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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.

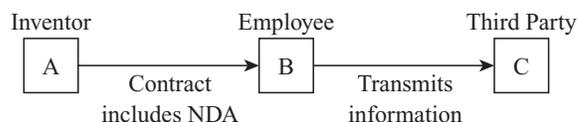
Because of these problems, private markets often undersupply public goods. Similarly, economists who developed the original economics of information concluded that a private market would provide less than the efficient amount of information. These theoretical considerations suggest that an unregulated 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

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.

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

QUESTION 5.1: When the patent expired on a drug named “Librium” (a sedative that was the forerunner of Valium), its price dropped from \$15 to \$1.10.⁸ Explain why this drop in price occurred. Relate your explanation to the problem of efficient incentives for creating and transmitting an idea.

QUESTION 5.2: Recall our example of an investment of \$100,000 in research that yields a pioneering invention that has no commercial value, and a subsequent investment of \$50,000 in development that yields an improvement that has commercial value of \$1 million. Assume that Firm A is uniquely situated to do the pioneering research, and Firm B is uniquely situated to develop the application. Predict the difference in investment resulting from a broad patent law and a narrow patent law. In making your prediction, distinguish between a situation in which transaction costs prevent Firm A and Firm B from bargaining with each other and a situation in which transaction costs of bargaining are zero.

QUESTION 5.3: When inventions take the form of discovery and application, the authorities may issue a “dominant patent” to the pioneering discovery and a “subserving patent” to the improvement. The subserving invention cannot be manufactured legally without the agreement of the holders of the dominant patent and the subserving patent. Thus, the two parties are compelled to bargain, each having veto power, and agree on the division of future profits before manufacturing the improvement. Absent such an agreement, only the pioneering invention can be manufactured. Answer Question 5.2 under the assumption that, instead of prescribing broad or narrow patents, the law grants a dominant patent and a subserving patent.

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.

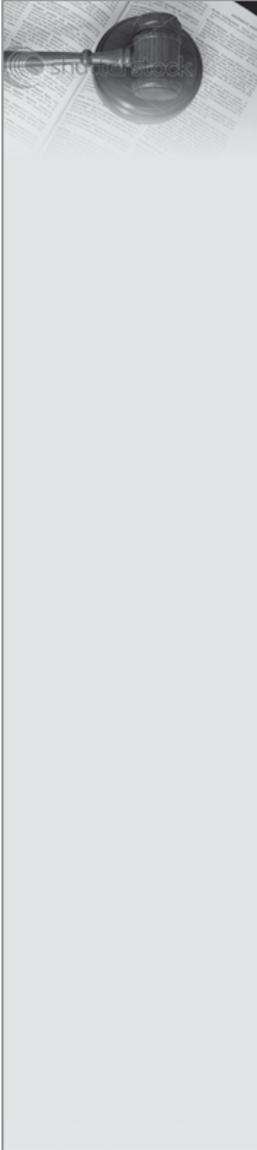
Marginalist reasoning describes the optimal patent life in abstract terms. But what particular life is optimal? Ideally, there would be a different patent life for each invention, depending on its individual characteristics.

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.

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.

QUESTION 5.4: One possible pitfall of the renewal-fee system for determination of optimal patent life is that, ideally, we want the patent-holder to compare the renewal fee with the *social* benefit of continuing the patent for another year, not just the *private* benefit. Can you suggest how, in setting the annual renewal fee, we might induce patent-holders to make the appropriate social calculation?

QUESTION 5.5: A third means of reducing the social costs of granting a patent life that is too long is a policy of *compulsory licensing*. This policy, which forms part of the patent systems of most Western European countries, allows frustrated licensees to ask courts to compel patentees to license to them if they can show that patent-holders have failed to use their patents in the domestic market within a specified time period, have failed to license when that is essential to bringing a complementary invention into use, or have abused their positions by, for example, excessively restricting the supply of their inventions. If the court is persuaded by the prospective licensee to compel licensing, then it also determines a *reasonable* royalty. Give an economic evaluation of the policy of compulsory licensing.

¹⁰ See Frank Lichtenberg & Joel Waldfoegel, "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

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.

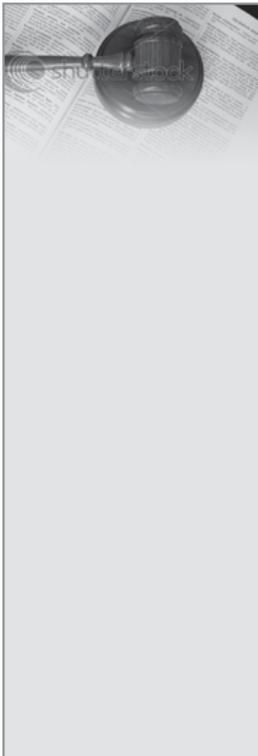
Such a pattern of abuse was the central allegation of the U.S. Justice Department in its recent antitrust suit against Microsoft. Owning a computer operating system has been analogized to having a patent on use of the English language.

QUESTION 5.6: Suppose that the inventor of a weather-forecasting technique determines that the weather during the growing season will be perfect, causing a bumper harvest. Explain how the inventor could use this information to make profitable investments.

QUESTION 5.7: The directors of a corporation are often the first people to know about facts that affect its stock price. American law forbids directors and other “insiders” from using “inside information” to speculate on the value of the company’s stocks. Use the theory of first appropriation and the economics of information to make arguments for and against the efficiency of this prohibition.

1 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

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 Restitutory 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 laws? 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.

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

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.

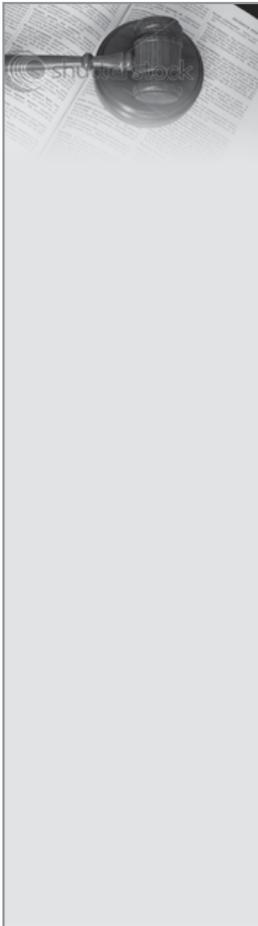
Besides quality, trademarks also signal prestige. In some east Asian markets a consumer can choose an unbranded watch and then choose the brand name to put on it. Thus, a consumer can get the prestige of a watch that proclaims itself to be a “Rolex” without paying the cost. These “knockoffs,” which violate 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.

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.

QUESTION 5.8: The duration of copyright increased under U.S. law in several steps since the eighteenth century until it reached the life of the author plus 70 years. Suppose that a writer completes a novel at age 40. If the writer lives to be 75, then the copyright will last for 105 years. At an interest rate of 10 percent, the present value of \$1 paid after 105 years equals much less than 5 cents. What does this fact suggest about whether the efficient duration of copyright is longer or shorter than currently provided by law?

QUESTION 5.9: In 1939 the composer Igor Stravinsky received \$6000 from Walt Disney for the right to use “The Rite of Spring” in the animated film “Fantasia,” featuring Mickey Mouse. Should Disney own the exclusive right to release the film in videocassette, which generated \$360 million in revenues in the first two years after its release in 1996, or are Stravinsky’s assignees entitled to some of the money?²⁴



“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.

QUESTION 5.10: No one may use a patent without the patent-holder’s permission. But in a limited set of circumstances, others may use copyrighted material without the copyright-holder’s permission. These circumstances—called the “fair use” exception—allow, for example, reviewers to quote from copyrighted material without permission, teachers to photocopy or distribute electronically and assign limited portions of copyrighted material to their classes, and musical groups to include or “sample” copyrighted music in their own compositions.

Use economic theory to explain why it may be efficient to allow the fair use exception.

QUESTION 5.11: Why is it efficient to limit the duration of patents and copyrights, whereas real property rights endure almost forever (with an important exception to be noted later in this chapter)?

QUESTION 5.12: Trademark law does not allow a holder to sell a trademark independent of the good to which it is attached. Thus, Coca-Cola cannot sell its use of the trademark “Coke” to another producer of cola syrup; that mark may be sold only with the syrup produced by or under the supervision of the Coca-Cola Company. Can you provide an economic rationale for this restriction?

Web Note 5.5

What are the appropriate remedies for unlawful use of a patent, copyright, or a trademark? See our website for a discussion of the economics of those issues.

Web Note 5.6

This section has only skimmed the surface of the remarkable developments in intellectual property of the last 10 years. See our website for more on the issues of the law, such as private ownership versus “open source” software, how the fashion industry uses IP, and how magicians, cooks, and comedians protect their intellectual property.

C. Organizations as Property

Families, clubs, churches, cooperatives, trusts, charities, and the state are organizations that own property, such as land, buildings, and machinery. An organization, however, is not the same as the property that it owns. For some kinds of organizations, the members can buy and sell assets, but no one can buy or sell the organization. To illustrate, no one owns a family, club, church, cooperative, trust, charity, or state. In contrast, corporations have owners who buy and sell, not just the corporation’s assets, but also the corporation itself. In brief, many organizations own property and some organizations *are* property.

Owned and unowned organizations perform different roles in society. Unowned organizations play the central role in social life, religion, and government, whereas

corporations play the central role in production and economic growth. We will explain the connection between the difference in ownership and the difference in function.

To begin, consider what an organization is. Organizations generally have a structure of offices created by laws and contracts, such as Chairman, Treasurer, or Ombudsman. While some members of organizations have offices, all members have roles to play. Standardization in the division of labor creates roles like bookkeeper, mechanic, or purchasing agent. By supplying a structure of offices and roles, an organization coordinates the behavior of its members so that it can pursue goals. When coordination is tight enough, observers of the organization ascribe goals to it, not just to its individual members. Thus, we can define an organization as *a structure of offices and roles capable of corporate action*.

Organizations adjust their structure to improve performance or change goals. Owned organizations adjust in response to pressure from markets for organizations. For example, corporate officers who fail to perform may find their company bought by a new owner who fires the old managers and replaces them with new managers. In contrast, an unowned organization avoids pressure from the market for organizations because no one can buy or sell it.

We must consider how a market for organizations changes their behavior. According to the bargain theory of property developed in this book, markets tend to move property from people who value it less to people who value it more. Thus, the market for organizations tends to move organizations from owners who value them less to owners who value them more. Corporations are primarily instruments to make money, so the owners of corporations tend to value them according to their profitability. Consequently, the market for corporations tends to bring the ownership of each corporation to the people who can make the most profit from them. Under ideal conditions described in the model of perfect competition, profitability measures the social value created by a corporation. When reality approximates these conditions, the market for corporations maximizes the nation's wealth by transferring ownership to the people who can run corporations most profitably.

Because no one owns a family, club, church, cooperative, trust, charity, or state, there are no markets to move control of these organizations to the people who can make the most profit from them. Consequently, the primary purpose of these organizations is not profits. Instead of being an instrument for wealth, most members regard these organizations as primarily serving other purposes. If these organizations were owned, pressure from the market for organizations would divert their purpose to profitability. Consequently, no one should own an organization whose purpose is not profit, which is what we observe in fact.

The owner of property enjoys discretionary power over it, including the right to transform it. When an organization is owned, the owner usually has the power to restructure its offices and roles, and change the people who fill them. This owner's legal power over an organization often suffices to control it. When an organization is unowned, however, no one may control its offices and roles. *The alternative to ownership is often governance*. A system of governance involves politics and collective control. To illustrate the difference, the owner of a small corporation controls it and does with it as he wishes, whereas the members of a club, church, cooperative, or democratic state make collective decisions and engage in politics. Ownership is usually best for pursuing wealth, and governance is usually best for pursuing more diffuse goals.

We have explained that different organizations have different functions, and the primary function of corporations is to create wealth by pursuing profits. The market for corporations helps to keep management focused on this task. Markets for corporations, however, are often “thin,” by which we mean that there are few buyers or sellers. To illustrate, economic recession at the turn of the 21st century and destruction of the World Trade Center by terrorists caused a significant decline in the number of air travelers. In this environment, many (but not all) airlines are unprofitable. This situation creates pressure for the owners of unprofitable airlines to sell them. The potential buyers are few in number, because airlines are very expensive to buy and running them requires expert knowledge. The market for airlines is “thin” in the sense of having few buyers and sellers. The problem of thin markets is aggravated by antitrust authorities who may prevent one airline from merging with another. In general, blocking mergers to thicken product markets thins the market for corporations.

As a market thins, competitive pressures diminish. Specifically, thin markets for corporations allow their members to pursue goals other than maximizing the company’s profits. Understanding this fact requires appreciation of the history of corporate law. Corporations are very old forms of organization. For example, the British government financed itself in the past partly by selling exclusive licenses to large corporations to develop trade in the colonies. As a specific example, the Hudson’s Bay Company was formed in 1670 and was soon thereafter given control over fur trading and other businesses in the area amounting to one-third of present-day Canada.

Two important legal innovations distinguish these historic corporations from modern corporations. First, like the Hudson’s Bay Company, the charters of the historic companies restricted them by activity and geography. In contrast, modern corporations can enter almost any form of business in any place. To illustrate, a corporation chartered in Indiana can enter almost any kind of business in any other U.S. state. (Corporations are restricted from entering a few lines of business in the United States that are reserved for partnerships, notably law and accounting, or require separate incorporation, notably commercial banks.) Removing restrictions on activities and geography vastly increases competition among corporations.

Second, the owners of the historic corporations were liable for the corporation’s debt. To illustrate, if the Hudson’s Bay Company had gone bankrupt in the eighteenth century, then its creditors could obtain repayment by seizing the wealth of its stockholders. Given unlimited liability of investors in a company for its debts, people who invest must carefully monitor and control the company’s policies. In contrast, the owners of modern corporations are not liable for the corporation’s debts. To illustrate, if an airline goes bankrupt, its creditors can liquidate its assets, but its creditors cannot seize the homes, cars, or bank accounts of its stockholders. As a result of *limited liability*, people who invest in stock run the risk of losing their investment and nothing more. Limited liability allows people to invest in a company without monitoring or controlling the company’s policies so thoroughly.

Limited liability is an aspect of the more general problem of separating the assets of a company from the assets of its owners and managers. Limited liability prevents the creditors of the company from reaching the personal assets of the company’s owners. An equally important body of law prevents the creditors of the owners from reaching

the assets of the company. Separating the assets is called “partitioning,” and not separating the assets is called “co-mingling.” Modern corporate law partitions the assets of corporations and their owners, whereas the law historically co-mingled them.

Limited liability has created a situation commonly described as the *separation of ownership from control*. This phrase refers to the fact that many stockholders in large companies sold on public stock exchanges do little monitoring of it and have no control over it. Sometimes a small number of large investors monitor and control the corporation. Often, however, none of the owners exercises control over the corporation. Instead, control over the corporation rests with its management. Most investors want to make money, so they want the managers to maximize profits. The managers, however, have their own goals to pursue.

A vigorous market for corporations can prevent managers from pursuing goals other than maximizing the company’s profits. In general, the stock market bids up the price of a company’s stock until it equals the sum of the company’s expected future earnings discounted to present value. If managers fail to maximize the company’s profits, then the expected future earnings of the company fall and its stock price declines. Under these circumstances, an outsider may attempt to buy the company and replace its management. As this theory predicts, econometric evidence demonstrates that the stock price of firms rises and remains higher as a consequence of a successful hostile takeover. So, the new managers must make the acquired firm more profitable. Foreseeing the possibility of a hostile takeover helps to prevent managers from departing very far from the goal of maximizing the company’s profits. Conversely, a thin market for corporations makes hostile takeovers unlikely, so managers can pursue other goals than profits.

In recent years, much scholarship and research on corporations concerns how the law ameliorates or exacerbates problems created by the separation of ownership from control. For example, managers employ various contractual devices to reduce the possibility that someone will buy the company and bring in new managers (for example, “poison pill,” “golden parachute,” “lock-ups,” and non-voting shares of stock). Also, managers have succeeded in persuading legislators to enact statutes to reduce the effectiveness of the market for corporate control (notably the Williams Act).

Before beginning a new topic, we want to connect this discussion of organizations as property to the discussion of contracts in Chapter 8. The problem of the separation of ownership from control in the modern corporation has a general analytical form. Owners often placed their assets under the control of someone else. In these circumstances, economists describe the owner as the “principal” and the controller as the “agent.” The principal-agent problem is to write a contract that gives the agent incentives to manage the asset in the best way for the principal. A later chapter uses the principal-agent model to develop the theory of contracts.

QUESTION 5.13:

- a. Give a concrete example of the difference between ownership and governance in organizations. In your example, which form of organization has a higher transaction cost of making decisions?
- b. Find a concrete example of a corporation whose managers faced a hostile take-over bid that succeeded. After the take-over, what happened to the managers of the acquired firm?

D. Public and Private Property

Having discussed the ownership of organizations, we return to a discussion of the ownership of assets like land, buildings, and machinery by organizations. We will use our theory of property to explain the difference between private and public ownership of a resource. Private and public externalities differ according to the number of affected people. Similarly, private and public ownership can be distinguished by the number of owners. A resource owned by a single individual is private. A corporation owned by a small group of stockholders (“closely held corporation” or “close corporation”) is a “private company.” Corporations owned by many shareholders are “public companies.” Similarly, the state is called the “public sector.” When the state owns a resource, such as a public park, we sometimes say that the resource belongs to all of the citizens or that it belongs to no one other than the state.

What difference does the number of owners make? In discussing the Coase Theorem, we described bargaining among the owners of separate properties, such as the rancher and the farmer. Bargaining also occurs when several people own the same property. For example, the partners in a business bargain over the allocation of tasks. The difference between private and public ownership can be described as a difference in the structure of bargaining.

