4. **Economic Theories Underlying the American Patent System**

The American patent system provides several discrete incentives. While each is important, the relative strength of the various incentive based theories remains a topic of much debate. Indeed, it is unclear which, if any, of the postulated incentives is most needed. In addition, a unified theory postulating some primary incentive may emerge with defined subordinate roles for the other incentives. At the moment, however, it is sufficient for the student to appreciate the existence of at least four different incentives that have been postulated to justify the patent system: (1) incentive to invent; (2) incentive to disclose; (3) incentive to commercialize; and (4) incentive to design around. In each case, it is argued that the patent system provides some incentive that would be present at sub-optimal levels absent the patent system.

a. **Incentive to Invent**

The incentive to invent theory suggests that a patent is granted to encourage invention. Under this theory, the original inventor will not be able to recoup the costs of invention, including risk, unless she is ensured

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"an exclusive" on the product of her inventive efforts. It is postulated that without this reward, the inventor might not invest in the inventive process.

One objection to this theory is that the incentive may be too great, resulting in an inefficiently high level of pre-inventive activity. Patent incentives may cause too many firms to invest in research and development, resulting in duplicative efforts.\(^\text{21}\) The result may be a slightly earlier discovery but a substantially increased aggregate cost of inventing.\(^\text{22}\) This objection, however, ignores the possibility that duplicative efforts may ultimately lead to entirely distinct alternative inventive solutions to the same underlying necessity-creating problem. It also ignores the possibility that some putatively duplicative alternatives might actually be better for some, or all, consumers. Consider the possibility of two drugs able to cure the same illness but each having distinct side-effects. It may be that patients particularly susceptible to one set of side-effects may prefer, if not require, the second, allegedly duplicative drug.\(^\text{23}\)

A further criticism of this theory is that it suggests the inventor should be awarded the total social value of the invention. However, the inventor's contribution is often not the invention itself—which would have eventually been invented by someone else—but rather the timing of the invention. In this case, the patent should not reward for the entire value of the invention, but rather for the value of early discovery and disclosure.\(^\text{24}\) This criticism does assume that the invention would have been made anyway: perhaps because the institutional norms of science provide adequate incentive.\(^\text{25}\) Indeed, some inventors are simply curious, and will go on inventing absent all the external incentives in the world. This assumption is surely valid for fields such as modern biotechnology, or high technology, which


23. It has also been argued that the patent system may provide a disincentive for others to make improvements on a patented invention. Professor Eisenberg notes, however, that this argument ignores the value of improvement patents in providing incentives for down-stream inventions. Eisenberg, Patents and the Progress of Science, supra note 20, at n. 43.


have a large number of people with sufficient creative ability seeking to make the invention.26 Or is it?

Additional criticisms of this theory suggest that other rewards may be available. Perhaps the government could award valuable prizes to inventors in lieu of patents.27 Fame, alone may be such a prize.28 The potential for fame, however, requires public disclosure, an issue that is the topic of a separate theory of patent incentives.

b. INCENTIVE TO DISCLOSE

Incentive to disclose suggests that a patent is granted to encourage an “enabling disclosure” that is required to be in the patent application by Section 112 of Title 35. This theory posits that inventors will seek trade secret protection in the absence of a patent system. Such secrecy would interfere with the basic norms of science, including the free and immediate disclosure of information. Moreover, secrecy would deprive the public of the new knowledge and would lead to duplicative work.29 Under this theory, the patent is offered in return for the “enabling disclosure” in the patent application.

Several objections have been raised against this theory. Most significantly, secrecy is often not a viable alternative to patent protection. Secrecy is especially unavailing if the invention can be easily reverse-engineered. Moreover, it has been argued that the enabling disclosure of the patent application is often not enabling at all.30 In addition, many inventors are driven by fame, at least as much as by money, and are already sufficiently motivated to bring their work to the public’s attention. Perhaps the rush to announce cold fusion exemplifies this drive. It may also be argued that where long term secrecy is possible, the incentive to disclose is greatly diminished, especially if infringing activities may be kept equally secret.

c. INCENTIVE TO COMMERCIALIZE

In his 1942 series of articles on the relationship between the patent and anti-monopoly laws, Judge (then attorney) Rich discussed the above theories, but reminded us that they both focus primarily on the inventor as though he were the principal character in this economic drama. We think this is a great mistake. He may be an essential party but the emphasis should be placed elsewhere.31 Instead, Judge Rich suggested that the focus should be placed on a third theory:

27. See Polanyi, Patent Reform, supra note 14, at 65.
29. See Eisenberg, Patents and the Progress of Science, supra note 20, at 1028.
30. Id. at 1029.
The third aspect of inducement is by far the greatest in practical importance. It applies to the inventor but not solely to him, unless he is his own capitalist. It might be called inducement to risk an attempt to commercialize the invention. It is the “business” aspect of the matter which is responsible for the actual delivery of the invention into the hands of the public.

