5 Topics in the Economics of Property Law

In the preceding chapter, we developed an economic theory of property rights and remedies. We saw that property law creates a bundle of rights that the owners of property are free to exercise as they see fit, without interference by the state or private persons. Consistent with this freedom is a system of allocation by voluntary exchange. Property law fosters voluntary exchange by removing the obstacles to bargaining. When the obstacles to bargaining are low, resources will be allocated efficiently. We used this framework and economic theory to answer the following four questions that must be addressed by a theory of property law:

1. What can be privately owned?
2. How are ownership rights established?
3. What may owners do with their property?
4. What are the remedies for the violation of property rights?

To answer the first question, we distinguished between private and public goods, and we claimed that the former should be privately owned. Private ownership is appropriate when there is rivalry and exclusion in the use of goods. To answer the second question, we presented a thought experiment to illustrate how property law encourages production, discourages theft, and reduces the cost of protecting goods. According to this thought experiment, people agree to establish property rights to share the benefits from increased productivity. We answered the third question by developing the theory of externalities, especially the connection between public bads in economics and nuisances in law. We noted that common law approximates a system of maximum liberty, which allows any use of property by its owner that does not interfere with other people's property or protected rights. In answering the fourth question, we used bargaining theory to conclude that the injunctive remedy is preferred for private bads with low transaction costs for private bargaining. Conversely, the damage remedy is preferred for public bads with high transaction costs that preclude private bargaining.

These answers given in the previous chapter are very general. In this chapter, we reexamine these questions in detail, with concrete applications. The topics are organized roughly according to the four fundamental questions of property law.

I. What Can Be Privately Owned?

The economic distinction between public and private goods characterizes two ideal types. Although reality is never ideal, understanding these ideal types increases your

understanding of laws governing real goods. In this section we discuss the application of property law to information, which has some features of a public good. Four principal areas of law create property in information and are called "intellectual property law." The *patent system* establishes ownership rights to inventions, processes, and other technical improvements. The *copyright system* grants ownership rights to authors, artists, and composers. The *trademark system* establishes ownership for distinctive commercial marks or symbols that uniquely identify an individual's or organization's output. The area of law known as *trade secrets* deals with business practices in which commercial enterprises have a property interest. (We discuss trade secrets briefly below and more extensively on our website.) After discussing the economics of information, we will turn to its application to the law of patents, copyright, and trademark. Then we will turn to a new section on the ownership of organizations, specifically corporations.

A. Information Economics

Five thousand years ago people slept under grass roofs, covered themselves with skins, and fastened sharp stones on sticks to throw at animals. An American Indian friend of Professor Cooter said, "My father lived in the stone age, I grew up in the iron age, and I'm dying in the computer age." The technical innovations that drove these changes have accelerated. Since the industrial revolution, innovation has caused wealth to grow at compound rates. Compounded over a century, a 2 percent annual growth rate increases wealth more than six times; a 5 percent annual growth rate increases wealth more than 130 times; and a 10 percent annual growth rate increases wealth almost 14,000 times.

This section concerns some laws that promote innovation and cause compound growth. To understand how these laws affect growth, we must first explain the basic economics of innovations, beginning with the effects of innovation on welfare. An economic innovation provides a better way to make something or something better to make. A better way to make something lowers its cost, so the supply curve shifts down and to the right. This shift causes the price of the good to fall for consumers. The amount of their gain is measured by the increase in consumers' surplus in the market for the cheaper good. Similarly, finding something better to make creates a new good that some consumers buy.

Consumers benefit from the fall in the price of a good that they buy or from the introduction of a new good. In addition, innovations can make whole industries appear, disappear, or restructure. Only historians remember the American Ice Trust, which was one of America's largest corporations in 1900. By changing wages and employment, innovation disrupts communities, causing some to grow and others to wither. The mechanization of agriculture in the U.S. emptied the countryside in the early twentieth century and left vacant buildings boarded shut in small towns. Although many agricultural workers moved to the city for higher wages, a ploughman with a team of horses who remained in the countryside found few employers who valued his skill. In Europe, the industrial revolution shoved the nobles with large estates out of the centers of political power. Joseph Schumpeter appropriately called innovation "creative destruction."

Most societies value the gains from faster growth more than they fear its destructive effects. Property law can help to secure rapid economic growth. To understand why, we must shift from consumers and workers to companies. A company that innovates gains a competitive advantage, which immediately creates extraordinary profits. Extraordinary profits reward the innovator for the resources and effort devoted to a very risky activity. In the long run, however, competition causes the innovation to diffuse, and many companies make use of it. When the innovation diffuses fully, the innovator loses its competitive advantage, and its profits fall to the ordinary level. When diffusion is complete, the economy reaches a new equilibrium whose benefits diffuse even more broadly than the innovation.

In this life cycle of an innovation, the innovation causes a disequilibrium, and the innovator earns extraordinary profits as long as it persists. The reward for innovation thus depends on how long the disequilibrium persists. A quick move to equilibrium gives little reward to the innovator for the resources that it invested and the risk that it assumed. Without legal intervention, competition can quickly destroy the profits from innovation, which results in too little innovation.

To see why, we must understand some elements of the economics of information. Everyone with a television or computer buys information, but information differs from other commodities like oranges or razor blades. What special problems exist in defining property rights and establishing markets in information? Information has two characteristics that make transactions in information different from transactions in ordinary private goods. The first characteristic is *credibility,* which we discuss in Chapter 9. The second characteristic, which we discuss now, is *nonappropriability.* Information is generally costly to produce and cheap to transmit.

To illustrate, popular music is costly to make and recordings are cheap to copy. The instant the producer sells information to the buyer, that buyer becomes a potential competitor with the original producer. For example, when someone buys a compact disk recording at a music store, the buyer can copy the disk immediately and resell it to others. Furthermore, the reseller bears only the cost of transmission, not the cost of production. Thus, resellers who pay for transmission undercut producers who pay for production. Consumers try to "free ride" by paying no more than the cost of transmission.

The fact that producers have difficulty selling information for more than a fraction of its value is called the problem of *nonappropriability.* To illustrate, Hong Kong shops traditionally resell American software at the cost of a diskette. Producers use various devices to try to protect their products against appropriation, such as writing computer programs that are hard to copy. (The industry calls this "digital rights management.") But for every program obstructing copying, there is a hack.

Consider the connection between nonappropriability and public goods. Information contains ideas. One person's use of an idea does not diminish its availability for others to use. Thus, information use is *nonrivalrous.* Excluding some people from learning about a new idea can be expensive, because the transmission of ideas is so cheap. Thus, information is *nonexcludable*. These are the two characteristics of public goods identified in Chapter 2. Nonappropriability of information is essentially the same problem as non-excludability for public goods.