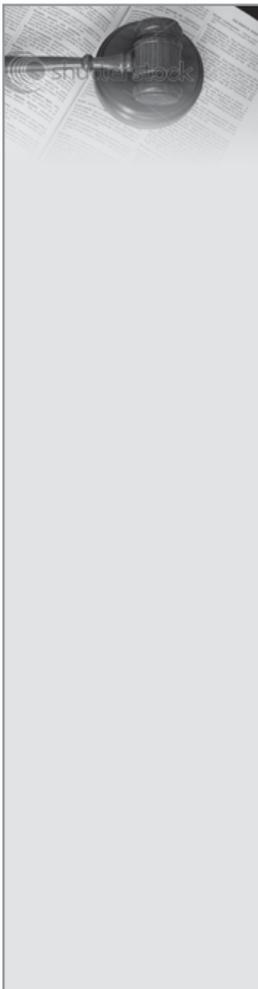
Private ownership divides people into small groups. So long as externalities are private, private owners can advance their interests by cooperating with a small number of people. Bargaining among small groups of people tends to result in cooperation and to achieve efficiency. Consequently, the case for private ownership is easy to make when production and utility functions are separable, or when externalities affect few people. In these circumstances, public ownership is a costly mistake.

An illustration comes from a study of oyster beds along the Atlantic and Gulf coasts of the United States.²⁵ At an early stage in their lives, oysters attach themselves permanently to some subaqueous material, such as rock. This attachment makes it possible to imagine defining private property rights in oysters for commercial fishing operators. However, the states along the Atlantic and Gulf coasts that have commercial oyster industries have not settled on a single system of property rights for oysters. Some states have determined that the subaqueous areas where oysters tend to congregate are to be *common* property for oyster harvesters; any of them may take oysters from those areas, and none may exclude another. Other states have held that these areas are to be available for private leasing from the state and that the lessee will have the usual rights to exclude and transfer (with some limitations). This difference allowed Professors Agnello and Donnelly to compare the relative efficiency of the private and communal property-rights systems. The measure of efficiency they used was labor productivity (output per person-hour in oyster fishing). Their finding was that labor was much more productively employed in the privately leased oyster beds than in the communal oyster beds. Put dramatically, the authors of this study concluded that if all oyster beds had been privately leased in 1969, the average oyster harvester’s

²⁵ See R.J. Agnello & L.P. Donnelly, *Property Rights and Efficiency in the Oyster Industry*, 18 J. LAW & ECON. 521 (1975). See also G. Power, *More About Oysters Than You Wanted to Know*, 30 MD. L. REV. 199 (1970).

income would have been 50 percent higher than it was. That implies a sizable welfare loss due to public ownership.

The public oyster beds are an example of the depletion of an open-access resource by overuse, which is called “the tragedy of the commons.”²⁶ Open access to a congested natural resource has a remorseless logic with a terrible ending, like a Greek tragedy. There were two clear correctives to the problem: Turn ownership of the resource over to an individual (who would then have the appropriate incentive to invest in its preservation or use and to exclude others from using it) or devise an enforceable and effective method of restricting access to the common resource.²⁷



Commons and Anticommons

Instead of a tragedy of the commons, the breakup of the Soviet Union in the early 1990s exposed the symmetrically opposite problem of property rights.²⁸ Rather than too few property interests—the problem of the commons—there were too many property interests. How did this come to be? Private property interests were largely unknown during the 70 years of communist rule, and people came to have ownership claims to resources in idiosyncratic ways. So, for example, a large apartment with many rooms, which had been privately owned before the 1917 Revolution, had come to be home to several different families. Each family might occupy one of the rooms of the apartment and share the use of the kitchen and bathroom. When communism ended, these families thought that they had continuing ownership claims to their individual rooms and the common spaces. Suppose that if integrated into an apartment for a single owner, the apartment—or *komunalka*, as it was called—would be worth \$500,000. Assume that there are currently four tenant families, each occupying one room and sharing use of the common spaces. If sold separately, the interests of the tenants would fetch, we assume, \$25,000—or \$100,000 in total. Converting the *komunalka* into a single apartment would create \$400,000 in value. But it was frequently the case that the costs of assembling the individual tenant interests into the more valuable whole were so great as to preclude the more valuable use of the resource.

The tragedy of the anticommons occurs when multiple owners are each endowed with the right to exclude others from a scarce resource, and no one has an effective privilege of use. Property interests can be so finely divided as to impose significant assembly costs on later users who would like to consolidate the property interests into a more valuable whole. Heller and others have argued that precisely this anticommons problem arises in biomedical research.²⁹ We shall see an additional example in the box on the public domain later in this chapter. The commons and the anticommons suggest symmetric problems of “under-propertization” and “over-propertization.” Just as the porridge of the three bears could be too hot or too cold or just right, so, too, the law can define property interests too finely or not at all or in just the right measure.

²⁶ G. Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243 (1968).

²⁷ See ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR ACTION* (1990).

²⁸ See Michael Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Market*, 111 *HARV. L. REV.* 621 (1998).

²⁹ Michael A. Heller & Rebecca Eisenberg, *Can Patents Deter Innovation?: The Anticommons in Biomedical Research*, 280 *SCIENCE* 698 (1998).

We have discussed the easy case in which private ownership can separate utility and production functions and in which externalities are private. A more difficult case for choosing between public and private ownership arises when production and utility functions of many owners are interdependent and externalities are public. To address this problem through private ownership, the affected parties must bargain with each other, and the transaction costs are prohibitive. Public ownership is a possible solution. Instead of unstructured bargaining and a requirement that everyone agree, the switch from private to public ownership substitutes structured bargaining and a collective-choice principle, such as majority rule.

To illustrate, consider pasture land in the mountains of Iceland.³⁰ Dividing the mountain pasture among individual owners would require fencing it, which is prohibitively expensive. Instead, the highland pasture is held in common, with each village owning different pastures that are separated by natural features, such as lakes and mountain peaks. If each person in the village could place as many sheep as he or she wanted in the common pasture, the meadows might be destroyed and eroded by overuse. In fact, the common pastures in the mountains of Iceland have not been overused and destroyed because the villages have effective systems of governance. They have adopted rules to protect and preserve the common pasture. The sheep are grazed in common pasture in the mountains during the summer and then returned to individual farms in the valleys during the winter. The total number of sheep allowed in the mountain pasture during the summer is adjusted to its carrying capacity. Each member of the village receives a share of the total in proportion to the amount of farmland where he or she raises hay to feed the sheep in the winter.³¹

Some discussions of the superiority of private ownership over public ownership equate public ownership with open access to resources. This equation is too simple. In fact, the general public does not have free access to most public property. To illustrate, the national parks in the United States are publicly owned, but a fee is charged to enter; many activities require reservations in advance (a form of rationing by time), and no one can graze animals or cut wood. The tragedy of the commons, in its fully disastrous form, requires a political paralysis that prevents government from stopping the destruction of a resource. This paralysis seems to have reached an advanced stage for some resources, such as fisheries. For other resources, there are symptoms of paralysis, but not the full disaster. For example, the federal government owns vast lands in the American West and sells permits for grazing, forestry, and mining on these lands. The federal domain is inefficiently managed. As a result, the environment has deteriorated.³²

Communism's collapse in Eastern Europe identified a kind of property problem that had gone unnoticed. Many shops in Moscow remained closed for several years while busy street kiosks appeared on the street in front of them. Potentially profitable shops remained closed because too many people had the legal or effective power to prevent

³⁰ See the discussion of common mountain pastures in Iceland in THRAINN EGGERTSSON, *ECONOMIC BEHAVIOR AND INSTITUTIONS* (1990).

³¹ Professor Elinor Ostrom won the 2009 Nobel Prize in Economics for her studies of governance systems of public and common resources.

³² For an introduction to federal ownership of American land, see MARION CLAWSON, *THE FEDERAL LANDS REVISITED* (1983).

anyone from using them. Multiple vetoes resulted from the overhang of socialist laws enacted under the communist regime. The situation where everyone could prevent anyone from using a Moscow shop is the mirror image of the sea where no one could prevent anyone from fishing. The problem of the sea was already called the “tragedy of the commons,” so the problem of the Moscow shops was named the “tragedy of the anti-commons.” Once an anticommens emerges, collecting rights into usable private property bundles can be brutal and slow.

Private ownership assigns each resource to a person who owns it, and the owner can control access by excluding users. Private owners must bear the cost of boundary maintenance. Private ownership works well when production and utility functions are separable or externalities affect few people who can bargain with each other. *Public ownership* comes in three forms. First, *open access* allows everyone to use a resource, and no one can exclude anyone from using it. Nothing is spent on boundary maintenance. Open access works well when the resource is uncongested, but congestion causes tragic overuse. Second, *political control* allows lawmakers or regulators to impose rules concerning access. Limited access is the most common rule for the state’s property, including public lands. Third, the opposite of open access is *unanimous consent*, which allows no one access unless everyone agrees. The need for unanimous consent among multiple owners causes tragic underuse. In special circumstances where the aim is to preserve a resource in its unused condition, underuse is serendipitous rather than tragic.

It would be surprising if a small, homogeneous village in Iceland were paralyzed politically to the point of being unable to manage public resources. However, a large, heterogeneous country such as the United States faces far more difficult problems in managing public resources. One solution is to reduce public ownership by selling federally owned land. The market value of the products yielded by lands in the American West would surely be higher if the land currently under public control were transferred to private control.

This argument, however, is unlikely to persuade those who *want* to see the wilderness underutilized. Most ecologists believe that public land should *not* be managed with the aim of maximizing the market value that it yields. Everyone tends to think that some things are more valuable than wealth (at least at the margin), such as liberty or truth; for some people, wilderness is such a value. People who love liberty would never decide whether persons have the right to speak by asking whether people would pay more to hear them or to shut them up. Similarly, those who love the wilderness would never decide whether to build condominiums on the nesting site of the California condors by asking whether developers would pay more for the land than would the ecologists. Ecologists usually oppose the sale of public lands to private interests because their aim is to limit development rather than to increase yield. Given the scope of disagreement between ecologists and developers, it seems certain that vast resources will be used up in political disputes over the governance of public lands in the western United States.

QUESTION 5.14: Cooperative enterprises are collectively owned, and their affairs are directed through shared governance. Use the preceding theory to discuss the management of some cooperative enterprises with which you are familiar, such as a cooperative dairy, a cooperative apartment building, an Israeli kibbutz, a Hutterite farm, a commune, and so on.

II. How are Property Rights Established and Verified?

As explained in the preceding chapter, the clear delineation of property rights typically facilitates bargaining and voluntary exchange. If property rights are unclear, the parties have an incentive to bargain and clarify them. However, delineation and enforcement of property rights is costly. It is necessary, consequently, to balance the benefit from delineating property rights against the costs. In this section we consider how law strikes the balance.

A. Establishing Property Rights Over Fugitive Property: First Possession versus Tied Ownership

The problem of defining property rights seems straightforward for objects like land and houses, which have definite boundaries and stay put. But what about objects that move around or have indefinite boundaries, like natural gas or wild animals? “Fugitive property,” as such things are called, creates a legal problem as illustrated by the case of *Hammonds v. Central Kentucky Natural Gas Co.*, 255 Ky. 685, 75 S.W.2d 204 (Court of Appeal of Kentucky, 1934). The Central Kentucky Natural Gas Company leased tracts of land above large deposits of natural gas. Some of the leased tracts were separated from one another by land that the company did not own or lease. The geological dome of natural gas from which the company drew its supply lay partially under the leased land and partially under unleased land. Hammonds owned 54 acres of land that lay above the geological dome tapped by the Central Kentucky Natural Gas Company, but she had not let the subsurface rights in her land to the company. When the Central Kentucky Natural Gas Company extracted natural gas and oil from the dome, she sued the company on the theory that some of the natural gas that was under her land had been wrongfully appropriated by the defendant.

It is difficult in this case, if not impossible, to identify which natural gas came from under unleased land and which came from under leased land. Two general principles can solve the problem of establishing ownership:

1. *First possession*: oil and gas are not the property of anyone until reduced to actual possession by extraction, or
2. *Tied ownership*: the owner of the surface has the exclusive right to subsurface deposits.

Under the first rule, the Central Kentucky Natural Gas Company was entitled to extract all the natural gas from the dome, regardless of whether it held the surface rights. But under the second rule, the Central Kentucky Natural Gas Company was only entitled to extract the natural gas under the ground that it owned or leased.

The consequences of these two rules for the efficient exploration and extraction of natural gas are very different. According to the first rule, fugitive oil or gas is not owned by anyone until someone possesses it, and the first person to possess it thereby becomes the owner. This rule can, consequently, be called the *rule of first possession*. The rule of first possession applies the legal maxim “first in time, first in right.” This rule has been used to establish ownership rights for centuries. To illustrate, in the arid

American Southwest, state law allowed a person to obtain a right to water in a stream by being the first to tap it for use in mining or irrigation. (See the box entitled “Owning the Ocean” on page 156.) By now, there are few opportunities to claim unpossessed land or water, but the rule of first possession applies to important forms of intangible property, such as inventions.

A great advantage of the rule of first possession is that it focuses on a few simple facts, so it is relatively easy and cheap to apply. In the event of a dispute about ownership, determination of who first possessed the property in question is usually straightforward. For example, material evidence usually proves who tapped a water supply first. There is, however, an economic disadvantage of the rule of first possession: it creates an incentive for some people to preempt others by making uneconomic investments to obtain ownership of property. The reason why the rule of first possession creates an incentive to invest too much too early is easily explained. According to the rule of first possession, an appropriate investment transfers the ownership of a resource to the investor. The owner of a scarce resource can rent it to others. Rent increases as a resource becomes more scarce. Indeed, rent is the scarcity value of the resource. Under the rule of first possession, an investment thus yields two types of benefits to the investor: (1) production (more is produced from existing resources), and (2) future rent (scarcity value of the resource in the future).

To illustrate, assume that the law allows a person to acquire ownership of “waste” land by fencing it. Fencing land increases its productivity from, say, grazing cattle on it. By assumption, fencing the land also transfers ownership to the person who built the fence. Assume that fencing waste land costs more than the profit from grazing cattle on it at current prices, but everyone expects the use value of the land to increase as population grows in the future. Investors may build useless fences to “preempt” others and secure title to the land.

Preemptive investment illustrates a general economic principle applicable to the rule of first possession. When the state awards property rights, people contest vigorously to obtain title. In a contest for title, persons try to get ownership rights transferred to themselves. Economic efficiency, however, concerns the *production* of wealth, not the *transfer* of it. Investments for the sake of transferring wealth, not producing it, are socially inefficient.

In technical terms, social efficiency requires investors to invest in a resource until the marginal cost equals the marginal increase in productive value. The rule of first possession causes people to invest in a resource until the marginal cost equals the marginal value of the sum of increased production *plus* transferred ownership. The transfer effect under the rule of first possession thus causes over-investment in the activities that the law defines as necessary to obtain legal possession. It is in the self-interest of investors, but not in the interests of social efficiency, to improve property in order to transfer ownership.

To illustrate, consider the Homestead Act of 1862 in the United States, which established rules allowing private citizens to acquire up to 160 acres of public lands in the West. The act required claimants to fulfill certain requirements before they acquired title. For example, the claimant had to file an affidavit swearing that he or she was either the head of a family or 21 years old, and that the claim was “for the purpose of actual settlement and cultivation, and not, either directly or indirectly, for the use or benefit of any other person or persons whomsoever.” Moreover, before full title

was acquired for \$1.25 per acre, the claimant had to reside on the claim for 6 months and make “suitable” improvements on the land. These requirements were meant to minimize transfer effects and to encourage production. In practice, however, the requirements were fleetingly enforced (as was usually the case with the residence requirement) and easily evaded (as when “suitable” improvements consisted of placing miniature houses—really large doll houses—on the claim). The occupation and development of the American frontier occurred at a faster pace than competitive markets or a strictly enforced Homestead Act would have produced.

In contrast to the rule of first possession, there is no gap in ownership under the second rule for fugitive gas, according to which all the gas under the ground already belongs to the people who own the surface. By extension, the second rule suggests that wild animals belong to the owners of some piece of land, such as the land where the wild animal was born. Ownership of fish and other marine resources should perhaps be tied to ownership of the ocean floor. In general, the second rule, called the *rule of tied ownership*, ties ownership of fugitive property to settled property.

The common and civil law often tie ownership by applying the principle of *accession*. According to this principle, a new thing is owned by the owner of the proximate or prominent property. Thus, a newborn calf belongs to the owner of the mother cow, new land created by a shift in a river belongs to the owner of the river’s bank; the owner of a brand name has an exclusive right to use it in an Internet domain name; the owner of copyright has an exclusive right to adapt the work to another medium; an owner of an apartment also owns any fixtures that a tenant attaches to the walls; a new business opportunity discovered by a corporate employee in the course of work belongs to the corporation; and a carpenter who unknowingly uses someone else’s wood to make a barrel owns it (but he must pay restitution to the wood’s owner).³³

Tying ownership of fugitive property to settled property avoids preemptive investment *so long as the ownership claims in the resource to which the fugitive property is tied are already established*. To illustrate, all the gas is already owned under the second rule because all the surface rights are already owned, so the rule does not provide an incentive to acquire ownership by extracting too much gas too soon. Similarly, if salmon were the property of the people who own the streams where they spawn, the owners would not deplete the salmon by catching too many of them.

The problem with the second rule, as illustrated by the facts in *Hammonds*, is the difficulty of establishing and verifying ownership rights. The homogeneity of natural gas and its dispersion in caverns makes proving its original underground location difficult and costly.

