers (agents) with golden parachutes may not solve the principal-agent problem and may lead to abuses.

EXAMPLE 18–4

Do Golden Parachutes Reward Failure?

Some firms use golden parachutes to overcome their managers' objections to a takeover that might greatly increase the value of the firm. The proliferation and size of golden parachutes has sharply increased during the great wave of mergers that has

[15] See E. F. Fama, "Agency Problems of the Theory of the Firm," *Journal of Political Economy*, April 1980, pp. 288–307.

[16] See W. Baumol, *Business Behavior, Value, and Growth* (New York: Harcourt-Brace, 1967); and O. Williamson, *Corporate Control and Business Behavior* (Englewood Cliffs, NJ: Prentice-Hall, 1964).

taken place in the United States since the early 1980s. Some of the largest and most controversial golden parachutes (amounting to a total of nearly $100 million) were set up for ten of Primerica's executives for retiring as a result of its friendly merger with the Commercial Credit Corporation in 1988. These golden parachutes represented 6% of Primerica's $1.7 billion book value and cost stockholders $1.88 a share. Gerald Tsai, Jr., the chairman of Primerica, who arranged the merger, was to receive $19.2 million as severance pay, $8.6 million to defray the excise taxes resulting from the compensation agreement, and several other millions of dollars from Primerica's long-term incentive, life insurance, and retirement benefits program—for an overall total of nearly $30 million!

Even before the final approval of the merger in December 1988, some of Primerica's stockholders filed suit in New York State Supreme Court charging that Primerica's top executives had violated their fiduciary role and had acted in their own interest and against the stockholders' interests; they demanded that the termination agreements for the ten executives be canceled. The lawsuit pointed out that golden parachutes were originally set up in 1985 for six of Primerica's executives to cover only hostile takeovers; they were then extended to ten executives in 1987; and finally they were revised in 1988, three months after Primerica agreed to the merger, to also cover friendly takeovers.

It has been estimated that 15% of the nation's largest corporations offered golden parachutes to its top executives in 1981. This figure rose to 33% in 1985 and to nearly 50% in 1990. Indeed, golden parachutes are no longer confined to the corporation's top executives; they are offered farther and farther down the corporate ladder to middle-level management and sometimes even to all employees. This has resulted in a public outcry and has led the Securities and Exchange Commission to rule that a firm must hold a shareholder vote on its golden parachute plans. Until the early 1990s, corporations typically did not make public their offer of golden parachutes. Not only are they now required to do so, but some companies are even beginning to demand restitution.

The practice of giving golden parachutes, nevertheless, continues. Indeed, after observing huge severance packages given to CEOs who "were let go" in 2000, Dean Foust of *Business Week* (see the reference below) remarked "failure has never looked more lucrative." For example, in August 2000, Proctor & Gamble gave Durk Jager, its just-ousted CEO, a $9.5 million bonus even though he had been at P&G less than one-and-half years and P&G stock had fallen by 50% during his tenure. Also in 2000, Conseco Inc. gave a $49.3 million going-away gift to CEO Stephen Hilbert, who practically bankrupted the company with his ill-fated move into sub-prime lending. Similarly, Mattel gave a parachute package worth nearly $50 million in severance pay to Jill Barard, its departing CEO, and Ford gave Jacques Nasser, its ousted CEO, a compensation package worth $23 million in 2001 even though the company lost $5.5 billion that year. Large-company boards point out, however, that at the point of firing the CEO they usually have limited discretion, if any, in the payouts, due to contractual obligations and other entitlements. Thus, Stanely O'Neil walked away from Merrill Lynch in November 2007 with a $161.5 million package after the company announced a staggering $8.4 billion write-down of securities backed by subprime mortgages, and

Charles Prince left Citigroup soon after, for the same reason, with a $104.7 million exit package.

Sources: "Ten of Primerica Executives' Parachutes Gilded in $98.2 Million Severance Pay," *Wall Street Journal*, November 29, 1988, p. A3; "Primerica Holders File Lawsuit to Halt 'Golden Parachutes'," *Wall Street Journal*, December 2, 1988, p. A9, "Ruling by SEC May Threaten Parachute Plans," *Wall Street Journal*, January 1990, p. A3; "CEO Pay: Nothing Succeeds Like Failure," Business Week, September 11, 2000, p. 46; "When Bosses Get Rich from Selling the Company," *Business Week*, March 30, 1998, p. 33–34; "Golden Parachutes' Emerge in European Deals," *Wall Street Journal*, February 14, 2000, p. A17; "Ex-Ford Chief Receives $23 million in 2001," *New York Times*, April 10, 2002, p. C6; "How Golden Is Their Parachutes?" *Business Week*, November 26, 2007, p 34; and http://dealbook.blogs.nytimes.com/2007/12/05/whos-to-blame-for-big-golden-parachutes.

18.6 THE EFFICIENCY WAGE THEORY

We have seen in Section 14.5 that in a perfectly competitive labor market, all workers who are willing to work find employment and the equilibrium wage rate reflects (i.e., is equal to) the marginal productivity of labor. In the real world, however, we often observe higher-than-equilibrium wages and a great deal of involuntary unemployment. Why, then, don't firms lower wages?