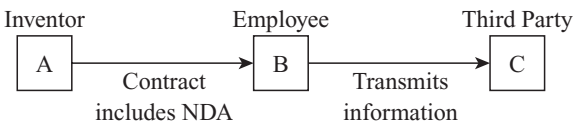
Because of these problems, private markets often undersupply public goods. Similarly, economists who developed the original economics of information concluded that a private market would provide less than the efficient amount of information. These theoretical considerations suggest that an unregulated market will undersupply creative works that embody ideas, such as science, inventions, books, and paintings. The problem has four different remedies that we will describe.

The first remedy is for the state to *supply or subsidize art and science,* especially basic research. Thus, the state owns or subsidizes many universities. More relevant to this book are subsidies for trials. In many civil law countries such as Mexico and Chile, the citizens have a right to use the courts for free. In the United States litigants are assessed court fees, but fees fall far short of court costs, so trials are subsidized. In Chapter 10 we will argue that common law precedents are a valuable stock of ideas. From this fact we will conclude that U.S. courts should stop subsidizing the resolution of private disputes and continue subsidizing the creation of legal precedents.

The second remedy is *charitable contributions.* A great tradition in the United States and some other countries (but not all) is the expectation that wealthy people will make substantial voluntary contributions to the arts and sciences. Besides social norms requiring such gifts, the tax system in the United States allows for the deduction of charitable donations from the donor's taxable income. In practice, the charitable deduction means that donors contribute roughly two-thirds of the donation's value and the U.S. Treasury contributes the other one-third. Other countries such as Switzerland do not allow such deductions, apparently because of sentiment that the state, not the rich, should control the arts and sciences. Charity, however, enjoys this significant advantage over government: donors monitor the use of their money by their favorite charities more carefully than taxpayers monitor the government's use of taxes, and monitoring reduces waste.

The third remedy, broadly described as *trade secrets protection,* comes from contract and tort law. An employee or contractor with a Silicon Valley company is routinely required to sign a non-disclosure agreement (NDA). In an NDA, the employee or contractor promises not to disclose any of the company's secrets. For example, the employee or contractor promises not to speak or write about the company's machinery, equipment, research, or business practices. Trade secrets protection ideally prevents the transmission of information and allows its producer to appropriate its value.

Trade secrets laws, however, have weaknesses that impair their effectiveness. Assume that inventor A employs person B who signs an NDA, and then person B leaks A's secrets to company C:



A has a contract with B and no contract with C. Because C has no contractual obligations to A (in legalese, A and C do not have "privity" of contract), A has limited legal powers to prevent C from using A's trade secrets or transmitting them to

others. If C knew or had reason to know that B violated the NDA, then A could sue C. If C induced B to violate the NDA, then A could sue C. But if C did not know, or have reason to know, or induce B's breach of contract with A, then C did nothing wrong in receiving the information. Furthermore, if the information has thoroughly leaked and become common knowledge in the industry, anyone can use it for free, even if they know that the information originally escaped into the public sphere by breach of contract.

Recent survey research concludes that trade secrets protection is not very effective in Silicon Valley. In reality, employees change jobs frequently in Silicon Valley, and they carry many of the old firm's secrets to the new firm. In fact, many Silicon Valley employees do not understand when they breach trade secrets laws, partly because these laws depart so far from business practices in Silicon Valley.

The fourth remedy, which usually supplements trade secrets protection, is *intellectual property law.* In addition to non-disclosure agreements with his employees, associates, and business customers, inventor A may try to obtain a patent, copyright, or trademark. If his application succeeds, A will have property rights in the information that he produced. For this reason, these three bodies of law belong to the study of *intellectual property,* which is our next topic.

Web Note 5.1

We discuss the burgeoning law-and-economics literature on trade secrets on our website.

B. Intellectual Property

As with real estate, ownership of the mind's products implies the right to exclude others from using them. When intellectual property rights are effectively enforced, the owner of a new computer chip or novel can use the power of exclusion to extract a price from other users. The price rewards the creator, which results in more innovations and faster growth—a form of "dynamic efficiency."

After making an innovation, disseminating it allows more people to enjoy its advantages. Intellectual property rights can also increase dissemination. Without property rights, the innovator may try to keep the innovation secret in order to profit from it. Thus, Renaissance Venetians carefully guarded the secrets of glassmaking, and Shakespeare carefully guarded the texts of his plays so that only his company could perform them. With effective intellectual property rights, however, the innovator need not fear that others will steal the innovation. Instead of keeping it secret, the owner can disseminate it and charge fees for its use, such as licensing fees for patents or performance fees for plays. Replacing secrecy with property increases dissemination, which results in wider use—an increase in "static efficiency."

Although secure intellectual property rights cause the owner to disseminate an innovation, dissemination usually stops short of the point required for static efficiency. Monopoly theory explains why. A valuable invention creates a better product or a better way to make an old product. If the invention has no close substitutes, granting a patent

or copyright creates "monopoly power," which means that the seller can raise the price. To maximize profits, the owner-monopolist sets the user fee too high for social efficiency, so use is too low. Thus, intellectual property law may result in less dissemination of an innovation than required for static efficiency.

Patents and copyright may be temporary monopolies that can vary in breadth and duration. Narrowing the breadth or shortening the duration of intellectual property rights often decreases monopoly profits and increases dissemination. To illustrate, assume that one person writes a novel and another adapts it for a movie. Narrow copyright law gives the novelist ownership of the novel and the adapter ownership of the movie rights. In contrast, broad copyright law gives the novelist ownership of the novel and the movie rights, which are an example of what are called "derivative works." Similarly, a patent on a computer chip can last different lengths of time in different countries. Starting from narrow, short intellectual property rights, broadening and lengthening them rewards the creator and encourages more innovation. If the innovation can be kept secret, then broadening and lengthening the intellectual property rights rewards dissemination by increasing user fees. Thus, increasing incentives for creation also increases incentives for dissemination, at least up to a point. Beyond this point, however, broadening the scope or duration of the creator's property rights increases monopoly power, which rewards creation and reduces dissemination. Thus, incentives for creation and dissemination trade off. (Later we explain that increasing the scope or duration of the creator's property rights still further may eventually reduce creation and dissemination.)

To appreciate the problem of dissemination, consider bridge tolls. Efficiency requires the toll to equal the marginal cost of crossing the bridge. The cost of allowing another motorist to cross an *uncongested* bridge is approximately zero, so the optimal toll is approximately zero. If the optimal toll is not zero, someone who values crossing the bridge will fail to do so, which is a waste. Suppose the toll is $1. A person who is willing to pay $.75 will not cross, so the toll destroys $.75 in benefits that could have been created at no cost. (The conclusion is different for a congested bridge, where increased congestion is the cost of allowing another motorist to cross.) Similarly, the cost of allowing another person to use a patented computer program or music recording is approximately zero, so the optimal user fee is approximately zero. However, the fee that maximizes profits for the owner is much larger than zero. Thus, intellectual property may result in too-high user fees and too-low dissemination.