Our analysis of fugitive resources reveals a common trade-off in property law:

Rules that tie ownership to possession have the advantage of being easy to administer and the disadvantage of providing incentives for uneconomic investment in possessory acts, whereas rules that allow ownership without possession have the advantage of avoiding preemptive investment and the disadvantage of being costly to administer.

³³ Thomas A. Merrill, “Establishing Ownership: First Possession versus Accession.” BERKELEY LAW AND ECONOMICS WORKSHOP (26 February 2007).

Choosing the more efficient rule in a case such as *Hammonds* requires balancing the incentive to overinvest under the rule of first possession against the cost of administering and enforcing ownership without possession. (Besides first possession and tied possession, other ways of allocating initial rights include auctions, lotteries, and preferences based on attributes such as needs, accomplishments, ethnicity, and gender.)

QUESTION 5.15: Here is the critical part of the case of *Pierson v. Post*,³⁴

“ . . . Post, being in possession of certain dogs and hounds under his command, did, ‘on a certain wild and uninhabited, unpossessed and waste land, called the beach, find and start one of those noxious beasts called a fox,’ and whilst there hunting, chasing and pursuing the same with his dogs and hounds, and when in view thereof, Pierson, well knowing the fox was so hunted and pursued, did, in the sight of Post, to prevent his catching the same, kill and carry it off. A verdict having been rendered for [Post, who was] the plaintiff below, [Pierson appealed] . . . However uncourteous or unkind the conduct of Pierson towards Post, in this instance, may have been, yet his act was productive of no injury or damage for which a legal remedy can be applied. We are of opinion the judgment below was erroneous, and ought to be reversed.”

Does this decision implement a principle of tied ownership or a principle of first possession? Note that the case, which is a staple in introductory courses on property law in American universities, seems irrelevant to modern conditions because first possession of foxes apparently does not lead to capturing too many of them too soon.

Economic analysis suggests that it should not be because of concerns about which hunter owns a fox. Explain the costs and benefits to weigh in an efficiency analysis of this case.

QUESTION 5.16: Can you make any sense of the proposition that the rule of first possession is a principle of “natural justice”?

B. When to Privatize Open-Access Resources: Congestion versus Boundary Maintenance

We have discussed various examples from history of unowned resources that become private property. *When* do unowned resources become owned? Economics suggests an answer.

The rule of first possession often applies when property is owned in common and accessible to the public. Property that is accessible for use by a broad public is called an *open access resource*. To illustrate, the seas are common property to which the public has access. In many cases, the fish and mammals in the sea can be owned by whoever catches them. Consequently, fish and marine mammals have been hunted far

³⁴ Cal. R. 175, 2 Am. Dec. 264 (Supreme Court of New York, 1805).

beyond the economic level, some to the brink of extinction. Similarly, in much of the world, common hunting land is over-hunted, common pasture land is over-grazed, and public forests are over-harvested. Much of the world's soil erosion and forest depletion is caused by the open-access rule.

Some technical terms follow to help explain the economic irrationality of the situation. The "maximum sustainable yield" is the largest yield sustainable in the long run. To maximize the yield, the application of labor and capital must expand until the marginal products of labor and capital are zero. All of the world's major fisheries are currently fished beyond the maximum sustainable yield, which means that the marginal product of labor and capital is negative. In these circumstances, the catch on the fisheries would increase simply by making less effort and reducing expenditures on labor and capital. Similarly, the yield on many open-access forests would increase by investing less effort and cutting fewer trees, and the yield on many open-access pastures would increase by investing less effort and keeping fewer animals. Overused fisheries, forests, and pastures are analogous to a factory with so many workers that they get in each others' way and slow each other down, so the factory's total product would increase merely by reducing its total employment. Nothing could be more irrational than assigning people to work at jobs with negative productivity.

Preventing overuse of common resources involves controlling use by means other than the open-access rule. Tied ownership is one method. For example, to prevent overgrazing of common pastures, small communities in Iceland traditionally tied access to common pastures to production on private pastures. Specifically, farmers were allowed to graze animals in the common, high lands in the summer according to a formula based on the number of animals each farmer sustained in the winter from hay grown on private pastures in low lands.³⁵

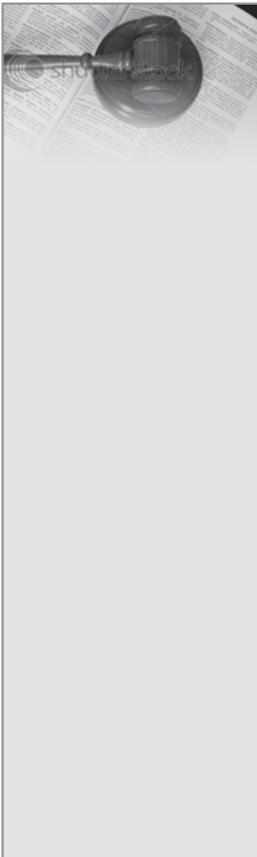
Another method to prevent overuse is *privatization*, which means in this context converting from public to private ownership. To illustrate, many people could homestead land, fish in the sea, or gather coral from reefs. In contrast, a private owner can exclude others from using his or her resource. Granting private property rights over land, whales, or elephants would close access by limiting it to the owner. Thus, homesteading land converts it from public to private ownership; some salmon streams have been converted to private ownership; and some villages have been given ownership of coral reefs.

The conversion from common ownership to private ownership involves this trade-off: A rule of open access causes over-use of a resource, whereas private property rights require costly exclusion of non-owners. This formulation suggests when an economically rational society will change the rule of law for a resource from open access to private ownership. When the resource is uncongested and boundary maintenance is expensive, open access is cheaper than private ownership. As time passes, however, congestion may increase, and the technology of boundary maintenance may improve. Eventually, a point may be reached where private ownership is cheaper than open

³⁵ See T. Eggertsson, *Analyzing Institutional Successes and Failures: A Millennium of Common Mountain Pastures in Iceland*, 12 INT'L. REV. LAW & ECON. 423 (1992).

access. An economically rational society will privatize a resource at the point in time where boundary maintenance costs less than the waste from overuse of the resource.³⁶

This theory makes definite predictions about privatization. For example, it predicts that the invention of barbed wire, which lowered the cost of boundary maintenance in areas where there were few fencing materials, would promote the privatization of public lands in the American West. As another example, it predicts that property rights will be created in the electromagnetic spectrum when broadcasters begin to interfere with each other. The predictions of this theory are confirmed by some facts and disconfirmed by others. Apparently, societies are often rational, as the theory assumes, but not perfectly rational. Politics leads to bargains and compromises that violate the requirements of economic efficiency. For examples of these compromises, read the box entitled “Owning the Ocean.”



Owning the Ocean

Water covers 70 percent of the Earth’s surface in the form of oceans; yet, almost all of that vast amount of water is unaffected by well-defined property rights. In the late sixteenth and early seventeenth centuries, the great voyages of discovery and the resulting sea-borne empires in Europe necessitated internationally accepted rules on rights to use the ocean. These rights were first catalogued in the famous *Mare Liberum* of Hugo Grotius of Holland. He noted that the “sea, since it is as incapable of being seized as the air, cannot have been attached to the possessions of any particular nation.” In the system that Grotius suggested and that prevailed in international law for nearly 300 years, each nation was to have exclusive rights to the use of the ocean within three miles of its shoreline, with that area to be called the “territorial seas.” (The three-mile distance was not picked at random; it was the distance that an early seventeenth-century cannonball could carry.) Beyond the three-mile limit, Grotius urged that the “high seas” should be a common resource from which none, save pirates, could legitimately be excluded.

Increasing use of the high seas in the early and mid-nineteenth century led to the replacement of the doctrine of “free use” with that of “reasonable use.” After World War II, the increasing importance of shipping, fishing, offshore oil and gas deposits, and seabed mining caused the legal system of ocean rights to crumble. In 1945 President Truman announced that the United States’ exclusive rights to subaqueous organic resources—such as oil and natural gas—extended to the edge of the continental shelf or margin, an area that stretched 200 miles from the Atlantic Coast of the United States. Other nations quickly made similar claims. Unlike these unilateral actions, attempts at international cooperation have achieved mixed results.

³⁶ This is the central point made by Harold Demsetz in *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347 (1967). He argues, for example, that American Indians did not establish property rights in land when the costs of administering the rules exceeded the benefits from private ownership. Proceeding along these lines, he tries to explain why certain North American Indian tribes, such as those in the Northeast, whose principal economic activity was trapping animals for their fur, developed a notion of property rights and others, such as the Plains Indians, whose principal resource was the migratory buffalo, did not. The extent to which his arguments can be squared with history or anthropology is still open to question.

To illustrate, when the third United Nations Convention on the Law of the Sea (UNCLOS) convened in 1973, there was widespread agreement that the territorial sea would be established at the 12-mile limit and that there should be an “exclusive economic zone,” largely but not completely controlled by the coastal state, stretching to 200 miles beyond the shoreline, the general extent of the continental shelf.

There was not general agreement on what to do with property rights to the areas beyond this 200-mile limit, and it was the disposition of these areas that raised the really hard issues. The developed countries urged a private-property-rights-based system of development, whereas the developing countries offered a common-property-rights system. In the end a compromise, called the *parallel system*, was agreed on. There would be both private development and a UN-funded and UN-operated company, called the “Enterprise.” In order to give the Enterprise the ability to compete with the more advanced countries of the developed world, an International Seabed Authority (ISA) would be created to allocate rights to mine the oceans. The conference specified an ingenious variant of the “I cut, you choose” method of cake-cutting in order to allocate mining rights. Before it could begin operation, a private or state organization had to submit to the ISA two prospective sites of operations. The Authority would then choose one of those sites for later development by the Enterprise and allow the applicant to proceed with the mining of the other.

The United States refused to sign the final treaty, although 117 countries eventually signed it in December, 1982. Over time, the U.S. objections to the missing provisions of UNCLOS III have faded or been proven unfounded. The treaty went into effect in 1994. The U.S. has signed the treaty, but Congress has not ratified it.

QUESTION 5.17: In what ways do these historical developments respond to efficiency, and to what extent do they respond to political power and distribution?

QUESTION 5.18: Read the following account of the history of water law and discuss whether the law appears to have evolved toward economic efficiency.

Water has always been one of the most valuable natural resources, but because it tends to run away, there have always been problems in defining and assigning property rights in water. Centuries ago in England, the general rule was that rights were vested in the “riparian owner,” that is, in the person who owned the land on the bank of the river. The riparian owner’s principal right was to a flow of water past his land. It would be a violation of someone else’s rights for an upstream user to use the water that passed by his property in such a way as to reduce the flow to downstream users. The upstream user could not, therefore, divert so much of the water to his own use that the flow was significantly diminished for those downstream. A riparian was restricted in his ability to sell water to nonriparians (that is, people who do not own land along the water).

However, in the nineteenth century, this legal arrangement had to be altered because industrial demand on the natural flow of a river frequently exceeded the supply. In the eastern United States, these issues were resolved by elaborating the natural-flow theory of water rights that had been adopted from the English common law. An alternative theory of water rights appeared in the western United States. Under the *reasonable-use theory*, the riparian owner is entitled to use the water flow in any reasonable way. It was

deemed reasonable for one owner to use all of the water in a stream or lake when others are making no use of it. Under the reasonable-use theory, a riparian owner does not have a right to the natural water flow. Furthermore, a riparian owner may transfer rights to nonriparians.

C. Recording and Transferring Title: Verification Costs versus Registration Costs

Branding cattle, stamping a serial number on an automobile engine, stenciling a Social Security number on a TV—these are some ways that private persons try to prove their ownership of valuable goods. In addition to these private remedies, the state sometimes provides registries of ownership. Thus, trademarks are registered to avoid duplication or overlap. Brand inspectors employed by the state or private companies may police violations. Despite these devices, people sometimes “buy” goods that were not the seller’s to sell. This section concerns verifying ownership and remedies when a good is “sold” without the owner’s permission.

Suppose you decide to fulfill a lifelong dream and buy a farm. You find a parcel in the country that you like and approach the farmer who is living there. After discussing the parcel’s boundaries, fertility, and drainage, the farmer offers to sell the land at an attractive price. You shake hands to seal the agreement. The next week you return with a check, hand it over to the farmer, and shortly thereafter move onto the property. Two weeks later, a man knocks at the cottage door, announces that he is the owner of the property, and explains that he has come to evict the nefarious tenant who rented the cottage in which you are living. At this point you recall the joke that begins: “Hey buddy, how would you like to buy the Brooklyn Bridge?”

When you buy property, you should ascertain the rightful owner and deal with him or her. A reliable and inexpensive method for determining ownership prevents fraudulent conveyances, such as tenants representing themselves as owners. There are various ways to create a record of ownership. Consider the story—presumably apocryphal—of “recording” title in England in the Middle Ages, when few people could read. It is said that the seller handed the buyer a clod of turf and a twig from the property in a ceremony before witnesses known as *livery of seisin*. Then, the adults thrashed a child who had witnessed the passing of turf and twig severely enough so that the child would remember that day as long as he or she lived, thus creating a living record of the transfer.

Fortunately, we now have better methods of recording title in land. In the United States, there is no uniform method of land registration,³⁷ but each of the fifty states has some system for the public recording of title to land. A change in ownership of real

³⁷ There is an alternative land registration system, known as the *Torrens system*, after Sir Richard Torrens, who introduced this simplified mechanism into South Australia in 1858, and that system or something like it is in use in many parts of the world. In the Torrens system, the state operates a registry and a title insurance fund. Defects in title caused by the state record-keeper are compensated from the insurance fund. Several of the United States tried the Torrens system, but every one of them has abandoned the system, because incompetent bookkeeping caused such a drain on the state-operated title insurance funds that the funds went bankrupt. (See SHELDON KURTZ & HERBERT HOVENKAMP, *AMERICAN PROPERTY LAW* 1151–1244 [1987].)

property must be recorded in an official registry of deeds, such as the county recorder's office. Recording is a formal process, and the records are open to the public. The record of ownership on file usually contains a formal description of the property's location, a list of restrictions that apply to the property, and an account of who has owned the property at each point in time.

While a system of recording title is maintained for land and a few other valuable items, like automobiles, there is no such system for most goods. In most exchanges the buyer does not devote resources to determining whether the seller truly owns what he or she is selling. For example, you rarely question whether the books you purchase at the bookstore were rightly the bookstore's to sell. Your presumption is that whoever possesses a book rightfully owns it. Further proof of ownership is in the memory of witnesses to the sale, like the child in the medieval example, or perhaps in a written sales contract. A system of recording the ownership of books would burden commerce and impede the efficient movement of goods.

The security of major contracts is strengthened by a system of official witnesses to the event. Official witnesses, called "notaries," record the event in an official document and fix their seal to it. Some U.S. states license many notaries, so their fees are low. At the other extreme, some countries like Italy restrict notaries to specialized lawyers who pass difficult exams, perform complicated services far beyond witnessing a document, and enjoy high monopoly profits, especially in real estate transactions.

We have encountered another trade-off in property law. On the one hand, verifying title by formal means, such as recording the transfer of a deed, reduces the uncertainties that burden commerce. On the other hand, the verification of title through formal means is costly. Property law thus has to develop rules that *balance the impediments to commerce created by uncertain ownership against the cost of maintaining a system of verification*. For costly items like houses and cars, the law reduces the uncertainties that burden commerce by providing a system for recording title, and the law typically forces all sales through the recording process by refusing to protect unrecorded transactions in these items. For small transactions, however, the cost of maintaining a system of verification would exceed the benefit from reduced risk.³⁸

D. Can a Thief Give Good Title?

Let us consider how people respond to laws allocating the responsibility to verify ownership. Imagine that you have made a shrewd deal for the purchase of a television from a person whom you met in the parking lot outside a local bar. The seller told you a tale about his urgent need to raise cash by selling his TV and handed it over from the trunk of his car. One evening while you are enjoying your new television, the police arrive at your apartment with the person from whom the TV was stolen. Should the law allow you to keep the TV or require you to return it? This example poses the general question: if a good is stolen from owner A by thief B, and B disappears with the money after selling the good to innocent buyer C, does the good belong to A or C?

³⁸ You should recognize that this argument in favor of a system of recordation of ownership claims is a general instance of the Normative Coase Theorem of the last chapter.

This figure depicts the facts:



This question is answered differently in different jurisdictions. According to the rule in America, transferors can usually convey only those property rights that they legitimately have. Thus, a person without title cannot convey title to a purchaser.³⁹ In this example, the thief did not have good title to the television, so he could not give you good title to it. Instead, title rests with the person from whom the TV was stolen. According to the American rule, you must return the television set to its owner. You are entitled to recover your money from the thief (technically, the thief breached his warranty of title), if the thief is caught and has money.

A different rule prevails in much of Europe, where the buyer acquires title by purchasing the good “in good faith.”⁴⁰ The good-faith requirement means that the buyer must genuinely believe that the seller owns the good. The good-faith requirement prevents a “fence” of stolen goods from hiding behind the law. The law may also require the buyer to make reasonable efforts to verify ownership, such as checking that the serial number was not filed off the television. Applied to this example, the European law presumably permits you to keep the television. The original owner may recover your money from the thief, if possible.

In general, law must allocate the risk that stolen goods will be bought in good faith. The American rule places the entire risk on the buyer, whereas the European rule places that risk on the original owner. The American rule gives buyers an extra incentive to verify that the seller is truly the owner. The European rule gives owners an extra incentive to protect their property against theft. One of these rules is more efficient in the sense of imposing a lower burden on commerce and promoting the voluntary exchange of property.