Let us return to the inventor’s paradox. Potentially, one of the most serious problems facing the inventor is the lack of experience and resources necessary to produce, advertise, distribute, and sell large quantities of the invention’s commercial embodiment.

The so-called incentive to commercialize, incentive to invest, incentive to innovate, or prospect theory, offers the patent as a Coasian-type property right placed on the public’s auction block by the government. This theory assumes that the rules of the patent system serve to give fixed and public notice to all parties involved in the technology licensing market. Once the property lines are fixed, the parties will bargain toward an efficient result in which the firm that is best able to bring the patented subject matter to market will do so. The patent system achieves this end by awarding publicly announced, exclusive ownership of a prospect shortly after its discovery. The Gordian Knot of the inventor’s paradox is thereby cut, and venture capitalists, developers, advertisers, and sellers can all begin to make the necessary investments to ensure that consumers will eventually be offered the invention’s commercial embodiment.

For fear that the validity of this theory might lack intuitive appeal, Judge Rich provides the following pointed example:

32. Id. at 179.
34. The role of monopolies in fostering innovation is associated with Professor Schumpeter’s work on economic development including, Joseph Schumpeter, CAPITALISM, SOCIALISM, AND DEMOCRACY, 81-110 (1950), Joseph Schumpeter, 1 Business Cycles, 84-192 (1939), and Joseph Schumpeter, The Theory or Economic Development, 61-94 (1983).
35. This is the label given by professor Edmund Kitch in his article, The Nature and Function of the Patent System, supra note 20, in which he analogizes the United States patent system to the United States mineral claims system.
36. See generally Ronald Coase, The Problem of Social Cost, 2 J. L. & ECON. 1, 25 (1969) (describing the importance of rules for fixing initial allocations of resources with which parties can bargain for exchanges in order to increase joint profits).
37. Indeed, the several labels for this theory each correspond to a somewhat different approach toward what is generally considered to be the same underlying feature of the patent system. For purposes of this discussion, therefore, we treat these several theories as one.
39. Id.
40. This is possible because the invention need not actually be reduced to practice before the patent application is filed: filing constitutes a constructive reduction to practice as a matter of law. See Kitch, The Nature and Function of the Patent System, supra note 20, at 266.
Irving Fisher tells the story of Herbert Spencer who invented “an excellent invalid chair, and, thinking to give it to the world without recompense to himself, did not patent it. The result was that no manufacturer dared risk undertaking its manufacture. Each knew that, if it succeeded, competitors would spring up and rob him of most or all of his profits, while, on the other hand, it might fail.”

This lesson may be timely indeed. The vast potential for tort liability in medicine today may already provide a large disincentive to invest in healthcare-related technologies. Moreover, this disincentive may be combined with a reticence to invest in any health-care product (or service) that is not already flagged as billable or reimbursable by today's large managed health-care provider systems.

Under the incentive to commercialize theory, the patent system can be analogized to the mineral prospecting system in which the staking of the claim is the first step in securing the minerals. Like a mineral claim, a patent application need only disclose an invention that is useful, i.e. that works, not necessarily one that is in the most marketable form. The analogy to the mineral prospecting system is extended further in the case of inventions for which substitutions are easily found in the marketplace. The demand facing the inventor of such a substitutable invention is not the market demand facing a monopolist, but rather the horizontal demand confronting a competitive firm.