The innovation-diffusion tradeoff causes major trade tensions in the contemporary world. The world's developed countries create far more innovations that result in patents or copyrights than developing countries do. The developed countries, consequently, focus on the benefits of strong intellectual property rights that protect their creators. In contrast, the developing countries benefit from wide diffusion of technology at low cost. The developing countries, consequently, lack enthusiasm for enforcing intellectual property rights that raise prices to their consumers. Thus, Microsoft wants China to suppress illegal copying of its software, and China apparently lacks enthusiasm for this effort. The net result is that the latest Microsoft software sells in Hong Kong street markets for the cost of a diskette, and the U.S. threatens to sue

China in the World Trade Organization.[1] These tensions should ameliorate as China finds that weak intellectual property law retards its own development of software and other creative industries.

Intellectual property law confronts the innovation-dissemination tradeoff and resolves it somewhat differently in each of its three principal areas—patents, copyrights, and trademarks. Intellectual property law, however, is a historical accretion that developed without a scientific basis. Only recently has property law come under economic analysis. Even today, however, available economic analysis is insufficient to the task. The usual technique of economic analysis involves comparing equilibria with fixed technology ("static equilibrium analysis"), whereas intellectual property law requires an analysis of innovation and changing technology ("growth theory"). Improvements in the economics of information will no doubt produce new, better critiques of intellectual property law. In the meantime, the economic analysis of intellectual property law must proceed with the tools at hand. Besides inadequate scientific tools, intellectual property law aligns poorly with economic efficiency because the legislators respond to politically powerful special interest groups who care about their own profits more than the nation's wealth. The development of high technology industries challenges both economic theory and the law. Almost all questions regarding intellectual property law are open. This fact makes the subject both exciting and confusing.

1. Patents: Broad or Narrow? To appreciate the history of patent law, consider its evolution. European patents for inventions began in the Republic of Venice in 1474 and were formalized in England in the Statute of Monopolies in 1623. Article I, Section 8 of the U.S. Constitution gives Congress the power "to promote the progress of science and useful arts, by securing for limited time to authors and inventors the exclusive right to their respective writings and discoveries." To put this power into action with respect to patents, the U.S. Congress passed America's first patent law in 1790, which was revised in 1793, 1836, 1952, and 1995. To secure an exclusive right to an invention, the inventor must submit an application to the U.S. Patent Office establishing that the invention is for a "new and useful process, machine, manufacture, or composition of matter, or [a] new and useful improvement thereof." (35 U.S. Code 101.) The invention must be "non-obvious," must have "practical utility" (a characteristic that is more or less presumed for all applicants), and must not have been commercialized or known to the public for more than a year before the date of application. A patent examiner—a government official who is, ideally, a lawyer with a strong scientific background—must decide whether to grant the patent. Approximately three-fourths of all applications are granted by the Patent Office. Throughout the 1970s, between 70,000 and 80,000 patents were granted per

[1] The Agreement on Trade Related Aspects of Intellectual Property, or TRIPS, applies to all members of the World Trade Organization. Intellectual property rights are also enforced internationally through the World Intellectual Property Organization, or WIPO.

year.[2] But in the 1990s patent applications and the number of patents granted in the United States exploded to nearly 150,000 per year. The successful applicant now receives a 20-year monopoly on the use of the invention.[3] No one can use the invention except by its owner's consent. Others who wish to use the invention must purchase the right to do so from the patent-holder. The holder may, at his or her discretion, *license* the use of the patent in exchange for the licensee's payment of a fee known as a *royalty.*

If a patent-holder believes that another is using his patent without permission, he or she may bring an action for infringement and seek both injunctive and legal relief.

Web Note 5.2

See our website for more on recent developments in patent laws in the United States and other nations, including speculation on the causes of the tremendous upsurge in the number of patents in the 1990s and early 2000s.

An inventor who applies for a patent risks more than lawyers' fees. The information in the application is accessible to the public. If the application fails, competitors will be able to freely use the invention described in the application. If the application succeeds, competitors will have a precise description of the invention, so they can try to emulate it without trespassing on the patent ("engineer around the patent"). For these reasons, some inventors prefer to rely on trade secrets protection and not apply for a patent. More typically, however, an inventor relies on both trade secrets laws and patents to protect his intellectual property.

Patents create an exclusive property right in an invention with two dimensions: *duration* and *breadth*. "Duration" refers to the number of years between a patent's registration and its expiration. For example, most U.S. patents last for 20 years from the date of application. "Breadth" refers to how similar another invention can be without infringing on the patent for the original invention. To illustrate, the Rubik's Cube is a popular puzzle in which each of the six sides of the cube are divided into a 3×3 grid, and each of the cells in the grid is colored. The object of the game is to manipulate the cube in order to align rows of same-colored cells. An American court ruled that the Rubik's Cube did not infringe an earlier patent by Moleculon for a similar game using a 2×2 grid.[4]

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[2] Of those issued between 1971 and 1975, 51 percent were granted to domestic corporations, 23 percent to foreign corporations and governments, 2 percent to the U.S. federal government, and 23 percent to individual inventors. This distribution represents a trend in the century toward corporate ownership and away from individual ownership of new patents. FREDERICK SCHERER, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE (2d ed. 1980).

[3] In 1995, as part of the agreement establishing the World Trade Organization, the U.S. Congress changed the patent life from 17 years from the date of approval to 20 years from the date of application. The change, which brings the U.S. system into conformity with other national patent systems, arose from the approval of the latest international trade agreement.

[4] *Moleculon Research Corp. v. CBS, Inc.,* 872 F.2d 407, 409 (Fed. Cir. 1989).

1a. Breadth An important policy question concerns the efficient breadth of a patent. To understand the difference in incentive effects between narrow and broad patents, contrast two inventors, two inventions, and two rules. Assume that two inventors are contemplating investing in research on two inventions. The first invention would improve oil-cracking processes, and the second invention would provide a substitute for lead in gasoline. The inventors expect the two inventions to be similar but not identical. Under a broad rule, a single patent would encompass both inventions. Because the party who makes the first invention receives exclusive rights to both inventions, the party who makes the first discovery gets all of the profits, and the other party gets nothing. Thus, the broad rule encourages fast, duplicative research. In contrast, under a narrow rule, a separate patent would be required for each invention. The party who makes the first invention would receive exclusive rights to it, and the party who makes the second invention would have exclusive property rights to it. Thus, the narrow rule encourages slower, complementary research.

To appreciate this contrast between broad and narrow patents, consider a typical relationship between research and development (R&D). Research sometimes yields a pioneering discovery with no immediate commercial value, but with large commercial potential. To realize its potential, a pioneering discovery must be developed and "brought to market." Development involves a series of small improvements. A patented pioneering invention can be followed by a valuable application patented by another inventor. In such cases, U.S. law has an interesting feature: Neither party can use the application without the other's permission. As long as both patents endure, the owner of the application cannot use his patent without a license from the owner of the pioneering invention, and the owner of the pioneering invention cannot use the application without a license from its owner. The result is that they have to negotiate with each other and reach an agreement before anyone can use the application and make money from it. U.S. patent law for pioneering inventions and applications creates an incentive for each to bargain with the other.