Which rule is it? Here is a method for finding out. Let C_o indicate the lowest cost to the original owner of protecting against theft by, say, engraving his or her Social Security number on the object. Let C_B indicate the lowest cost to the purchaser of verifying that the seller is the owner by, say, confirming this fact with the party from whom the seller originally obtained the good. For the sake of efficient incentives, liability

³⁹ This is true as a generalization, but there are important exceptions. For example, if a thief steals money and uses it to buy goods from a merchant, the original owner of the money cannot recover the money from the merchant. A thief can convey good title to money. Moreover, the *Uniform Commercial Code* allows regular dealers in goods sometimes to give *better* title than they got. Thus, if a television store happens to have taken possession of and sold a stolen television, the buyer is entitled to presume that the dealer had good title to the television. Any liability to the true owner of the television lies with the dealer. Can you suggest an economic reason why this is a sensible rule?

⁴⁰ Our simplification of the European rule omits nuances in civil law. Thus, rule §935 of the *German Code of Civil Law* distinguishes an owner who lost possession of a movable good voluntarily as opposed to involuntarily. An owner who lost possession involuntarily has a relatively strong claim against a good faith purchaser of it.

should fall on the party who can verify ownership at least cost. Thus, the efficiency of the competing rules may be determined as follows:

1. If it is generally true that $C_o < C_B$, then it is more efficient for the good-faith buyer to acquire good title against the original owner.
2. If it is generally true that $C_o > C_B$, then it is more efficient for the original owner to retain title against the good-faith buyer.

Unfortunately, the absence of empirical evidence about the values of C_o and C_B prevents us from answering decisively whether one rule is better than the other. Indeed, the lack of evidence also prevents different countries from identifying the more efficient rule and adopting it. However, the example of Spain suggests what is probably the best approach. In Spain, the “American Rule” typically applies when the thief steals the good from a household and sells to a merchant. In other words, a Spanish merchant cannot get good title from a thief. Merchants who buy from a thief encourage thievery by making it more profitable. The Spanish practice of applying the American Rule to merchants who buy from thieves discourages merchants from “fencing” stolen goods, thus reducing the profitability of theft. In Spain, however, the “European Rule” that a buyer can acquire good title from a thief typically applies when the thief steals the good from a merchant and sells it to another merchant or a household. Thus, the Spanish practice increases the ease with which goods circulate among merchants in commerce and passes to the final consumer.⁴¹

E. Breaks in the Chain of Title

Uncertain ownership burdens commerce and causes deep discounting of the value of an asset by prospective purchasers. Consequently, economic efficiency requires clearing away uncertainties, or “clouds,” from the title to property. This section briefly examines how property law removes the clouds that accumulate over titles.

1. Adverse Possession In the preceding chapter we discussed an example in which Joe Potatoes unwillingly built his house so that two feet of it extended over the property line onto Fred Parsley’s lot. Recall that Parsley did not discover the trespass and sue until 10 years had passed. Has Potatoes acquired any right to the part of Parsley’s property that he has occupied? According to Anglo-American law, he may have. If the owner “sleeps on his rights,” allowing trespass to age, the trespasser may acquire ownership of the property.

The relevant legal doctrine is *adverse possession*. The phrase refers to the fact that a trespasser’s possession of the land is adverse to the owner’s interest.⁴² Someone can

⁴¹ C. Paz-Ares, *Seguridad Jurica y Seguridad del Trafico*, REV. DE DERECHO MERCANTIL 7–40 (1985).

⁴² It is also possible to acquire an easement by adverse use of another’s property. For example, someone who habitually cuts across someone’s property without protest by the owner may acquire the right to continue cutting across the property.

acquire ownership of another's property by occupying it for a period of time specified in a statute, provided the occupation is adverse to the owner's interests, and the original owner does not protest or take legal action.⁴³

The economic advantage of adverse possession is that it clears the clouds from title and allows property to move to higher-valuing users. To illustrate, assume that you want to buy a house that was built in 1910 and sold in the years 1925, 1937, and 1963. Your search of title reveals a confusion in the legal records about whether the sale in 1937 was legal. However, the current owner has resided on the property since 1963 without a legal challenge. The law for this jurisdiction stipulates that adverse possession for 25 years transfers ownership to the trespasser. The adverse-possession statute and the current owner's unchallenged occupancy since 1963 have thus removed the cloud from the title dating to 1937. In general, a rule for acquiring title by adverse possession lowers the cost of establishing rightful ownership claims by removing the risk that ownership will be disputed on the basis of the distant past.

Another efficiency justification for adverse possession was emphasized in the past: adverse possession prevents valuable resources from being left idle for long periods of time by specifying procedures for a productive user to take title from an unproductive user. Under such a rule, persons who neglect to monitor their property boundaries run the risk of losing idle parts of them to someone who makes use of them. In this respect the rule tends to move property from idleness to productive use. Sometimes squatters have acquired land from absentee owners through adverse possession. In the American West, settlers historically acquired much Indian land through adverse possession. The settlers viewed themselves as putting the land to a higher use, whereas the Indians viewed the settlers as thieves.

Besides the two types of economic benefit, adverse possession has a cost. The cost is that owners must actively monitor their land to eject trespassers who might otherwise become owners through adverse possession. Without adverse-possession statutes, owners might reduce monitoring costs and more trespassers would enjoy using other people's land.

QUESTION 5.19: Apply the concept of adverse possession to the electromagnetic spectrum.

⁴³ To be precise, traditional scholarship distinguishes four conditions that adverse possession must satisfy:

1. The adverse possessor must have actually entered the contested property and have assumed exclusive possession.
2. That possession must be "open and notorious." This phrase means that the trespass must not be done in secret; an alert owner should be able to detect it.
3. The trespasser's possession must be adverse or hostile and under a "claim of right." This condition requires the trespass to be inconsistent with the owner's use rights and against the owner's interests.
4. Finally, the trespass must be continuous for a statutorily specified period. Some states in the American West also require the adverse possessor to pay property taxes for a statutorily specified period before acquiring title. See LAWRENCE FRIEDMAN, *A HISTORY OF AMERICAN LAW* 360–361 (2d ed. 1985). Note that these conditions do not inquire into the intentions of the adverse possessor. Despite this, there is evidence that courts are more likely to apply the adverse-possession rule when the trespass is accidental. See Richard Helmholz, *Adverse Possession and Subjective Intent*, 61 WASH. U. L. Q. 331 (1983).

QUESTION 5.20: Why do you think that the statutory time period for adverse possession tends to be short in states like Oklahoma where Indians owned a lot of land?

QUESTION 5.21: Suppose the statute of limitations for adverse possession is 10 years. After 9.9 years of trespass owners retain full rights, but after 10 years of trespass owners lose all of their rights. Instead of owners losing their rights abruptly at the end of 10 years, the statute could be written so that the rights depreciate gradually over time. For example, the trespasser could be granted a 10 percent interest in the property for each year of adverse possession, so that after one year the trespasser would own 10 per cent of it and after 10 years the trespasser would own all of it. Compare the efficiency of the “discontinuous rule” and the “continuous rule.”

2. Estray Statutes Suppose that while strolling down an alley in Manhattan you stumble over a brown paper bag. Opening the bag, you find that it contains a diamond brooch. Naturally, you would like to claim it for your own. But clearly someone has lost it. Are you entitled to keep it if the owner does not demand it back after a reasonable period of time? Are you obligated to make efforts to locate the owner, say, by advertising in the paper? Who owns property that has been abandoned, lost, or mislaid? *Estray statutes* answer these questions.

A typical estray statute in the United States stipulates a procedure for the finder to acquire ownership of lost or abandoned property. If the property exceeds a stipulated value, the finder may have to appear before a court official and sign a document concerning the facts about the property found. The court official then places an advertisement concerning the found item. If the owner does not appear to claim it within a stipulated time period (for example, one year), the finder becomes the owner. A finder who keeps the item without complying with the statute is subject to a fine.

Like registering title, estray statutes discourage the theft of property. Given an estray statute, a thief who is caught with another’s property cannot avoid liability by claiming that he or she found it. (“Where did you get that watch?” Sherlock asked the suspect. “It fell off the back of a truck,” he replied.) Thus, an estray statute helps to distinguish a good-faith finder from a thief. Like adverse-possession rules, estray statutes tend to clear the clouds from title and transfer property to productive users. Like adverse-possession rules, estray statutes also provide an incentive for owners to monitor their property. Finally, estray statutes induce the dissemination of information by finders and thus reduce the search costs of owners who lose or mislay their property.

QUESTION 5.22: If the value of a lost object is low enough, the estray statutes do not apply. Consequently, the finder has no legal obligation to advertise. Discuss the costs that need to be balanced to the most efficient lower bound in the value of a lost object for purposes of the estray statutes.

QUESTION 5.23: In admiralty law, there have to be rules for allocating ownership rights to property lost at sea. In the United States, the finder of an

abandoned ship is generally awarded ownership, but in some cases the government takes possession of abandoned ships in its waters. Where that latter condition holds, a salvor (that is, one who salvages an abandoned ship) is usually entitled to a salvage award determined by the court.

Does this practice of making awards to salvors encourage dishonesty, or does it attract an efficient number of resources into the business of searching for lost ships? Is the system of awarding complete ownership rights to the finder more or less efficient than the award-to-salvors system?

III. What May Owners Do with Their Property?

What may owners do with their property? In this section we analyze some traditional restrictions on property rights. We postpone discussing modern government regulations such as zoning ordinances till the final section of the chapter.

A. Bequests and Inheritances: Circumvention Costs and Depletion Costs

In a feudal or tribal world, law typically stipulates the heirs to land, rather than the owner choosing heirs. To illustrate, the eldest son inherited all of his father's land in medieval England,⁴⁴ and in matrilineal tribes the land is often inherited by the niece from her aunt. Furthermore, feudal and tribal societies typically restrict the sale of land. As law modernizes, owners increase their power to stipulate the terms of inheritance and sales. The law in Western countries has evolved over centuries toward more freedom for the owner to specify who may have the property after his or her death and what they may do with it. We discuss briefly the economic analysis of this trend.

Any restriction on the owner's choices creates an incentive to circumvent it. To illustrate, imagine an owner who wants to bequeath her land to a particular friend, and imagine that the law will award the property to someone else. The owner can circumvent the law, say, by transferring title to the friend today and leasing it back for \$1 per year until her death. Circumventing the law usually requires the assistance of a good lawyer. In general, owners use costly legal resources to circumvent restrictions on the use of property.

Now change the example and imagine that tight laws and costly lawyers prevent the owner from circumventing restrictions on bequests. Because her desire to designate her heir was frustrated, the owner may deplete her property before she dies. For example, she might cut timber prematurely, or exhaust the soil's fertility by intensive farming, or postpone needed improvements to buildings. In general, rules that restrict transfer undermine the owner's incentive to maximize the value of the property.

Circumvention costs and depletion costs provide two reasons for allowing an owner freedom in transferring property at death. However, these same reasons justify restricting

⁴⁴ In most of England from 1066 (the date of the Norman conquest) until 1925, the general rule for disposing of real estate on one's death was that it passed intact to the decedent's eldest son, a system called *primogeniture*. Testators were not free to alter this rule except under very narrow circumstances.

the freedom of an owner in special circumstances. Most property rights live forever, but all owners die. Sometimes one generation of owners wants to limit the discretionary power of subsequent owners. To illustrate, suppose that I own my family's ancestral home, Blackacre, and I stipulate in my will that no one will ever use Blackacre for purposes other than as a residence. Subsequently, I die and my heir wants to develop Blackacre into a golf course. Should the law enforce the restrictions in my will or set it aside and allow my heir to build a golf course? If the law routinely sets aside such restrictions, then I have an incentive to deplete the resource or circumvent the law prior to my death. If the law enforces such restrictions, then my wishes may be fulfilled but at the social cost of making it difficult, if not impossible, to move Blackacre to a higher-valued use than its use as a residence.

In the preceding example, the owner apparently wants to restrict future uses of Blackacre for his own, perfectly legitimate reasons. In other examples, an owner creates a trust (called a "spendthrift" trust) to protect someone from his or her own bad judgment,⁴⁵ or a bequest attempts to keep property in the family forever,⁴⁶ or a restrictive covenant attempts to channel future sales to certain classes of buyers.⁴⁷ In general, the principle that the current owner should be free to structure transactions as he or she wishes runs up against a difficulty when the owner wants to restrict future owners. In these cases, a conflict exists between the freedom of sequential owners of the same property. Any reduction in the freedom of any owner in the sequence may cause economic waste, regardless of whether the reduction in freedom comes from law or a private transaction.

English common law responded to these facts generally by being skeptical of "restraints on alienation," as they are called, and specifically in the case of bequest by a complicated law called the *rule against perpetuities*. The rule imposes a time limit on property restrictions imposed by the terms of a gift, sale, bequest, or other transaction. Instead of lasting in perpetuity, restrictions automatically lapse when a legal time limit expires. The legal time limit has the curious formulation "lives-in-being plus 21 years." To illustrate its meaning, assume that my only child is an unmarried daughter, and I stipulate in my will that she will inherit my ancestral home, Blackacre, on the condition that it never be used except as a residence. According to the rule, the restriction must ordinarily lapse 21 years after my daughter's death.⁴⁸

Notice that the rule against perpetuities is a "generation-skipping rule." By this phrase we mean that it allows an owner to skip over the living generation by restricting their use of the property, but the property passes unrestricted to the unborn when they reach the age of 21 and become legal adults. A generation-skipping rule has an economic rationale. Assume that you must choose a principle concerning the power

⁴⁵ For example, a trust is created in which the beneficiary receives the interest income from the trust property but cannot touch the capital until she is middle-aged.

⁴⁶ For example, the owner leaves instructions that, at his death, his land is to be given to his oldest son, at whose death the land is to be given to *his* oldest son, and so on.

⁴⁷ In the past in America, covenants sometimes blocked future sales to buyers belonging to certain races.

⁴⁸ This account of the rule against perpetuities is roughly, but not exactly correct. The "life in being" designated as the "measuring life" does not have to be that of the daughter. It could, for example, be the first child born in Kinshasa the month before the testator's death. The rule, to be brief, is extremely complicated—so complicated that it invites creativity to avoid it.

of one generation to impose restrictions on the use of property by subsequent generations. The principle that you choose will apply to every generation. You know that the world changes in unpredictable ways, so no restriction is good forever. You also know that most owners are prudent and benevolent toward their heirs, and a few are foolish and venal. In effect, you want a principle to protect against an occasional fool in an unending sequence of owners, given a constantly changing world.

A prudent owner will not restrict a prudent heir, and a prudent owner will restrict a foolish heir. Given these facts, an attractive principle for you to choose allows each generation to restrict the next generation, but not subsequent generations. When prudent owners apply this principle, only foolish heirs will be restricted. Furthermore, the restrictions that prudent owners impose on foolish heirs may prevent the foolish heirs from imposing restrictions on the next generation. So, the rule against perpetuities appears to maximize the value of property across generations.

A trust is an organization where one person owns and manages money for the benefit of another. Trusts have different purposes, such as transferring wealth to one's heirs while avoiding inheritance taxes. When a person creates and endows a trust, it pays money to the beneficiary, which is not an inheritance, so no inheritance tax is owed. Eventually, however, the trust is dissolved, and the tax authorities may recapture part of the taxes that the trust avoided. To further reduce tax liability, some U.S. states have enacted laws allowing citizens to create "perpetual trusts" or "dynasty trusts." Because they never dissolve, they avoid the tax liabilities triggered by dissolution, but they are also inconsistent with the rule against perpetuities.

U.S. citizens in one state can establish a trust in another state. States compete to attract trust business by making favorable laws, especially for avoiding taxes owed to the federal government or other states. Perpetual trusts are an example. Besides avoiding taxes, competition for trust business can also improve the efficiency of trusts. The management of stock portfolios, which trusts often have, illustrates such an improvement. In the nineteenth century, most U.S. states adopted a rule making the trustee liable if the portfolio included speculative stocks that lost their value. This rule caused trustees to buy bonds and very conservative, "blue-chip" stocks. Low risk, however, characterizes the portfolio as a whole, not each stock in it. In a balanced portfolio, the risk from one stock offsets the risk from another. In technical terms, holding stock with negatively correlated risk results in low risk for the portfolio as a whole, even though individual stocks are high risk. Some innovative states responded to these facts by changing the rules of trust management. Under the revised rules, the trustee who holds a balanced portfolio is not liable for losses caused by a fall in value of individual stocks. This change in the rule caused trust portfolios to shift away from conservative bonds and toward more individually risky stocks. States making the change attracted more trust business, which puts pressure on other states to modernize their rules of trust management.⁴⁹

⁴⁹ See Max M. Schanzenbach & Robert H. Sitkoff, *Did Reform of Prudent Trust Investment Laws Change Trust Portfolio Allocation?*, 50 J. LAW & ECON 681 (2007). See also those authors' *Lawyers, Banks, and Money: The Revolution in American Trust Law* (2011). As another example of competition among jurisdictions, the trust was developed in the common law, not in civil law. The success of London banks in the trust business has put pressure on Paris banks to modify French civil law to gain all the advantages of the trust in English common law.

QUESTION 5.24: Instead of “lives-in-being plus 21 years,” the rule might be “lives-in-being plus 10 years,” or “lives-in-being plus 35 years.” Compare these rules as means for “generation-skipping.”

QUESTION 5.25: Suppose that a testator imposes a condition that cannot be met. For example, the decedent gives her property to be used for a medical school in Lebanon, Indiana, but after the testator’s death, the State of Indiana abandons its plans to build a medical school there. In this situation, American courts apply the doctrine of *cy pres* (pronounced “see pray” and meaning, in law French, “so nearly” or “as near as possible”). Under that doctrine the court will find an alternative condition that is as close as possible to the decedent’s intentions. For example, the proceeds from the sale of the decedent’s property in Lebanon, Indiana, might be given to a medical school located somewhere else. Use the concepts of circumvention costs and depletion costs to provide an economic rationale for this rule.