For example, a monopoly on the better mousetrap will not prevent consumers from buying cats. The seller of better mousetraps must still charge a price which is lower than the cost of a cat. Similarly, the gold mined from any one prospect is usually sold on a market with gold from many other prospects. Under this theory, the dead weight loss associated


42. The publicly spirited inventor has options besides avoiding patent protection altogether. First, it is important to remember at this juncture that the right to exclude others, which is the core of the patent right, does not require that there be any exclusion. Indeed, many patentees choose to offer broad-based, non-exclusive licenses to anyone interested in paying a nominal fee. This licensing strategy is common in the biomedical community for basic inventions. For example, the Columbia University patents on transforming cells with foreign DNA and the Stanford University patents on recombinant DNA have been available for licensing by just about anyone, and the fees are commensurate with the intended use: low for academic use and high for commercial use. The universities that own these patents use the revenues to fund new research. Second, in the context of medicine, as suggested in Joseph M. Reisman, Physicians and Surgeons as Inventors: Reconciling Medical Process Patents and Medical Ethics, 10 High Tech. L. J. 355, 397–98 (1995), clearinghouse organizations might be established just like ASCAP and BMI, which exist for copyrights. Doctors could be required by state licensing boards to assign all patents to such clearinghouses, who would then monitor use and collect royalties to be distributed to the public, or to fund research, or apportioned among contributing doctors.


44. Again, the cost here is an economic one. It includes monetary costs as well as other, harder to quantify costs, such as the cost of caring for and cleaning up after a cat.

with the patent’s potential monopoly effects is analytically analogous to the transaction costs of building a fence around the prospect and of the sign designating ownership. Both are merely indispensable costs of using the system to allocate resources.

An important implication of the incentive to commercialize theory is the ability of the patent owner (either the original inventor or a subsequent assignee) to coordinate efforts among all players in the relevant market. The signaling function of the patent is especially important. Potential competitors are warned not to invest in making the same patented product, while at the same time are encouraged by the patentee’s already established customer base to invent improvements to the patented product. In addition, potential competitors may even be induced to create non-infringing alternatives. This inducement lies at the heart of the fourth theory of patent incentives, the incentive to design around.

d. INCENTIVE TO DESIGN AROUND

The last of the incentives is the incentive to design around. This is really a corollary to the incentive to invest. Incentive to design around proudly offers the patent as forbidden turf, taunting competitors to circumvent its scope by inventing substitutes. Under this theory, one might only condemn the patentee for teasing, and not for taking.

As the market for a patented product becomes tighter and tighter, the patent provides a stronger and stronger incentive for third parties to invent non-infringing substitutes, or even infringing improvements. Simultaneously, it provides stronger and stronger incentives for capitalists to invest in such secondary inventive activity. While at first blush this may seem wasteful, as redundant, it becomes immediately apparent that such secondary inventive activity is usually a very good thing. Often, a second-generation product is better than the first: perhaps being cheaper, more effective, or having fewer collateral costs or side effects. Remember the possibility of two drugs usable to cure the same illness but each having distinct side-effects. Patients particularly susceptible to one set of side effects may prefer, if not require, the second, allegedly duplicative drug.

Having now reviewed many philosophical theories of patents, and the four central incentive theories of patent law, as well as some key objections to each, you might rightly wonder whether you made any progress. Are you

46. As distinct from the costs of raw materials and hired labor. Both of these costs will have allocative effects but do not necessarily decrease net societal wealth.
47. See Posner, Economic Analysis of Law, supra note 22, at 37.
49. See Posner, Economic Analysis of Law, supra note 22, at 36.
now more settled in your understanding of why we even have a patent system? Consider the following effort, by Federal Circuit Judge Pauline Newman, to wrap many of the patent theories into a unified theme.


Introduction
I'm going to tell you some of the things I've been thinking about. I've done a lot of thinking since I first reported to you as a judge.

I start with the premise that the dominant consideration of a patent system is industrial growth in a competitive marketplace. And the premise that technological innovation is a primary foundation of industrial growth. On these premises, I'll concentrate on the role of patents, although much of this theory also applies to copyright.

It's fascinating to pull together the facets of the theory of the patent. Some see the patent primarily as an economic tool; some as founded on principles of natural rights and fairness; some as an obstacle to the flow of ideas and knowledge; some as a stimulus to the flow. Much of the controversy concerning the role of patents—much of the differences in judicial opinions, even today—can be explained by the different weights placed on different theories of patent systems. The way judges—or nations, or the antitrust division—look at patents depends on the value, and on the understanding, of the various facets.

The Securing of a Natural Right
Principles of natural rights are fundamental to most theories of property. What about property in the products of the intellect?