These mutual rights get triggered when the subsequent invention is an application of the prior invention. The legal question is how broadly the pioneering discovery extends over the follow-on inventions. Broad patents encourage fundamental research, and narrow patents encourage development. Thus, suppose that an investment of $100,000 in research yields a pioneering invention that has no commercial value. Subsequently, an investment of $50,000 in development yields an improvement to the pioneering invention that has commercial value of $1 million. If the law grants broad patents, a patent for the pioneering invention would also cover the improvement, but if the law grants narrow patents, separate patents would be required for the pioneering invention and the improvement.

What breadth of patents is most efficient? If the social value of investment on fundamental research exceeds the social value of investment on developing applications, then patents should be broadened. Conversely, if the social value of investment on developing applications exceeds the social value of investment on fundamental research, then patents should be narrowed.

In reality, questions of breadth are decided in law according to the "doctrine of equivalents," which refers to a series of court findings about how nearly equivalent

two inventions must be before finding patent infringement. This doctrine is obscure and unpredictable. Courts have sometimes reasoned that an improvement with great commercial value should not be interpreted as infringing on a pioneering invention with little stand-alone value.[5] After all, the improvement, not the pioneering invention, is what people really value.

Howard Chang, an economist-lawyer, has recently shown that this argument is flawed for purposes of maximizing the social value of inventive activity.[6] If the people who do fundamental research receive the sale value of the pioneering invention, but they do not receive any of the sale value of the commercial applications, there will not be enough fundamental research. To see why, consider an analogy between pioneering inventions and raising sheep. Sheep are sold for mutton and wool. Assume that the mutton from a sheep is worth much more than the wool. If shepherds are paid the value of the wool, but not the value of the mutton, then shepherds will not be paid enough, and they will raise too few sheep. Mutton and wool are *joint products* of rearing sheep. Efficient incentives require that shepherds receive the sale value of their product (sheep), which is the sum of the sale value of mutton and wool.

Similarly, commercial applications and pioneering inventions are joint products of fundamental research. Commercial applications require pioneering inventions, and pioneering inventions require fundamental research. A joint product will be undersupplied if the supplier's compensation equals the commercial value of only one of the joint products. Ideally, the fundamental research and commercial development would be joined together in a single firm. If the activities are joined under a single producer, then the producer will receive the sum of the value of the fundamental research and commercial application, just like paying the shepherd the sum of the value of the mutton and wool.

Even if one firm conducted fundamental research and another firm developed commercial applications, the incentive problem could be solved if transaction costs were zero. If transaction costs were zero, then the Coase Theorem would apply: breadth of patent does not matter to economic efficiency so long as inventors can bargain with each other costlessly and make efficient contracts.

Problems arise under the realistic assumption that transaction costs impede bargaining between suppliers of fundamental research and commercial development. Two legal remedies are available: lubricate bargaining (Normative Coase Theorem) or allocate rights to the party who values them the most (Normative Hobbes Theorem). Instead of pursuing these two remedies, U.S. law has been perverse in both respects.

Bargaining among inventors sometimes leads to joint research ventures, in which competing manufacturers share an R&D facility and compete with each other in production and sales. In America, antitrust laws have inhibited joint ventures for research and development. Thus, the application of antitrust law to R&D obstructed a solution to the problem of the joint production of inventions. Fortunately, American officials have recognized this failure in policy and taken steps to correct it.

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[5] See *Westinghouse v. Boyden Power Brake Co*., 170 U.S. 537, 572 (1898).

[6] See Howard F. Chang, *Patent Scope, Antitrust Policy, and Cumulative Innovation,* 26 RAND J. ECON. 34 (1995). See also Robert P. Merges & Richard R. Nelson, *On the Complex Economics of Patent Scope,* 90 COLUM. L. REV. 839 (1990).

When separate producers make joint inventions, officials face a difficult problem in determining the breadth of the patents. If the pioneering invention has little stand-alone value, then some of the improvement's value must be paid to the pioneer in order to provide an adequate incentive for pioneering inventions. On the other hand, if the pioneering invention has large stand-alone value, then its inventor often will be rewarded adequately already, even if he or she receives no share of the value of the improvement. Thus, patent protection for pioneering inventions should be *broader* for those with *little* stand-alone value, and the patent protection for pioneering inventions should be *narrower* for those with *large* stand-alone value. This is just the opposite of the result sometimes reached by U.S. courts.[7]

[7] The technical name for the legal doctrine giving perverse results is the "doctrine of equivalents." Applying this doctrine, courts may find that a pioneering invention with little stand-alone value *is not equivalent* to an application of it, so the patent for the former does not extend to the latter. In contrast, the courts may find that a pioneering invention with stand-alone value *is equivalent* to an application of it, so the patent for the former extends to the latter.

[8] "'When Librium, Hoffmann-LaRoche's forerunner to Valium, came off patent, prices dropped from $15 to $1,' said William Haddad, president of the Generic Pharmaceutical Industry Association." See "The Shift to Generic Drugs," *New York Times*, July 23, 1984, p. 19.

1b. Duration As noted, the rights to a patent last for a fixed time period. What is the optimal patent life? We provide an economic framework for answering this question. Because patents may create a temporary monopoly that rewards the inventor and overcharges buyers, the optimal life of a patent strikes the best balance between encouraging creativity and discouraging dissemination. As the duration of patents increases, society enjoys more benefits from more innovation. However, the rate at which these benefits increase presumably decreases. Consequently, the marginal benefit from more innovation decreases as the duration of patents increases. As the duration of patents increases, society suffers more costs from less dissemination. Society responds to long patents by searching for substitutes for patented goods. The longer a society searches, the more substitutes it finds. As with benefits, the rate at which the social costs of patents increases presumably decreases with duration. Consequently, the marginal cost from less dissemination presumably decreases as the duration of patents increases.

Marginalist reasoning describes the optimal patent life in abstract terms. But what particular life is optimal? Ideally, there would be a different patent life for each invention, depending on its individual characteristics.

Such a scheme of individualized patent terms is impractical, but practical alternatives exist to granting a 20-year patent for every invention (the current international default patent term). Germany, for example, has established a two-tiered patent system. Major inventions in Germany receive full-term patents, while minor inventions and improvements receive *petty patents* for a term of 3 years. In addition, Germany requires patent-holders to pay an annual fee to continue the patent. The annual fee is relatively modest for the first several years of a patent's life, but thereafter escalates at regular intervals until the patent period is exhausted. Consequently, fewer than 5 percent of German patents remain in force for their entire term, the average patent life being a little less than 8 years. This fact is not surprising when you consider that, given an interest rate of 10 percent, a promise to pay $1 in 8 years is worth less than $.50 today, and a promise to pay $1 in 20 years is worth less than $.20 today.

Would economic efficiency increase by changing the U.S. system to resemble the German system? Perhaps. A convincing answer, however, requires much statistical research to provide evidence about broad averages, and that research remains to be done.