QUESTION 5.26: We suggested above that an annually increasing renewal fee would be an efficient means of setting optimal patent life. Similarly, suppose that owners who wanted to restrict future use of their property had to pay a fee for each year that the restriction runs. For example, if my will stipulates that Blackacre should be used exclusively as a residence for 100 years, then I would have to make provision in my will to pay the state for each year that the restriction runs. In effect, the state deducts an annual fee from a bequest for a testator who desires to impose posthumous restrictions on property for a specified number of years. At what level would you set such a fee? Would it be the same for all types of conditions and all types of property? Is such a fee more efficient than the rule against perpetuities?

B. Rights to Use Someone Else’s Property

In general, no one may use another’s property without the permission of the owner. Use of another’s property without the owner’s permission is an illegal trespass. As we saw in Chapter 4, this rule and moderate transaction costs induce those who want to use another’s property to bargain with the owner. Bargaining leads to the use of property by the party who values it the most, as required for allocative efficiency.

Can someone ever use another’s property lawfully without the owner’s permission? We have already seen that the “fair use” exception allows one to use copyrighted material without the owner’s permission—in limited circumstances. (See question 5.11 on page 135). This issue arose in the famous case of *Ploof v. Putnam*.⁵⁰ Putnam was the owner of a small island in Lake Champlain, a large body of water in northern Vermont. In November, 1904, Ploof was sailing on that lake in a sloop with his wife and two children when a violent storm arose very suddenly. Ploof needed a safe harbor quickly, and the nearest one was Putnam’s island. Ploof moored his sloop to a pier on that island, hoping that his ship and family would be able to ride out the storm in safety.

⁵⁰ 81 Vt. 471, 71 A 188 (Supreme Court of Vermont, 1908).

However, an employee of Putnam's, fearing that the sloop would damage his employer's property by being cast repeatedly against it during the storm, untied the ship from the pier and pushed it away. The sloop and its passengers were then at the mercy of the storm. The ship was ultimately driven by the storm onto the shore and wrecked.

Ploof sued Putnam, alleging that the losses to his ship and the injuries to himself and his family were the result of wrongful action by the defendant, through his employee. Ploof argued that the storm caused an emergency that justified his trespassing on the defendant's property, even without permission. He asked for compensatory damages for his losses. Putnam replied that every property owner has a right to exclude trespassers. This principle is so firmly settled, he asserted, that the court should award him summary judgment without proceeding to trial. The trial judge denied the defendant's motion for summary judgment, and the defendant appealed. The Supreme Court of Vermont affirmed the decision and held that *private necessity* like that of Ploof was an exception to the general rule against trespass.

In an emergency, one person can use another's property without permission. However, the user must compensate the owner for the costs of use. To illustrate, a hiker who gets lost in a remote wilderness may break into an uninhabited cabin in order to obtain food and shelter, but the hiker must compensate the owner for damage to the cabin and food consumed. As another example, X becomes deathly ill during the night, the only pharmacy in town is closed, and its owner Z is unreachable, so X breaks into Z's pharmacy and takes the required medicine. The law will excuse the trespass, but X must pay damages to Z. As a final example, X, who is about to be murdered by Y, picks up the nearest heavy object, Z's valuable china vase, and crashes it over Y's head, thereby saving X's life. X must pay damages to Z for the vase. In brief, the private-necessity doctrine allows compensated trespass in an emergency.

Bargaining theory rationalizes the *private necessity* exception to the general rule against trespass. In an emergency, transaction costs may preclude bargaining. For example, the suddenness with which the storm arose precluded Ploof from finding Putnam and bargaining with him. When bargaining is precluded, voluntary transactions do not necessarily cause goods to be used by the party who values them the most. A rule allowing compensated trespass assures that trespass occurs only when its value to the trespasser exceeds the cost to the owner.⁵¹

QUESTION 5.27: An interesting variation on the facts in *Ploof* occurred in *Vincent v. Lake Erie Transport Co.*, 109 Minn. 456, 124 N.W. 221 (Supreme Court of Minnesota, 1910). In late November, 1905, the steamship *Reynolds*, owned by the defendant, was moored to the plaintiff's pier in Duluth and discharging cargo. A storm suddenly arose on Lake Superior. The *Reynolds* signaled for a tug to take her away from the pier,

⁵¹ Suppose that Ploof had found Putnam on the pier and bargained with him. The emergency has conveyed monopoly power on Putnam, who has the *only* nearby pier. Given Putnam's monopoly and Ploof's desperation, Putnam might demand an exorbitant amount of money for use of the pier. Ploof might promise to pay it, and then refuse to do so after the emergency passes. Litigation of such "bad-Samaritan contracts" is discussed later, when we come to the "necessity doctrine" in contract law.

but because of the storm, none could be found. The ship remained moored to the pier during the storm. The violence of the storm threw the steamship repeatedly against the plaintiff's pier, causing damage in the amount of \$300. The plaintiff asked for that amount. The Lake Erie Transport Co. contended that its steamship was an involuntary trespasser. The *Reynolds* had tried to leave the plaintiff's property but had not been able to do so *through no fault of its own*. The court held that the plaintiff was entitled to damages. Argue that this holding is efficient.

C. Inalienability

The law forbids the sale of some valuable things, such as body organs, sex, heroin, children, votes, atomic weapons, or human rights. You cannot even *give away* some of these things, such as heroin or your vote in a national election. You cannot lose some of these things by *any* legal means, such as your human rights. One meaning of *alienation* is losing something, especially an intimate part of yourself. In law, the term *inalienable* refers to something of yours that you cannot lose by specified means. Thus, body organs, sex, and children are inalienable by sale, your vote is inalienable by sale or gift, and your human rights are inalienable by any means.

The sale of sex or children is prohibited by conventional morality, as well as law. Many forms of inalienability express conventional morality. Other forms of inalienability, such as the enactment of human rights, express the aspirations of eminent political theorists. What about economic theorists? What have they had to say about the efficiency of inalienability? Occasionally, a regulation increases the efficiency of a transfer. This fact provides an economic rationale for regulation. However, inalienability goes far beyond regulation. Whereas regulations restrict transfers, inalienability prohibits them. The efficiency of a transfer cannot increase by prohibiting it. In general, prohibitions on transfers are inefficient because they prevent people from getting what they want. Following this line of thought, some economic writers have attacked laws that make certain goods inalienable.⁵² Is there *any* economic rationale for inalienability?⁵³

Some theorists argue that the sale of certain commodities undermines their transfer by superior means. For example, consider the supply of blood to hospitals. Two complementary means are used to ensure that blood is free from infection: A medical history is taken from the individuals who supply blood, and the blood is tested in laboratories. The individual suppliers are more likely to provide an accurate medical history when they give their blood away than when they sell it.

⁵² For example, see Elizabeth Landes & Richard A. Posner, *The Economics of the Baby Shortage*, 7 J. LEGAL STUD. 323 (1978) and J. Robert Pritchard, *A Market for Babies?*, 34 U. TORONTO L. J. 341 (1984). See also the 1987 symposium on the economics of selling babies in the *Boston University Law Review*.

⁵³ See Susan Rose-Ackerman, *Inalienability and the Theory of Property Rights*, 85 COLUM. L. REV. 931 (1985), Margaret Jane Radin, *Market-Inalienability*, 100 HARV. L. REV. 1849 (1987), and Richard Epstein, *Why Restrain Alienation?*, 85 COLUM. L. REV. 970 (1985).

Consequently, donated blood is freer from infection. This fact provides an economic rationale for obtaining blood by donations rather than purchases, but not a reason for prohibiting the sale of blood.⁵⁴ For example, in the United States most blood is obtained by donations, but some blood is purchased.⁵⁵

However, assume that the sale of blood undermines voluntary donations. For example, people might feel that giving blood away for free is stupid so long as it can be sold. If these facts were true, then prohibiting the sale of blood might be necessary in order to divert transfers into the superior channel of gifts. Similarly, anthropologists have argued that markets destroy gift economies among tribal people. Although plausible, the factual support for this theory is not strong enough to provide a convincing defense of inalienability. It seems, then, that inalienability rests on conventional morality and political philosophies that stress values other than Pareto efficiency.

QUESTION 5.28: Assume that every adult in a particular jurisdiction is eligible to serve as a juror. Panels of potential jurors are drawn by rotation from the qualified population. Currently, no jurisdiction allows someone called for jury service to hire a qualified replacement. Would society be better off if people were allowed to engage in a market for jurors?



Web Note 5.7

As the technology for making use of transplantable human organs improves, the demand for those organs has far outstripped the supply available under the inalienability rules. See our website (and the box on “Inalienable Bodily Organs”) for a discussion of how a regulated market in human organs might significantly increase the supply.

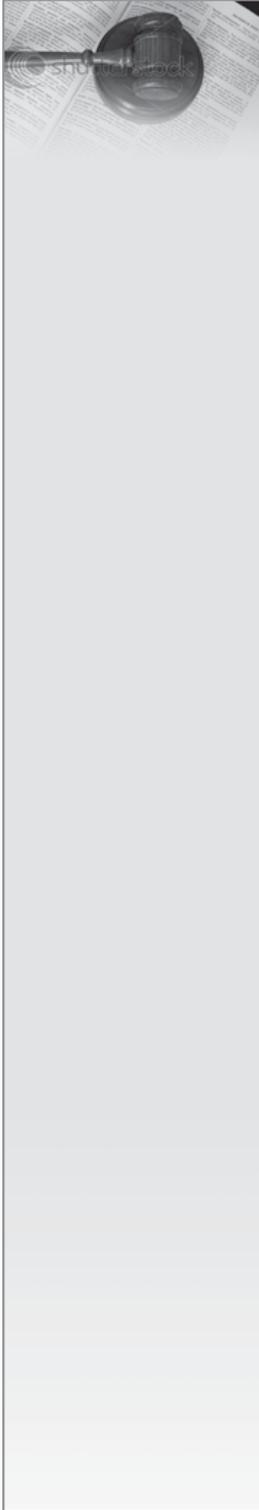
D. Unbundling Property Rights

In England, the boundaries of property are often based on enduring natural objects and contours of the land such as rocks, trees, or hills. In the United States, much of the land was surveyed and divided into uniform parcels in the countryside and in towns.⁵⁶ Standardizing property simplifies comparing one property to another. Easy

⁵⁴ See RICHARD TITMUS, *THE GIFT RELATIONSHIP: FROM HUMAN BLOOD TO SOCIAL POLICY* (1971), in which the author argues that inalienability is an efficient method of assuring quality control. See also Kenneth Arrow, *Gifts and Exchanges*, 1 *PHILOSOPHY & PUBLIC AFFAIRS* 343 (1972), and Reuben Kessel, *Transfused Blood, Serum Hepatitis, and the Coase Theorem*, 17 *J. LAW & ECON.* 265 (1974).

⁵⁵ Blood can be purchased in the United States, but the federal Food and Drug Administration requires labels to distinguish whether the source is a “paid donor” or “volunteer donor.” Note that nonprofit institutions that collect blood from “volunteer donors” usually sell it to hospitals.

⁵⁶ A grid for land boundaries (“rectangular survey”) was an innovation that spread in the British Empire during the nineteenth century, replacing the demarcation of land boundaries by natural objects such as trees and rocks (“metes and bounds”).



Inalienable Bodily Organs

Advances in medical technology have sharply increased demand for transplantable bodily organs.⁵⁷ Each year in the United States there are almost 80,000 people waiting for organ transplants. But the supply of suitable organs, is much smaller—approximately 10,000 organs per year. Excess demand in a market causes the price to rise, which brings supply and demand into equilibrium. This cannot happen to transplantable organs because all states adopted the Uniform Anatomical Gift Act of 1968, which forbids the sale of organs. Consequently, gifts or donations are the only means by which to supply transplantable bodily organs. The donor may consent to give up transplantable organs in the event of his or her death. People often have the opportunity to consent when renewing a driver's license. However, less than 20 percent of the United States' driving-age population has filled out the donor cards. Absent consent, the current system typically requires physicians to ask next of kin whether they may "harvest" the organs of the decedent. This is not the best time to make such a request.

To cope with excess demand, the United States has a non-market method of allocating organs. The rules are very complicated, but most organs are awarded in the order in which patients have been on an official waiting list. In 2006 the organization overseeing organ transplantation (UNOS) suggested an alternative rule—organs may be given first to those likely to live the longest after a transplant. That controversial proposal is still under discussion.

How to increase the supply of organs for transplant? Technology may develop more artificial organs, or technology may make it increasingly possible to transplant organs from other animals into humans. Alternatively, a regulated market in human organs might be allowed somewhere in the world. (The virtues and pitfalls of such a market are explored in the sources that follow.)

However, some nations have already implemented a rule that dramatically increases the supply of organs. We called the current donation rule "required consent." While less than 20 percent of the United States' driving-age population has filled out the donor cards, 85 percent of that same population say that they are willing to make a donation of their organs. An alternative to required consent is a rule of "presumed consent": Everyone is presumed to have consented to his or her organs being harvested upon death unless they have affirmatively declared otherwise. Data suggests that switching from required consent to presumed consent dramatically increases the supply of organs. The four European countries with a rule of required consent (Denmark, Germany, the Netherlands, and the United Kingdom) have much lower rates of donation (ranging from 4.25 percent in Denmark to 27.5 percent in the Netherlands) than do the six countries (Austria, Belgium, France, Hungary, Poland, Portugal, and Sweden) that use a rule of presumed consent (ranging from a low of 85.9 percent to a high of 99 percent).

SOURCES:

See Lloyd R. Cohen, *Increasing the Supply of Transplantable Organs: The Virtues of a Futures Market*, 58 *Geo. WASH. L. REV.* 1 (1989).

Gregory Crespi, *Overcoming the Legal Obstacles to the Creation of a Futures Market in Bodily Organs*, 55 *OHIO ST. L. J.* 1 (1994).

RICHARD EPSTEIN, *MORTAL PERIL: OUR INALIENABLE RIGHT TO HEALTH CARE?* (1997).

Eric J. Johnson & Daniel Goldstein, "Do Defaults Save Lives?," 302 *SCIENCE* 1338 (2003).

⁵⁷ An economist joke about this situation goes like this: A patient waiting for a heart transplant learns from his doctor that there are suddenly two hearts available—one from a 24-year-old marathon runner and one from an elderly economist. Without hesitation the patient chooses to receive the heart of the economist. It explains to his astonished doctor, "It is unused."

comparison of property opens the real estate market to broader competition because potential buyers need less information to compare the value of one property relative to another. Besides real estate, uniformity lubricates sales for stocks, bonds, wheat, oil, and many other goods.

Conversely, inconsistent bundles of rights make properties incomparable to each other, so prices must be negotiated individually. Thus, one share of stock issued by Honda is the same as another share of the same class of stock. Honda shares have a public price in the stock market at which they can be bought or sold. In contrast, investment banks have created bundles of unstandardized real estate mortgages (“derivatives”) whose prices are individually negotiated. Unlike stock market prices, individually negotiated prices for securities are not public information. Most people do not know the price at which such a security last sold. When securities prices plummeted in the financial meltdown of 2008, Harvard University held many unstandardized securities without a public price, so it did not know how much value its portfolio had lost.

In general, the owners of property possess a bundle of rights. To standardize property, the law must restrict the owner’s ability to repackage these rights. The owner of a good may have rights w , x , y , and z over it. The owner may want to unbundle these rights and sell w and x to one person, while retaining y and z for himself. Sometimes, however, law only allows sales of the complete bundle. For example, the owner of a city lot can sell it as a whole, but city regulations may prevent him from cutting it in half and selling half of it.

Zoning illustrates specific regulations that prevent unbundling some property rights. A deeper question is whether something in the nature of property generally limits or restricts unbundling. To illustrate what is at stake, assume that A inherits his family’s heirloom pocket watch. B, who is A’s brother, would like to wear the watch to a Christmas party each year. B pays some money to A in exchange for A’s promise to let B wear the watch every Christmas. A’s refusal to let B wear the watch on Christmas in a future year would breach their contract, so B could sue A for money damages.

Continuing the example, assume that A sells the watch to C. In making the sale, A tells C nothing about B. C remains ignorant about A’s contract with B until Christmas approaches and B asks C for the watch to wear. C refuses. What can B do? Nothing to C. C does not have to let B wear the watch on Christmas. B’s only available remedy is to sue A for compensatory damages for breach of contract.

As this example illustrates, the contract between A and B does not give B security that he will always get to wear the watch on Christmas. What B wants is a right to use the watch on Christmas that he can assert against anyone who owns the watch. B might take a novel legal approach in an attempt to get security: Let A sell B the use rights over the watch on Christmas, and let A retain all other rights over the watch. If A did not own use rights to the watch on Christmas, then presumably A could not sell those rights to anyone else. Further, anyone who tried to prevent B from using the watch on Christmas would presumably interfere with his property rights. Specifically, if C refused to let B use the watch on Christmas then B could sue C for “trespass” and obtain specific performance. (We will explain these terms in more detail in Chapters 8 and 9.)

Notice what happens when A and B replace A’s contractual promise to B with A’s sale of use rights to B. Damages are the usual remedy for breach of contract. Hence B’s

contractual right to wear the watch on Christmas is protected by A's liability to pay damages for breach. In contrast, injunctions are the usual remedy for trespass on property rights. Hence B's ownership of the right to wear the watch on Christmas is protected by his ability to obtain an order from the court requiring C to allow B to wear the watch on Christmas.

The example of the watch illustrates how unbundling can hinder commerce. Specifically, if unbundling is allowed, C would be uncertain exactly what rights he acquired by buying the watch from A, which would dampen C's interest in buying the watch. A vigorous market requires certainty of buyers concerning the rights that they acquire.