When new knowledge is created, it's possessed solely by the creator. That right of possession does not arise by statute, but by the act of creation. The laws of patent and copyright secure this right—"secure" is the word in the United States Constitution—to the creator of the knowledge. This theory of natural rights was dominant in the American revolution. In 1813, Chief Justice John Marshall wrote that patents fulfill the "great fundamental principles of right, and of property."

On this theory, the creator of an idea has the natural right to control the use and profit of the idea, even after the idea is disclosed to others. The natural rights theory underlies much of the ensuing construct of intellectual property. It doesn't get much attention from economists, unless it's also viewed as an industrial policy set in the Constitution and therefore of historic interest. But I view this theory as fundamental to our national ethic.

* 48 Luncheon Speech to the ABA-IPL Section, July 21, 1994.
There's a close relation to the labor theory.

**The Labor Theory**

The labor theory of property is philosophically associated with John Locke and Adam Smith. It shares the premise of human right and fundamental fairness. The labor theory holds that those who have labored in the creation of property are entitled to own the things that they created. It's a powerful theory, and underlay several revolutions. (In France a patent law was enacted by the revolutionary tribunal, as protection for the people against the sovereign.)

Today there is an increased emphasis on the concept of property in all areas. In 1964 Reich talked about this in "The New Property"—the concept of a property right in your job, for example. (We encounter this issue in our civil service jurisdiction, for example; issues of due process, how much of a property right is there in federal employment.) It's a small step for the labor theory to recognize property rights in ideas that are developed by intellectual and economic effort.

**The Property Theory**

The essence of the concept of property is the right to exclude others from its possession and enjoyment. Intellectual property law applies this principle to the intangible attributes of intellectual endeavor—to information, not things; for once information has been disclosed, it's no longer in the sole possession of its creator. Economists call this an appropriability problem. After the knowledge has been shared with the public, control does not derive from possession, but solely by operation of law. The knowledge is released, but the right to profit from the knowledge is restrained by the patent.

The principle is easy; it's the drawing of lines that's interesting. For example, is it more in the public interest to grant the originator of the knowledge broader or narrower scope of an invention—should there be a doctrine of equivalents?

I'm not going to decide that question today. But these are some of the theories on which I'll decide. Let's turn to some public interest theories.

**The Social Welfare Theory**

This is not a theory of property rights, but of social value. We must first accept the premise that technological innovation produces an overriding social benefit, in the form of jobs, goods, trade, and social stability, adding to the quality of life. On the premise that patents add economic incentive to the allocation of resources to technological innovation, patents serve the social welfare. This theory weighs heavily on the side of stable, enforceable patents: patents that are reliable when granted. We should think about what it means to patent scope and licensing practices. Will restrictions on the terms of patent licenses, and encouragement to licensees to litigate successful patents, aid the social welfare?
The Monopoly Theory

Intellectual property, like all property is a form of economic monopoly. All property functions through a right to exclude. This is the economic value of the patent. Of course it does not exclude other products competing in the same market, but only the patented product. Some monopoly theorists think that this is bad enough, especially if the relevant market can be defined by the patented product. Ears were closed to the explanation that the patent created new property.

The monopoly theory for several decades was the dominant economic (and judicial) view, and patents acquired the aura of being anti-competitive and harmful. These tensions will undoubtedly always be with us. In this area, economic analysis can be most useful in understanding the competitive processes surrounding the making and commercialization of inventions.

A related aspect of understanding how patents serve industrial innovation has been called the market regulation theory.

The Market Regulation Theory

Economic theorists have described the patent right as a form of market regulation, achieved by operation of law instead of by governmental management. This theory focuses on the role of the patent system in industrial innovation, for the R & D and commercial decisions supported by the patent right are driven by market forces, not by government regulation. The theory is involved in other forms of commercial activity, for example in the orphan drug law, where government regulation interceded because there was no patent right to produce a patent-like market structure.

The Investment Incentive Theory

Next is a mixed legal and economic theory: the creation of a legal environment that supports private investment in technological innovation. This is the dominant effect of patent law in a market economy, for the reduction of commercial risk provides the economic incentive to commitment of capital and human resources. Although the arithmetic is usually quite complicated, the concept is elegantly simple.