1c. Too Much Patent Despite absence of statistical research, evidence exists that patent law has extended too far and threatens to choke creativity in some areas. Pharmaceutical research provides an example of such a problem that legislation cured. To develop a new drug, companies often have to use an existing drug. Fearing competition, the owners of patents on drugs are reluctant to license their use in research to competitors. This is a case where patent law suppresses the innovation that is the purpose of it. The Drug Price Competition and Patent Term Restoration Act (1984) (amending the Food, Drug, and Cosmetic Act, and known as the Hatch-Waxman Act) addressed part of the problem by allowing the free use of patented compounds in research to develop a generic alternative. In *Merck KGaA v. Integra Lifesciences I, Ltd.,* 545 U.S. 193 (2005), the Supreme Court extended this law to research aimed at developing entirely new drugs.

Another example of overextended patent law concerns business methods. In the past, no one thought that a business method could be patented. However, creative

Optimal Patent Life: Orphan Drugs

We have already remarked on the fact that there is one patent term—20 years. The analysis of this section has implied that this is not optimal; clearly the social costs and benefits of inventions and innovations differ, sometimes markedly. Ideally, the patent system would recognize these variations by granting different patent terms depending on the net social benefit of each invention. But the administrative costs of making an invention-by-invention determination of optimal patent life—or even of putting inventions into classes with different patent terms—are probably prohibitively high. There are, no doubt, social costs—perhaps, *significant* social costs—that follow. For instance, there may be a valuable invention that is extremely costly to develop but that simply could not generate enough revenues if sold at a reasonable cost within the 20-year patent term to justify development.

The United States Congress has recognized several important examples of such inventions. One is the Hatch-Waxman Act (Drug Price Competition and Patent Restoration Act) of 1984. That Act added up to five years of patent life for pharmaceuticals to make up for time lost in the pre-approval testing of new drugs required by the Food and Drug Administration (FDA). The Act also eliminated duplicative safety and effectiveness testing for generic drugs (those that share the chemical composition of drugs that are coming off patent).

Congress went even further in the Orphan Drug Act of 1983 and its later amendments. Congress addressed that Act at an instance of the problem we mentioned above—a valuable invention that might not be developed because the standard patent life was not long enough to justify the development costs. An "orphan drug" is one for treatment of "any disease or condition which occurs so infrequently in the United States that there is no reasonable expectation that the cost of developing or marketing the drug will be recovered by sales." A later amendment further defined such diseases or conditions as those affecting fewer than 200,000 people in the United States. The Act gives developers of orphan drugs tax credits for the costs of clinical studies and other subsidies for development costs. In addition, developers of orphan drugs are given a period of seven-year exclusivity, which may be revoked if the developer fails to provide the patient population with the drug or abandons the drug.[9] Finally, the FDA greatly accelerates the approval process for orphan drugs, sometimes taking only eight months for approval.

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[9] This term of exclusivity may strike some readers as odd. Aren't *all* patents grants of exclusivity? Yes, but there is a very important qualification. A normal patent gives the holder exclusive rights to *that* invention or innovation. But others are free to develop distinct but different inventions that substitute for (but do not infringe upon) existing patents. (See our brief discussion of the "doctrine of equivalents" in this section.) So, you may have developed and patented a pharmaceutical that lowers bad blood cholesterol. But others can develop other chemicals directed at the same end, so long as they are not close copies of your drug. (Consider that your ownership of a piece of real property gives you exclusive rights to *that* property but not to similarly situated pieces of property.) The distinction in the Orphan Drug Act is that once one has developed a pharmaceutical that meets the criteria for being designated an orphan drug, no one else can develop even a different drug addressed to the same condition or disease for seven years (at least under the original formulation of the Act).

The Act apparently had the desired effect. In the 20 years before 1983, the FDA had approved only 10 orphan drugs. But in 1984 alone it approved 24. During the Act's first 15 years, the number of orphan drugs increased fivefold, while the number of non-orphan drugs increased by twofold.[10]

This record of success notwithstanding, there are some concerns with the Orphan Drug Act. One has to do with the exclusivity period. That seven-year period, for example, encourages initial development but discourages development of competing but chemically different drugs. Congress found this to be undesirable, so in 1993 they passed amendments to the Act that allowed patenting of second and third orphan drugs directed at the same disease or condition as the original orphan drug so long as those second and third drugs were clinically superior in defined ways. There also have been some additional concerns with the status of orphan drugs. Suppose, for example, that the patient population turns out to expand beyond the 200,000 threshold or that the orphan drug turns out to be effective in treating other, non-orphaned conditions or diseases or that the orphan drug turns out to be extremely profitable. Should the orphan status be revoked in these instances? Congress has addressed these issues but has not yet reached agreement on what to do about them.

lawyers induced the U.S. Patent Office to issue patents on some business methods. The most famous example is Amazon's patent on "one-click" Internet orders. Most scholars believe that innovators who create new business methods should not be able to patent them.

[10] See Frank Lichtenberg & Joel Waldfogel, "Does Misery Love Company? Evidence from Pharmaceutical Markets Before and After the Orphan Drug Act," NBER Working Paper No. 9750 (2007).

1d. Conclusion on Patents As explained, the original economics of information concluded that an unregulated private market will undersupply information. Remedies to the problem include public supply or subsidies for scientific research, charitable donations, and intellectual property rights. This view still dominates most policy discussions. However, special situations can occur in which no regulation or subsidies results in too much information or just the right amount.[11]

To see why, consider the invention of a superior means of forecasting the weather. The original theory argued that the inventor cannot appropriate the value of the invention because people who buy her forecasts can resell them to others. However, there are alternative means for inventors to earn profits. The inventor of the weather forecast, for example, can profit by speculating on agricultural prices. To see how, let's suppose that the inventor forecasts a rainy autumn that will reduce harvests and cause the price of corn to rise. She can keep this information secret and buy corn in the summer for delivery in the autumn. Presumably, if everyone else anticipates normal fall weather, the price of corn in the summer for autumn delivery will be low—too low, the inventor of the weather forecasting method knows. When the harvest arrives in the fall, farmers will fulfill their contracts by delivering corn to the inventor at the low, summer price. Subsequently, the inventor can resell the corn on the spot at the high price caused by a rainy autumn. Thus, Aristotle asserts that Thales of Miletus used philosophy to predict the weather and made a fortune on what amounted to olive press call options.[12]

In general, the producers of information can obtain profits from speculative investments. In Silicon Valley, an inventor often participates in founding a firm and owns a lot of its stock. The inventor presumably knows more than the public about the firm's future performance. The invention may give the firm a competitive advantage in several respects beyond its immediate application. For example, the firm may learn many things about applying and marketing the invention in various fields ahead of its competitors. Also, the firm may establish its brand name over products associated with the invention. Once the market learns the firm's true value, the inventor's stock will appreciate.

Following this line of thought, some scholars have argued that some markets produce too much investment in information. For example, consider the stock market as a whole. An investor who finds out sooner than others that one corporation is buying another can make large profits by purchasing the target company's stock. The gains to society from faster price movements in the target company's stocks are modest compared to the vast wealth redistributed from uninformed stockholders to informed investors. This fact is one reason why securities laws in the United States and elsewhere forbid members of a firm from trading its stock based on information that they have not yet made public—the prohibition against *insider trading*.