This example raises the general question, "Can the owner of property, who has a bundle of rights, rearrange the bundle of rights freely, transfer them as he wishes, and force courts to protect the transfer of rights by injunctions?" While this problem seldom arises with watches or similar objects, it often arises with real estate. To illustrate, assume that I own my family's ancestral home, Blackacre, and I want to assure that no one will ever use it for purposes other than a residence. To secure this end, I would like to remove the development rights from the bundle of ownership rights. Can I do it? According to the common law of property, I can only restrict the use by the future owners of Blackacre for a limited period of time. (See the preceding discussion of the rule against perpetuities.) In general, an owner cannot freely unbundle and repackage real property rights in common law. Similarly, civil law systems in countries like France go beyond these common law restrictions by enumerating rights of real property that the owners cannot change. According to the civil law tradition, the enumerated rights attach to the property itself, not to the person who happens to own the property.⁵⁸

Another important kind of property that provokes disputes about bundling and unbundling is the corporation. The stockholders of a corporation are its legal owners. Each share of stock traditionally conveys to its owner the right to one vote at stockholders' meetings. In recent years, however, some corporations have created new kinds of stock that do not give voting rights to their owners. There are many other examples where corporations have unbundled and rearranged the traditional rights enjoyed by their owners.

Instead of entangling ourselves in the details of real estate or corporate law, we must focus on the general point underlying these controversies. In the example of the heirloom watch, the fundamental issue is whether the owner of property can give several different people rights over it that they can enforce by specific performance against anyone who interferes.

Economic efficiency generally favors allowing unbundling whenever it increases the market value of the property, and prohibiting unbundling when it decreases the market value of the property. Property owners generally want to maximize its market value, and they are better situated than the state to know how to do this. Consequently, the state seldom has reason to prevent owners who want to unbundle from doing so. Recall,

⁵⁸ In legal language, *numerus clausus* refers to a restricted list of rights, including property rights. In property, these rights are *in rem*, meaning that they attach to the property regardless of its owner, whereas contract rights are *in personam*, meaning that they attach to the particular people who made the contract. See the article by Thomas Merrill and Henry Smith noted at the end of Chapter 4.

however, our previous discussion about the “anticommons.” Unbundling may impose future costs on those who would like to repackage the rights into a new configuration. Insofar as there is an economic argument against unbundling, it is based on this desire to minimize future costs of assembling those rights into a more valuable whole.

Some theorists have argued that individuals can sometimes increase the value of their own property by unbundling in ways that increase transaction costs for the sale of other properties. To illustrate, a standard form contract lowers the bargaining costs of everyone in an industry. One seller who departs from the standard form reduces standardization, which imposes costs on other sellers. In general, a common pool of knowledge about contracts lowers transaction costs of exchange, and unbundling drains the common pool. This view implies that property law requires constraints against fragmentation by particularization.

This argument, however, is unconvincing. Much of contract law imposes rules that apply unless the parties stipulate otherwise in the contract. (See our discussion of “default rules” in Chapter 8.) The state does not have to police contracts to make sure that they remain sufficiently standardized. State requirements of standardized contracts are typically misguided for the same reason that state restrictions on unbundling property are misguided. The law should obligate sellers to disclose improbable restrictions on ownership due to past transactions, but as long as the parties understand what they are purchasing, the law should generally enforce agreements to unbundled property rights.

IV. What are the Remedies for the Violation of Property Rights?

As noted in Chapter 4, common law approximates a legal system of *maximum liberty*, which allows owners to do anything with their property that does not interfere with other people’s property. When applying this principle, the amount of liberty afforded to owners depends on disentangling one owner’s use of property from another’s. When uses are separate, the effect of one owner on another occurs through voluntary agreements, such as market exchange. When uses join, one owner affects another involuntarily, as when my smoke blows over your property. In this section we discuss the special legal and economic problems caused by entangled uses.

A. Externalities and Public Bads

When people agree to impose costs and benefits on each other, they often make a contract. In contrast, when the utility or production functions of different people are interdependent, they impose benefits or costs on each other, regardless of whether they have agreed. Such interdependence is called an *externality*, because the costs or benefits are conveyed outside of a market. To illustrate the difference, if I buy so many watermelons at my local fruit store that the seller raises the price, my action affects other buyers, but bidding up a price exemplifies the ordinary working of markets, not an externality. In contrast, if my rooster’s crowing annoys my neighbors, my action affects them independent from market transactions; so, the noise is an externality.

Costs or benefits conveyed outside of the market are not priced. Whenever costs or benefits are not priced, the supplier lacks incentives to supply the efficient quantity. Overcoming this incentive problem requires pricing the externality. When an externality gets priced, its supply is channeled through a market, which is called *internalizing the externality*. Thus, the solution to interdependent uses of property is to channel them through the market, or to internalize the externality.

The efficient solution to the problem of internalization depends on the number of affected people. If interdependence affects a small number of people, the externality is “private.” For example, the crowing of my rooster affects a few neighbors, so the noise is a private externality. If the interdependence affects a large number of people, the externality is “public.” For example, the smoke from a factory affects many households, so it is a public externality. Similarly, when one additional car enters a congested freeway, all the other drivers slow down a little, so congestion is a public externality. The private-public distinction in economics rests on a continuum describing the number of people who are affected by someone’s actions. As the number of people affected by someone’s action increases, a vague boundary is crossed separating “private” from “public.”

In Chapter 4 we explained that one person’s consumption of a public good does not diminish the amount available to others, and that excluding some people from enjoying a public good is difficult. Public externalities typically have these characteristics of nonrivalry and nonexcludability. For example, when one person breathes dirty air, just as much dirty air remains for others to breathe, and preventing some people in a given air-quality region from breathing the air is difficult. Consequently, harmful public externalities are also called “public bads.”

We summarize these points by using some notation. Imagine a small economy with two people, denoted a and b , and three private goods, denoted x_1, x_2, x_3 . Consumption of the first two goods involves no externalities, but consumption of the third good imposes external costs. For example, the first two goods might be apples and pears, and the third good might be cigarettes. We attach a superscript on a good to indicate who consumes. Thus, the utility of person a can be written as a function of the three goods that she consumes: $u^a = u^a(x_1^a, x_2^a, x_3^a)$. Assume that person b consumes the first two goods, but not the third good; that is, person b does not smoke cigarettes. Furthermore, assume that person b dislikes breathing the smoke from person a ’s cigarettes. Thus, the utility of person b can be written $u^b = u^b(x_1^b, x_2^b, x_3^a)$. (Note that b ’s utility will typically increase if she consumes more of x_1 and x_2 but that her utility will *decrease* if a consumes more x_3 .) The utility functions of a and b are interdependent because a ’s consumption of the third good is an argument in b ’s utility function. In other words, the presence of a variable in b ’s utility function bearing the superscript a indicates an externality.

Let us add additional notation to indicate incomplete markets. Suppose that the three goods (x_1, x_2, x_3) are purchased in a store at prices (p_1, p_2, p_3) . The price that person a must pay for x_3 presumably reflects the cost at which the store purchases the good. This price does not include the cost of the harm that a ’s consumption of x_3 imposes on b .

Consequently, there is no price associated with the variable x_3^a in b ’s utility function. In order to attach such a price, persons a and b would have to bargain with each other.

Through such bargaining, the externality might be internalized. Our two-person example is a private externality. Alternatively, assume that there are 1, 2, 3, . . . , n people just like person b . Choose any one of these n people and call this person j . Person j 's utility function has the form $u^j = u^j(x_1^j, x_2^j, x_3^j)$, for $j = 1, 2, 3, \dots, n$. Now the harmful externality from a 's consumption of x_3 affects so many people that it is a public bad. The transaction cost of bargaining with n people is presumably prohibitive, so the externality cannot be internalized by a private bargain. Instead, an alternative means of pricing the externality must be found.

QUESTION 5.29: Classify the items in the following list as markets, private externalities, or public externalities.

- a. A lighthouse warns ships about rocks.
- b. My building blocks your sunlight.
- c. You outbid me at the auction.
- d. Bees pollinate your apple trees.
- e. Noise lowers the sale value of my house.

QUESTION 5.30: Assume that the third good, x_3 , represents miles driven in cars by persons 1, 2, 3, . . . , n , and assume that cars are polluting. Rewrite the utility function of person j in the preceding formulation to represent these facts.

B. Remedies for Externalities

In property law, a harmful externality is called a *nuisance*. Remember that our discussion of remedies for nuisance in Chapter 4 distinguished between injunctions and damages, and that the relative efficiency of these remedies has a lot to do with the public-private distinction. If the nuisance is private, few parties are affected by it, and, as a result, the costs of bargaining together are low. When bargaining costs are low, the parties will ordinarily reach a cooperative agreement and do what is efficient. Consequently, in those circumstances the choice of remedies makes little difference to the efficiency of the bargaining outcome. The traditional property law remedy—injunctive relief—is attractive under these circumstances, because the court need not undertake the difficult job of computing damages. If one views an injunction as always and forever prohibiting the offensive activity, then its inflexibility is costly. However, if one views an injunction as an instruction to the parties to resolve their dispute through voluntary exchange, then it is an attractive remedy for private nuisances.

In contrast, trying to correct a harmful externality of the public-bad type by bargaining would involve the cooperation of all the affected parties. Bargaining fails in these circumstances because it requires the cooperation of too many people. The law refers to a harmful externality of the public type as a *public nuisance*. Our analysis suggests that damages will be a more efficient remedy for a public nuisance than an injunction would be.

To apply this prescription for choosing between injunctions and damages, the court has to examine the number of people affected by the externality. However, the court does not have to perform a cost-benefit analysis comparing injunctions and damages.

Cost-benefit analysis requires more information than courts typically possess, so legal rules whose application requires a cost-benefit analysis should be avoided.

When compensatory damages are perfect, they restore the victim to the same utility curve as he or she would have enjoyed without the harm. Compensatory damages can be *temporary* or *permanent*. With temporary damages, the plaintiff receives compensation for the harms the defendant has inflicted on him or her in the past. If harms continue in the future, the plaintiff must return to court in order to receive additional damages. Thus, temporary damages impose high transaction costs for dispute resolution. With permanent damages, reductions in future harms translate directly into reductions in liability. Consequently, temporary damages create incentives for injurers to continually adopt technical improvements that reduce external costs.

With permanent damages, the plaintiff receives compensation for past harms plus the present discounted value of all reasonably anticipated future harms.⁵⁹ One lump-sum payment extinguishes claims for past and future harms at the level specified in the judgment. Unfortunately, future changes in technology and prices are difficult to predict, so the estimation of future harms suffers from error. Thus, permanent damages impose high error costs. Furthermore, by paying permanent damages the injurer “purchases” the right to external harm up to the amount stipulated in the judgment. Consequently, permanent damages create no incentive for injurers to adopt technical improvements that reduce external costs below the level stipulated in the judgment.⁶⁰

As explained, temporary damages impose high transaction costs, whereas permanent damages impose high error costs and undermine incentives for reducing future harms. Transaction costs of resolving disputes, whether by trial or settlement, are low when liability is certain and damages are easily measured. Error costs are high when innovation improves abatement technology and changes the understanding of the harms caused by externalities. Thus, temporary damages tend to be more efficient given easily measured damages and rapid innovation. Conversely, permanent damages tend to be more efficient given costly measurement of damages and slow innovation.

We commend damages as the remedy for a public nuisance. However, common law has not traditionally followed this prescription. When the public is harmed by a nuisance, courts traditionally allow the affected parties to enjoin it. The following case suggests that the common law has become more receptive to damage remedies for public nuisances. Read the case, bearing in mind the difference between the traditional remedy for a nuisance (damages for past harm and an injunction against future harm), recurring damages, and permanent damages. After reading the case, test your knowledge of externality theory by answering the questions.

⁵⁹ See the section on asset-pricing in Chapter 2 for more on discounting.

⁶⁰ In his dissent in *Boomer v. Atlantic Cement Co.*, which we discuss next, Justice Jasen recognized this point in his criticism of the majority’s award of permanent damages. He wrote, “Furthermore, once permanent damages are assessed and paid, the incentive to alleviate the wrong would be eliminated, thereby continuing air pollution in an area without abatement.”

***BOOMER v. ATLANTIC CEMENT CO., INC.* 309 N.Y.S.2d 312,
257 N.E.2d 87 (Court of Appeals of New York, 1970)**

BERGAN, J. Defendant operates a large cement plant near Albany. These are actions for injunction and damages by neighboring land owners alleging injury to property from dirt, smoke and vibration emanating from the plant.

[At the trial court and on appeal, the defendant's cement-making operations were found to be a nuisance to the plaintiff-neighbors. Temporary damages were awarded, but an injunction against future dirt, smoke, and vibration from the plant causing the same or greater harms was denied. Plaintiffs have brought this appeal in order to receive the traditional remedy against a nuisance—an injunction.]

The ground for denial of injunction . . . is the large disparity in economic consequences of the nuisance and of the injunction. This theory cannot, however, be sustained without overruling a doctrine which has been consistently reaffirmed in several leading cases in this court and which has never been disavowed here, namely, that where a nuisance has been found and where there has been any substantial damage shown by the party complaining, an injunction will be granted.

The rule in New York has been that such a nuisance will be enjoined although marked disparity be shown in economic consequences between the effect of the injunction and the effect of the nuisance

The court at Special Term [the trial court] also found the amount of permanent damage attributable to each plaintiff, for the guidance of the parties in the event both sides stipulated to the payment and acceptance of such permanent damage as a settlement of all the controversies among the parties. The total of permanent damages to all plaintiffs thus found was \$185,000

This result . . . is a departure from a rule that has become settled; but to follow the rule literally in these cases would be to close down the plant at once. This court is fully agreed to avoid that immediately drastic remedy; the difference in view is how best to avoid it. [Footnote by Court: Atlantic Cement Co.'s investment in the plant is in excess of \$45,000,000. There are over 300 people employed there.]

If the injunction were to be granted unless within a short period—e.g., 18 months—the nuisance be abated by improved techniques found, there would inevitably be applications to the court at Special Term for extensions of time to perform on showing of good faith efforts to find such techniques. The parties could settle this private litigation at any time if defendant paid enough money and the imminent threat of closing the plant would build up the pressure on defendant

Moreover, techniques to eliminate dust and other annoying by-products of cement making are unlikely to be developed by any research the defendant can undertake within any short period, but will depend on the total resources of the cement industry nationwide and throughout the world. The problem is universal wherever cement is made.

For obvious reasons the rate of the research is beyond control of defendant. If at the end of 18 months the whole industry has not found a technical solution, a court would be hard put to close down this one cement plant if due regard be given to equitable principles.

On the other hand, to grant the injunction unless defendant pays plaintiffs such permanent damages as may be fixed by the court seems to do justice between the

contending parties. All of the attributions of economic loss to the properties on which plaintiffs' complaints are based will have been redressed. . . .

It seems reasonable to think that the risk of being required to pay permanent damages to injured property owners by cement plant owners would itself be a reasonably effective spur to research for improved techniques to minimize nuisance . . . Thus, it seems fair to both sides to grant permanent damages to plaintiffs which will terminate this private litigation. . . . The judgment, by allowance of permanent damages imposing a servitude on land, which is the basis of the actions, would preclude future recovery by plaintiffs or their grantees.

This should be placed beyond debate by a provision of the judgment that the payment by defendant and the acceptance by plaintiffs of permanent damages found by the court shall be in compensation for a servitude on the land.⁶¹

The orders should be reversed, without costs, and the cases remitted to Supreme Court, Albany County, to grant an injunction which shall be vacated on payment by defendant of such amounts of permanent damage to the respective plaintiffs as shall for this purpose be determined by the court.

JASEN, J., dissenting. I agree with the majority that a reversal is required here, but I do not subscribe to the newly enunciated doctrine of assessment of permanent damages, in lieu of an injunction, where substantial property rights have been impaired by the creation of a nuisance. . . .

I see grave dangers in overruling our long-established rule of granting an injunction where a nuisance results in substantial continuing damage. *In permitting the injunction to become inoperative on the payment of permanent damages, the majority is, in effect, licensing a continuing wrong. It is the same as saying to the cement company, you may continue to do harm to your neighbors so long as you pay a fee for it.* [Our emphasis.] Furthermore, once such permanent damages are assessed and paid, the incentive to alleviate the wrong would be eliminated, thereby continuing air pollution of an area without abatement.

It is true that some courts have sanctioned the remedy here proposed by the majority in a number of cases, but none of the authorities relied on by the majority are analogous to the situation before us. In those cases, the courts, in denying an injunction and awarding money damages, grounded their decision on a showing that the use to which the property was intended to be put was primarily for the public benefit. Here, on the other hand, it is clearly established that the cement company is creating a continuing air pollution nuisance primarily for its own private interest with no public benefit. . . . The promotion of the interests of the polluting cement company, has, in my opinion, no public use or benefit. . . .

I would enjoin the defendant cement company from continuing the discharge of dust particles on its neighbors' properties unless, within 18 months, the cement company abated this nuisance. . . .

⁶¹ A *servitude on the land* is a restriction or burden on a piece of real property. The servitude typically "runs with the land," which means that it becomes permanently attached to the particular piece of land and is not, therefore, dependent on the identity of the owner. In your discussion of the case, see if you can explain why the court wishes to make the obligation to pay permanent damages for the nuisance a servitude on the land rather than being a mere obligation to pay particular individuals.

QUESTION 5.31: Is the externality in *Boomer* private or public?

QUESTION 5.32: Are the transaction costs of bargaining among the parties low or high?

QUESTION 5.33: Suppose the households had a right to enjoin the cement company to stop polluting. What obstacles would the cement company face if it tried to purchase the right to pollute from the households?

QUESTION 5.34: Explain the remedy given by the court. Suppose that at some time in the future the cement company doubles its rate of output, thus increasing the noise, smoke, dust, and vibration inflicted on the neighbors. Do the homeowners have a remedy?