According to the **efficiency wage theory,** firms willingly pay higher-than-equilibrium wages to induce workers to avoid *shirking,* or slacking off on the job.[17] The theory begins by pointing out that it is difficult or impossible for firms to monitor workers' productivity accurately (thus, firms face a principal-agent problem resulting from asymmetric information). If workers are paid the equilibrium wage, they are likely to shirk, or slack off on the job, because, if fired, they can easily find another, equal-paying job (remember, there is no involuntary unemployment at the equilibrium wage, and in any event it is not easy for a firm to catch a worker shirking). According to the *efficiency* wage theory, by paying a higher-than-equilibrium or efficiency wage, the firm can induce employees to work more productively and not to shirk, because the employees fear losing their high-paying jobs. Even if all firms paid efficiency wages, employees would not shirk and not risk being fired, because it is not easy to find another similarly rewarding job in view of the great deal of unemployment that exists at the efficiency wage.

The efficiency wage theory can be examined graphically with Figure 18.2. In the figure, D_L is the usual negatively sloped demand curve for labor of the firm, and S_L is the supply curve of labor (assumed to be fixed for simplicity) facing the firm. The intersection of D_L and S_L at point E determines the equilibrium wage of $10 per hour and equilibrium number of 600 workers hired by the firm. There are no unemployed workers and this wage is equal to the marginal productivity of labor.

But at this equilibrium wage, workers have an incentive to shirk. To induce workers not to shirk, the firm will have to pay a higher or efficiency wage. The higher the efficiency wage is, the smaller the level of unemployment, because workers can then more easily find another job at the efficiency wage (if fired from the present job because of shirking).

[17] See J. L. Yellen, "Efficiency Wage Models of Unemployment," *American Economic Review,* May 1984, pp. 200–205; and J. E. Stiglitz, "The Causes and Consequences of the Dependence of Quality on Price," *Journal of Economic Literature,* March 1987, pp. 1–48.

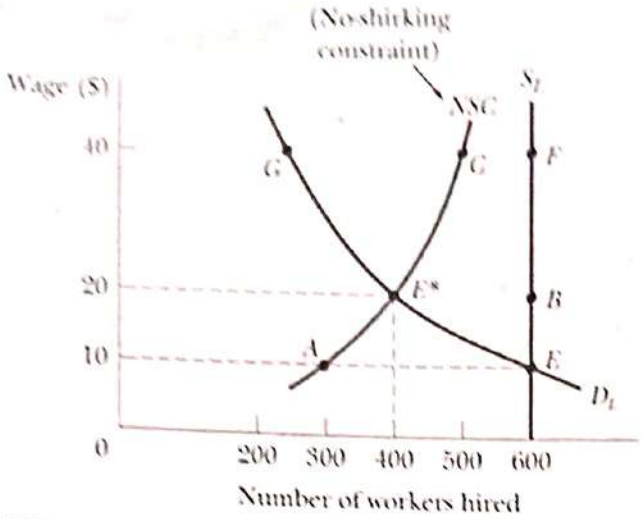

FIGURE 18.2 Efficiency Wage and Unemployment in a Shirking Model D_L and S_L are, respectively, the firm's demand and the supply curve for labor. Their intersection at point E determines the equilibrium wage of $10 per hour at which the firm employs 600 workers and there is no unemployment. Workers, however, have an incentive to shirk at this wage. The no-shirk constraint (*NSC*) curve is positively sloped and shows that the efficiency or minimum wage that the firm must pay to avoid shirking is higher the smaller the level of unemployment. The no-shirking equilibrium is determined at point E^* where D_L and *NSC* cross. The efficiency wage is $20 per hour and 200 workers (BE^*) are unemployed.

This is shown by the no-shirking constraint (*NSC*) curve shown in the figure. The *NSC* curve shows the minimum wage that workers must be paid for each level of unemployment to avoid shirking. For example, the efficiency wage of $10 requires 300 workers (EA) to be unemployed. With 200 workers (BE^*) unemployed the efficiency wage is $20, and with only 100 workers unemployed (CF) the efficiency wage will have to be $40. Note that the *NSC* curve is positively sloped (i.e., the efficiency wage is higher the smaller the level of unemployment) and gets closer and closer to the fixed S_L curve but never crosses it (i.e., there will always be some unemployment at the efficiency wage).

In Figure 18.2, the intersection of the D_L and *NSC* at point E^* determines the *efficiency* wage of $20 per hour. At this wage rate, the firm employs 400 workers and 200 workers are unemployed. The reason that $20 is the equilibrium efficiency wage is that only at this wage is the level of unemployment (BE^*) just enough to avoid shirking. For $10 to be the efficiency wage, 300 workers (EA) would have to be unemployed. But at the wage of $10 there is no unemployment (point E). Thus, *the equilibrium* efficiency wage must be higher. On the other hand, for $40 to be the efficiency wage, only 100 workers (FE) need to be unemployed. But at the wage of $40, 350 workers ($FG$) are unemployed. Thus, the equilibrium efficiency wage must be lower. The efficiency wage is $20 because only at this wage is the number of unemployed workers ($200 = BE^*$) just right for workers not to shirk.