Investors race to buy a stock whose price will rise before someone else does, which creates the possibility of excessive trading. Similarly, fishermen race to catch the fish

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[11] J. Hirshleifer *The Private and Social Value of Information and the Reward to Innovative Activity*, 61 Am. Econ. Rev. 561 (1971). See also R. Posner, *The Social Costs of Monopoly and Regulations*, 83 J. POL. ECON. 807 (1975), and E. Rice & T. Ulen, *Rent-Seeking and Welfare Loss*, 3 RES. IN LAW & ECON. 53 (1981).

[12] Aristotle's *Politics*, Book 1, Chapter 11. Thanks to Eric Rasmusen for this example.

in the sea before someone else does, which causes tragic over-fishing. Inventors race to secure patents. Unlike the Olympics, patent law typically (but not always) has no silver medals—the second-place finisher often gets nothing. Are inventions like fish in the sea? No. The advantages of growth are so vast that society benefits from the innovation race, even when it is frenetic. Beating the competition in a patent race has negative externalities, but inventions cause much larger positive externalities that the public enjoys as the innovations disseminate.

Before concluding this section, we want to mention a reason why patent protection for some inventions is higher than commended by economic efficiency. In addition to the legal monopoly sometimes given by a patent, some inventions create natural monopolies. A natural monopoly exists when average costs fall as the scale of production rises. Given a natural monopoly, the largest firm with the lowest costs can drive out the competition. For example, spreading research and development costs over larger production volumes reduces the average cost of innovation. Thus, the average cost of developing an operating system for users of personal computers falls as the number of users increases. In information technologies, industry standards provide an additional element of natural monopoly. To illustrate, standardizing the key strokes required to move the cursor in a word processing program lowers the learning cost of word processing to everyone. As the standard becomes more dominant, users value it more. Consequently, any company that can establish exclusive rights over an industry standard can enjoy an element of natural monopoly and exploit this power in licensing the right to use the standard.

If an invention is the basis of a natural monopoly, then the inventor can obtain monopoly profits even without a patent. To do so, the inventor must use his lead-in time to expand his business and innovate faster than the competition. By growing and innovating faster than the competition, the leader enjoys increasing returns to scale, which convey monopoly profits. To illustrate, assume that a computer software product begins with a fundamental discovery and then undergoes constant improvement through innovation. To finance constant improvement, a company needs a significant level of sales. The original inventor may achieve the critical sales level before anyone else and then price the product low enough to preclude entry by other firms. The price that precludes entry into the market by competitors (the so-called "entry-limiting price") can still yield supra-competitive profits to the producer.

Natural monopoly is such a common feature of networks that its occurrence in networks has a special name—*network effects*. The economic analysis of network effects began with railways in the nineteenth century. The most efficient organization of a railway usually requires lines to radiate from a central terminal. The central terminal is the "hub" and the radiating lines are the "spokes." (This same language is now applied to airlines.) The owner of the central terminal can favor connections to its own railway lines and disfavor connections to competing railway lines. This network effect in railways confers a large advantage on the owner of the central terminal for a region. Similarly, information-based industries often rely on connections analogous to the central railway terminal. For example, all the software on a personal computer must use its operating system. An exclusive owner of the operating system for personal computers can favor the use of its own software and disfavor the use of rival software.

Such a pattern of abuse was the central allegation of the U.S. Justice Department in its recent antitrust suit against Microsoft. Owning a computer operating system has been analogized to having a patent on use of the English language.

Web Note 5.3

See our website for additional law-and-economics literature on patent issues.

Patent (and Other) Prizes

The economic argument for patents asserts that giving the developer of a new, useful, and nonobvious invention or innovation an exclusive right encourages investment in and dissemination of new methods, machines, and practices. But there has always been skepticism about the necessity of the patent system. Critics have long argued that the shortcomings of that system—particularly the high prices and restricted output of monopoly—are not worth the alleged benefits.[13] Indeed, because of their deep concerns about the ill effects of the IP system, several European countries, including Sweden and the Netherlands, suspended their intellectual property systems for several decades in the mid- and late nineteenth century.

But if there is no patent system, how can society encourage investment in invention and dissemination? One possible method is through the award of prizes. These can be monetary rewards for designated accomplishments or for general innovations, and they can be offered by either public or private parties or both simultaneously. Perhaps the best example of a public reward designed to induce a particular invention is the English government's search for an accurate method of measuring longitude.[14] Using sightings of the sun, ships could relatively easily measure latitude, their distance north or south of the equator. But with regard to longitude they were—well, at sea. The results of not knowing where one was could be, and sometimes were, disastrous. In response to a famous ship disaster, the English Parliament decided to do something. In 1714 they offered a reward of £20,000 to the first person who could

[13] See for example, Michelle Boldrin & David Levine, *The Case Against Intellectual Property*, 92 AM. ECON. REV. 209 (2002). See also the authors' *Against Intellectual Property* (2008).

[14] See DAVA SOBEL, LONGITUDE (1997).

accurately measure longitude at sea. To evaluate the submissions, Parliament appointed a Board of Longitude, with Sir Isaac Newton as its Prime Commissioner, and they required a testing voyage to the West Indies with criteria for success.

A carpenter and clockmaker in Yorkshire, John Harrison, thought that the key to measuring longitude was an extremely accurate clock. (Most of the other inventors who pursued the prize thought the key lay in accurate sightings of celestial objects.) Harrison's insight was that the Earth turned through 360 degrees, a complete rotation, in the course of 24 hours. As a result, the Earth turns through 15 degrees each hour of each day. A traveler who departed from London to Moscow could set his watch for London time and compare it to the time when he reached Moscow. He would find that his watch said 9:00 am when it was noon in Moscow, which would enable him to deduce that Moscow is east of London by 45 degrees of longitude. If it were possible to measure the time difference between a ship at sea and at a fixed point on the Earth's surface (such as at London), then one could tell how far around the Earth one had gone. For this method of measurement to work would require having an extremely accurate clock. And that was the task that Harrison set himself.

In the eighteenth century, ships' clocks were inaccurate because the motion of the ship disrupted the clock's mechanism. In 1759, Harrison finally developed an extremely accurate ship's clock, which he called H-4. In 1764 the Board of Longitude ordered H-4 to be tested on a ship traveling from Portsmouth to Barbados, and Harrison's son, William, went to Barbados to oversee the test. The clock performed marvelously, but rivals blocked Harrison from receiving the prize until his son made a dramatic and successful appeal to King George III. Harrison finally received his reward 43 years after he had begun his quest.

England was not put off by this experience. Parliament later offered a reward for the first successful vaccine against smallpox.