QUESTION 5.35: Contrast the difference between temporary and permanent damages on the incentives of people to build new houses near the cement factory.

QUESTION 5.36: To what extent can the private law of property solve the problem of pollution?



Web Note 5.8

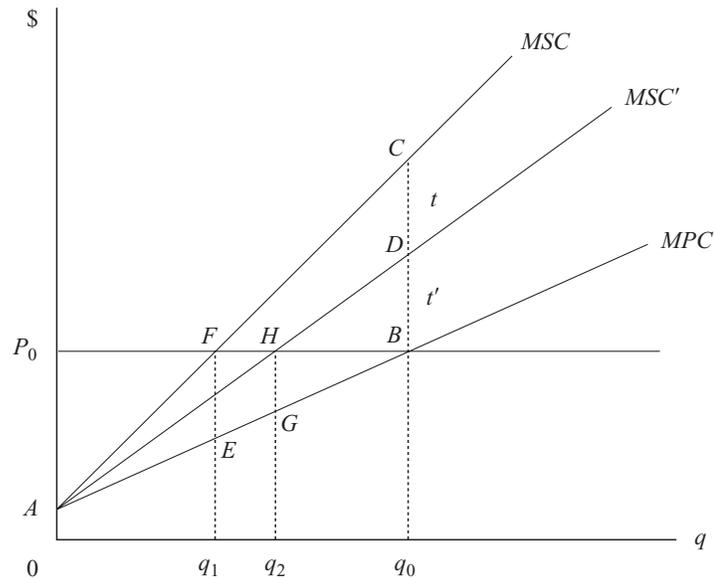
See our website for an additional case and some additional questions on using nuisance law to correct externalities. We also summarize there some new literature on the choice between property and liability rules as remedies.

C. Graphing Externalities

Let us graph how the award of damages can internalize an externality and restore efficiency. We assume that a firm like Atlantic Cement is held liable for the external costs it inflicts on others. The situation facing the firm is shown in Figure 5.1. The company's marginal private-cost curve, *MPC*, indicates the private cost to the firm of producing different quantities of cement. Private costs include the capital, labor, land, and materials but not the external harm caused by pollution. The external costs of pollution are added to the private costs to yield the social costs of producing cement. Figure 5.1 depicts two marginal social-cost curves representing two different technologies. Under the old technology, the addition of external costs of pollution to the private costs of production yields the marginal social-cost curve *MSC*. This curve depicts the true cost to society of each level of production under the old technology. There is, however, a new technology that pollutes less. Its marginal social costs are shown along line *MSC'*. The superiority of the new technology lies in the fact that it causes half as much pollution at any given level of output as the old technology. For example, the old technology might use filters in the smoke stack, and the new technology might use scrubbers in the smoke stack.

Figure 5.1

The incentives to adopt a new, superior technology under a rule of temporary damages.



Under either technology and in the absence of any court or regulatory action, the company's profit-maximizing rate of output, q_0 , is determined at the intersection of the private marginal-cost curve and the prevailing output price, P_0 . Under the old technology, the total amount of external cost inflicted by the output rate q_0 is the area ABC . Under the new technology, the total amount of external cost inflicted by the output rate q_0 is the area ABD . The net social cost inflicted by the last unit of output is $t' + t$ under the old technology and t' under the new technology. Note that it is easy to see here that, even if there is no legal compulsion for the firm to take external costs into account, society is better off if the firm is producing under the new technology rather than under the old technology. However, if the firm is not required to internalize these external costs, it has no incentive to adopt the new technology.

However, matters change if the firm can be made to internalize the social cost of its production of cement. Under the old technology and with the firm held responsible for its external costs, the profit-maximizing rate of output is determined by the intersection of P_0 and MSC at q_1 . At this point the cost of pollution is area AEF . But under the new technology and with the firm held responsible for its external costs, the profit-maximizing rate of output is determined by the intersection of P_0 and MSC' at q_2 . Social efficiency requires the firm to adopt the new technology and produce at q_2 . (Can you identify the cost of pollution at production level q_1 under the old technology, and at q_2 under the new technology?)⁶²

⁶² At q_1 under the old technology, the cost of pollution is AEF . At q_2 under the new technology, the cost of pollution is AGH .

But what about the firm? Is it indifferent between the two technologies? No. Assuming that the firm pays pollution costs, its maximum profits under the old technology are the area AP_0F , whereas maximum profits under the new technology are AP_0H . It is obvious that $AP_0H > AP_0F$.

How do these considerations relate to the question we asked above about the incentives for adopting superior technologies of production under the alternative damage measures? The intuitively plausible answer is that the cement company will adopt the cleaner technology more quickly under temporary damages than under permanent damages, and that intuition is borne out by our formal analysis. However, these economic advantages to temporary damages over permanent damages must be balanced against the potentially higher administrative costs of temporary awards.

QUESTION 5.37: The price line P_0 is horizontal in Figure 5.2. What does this fact indicate about competition?

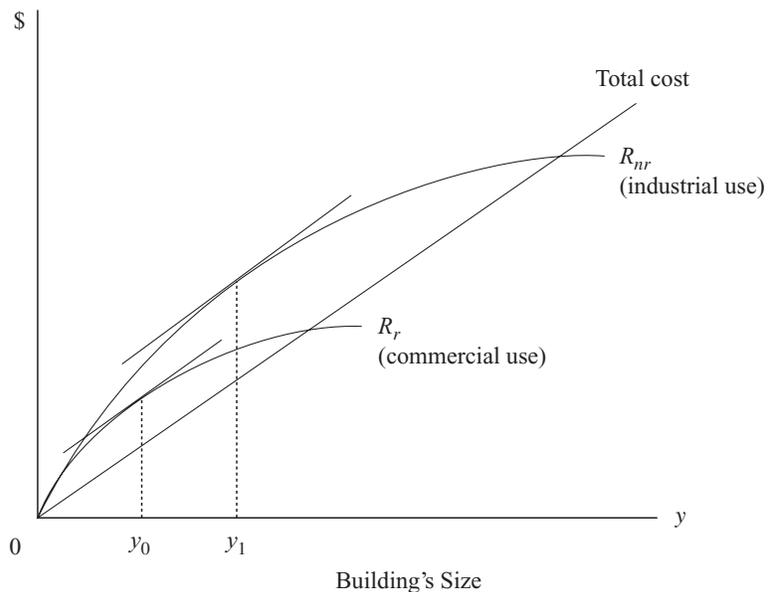
QUESTION 5.38: Assume that science reveals a new health hazard caused by breathing pollution from cement factories. How would such a discovery modify the graph and change the efficient level of production of cement?

D. Takings

The theory of property developed in Chapter 4 stresses that clear and certain property rights may facilitate bargaining, which creates a surplus from cooperation and exchange. Conversely, unclear and uncertain property rights may impede bargaining, which destroys the social surplus. The power of the state to take property (that is, to compel its sale to the state) and regulate its use reduces the clarity and certainty of

Figure 5.2

The incentive effects on private investors of a difference between compensable takings and noncompensable regulations.



property rights. The resulting destruction in social surplus represents the economic cost of the state's power to take property and regulate its use. Offsetting the economic cost is the benefit of providing public goods at lower cost. In this section we develop these ideas into an economic theory of the taking and regulatory powers.

In many countries, the constitution circumscribes the state's power to take private property. For example, the takings clause of the Fifth Amendment to the U.S. Constitution reads, "nor shall private property be taken for public use, without just compensation." Thus, the Fifth Amendment prohibits the state from taking private property except under two conditions: (1) the private property is taken for a public use, and (2) the owner is compensated. We will explain the economic rationale for these two conditions.

1. Compensation To understand the compensation requirement, we proceed in two stages. First, assume that there were no requirement to compensate (as was the case in England centuries ago) so that expropriating private property might be a means of financing the government. Second, assume that there is a requirement to compensate and examine its incentive effects for the government to use private property. (We will examine compensation's effect on the private property owner's use of the property in a subsequent section.)

First, contrast takings and taxes as means of financing government. Taxes are assessed on a broad base, such as income, property, sales, or bequests. Everyone subject to the tax faces the same schedule of rates. In contrast, a taking involves a particular piece of property owned by a particular person. Tyrannies sometimes finance government and enrich officials by taking property from individuals. To finance the state by takings, the private owner whose property is appropriated must not receive compensation. If the private property owner received compensation equal to the market value for his or her property, the state could not profit from taking it. So the requirement of compensation can be viewed as a device to channel government finance into taxes and away from takings.

Economics provides strong reasons for financing the state by taxes rather than takings. Any kind of expropriation distorts people's incentives and causes economic inefficiency, but taxes distort far less than uncompensated takings. To see why, consider the basic principle in public finance that focused taxes distort more than broad taxes. Applying this principle, a given amount of revenues can be raised with less distortion by a tax on food rather than vegetables, or a tax on vegetables rather than carrots. This principle follows from the fact that avoiding broad taxes is harder than avoiding narrow taxes. For example, avoiding a tax on food requires eating less, whereas avoiding a tax on carrots requires eating another vegetable, such as cucumbers. Broad taxes distort behavior less because many people cannot change their behavior to avoid broad taxes. Thus, efficiency requires the state to collect revenues from broad taxes such as income or consumption.⁶³ In contrast, takings have a very narrow base. Individual owners will go to

⁶³The precise proposition is that goods should be taxed at a rate inversely proportional to their elasticity of demand and supply. Broad taxes fall on aggregates that are inelastically demanded and supplied.

great expense to prevent the state from taking their property without compensation. Indeed, the possibility of uncompensated takings would divert effort and resources away from production and toward the politics of redistribution.

Now let us examine the effect of the compensation requirement on government's actions. Courts have held that the compensation requirement necessitates the government's paying roughly the fair market value to a property owner if her property is taken. For reasons that we will soon explain, that value may not be exactly what the owner would like or that would be reached in an arm's-length transaction between the owner and another buyer. Nonetheless, the government cannot make money by paying the market value for property that it takes. This fact discourages the government from excessive takings of private property.

2. Public Use The requirement of compensation does not preclude another political abuse, in which the state takes one person's property and sells it to someone else. To appreciate the problem, consider the difference between a taking and a sale. Sales are motivated by mutual gain, which is created by moving property from lower-valued to higher-valued uses. To illustrate, Blair's purchase of Adam's 1957 Chevrolet creates a surplus because Blair values it more than Adam does. The fact that both parties must consent to the sale guarantees mutual gain. In contrast, a taking does not require the consent of the property owner, so unilateral gain can motivate a taking. A property owner may value his or her property more than whoever takes it.

For example, assume that Samson owns his family's estate, the market value of which equals \$30,000, but Samson does not want to sell it because he values the estate at \$100,000 for sentimental reasons. Delilah covets Samson's estate and would be willing to pay up to \$40,000 for it. Assume that the state can compel Samson to sell his property at its "fair market value." So, Delilah contributes \$5000 to the campaign fund of a prominent government official, who takes Samson's estate, pays him \$30,000, and resells the estate to Delilah for \$30,000. Thus, Delilah and the government official each gain \$5000, although Samson loses \$70,000.

By taking Samson's property and giving it to Delilah, the state transfers property from one private person to another, so that Delilah does not have to pay Samson's subjective price for the estate. The requirement of compensation at market prices does not prevent this abuse, which occurs because the owner's subjective value exceeds the market price paid as compensation. To eliminate the abuse, the state could compensate the owner's subjective price rather than the market price. However, no one but the owner knows the subjective price. In a voluntary sale, the owner receives at least the subjective price or does not sell. If the state wanted to compensate at least the owner's subjective price, the state would have to buy the property, not take it.

The "public-use" requirement avoids the abuse in this example. Delilah's use of Samson's estate is private, not public. Consequently, the taking in this example violates the public-use requirement. The public-use requirement forbids the use of takings to bypass markets and transfer private property from one private person to another. Instead, property must be taken for a public use. For example, Samson's estate could be taken for a park, school, or highway.

The public-use requirement does not solve the problem of inefficiency in involuntary transfers. To illustrate, suppose that motorists would be willing to pay \$40,000 to use a highway through Samson's estate, the market value of which is \$30,000. By taking the land, paying Samson \$30,000, and building a highway, the government anticipates a surplus of \$10,000. In reality, Samson values his estate at \$100,000, so the net social loss will equal \$60,000, and Samson will lose \$70,000.

This example suggests that the state should not take property with compensation merely to produce a public good. In reality, the state buys most of the resources that it uses to supply public goods. For example, the state buys cement, pencils, trucks, light bulbs, and labor. In fact, takings are circumscribed more than the requirements of compensation and public use suggest.

3. Holdouts The government must purchase large tracts of land from many owners in order to provide some public goods, such as military bases, airports, highways, and wilderness areas. These projects often demand "contiguity," which means that the parcels of land must touch each other. To illustrate, the segments of a highway do not connect unless they are on contiguous parcels of land. Contiguity disrupts bargaining by creating opportunities for owners to hold out.

To illustrate, assume that the state proposes to construct a road across three parcels of land owned by three different people. The state determines that motorists would pay \$200,000 more than the construction costs for such a road. Consequently, efficiency requires undertaking the project provided that the land's value is less than \$200,000. The three owners value the land at \$30,000 per parcel, so construction of the road would create a social surplus of \$110,000. Assume that the state acquires an option to buy one of the parcels for \$30,000. The state could pay up to \$170,000 for the other two parcels and still come out ahead. Knowing this, each of the owners demands \$100,000 for her parcel of land. If the state must buy the land, not take it, the project fails.

The last owner frequently "holds out" when the state acquires contiguous parcels of land needed for a public project. In a real-life example, the developers of a new baseball stadium in Denver purchased all the land except for the property of one "holdout," whom the newspaper called "the guy who owns first base." Even when owners do not hold out, the possibility of doing so can dramatically increase the transaction costs of purchasing contiguous property. The taking power eliminates this problem. The government should resort to compulsory sale principally when there are many sellers, each of whom controls resources that are necessary to the project. Thus, takings should be guided by this principle: *in general, the government should only take private property with compensation to provide a public good when transaction costs preclude purchasing the necessary property.*

QUESTION 5.39: What if the government needs to purchase a single, large piece of property in order to provide a public good, say, a satellite-tracking station? There is only one private owner with whom to deal. And his property is the only one that is suitable for the station. Should the government be allowed to compel this individual, a monopolist for the contemplated public use, to sell at fair market value?

QUESTION 5.40: In *Kelo v. City of New London*, 545 U.S. 469 (2005), the U.S. Supreme court decided a case in which landowners challenged the power of a city in Connecticut to take their property for redevelopment. The redevelopment plan did not contemplate that all of the land would be open to the public. Parts would be privately developed. The plaintiffs alleged that the taking was unconstitutional because it was not for a public purpose. The Supreme Court rejected this claim. Use economic analysis to argue for or against the view that such a mixed development plan should be regarded as serving a public purpose. (For some recent cases like this one, see Web Note 5.9.)

QUESTION 5.41: Compare the efficiency of the following two methods of amending the just-compensation constraint:

- a. Define just compensation to be fair market value (including relocation costs) plus, say, 20 percent.
- b. Allow private property owners to make their own assessments of the value of their property. Property owners agree to pay property taxes on that self-assessed value. If the government ever takes the property, it agrees to pay the self-assessed property value as just compensation.

4. Insurance People typically purchase insurance on assets whose value constitutes a significant proportion of their wealth, such as a house. Most homeowners purchase fire insurance. Similarly, people want insurance against takings. Private companies provide fire insurance, whereas the state provides insurance against takings by compensating property owners. Why does the private sector provide insurance against fires, and the state sector provide insurance against takings?

This question challenges you to relate takings to the economics of insurance. Insurance spreads risk among policy holders. In general, spreading risk more broadly reduces the amount that anyone must bear. The state can spread the risk of takings through the base of all taxpayers, which is broader than the base of all policy holders in any insurance company. So, risk-spreading argues for public insurance.

Administrative efficiency argues for private insurance. The discipline of competition causes a higher level of administrative efficiency in private insurance funds than in state insurance funds. Many state insurance funds, such as depository insurance in American savings banks, have a dismal history.

Risk-spreading and administrative costs are not decisive. The decisive case for public insurance against takings rests on incentive effects for the state. Decisions about takings are made by the state. If the state did not have to pay compensation, it might take property to finance itself, or it might take property for redistribution to the friends of politicians, or it might purchase too many public goods.⁶⁴

5. Regulations Earlier in this chapter we discussed how interdependent utility or production functions can cause the externalization of social costs. Nuisance suits provide

⁶⁴For more on takings as insurance, see Lawrence Blume & Dan Rubinfeld, *Compensation for Takings: An Economic Analysis*, 72 CAL. L. REV. 569 (1984).

a remedy. State regulations provide another remedy. Regulations restrict the use of the property without taking title from the owner. Enacting regulations involves a political fight between the beneficiaries and victims. Since the outcome depends on politics, not cost-benefit analysis, the total costs of regulations often exceed the total benefits. However, a chapter on property is not the place to develop a full critique of regulations. In this section, we focus on a narrower issue related to takings.

Regulations typically cause a fall in the value of some target property, which may prompt a suit for compensation. To illustrate, an industrialist who acquires land to build a factory may be blocked when the local government “downzones” and forbids industrial uses. The industrialist may sue, alleging that the state took a substantial portion of the value of the property but not the title. When courts find for the plaintiff in such cases, they say there was a “taking.” When courts find for the defendant in such cases, they say there was a “regulation.” The difference is that a taking requires compensation and a regulation requires no compensation.

We want to discuss the incentive effects of this classification into compensated restrictions (takings) and uncompensated restrictions (regulations). If the state need not compensate for restrictions, then it will impose too many of them. If there are too many restrictions, then resources will not be put to their highest-valued use. Thus, uncompensated restrictions result in inefficient uses. Conversely, if the state must compensate fully for restrictions, then property owners will be indifferent about whether the state restricts them. If property owners are indifferent about whether the state restricts them, they will improve their property as if there were no risk that restrictions will prevent the use of the improvements. If restrictions subsequently prevent the use of the improvements, the investment will be wasted. Thus, compensated restrictions result in wasteful improvements.

We illustrate this argument by an example.⁶⁵

FACTS: Xavier is a government official whose wall contains a map with a thick blue line across it. Currently, the land-use planning laws allow the area to the south of the blue line to be used for any commercial, industrial, or residential purpose. The government proposes to change the law and forbid industrial uses, although commercial uses would still be allowed.

Yvonne owns a building that is located on the blue line. She currently uses the building as a retail outlet, but she is contemplating expanding and improving the building for use as a factory. Yvonne must decide how much to invest in improving her building. If she abandons the idea of using her building as a factory, she will make a smaller investment in improving it for use as retail space, and the government’s land-use regulation decision will not affect her. But if she proceeds with the idea of using her building as a factory, she will make a large investment, and the government’s decision *will* affect her. Should the government carry out its proposed change, she will lose money on the large investment, and a court will then have to decide whether she is entitled to compensation for the loss. The decision will turn on whether the court declares the change in the governmental land-use plan to be a regulation, in which case no compensation is due, or a taking, in which case compensation is due.

⁶⁵ See Cooter, *Unity in Tort, Contract, and Property: The Model of Precaution*, 73 CAL. L. REV. 1 (1985).

Consider the incentive effects of the court's decision on Yvonne. If she is confident that downzoning is a taking and that she will receive compensation, she bears no risk from making a large investment; so, she will invest as if there were no risk of loss from governmental action. On the other hand, if she is confident that downzoning is a regulation and that she will not receive compensation, she bears the risk that the value of her investment would be destroyed by the governmental action, and she will restrain her investment.

Figure 5.2 on page 174 illustrates these facts. The vertical axis indicates dollars, and the horizontal axis measures the size of Yvonne's renovated building. The straight line labeled "Total Cost" indicates the amount that she spends on enlarging the building. Two curves, labeled R_{nr} and R_r , indicate possible revenues yielded by the building as a function of its size. The higher revenue curve, labeled R_{nr} , indicates the revenues obtainable when there is no regulation, so that the building can be used as a factory. The lower revenue curve, labeled R_r , indicates the revenues obtainable when there is regulation, so that the building cannot be used as a factory.

Applying the usual economic logic, Yvonne will maximize profits by choosing the size of building for which the marginal cost equals the marginal revenues. Marginal values are given by the slopes of total value curves in the graph. y_0 is the point at which the slope of the lower revenue curve equals the slope of the total cost curve, so y_0 is the profit-maximizing investment level when industrial use is forbidden. If Yvonne were certain that the courts would hold that downzoning is a regulation, then she would maximize profits by investing at the low level y_0 .

y_1 is the point at which the slope of the higher revenue curve equals the slope of the total cost curve; so, y_1 is the profit-maximizing investment level when industrial use is allowed. If Yvonne were certain that downzoning would be deemed a taking by the courts, then she would maximize profits (including compensation) by investing at the high level.

Now consider the efficient level of investment. Social efficiency requires Yvonne to take account of real risks, including the risk that the value of her contemplated investment will be destroyed by governmental action. If it were certain that government would *not* alter the land-use regulations in this area, then efficiency would require Yvonne to invest at the high level y_1 . On the other hand, if it were certain that government would alter the rules, then efficiency would require Yvonne to invest at the low level y_0 . In reality, it is uncertain whether government will make the alteration, so efficiency requires Yvonne to invest at a level in between y_1 and y_0 .⁶⁶

No compensation causes Yvonne to internalize the risk. When she internalizes the risk, she invests efficiently, at a level above y_0 and below y_1 . We conclude that *no compensation for the loss of value in investments caused by uncertain governmental action provides incentives for efficient private investment*. However, compensation causes her to invest at y_1 , as if the risk were zero. We conclude that *full compensation for the loss of value in investments caused by uncertain governmental action provides incentives for excessive private investment*.

⁶⁶ To be precise, efficiency requires her to make additional improvements until the resulting increase in her profits when there is no government action, multiplied by the probability of no governmental action, equals the loss in profits when there is government action, multiplied by the probability of governmental action.

This argument concerns incentives for private persons, not the state. The effect of the two legal institutions—regulations and takings—is quite different when we turn from private persons to government officials. If the court decides that the alteration in the allowable uses of land in the relevant area is a mere regulation, so that compensation need not be paid, then the alteration costs the government nothing. On the other hand, if the court decides that this particular action is a taking so that compensation must be paid, then this type of action is very costly to the government. Obviously, *the noncompensability of regulations gives government officials an incentive to overregulate, whereas the compensability of takings makes government officials internalize the full cost of expropriating private property*. When government action is likely to be judged a taking, the government internalizes the cost of its actions and thus restrains its taking of private property. On the other hand, when government action is likely to be judged a mere regulation, the government lacks material incentives to conserve its use of valuable private property rights.

If the state compensates property owners for governmental takings, property owners have an incentive toward excessive improvements, whereas if the state does not compensate, the government has an incentive to overregulate private property. This is the *paradox of compensation*, which we shall meet again in our study of contracts and torts. Officials should consider this paradox when they must decide whether a state action that reduces private property values is a taking or a regulation. If private owners will respond to compensation by making excessive improvements, then their behavior will improve by declaring the state action to be a regulation. Conversely, if the government will respond to non-compensation by excessive action that harms property owners, then its behavior will improve by declaring the state action to be a taking. In technical terms, *elasticity in the supply of private investment with respect to compensation favors regulation instead of takings, and elasticity in the supply of state action with respect to compensation favors takings instead of regulations*.



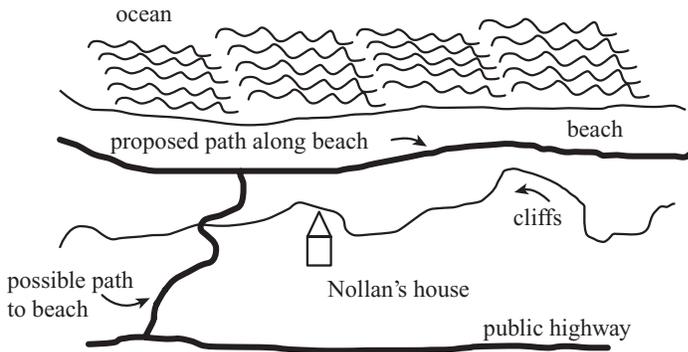
Web Note 5.9

There have been some fascinating recent U.S. cases regarding noncompensable regulations and compensable takings. We review some of those cases and some of the recent literature on these issues on our website.

E. Bargaining With the State

Now we turn to a famous case where a landowner successfully sued the state for taking a property right by the way it regulated development. North of Los Angeles, the magnificent coastline of California remains largely unspoiled by development, and the California Coastal Commission is responsible for keeping it that way. A property owner named Nollan sought a permit from the Commission to enlarge a small coastal dwelling into a house. The property was located between the beach and a public road, as depicted in Figure 5.3. The house would have diminished and degraded the view of the coast from the road. The Commission wanted to protect the view from the road. To protect the view, the Commission could have refused permission to build the house. The Commission,

Figure 5.3



however, took another approach because it had another goal: to create a public walking path along the beach, as indicated in the figure. The Commission asked the owner to donate a public path along the beach in exchange for permission to build the house. Private developers often donate land in exchange for permits, as when a housing developer donates land for a school and a road in exchange for a permit to build houses on farmland. Instead of donating the path, however, the owner sued the Commission.

The law clearly allows the state to regulate property to protect the public against harm, and the law clearly forbids the state from expropriating selected property owners without compensation in order to finance public goods. Was the Coastal Commission protecting the public or forcing a private person to pay for a public easement? The U.S. Supreme Court reached the latter conclusion in a complex opinion written by Justice Scalia. The Court looked for a “nexus” between the harm caused by the owner (obstructing the public view from the road) and the remedy demanded by the Commission (donating a public path along the beach). The Court reasoned that without such a nexus, the regulation was an illegal taking. Because the Court could not find a nexus, the owner won the dispute.

A legal principle can be abstracted from these facts. In order for a regulation to count as protecting the public from harm, the regulation must *mitigate* the harm. The state may condition a permit on mitigating the harm caused by its exercise. A donation of land to mitigate harm is allowed. For example, the Commission might have asked Nollan to donate a path to get around the house and reach the beach. (See “possible path to beach” in the picture.) A donation of land for a purpose *unrelated* to the harm does not mitigate it. Instead, a donation for another purpose *offsets* the harm by supplying something else of value. *Nollan* can be interpreted as standing for the principle that the state may not condition a permit on offsetting the harm caused by the permit’s exercise.

Some hypothetical numbers inspired by *Nollan* show a problem with this policy of forbidding permits conditional on offsets. According to Figure 5.4, the property owner values building the house at 1000, and the Commission values the public’s loss of view at 300. Figure 5.4 shows the valuations for “build” and “don’t build” in the two columns of the figure.

Figure 5.5 shows the valuations for “mitigate” and “offset.” Mitigating requires re-designing the house to improve the view, which costs the owner 300 and benefits the public by 250 as estimated by the Commission. Alternatively, donating a path along the beach costs the owner 250 and benefits the public by 400.

Figure 5.4

Value of building and not building.

	Act (build house)	Don't act (don't build house)
Property owner	+1000	0
Public commission	- 300	0

Figure 5.5

Value of mitigation and offset.

	Redesign house (mitigate)	Path along beach (offset)
Property owner	-300	-250
Public commission	+250	+400

Figure 5.6

Net values.

	Don't act	Act and mitigate	Act and offset
Property owner	0	700	750
Public commission	0	-50	100
Total	0	650	850

Figure 5.6 combines the numbers from the two previous figures to give the net benefits of alternative acts. “Don’t act” yields 0 to both parties. “Act and mitigate” yields 700 to the property owner ($1000 - 300 = 700$) and -50 to the public ($-300 + 250 = -50$), for a net benefit of 650. These two choices (“Don’t act” and “Act and mitigate”) are apparently the only ones allowed by the Court in *Nollan*. Given these two choices, the Commission will presumably refuse to issue a permit, and the result will be 0 benefits to both parties.

The Court apparently will not allow the parties to act and offset, which would benefit both of them. “Act and offset” yields 750 to the property owner ($1000 - 250 = 750$) and 100 to the public commission ($-300 + 400 = 100$) for a total benefit of 850.

With these hypothetical numbers, the holding in *Nollan* results in a payoff of 0 to both parties (the Commission denies the building permit), whereas allowing the Commission to demand an offset results in a payoff of 850 (Commission gives permit, and owner donates the path). These hypothetical numbers show that the principle in *Nollan* can easily cause inefficient blocking of building permits. The Supreme Court apparently arrived at this principle because it feared that the state will abuse offsets. The state might demand offsets from politically vulnerable property owners instead of collecting taxes. For example, a mayor elected by tenants might demand offsets whenever landlords need building permits. The mayor could use the offsets to finance public goods instead of imposing taxes that fall partly on tenants.

The potential scope for such abusive offsets is large for two reasons. First, the state has extensive powers of regulation, many of which go unused. The state might start to introduce unnecessary restriction on those seeking building (and other) permits just to obtain offsets. Second, the state can demand an offset whose value exceeds the harm caused by exercising the permit. In Figure 5.4, building benefits the owner by 1000. Thus, the state can demand up to 1000 in offsets as a condition for allowing the owner to build, and the owner gains from accepting the offer, even though building harms the public by only 300.

Fear of abuse is reasonable, but the Court should have solved the problem in a different way that avoids inefficiency. A better solution prohibits offsets unless the state

also gives the property owner the opportunity to mitigate. This approach implies that the Commission should give the property owner the permit to build the house conditional on the owner *either* mitigating *or* offsetting. The relationship “either . . . or . . .” is disjunctive. We are proposing a disjunctive conditional permit.

The additional choice can benefit both parties. In Figure 5.6, the disjunctive conditional permit allows the owner to redesign the house at a cost of 300 (mitigate) or donate a path along the beach at a cost of 250 (offset). The owner will choose the latter, which will benefit the public much more than the former. In general, allowing the state an additional choice—to issue a permit conditional on mitigating or offsetting—cannot make the state worse off. By issuing a disjunctive conditional permit, the state gives the property owner an additional choice. The property owner in Figure 5.6 will choose to offset. In general, allowing the property owner an additional choice—to mitigate or offset—cannot make the property owner worse off. So, allowing the state to choose or reject issuing a disjunctive conditional permit is more (Pareto) efficient than not allowing it to do so.

QUESTION 5.42: Assume that Figures 5.4 and 5.5 describe the facts in *Nollan*. Why might the property owner challenge the Commission and litigate instead of accepting the Commission’s offer to give a permit in exchange for donating a pathway along the beach?

QUESTION 5.43: The picture of the *Nollan* case indicates the “proposed path along the beach” and a “possible path to the beach.” The Court did not allow the Commission to give a building permit conditioned on donating a path along the beach. Why might the court have allowed the Commission to give a building permit conditioned on donating a path to the beach?

QUESTION 5.44: The Federal Government provides disaster insurance that helps people to build vacation homes in places subject to flooding, such as sand dunes. Assume the government wants to protect the environment by preventing construction of homes on a specific sand dune near the ocean. If the government takes private property on the sand dune, either by condemning it or by imposing regulations that forbid any construction, should compensation include or exclude the increase in the value of the land caused by government flood insurance?

F. Zoning and the Regulation of Development

Some goods, called *complements*, are better consumed together, such as hot dogs and sauerkraut, and other goods, called *substitutes*, are better consumed separately, such as ice cream and sauerkraut. A similar categorization may be made regarding the spatial separation of economic activities: it is best to locate restaurants near offices, and it is best to separate smokestack industries from residences. There is, however, an important difference between culinary and spatial separation: no law prohibits eating ice cream with sauerkraut, but zoning ordinances in most localities *do* prohibit locating industry in residential neighborhoods.

It is the element of compulsion in the segregation of economic activities by zoning laws that we here seek to explain. It is possible to make a case for zoning as a response to an important kind of market failure. When demand for a good increases, the price rises, and producers respond by supplying more of it. The rise in price is a signal for producers to devote more resources to producing the good. This signal is usually appropriate in the sense that society is better off when resources are shifted to producing goods whose price is rising. There are, however, special circumstances in which the signals get crossed. In these special circumstances, it would be better for society if producers of a certain good responded to a rise in the price of that good by supplying *less* of it; but in a free market, they will respond to the rise in price by supplying more of it.

To illustrate by a historical example, suppose that in 1900 industry locates on the shore of an undeveloped bay in California. Locating industry on the shore gave easy access to boats. By 1960, however, the manufacturers were supplied by truck rather than by boat. Moreover, the harbor now has great aesthetic and recreational appeal. Given the change in circumstances, efficiency requires gradually relocating industry into the interior and constructing residences or recreational parks on the harbor.

To cause factories to move out and residences to move in, residential developers should bid up the price of harbor land relative to land in the interior. There is, however, an obstacle to the unregulated market's accomplishing this end. The problem is that no one wants to live next door to a factory, so that residential developers are unwilling to pay much for harbor land as long as industry is present. Instead of factories' moving away from the harbor, the opposite may happen: as industry expands, residences may be driven farther away from the water. If the relative price of land near the water falls as residents flee to the interior to escape industry, the unregulated market in this situation gives the wrong signals.⁶⁷

Conclusion

In Chapters 4 and 5 we developed an economic theory of property and applied it to a wide-ranging set of legal problems. Our theory views property as the institution that gives people freedom over resources; property law can encourage the efficient use of resources by creating rules that facilitate bargaining and exchange and that minimize the losses when bargaining fails. We organized our theoretical discussion of property rules around four questions that a system of property law must answer. In answering these questions, we revealed the economic logic underlying much of property law.

Suggested Readings

Cooter, Robert D., *Organization as Property: Economic Analysis of Property Law Applied to Privatization*, 2 J. LEGAL ECON. 77 (1992).

EPSTEIN, RICHARD A., *TAKINGS: PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN* (1985).

⁶⁷ The explanation for why the market gives the wrong signals in this situation is somewhat technical. Our website contains the explanation.

- FISCHEL, WILLIAM A., *REGULATORY TAKINGS: LAW, ECONOMICS, AND POLITICS* (1995).
- GOLDSTEIN, PAUL, *COPYRIGHT'S HIGHWAY: THE LAW AND LORE OF COPYRIGHT FROM GUTENBERG TO THE CELESTIAL JUKEBOX* (1994).
- HELLER, MICHAEL A., *THE GRIDLOCK ECONOMY: HOW TOO MUCH OWNERSHIP WRECKS MARKETS, STOPS INNOVATION, AND COSTS LIVES* (2008).
- JAFFE, ADAM B., & MANUEL TRAJTENBERG, *PATENTS, CITATIONS, AND INNOVATIONS: A WINDOW ON THE KNOWLEDGE ECONOMY* (2002).
- Lubet, Steven, *Notes on the Bedouin Horse Trade or Why Doesn't the Market Clear, Daddy?*, 74 *TEX. L. REV.* 1039 (1996).
- MICELI, THOMAS J., & KATHLEEN SEGERSON, *COMPENSATION FOR REGULATORY TAKINGS: AN ECONOMIC ANALYSIS WITH APPLICATIONS* (1996).
- Parchomovsky, Gideon, and Peter Siegelman, *Selling Mayberry: Communities and Individuals in Law and Economics*, 92 *CAL. L. REV.* 75 (2004).
- Rapaczynski, Andrzej, *The Roles of the State and the Market in Establishing Property Rights*, 10 *J. ECON. PERSP.* 87 (1996).