There are many—indeed, an increasing number of—private prizes designed to elicit particular inventive activity. The Ansari X Prize, created in 1996, famously offered $10 million to the first private team that could finance, build, and launch a spaceship capable of carrying three people to a height of 100 km (62.5 miles) above the Earth, return safely to Earth, and then repeat the trip with the same ship within 2 weeks. A group headed by Burt Rutan and Paul Allen, the cofounder of Microsoft, won the prize in October, 2005. Recently, the Progressive Insurance Company announced a $5 million prize for the first team or individual to develop a car with an internal combustion engine capable of getting 100 miles per gallon of gasoline.

Some have suggested that the successes of rewards for particular achievements can be extended to general inventions. Steve Shavell and Tanguy van Ypersele have argued that a system of general governmental rewards for the developing of new, useful, and nonobvious inventions is superior to the current system of awarding patent rights.[15] Are the social costs and benefits of a reward system clearly superior to those of the current patent system? Could one argue that public and private rewards for inventive activity complement the patent system so that the two systems should operate together?

[15] See Steven Shavell & Tanguy van Ypersele, *Reward Versus Intellectual Property Rights*, 44 J. Law & Econ. 525 (2001). See also Michael Abramowicz, *Perfecting Patent Prizes*, 56 Vand. L. Rev. 115 (2003).

2. Copyright In our analysis of patents, we applied the economics of information to answer the two fundamental questions about breadth and duration. This same framework applies to other topics in intellectual property, notably copyright and trademark, which we discuss briefly. Copyright grants writers, composers, and other artists property rights in their creations on demonstration that their works are *original expressions.*[16] Unlike the patent system, the U.S. copyright system does not require creators to register their works in order to receive the protection of copyright. But very much like the patent law, copyright protection is limited in breadth and duration.

The breadth of a copyright concerns the uses to which copyrighted material can be put without authorization. A broad copyright forbids any unauthorized use, whereas a narrow copyright permits some unauthorized uses. For example, books are quoted in reviews and satires, or photocopied or distributed electronically for educational purposes. The law handles these uses through so-called *fair-use* exceptions. For example, in *Sony Corporation of America v. Universal City Studios, Inc.,* 464 U.S. 417 (1984), the *Betamax* case, the U.S. Supreme Court held that recording over-the-air copyrighted television programs on a videocassette recorder is fair use when done for "time-shifting" purposes, but not necessarily for purposes of "archiving." A vague line, frequently litigated, divides fair and unfair unauthorized copying.

Since its eighteenth century beginning, the United States has lengthened the duration of a copyright until it now stands as the creator's life plus 70 years.[17] The optimal duration of a copyright involves a different problem from patents—specifically, *tracing costs.*[18] Before producing her own copyrightable material, a creator may want to check to see if her ideas for a novel, say, are original. The costs of searching among all novels to make sure her idea does not, unintentionally, infringe on someone else's copyright can be extensive. To limit these costs, creators are given limited duration and relatively narrow breadth for their creations. However, the increasing ease of copying and the spread of literacy increase the ability of others to avoid paying the copyright-holder a royalty. So, the lengthening of copyright protection allows creators a longer time to recoup their just royalties.

In some areas, copyright and patent law have extended too far and threaten to choke creativity. To appreciate the problem, imagine that someone obtains copyright to the English language. No one would be able to say anything without paying a license fee. This copyright would suppress language creativity. Similarly, many computer experts believe that fundamental computer languages should remain in the public domain where people can freely modify, adapt, improve, and use them. In this way the Linux operating system has developed into a powerful programming tool. As we move

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[16] As Lord Macaulay put it, copyright is "a tax on readers for the purpose of giving a bounty to writers." THOMAS B. MACAULAY, SPEECHES ON COPYRIGHT 25 (C. Gaston ed. 1914).

[17] In October, 1998, Congress passed the Sonny Bono Copyright Term Extension Act, which lengthens copyright protection for works created on or after January 1, 1978, to the life of the author plus 70 years, and extends existing copyrights "created for hire and owned by corporations" to 95 years. Before the change, the 1976 Copyright Act had given protection for the author's life plus 50 years. Whatever other reasons there may be for the Copyright Term Extension Act, one justification is that it brings U.S. practice into conformity with Western European practice.

[18] William Landes & Richard A. Posner, *An Economic Analysis of Copyright Law*, 18 J. LEGAL STUD. 325 (1989). See also Wendy Gordon, *On Owning Information: Intellectual Property and the Restitutionary Impulse*, 78 VA. L. REV. 149 (1992).

away from operating systems to more applied programs, however, private owners control the most successful programs. Examples are Microsoft *Word* and *Google*. We could analogize operating systems to the English language and applied programs to novels. These facts suggest a natural boundary between open source and proprietary software. Computer programs hotly contest the proper location of this boundary. Their rhetoric can sometimes sound like a religious war of the seventeenth century or the bitter dispute between socialists and capitalists in the twentieth century.

The historical legacy of copyright law often hinders and obstructs communications among scholars and slows scientific development. Before the Internet, scholars communicated mostly on paper when they did not talk to each other. Publishing an academic journal on paper is costly, so the publisher has to restrict access by charging high subscription fees. With the Internet, the cost of disseminating journal articles plummeted; yet, the same academic journals with their high subscription fees dominate many academic fields. To change the situation, some scholars now refuse to transfer copyright over their articles to the publishers of journals with high subscription fees, or they reserve Internet dissemination rights for themselves. An initiative called the "Creative Commons" attempts to create a new, private copyright standard that guarantees for authors the right of cheap dissemination of their scholarship on the Internet.[19]

What is the future of copyright in the digital age? According to one vision of the future, most users of digital information will download it from a few large sellers who impose uniform charges. In this system, obtaining information resembles putting money in a jukebox to hear a song. According to the "celestial jukebox" model (see Paul Goldstein's book, cited at the end of this chapter), every user of digital information will resemble contemporary U.S. radio stations that must pay standardized royalties to a central clearinghouse whenever they broadcast a song. If the celestial jukebox succeeds, copyright will become the dominant law of the digital age. According to an alternative vision, however, copyright law will die because technology will make law unnecessary. In the model of "digital libertarianism," technical protection through cheap encrypting will be more efficient than legal protection of intellectual property. Cheap encrypting will allegedly enable producers of digital information to control who uses it without much need for law. Are new laws the answer to new machines, or are new machines the answer to new machines? If you think you know whether the future will bring the celestial jukebox or digital libertarianism, then you should immediately go buy technology stocks.

Web Note 5.4

Our website considers much more on the economics of copyrights, such as the recent legal controversy regarding downloading copyrightable material from the Internet, constitutional objections to the copyright extensions of the late 1990s, further proposals for copyright reform, and a recent proposal by Judge Richard Posner and Professor William Landes for an indefinitely renewable copyright.

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[19] The Creative Commons, a project of Professor Lawrence Lessig of the Stanford Law School, allows authors, composers, and other creators to choose among a variety of protections for their expressions. See www.creativecommons.org.

3. Trademark Many modern businesses and service organizations invest vast sums of money to establish easily recognizable symbols for their products. For example, children in many countries recognize the golden arches signaling the location of a McDonald's franchise. Such symbols are trademarks or servicemarks. The common law and statutes protected trademarks from as early as the 13th century in England. Proprietary rights in a trademark can be established through actual use in the marketplace, or through registration with the trademarks office. Modern trademark law in the United States stems from the Federal Trademark Act of 1946, commonly called the Lanham Act. The act provides a method for obtaining federal registration for trademarks or servicemarks.[20] As in the case of patents, the successful applicant must establish that the mark passes certain criteria, the most important of which is distinctiveness. Registration with the U.S. Trademark Office entitles the holder to certain protections and rights, among which is the privilege of placing beside one's trademark a sign, ®, that indicates a registered trademark.[21] The owner of a trademark can sue for infringement to prevent unauthorized use .

Trademarks help to solve the problem of consumer ignorance about the quality of a product. When quality is opaque, the consumer can use the trademark as a signal of quality. Furthermore, trademarks reduce the cost to consumers of searching for a product with specific qualities. The principal economic justifications for granting property rights to trademarks are that they lower consumer search costs and create an incentive for producers to supply goods of high quality.

Marketing in Eastern Europe before the fall of communism in 1989 shows what can happen without trademarks. State stores sold unbranded goods with generic labels—"bread," "shirt," "oil," or "pen." A consumer would find one or two unbranded pens on a store's shelf, so he or she could not tell who designed or manufactured them. A purchase was a random draw from the universe of state factories. Because factories could not acquire reputations with consumers, they could not compete to improve quality. In contrast, trademark law enables a company to build up a reputation for high quality and credible advertising, so it can compete with other companies on these dimensions.

The general problem of credibility is central to information economics. Buyers of information generally cannot determine its value until they have it. To illustrate, a banker recently received a letter that read, "If you pay me $1 million, I'll tell you how your bank can make $2 million." The only way to make this claim credible is by providing the information to the bank. After the bank has the information, however, it has no reason to pay for it. Similarly, to assess the value of innovative software, a large buyer like Microsoft must understand how it works. After learning how the product works, however, Microsoft may produce its own version of the product rather than paying royalties to the small company.

Notice that the economic justification for trademarks is different from those for patents and copyrights. Unlike patents and copyrights, the economics of trademarks

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[20] Note, however, that one does not have to register a mark in order to receive a property right in that mark.

[21] Some producers place the symbol TM or SM (for servicemark) on their products, but those symbols have no legal status.

does not concern innovation, temporary monopoly, or constrained dissemination. Consequently, we cannot make the same economic argument for limiting the duration of the property rights in trademarks as we did in the case of patents and copyrights. Limits on the duration of patents and copyrights were justified as attempts to minimize the social costs of monopoly and tracing. However, trademarks encourage competition and do not impose tracing costs.[22] Perhaps this is why trademarks can last forever, until abandoned. In this respect, trademarks are like property rights in land and unlike other forms of intellectual property.

The question of breadth in trademarks has an interesting twist. Nothing is more settled in the law of trademarks than the proposition that generic product names cannot be trademarks. For example, no producer of cameras may register the word "camera" as a trademark. To allow such a trademark would enable its owner to sue every camera manufacturer that advertised its product by use of the word "camera." If generic product names could be trademarks, then the law of trademarks would create monopoly power, rather than facilitating competition. Sometimes, however, a competitive product succeeds so far that its trademark becomes a generic name. For instance, people today speak of "xeroxing" when they mean "photocopying," or they speak of "Scotch tape" when they mean cellophane tape, or they speak of a "Hoover" when they mean a vacuum cleaner. When this situation arises, the trademark owner must protect the trademark by suing rivals who use the generic name to describe their products. Otherwise, the producer loses its property right in the generic name.

This sort of thing happened to the Sterling Drug Company in 1921. In that year a U.S. federal district court determined that Sterling's trademarked name for acetylsalicylic acid, "Aspirin," had become the common word for any brand of that drug, not just Sterling's. After this ruling, all producers of acetylsalicylic acid could use the term "aspirin" to describe their product. Bayer has managed to prevent this erosion of its trade name Aspirin in Mexico and Canada, where no company but Bayer may describe its acetylsalicylic acid as "aspirin."[23] To learn how manufacturers of very successful products protect their trademarks, read the box on "Coke" on page 134.

Besides quality, trademarks also signal prestige. In some east Asian markets a consumer can choose an unbranded watch and then choose the brand name to put on it. Thus, a consumer can get the prestige of a watch that proclaims itself to be a "Rolex" without paying the cost. These "knockoffs," which violate trademark laws, reward the consumer and cheat the manufacturer of the authentic good. Unfortunately, standard economic tools were not designed for prestige, and they do not do a good job of measuring the costs and benefits of knockoffs.

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[22] See, for general information, William Landes & Richard A. Posner, *Trademark Law: An Economic Perspective*, 30 J. LAW & ECON. 265 (1987).

[23] The Bayer Company of Germany had discovered acetylsalicylic acid in the late 1890s. The U.S. government seized the trademark "Aspirin" during World War I and sold the right to use that tradename to the Sterling Drug Company in 1918. Interestingly, Bayer purchased Sterling in 1994.

"Coke" Is It!

One of the best-known trademarks in the world is the word "Coke" to describe the Coca-Cola Company's cola soft drink. Precisely because it is so well known, there is the danger to the Coca-Cola Company that consumers might use the designation "Coke" to refer to any cola soft drink and not just the one the Coca-Cola Company produces. If that should happen, then "Coke" will have become a generic product name that any producer may use. The Coca-Cola trade research department, which has an annual budget of redundant millions of dollars and employs a team of investigators whose job it is to roam the United States asking at restaurants and soda fountains for "Coke" and "Coca-Cola." The investigators then send samples of what they are served to the corporate headquarters in Atlanta for chemical analysis. If the company determines that a restaurateur has served them something other than Coca-Cola, then that business is advised of its wrongdoing.

Since 1945, Coca-Cola has sued approximately 40–60 retailers per year. Retailers claim that what lies behind the company's vigorous campaign is not a fear of trademark infringement but an insidious and anticompetitive attempt to browbeat retailers into dealing only with the Coca-Cola Company. They note that it is frequently too costly for them—as on a busy night—to tell each customer who asks for a rum and Coke that they are really going to get a rum and Pepsi. Rather than face a lawsuit for trademark infringement, many of the retailers simply signed up with Coca-Cola as their exclusive supplier, saying that to do so was less costly to them. The retailers point to the fact that Coke has an 80 percent market share in the fountain-soda market but a much smaller share of the supermarket sales as evidence that the trade research department's work is part of an anticompetitive marketing operation.

(See "Mixing with Coke Over Trademarks Is Always a Fizzle: Coca-Cola Adds a Little Life in Court to Those Failing to Serve the Real Thing," *Wall Street Journal,* March 9, 1978, p. 1, col. 4.)

[24] James Zinea, "A Discordant Ruling," *Forbes*, October 5, 1998, p. 66.