The patent provides the investor with a shield from competition with the same product sold by others. Imitation pursues commercial success. It's only the profitable products that inspire imitation, usually by those who have borne neither the cost of the development nor the risk of failure. Most of the cases that I see in litigation involve copying—sometimes with modifications, but independent development is the exception. If the investor is confident in the patent, perhaps a higher technological risk will be taken, or investment made in products whose payout is longer term or that have a lower profit margin or a smaller potential market. Once more, we see a theory in which stability in scope and interpretation are factors in investment risk.
The statistics of industry investment in R & D following enactment of the Plant Variety Protection Act in 1970 are striking support for the incentive theory. The industry reported that after enactment over 3000 new crop varieties were developed, whereas over the previous ten years the extensive research in the Department of Agriculture resulted in development of only 150 new varieties. Economists have interesting terms for such developments. First is the rent seeking theory.

**The Rent Seeking Theory**

Rent is used by economists to describe the situation where the return exceeds the opportunity costs. Increased profit may be based on savings in cost to the patentee; rent can also result from a protected market based on the patent. Economists call the patent system a “rent seeking” function, since it allocates resources to generate growth-producing technology. A current refinement relates to a “rent dissipation” theory of patent scope, developed by Grady and Alexander. The theory correlates expenditures for research, improvements, and secrecy, and seeks to explain matters of patentability and scope.

**The Prospect Theory**

The prospect theory was formalized by Professor Kitch in 1977. Like rent dissipation, it’s not free of controversy. The patent assigns the right to prospect, defined as an “opportunity to develop a known technological possibility,” soon after the discovery is made, and communicates it to others. The patentee, with exclusive ownership of the information, is encouraged to invest in ways to increase its value.

Professor Kitch applies the prospect theory in several interesting ways. For example, he explains the use of considerations such as commercial success in determining validity, for they tell the court that the patent is serving as the basis for now valuable commercial rights. If the innovator knows in advance that if the patented product is successful these considerations will be taken into account, this adds to the incentive to invest in the development at the start.

The prospect theory emphasizes the purposes of early disclosure. I suggest that it raises issues of whether later developments should be covered, and supports rethinking of such expedients as the patent of addition, whereby an inventor can enlarge the scope of an issued patent based on later work.

My view, as with all theories I’ve mentioned, is that none explains everything, but all contain useful insights. For example, a small entrepreneurial business might well have prospect theory considerations in the forefront. No one disputes the importance of small business in introducing new technologies.

**The Reward Theory**

The reward theory is simpler than the prospect theory. It views the patent as a reward for invention, which reward is reaped through exercise
of the right to exclude. This theory has been around for a long time. Economists would say that through the patent, the inventor appropriates the social returns to innovation.

The reward theory generally gets the blame for historical misunderstandings of patents. The judicial view that public policy requires the courts to facilitate attacks on patents appears to be based on the theory that if an invention does not technologically merit a reward, the patent should not exist. A recent illustration is the holding of the Supreme Court that the Federal Circuit must always decide the issue of validity, even if it's mooted by noninfringement, lest meritless patents continue to exist.

The reward theory assumes that the technological work would have been done anyway, and that the reward of the patent simply enhances the profits, and therefore must be earned by technological merit. This audience knows that expensive R & D may not be done at all without an economically sufficient prospect. The reward theory would disapprove of petty patents, for example, whereas other theories would favor the grant of innovation incentives commensurate with the quality of the contribution. The Semiconductor Chip Protection Act of 1984 supports arguments on both sides.

Both the reward and the prospect theory place a heavy burden on the PTO as the granting agency. I agree with that burden. The patent when it is granted should be able to be relied on as a vehicle for further investment, like other property used in commerce.

The Contract Theory

This is a legal, not an economic theory. You've all heard it. The theory that a patent is a contract between the inventor and the government, wherein the patentee's part of the contract is disclosure of the invention and how to make it. Judges seem to like this theory. It appears in "best mode" decisions, enablement, description requirements.

Indeed, although public disclosure is only one of the purposes of patent system, much technical information appears only in the patent literature. The usual figures are 85–90%. Without the opportunity for patenting, information that is amenable to secrecy would surely be so kept. By relinquishing secrecy, the inventor complies with this part of the bargain at the time of disclosure. The patentee can’t recover the lost secrecy should the patent later be invalidated or held unenforceable. This again underlines the need for reliable grant by the PTO, and reliable judicial interpretation and enforcement of patents.

This theory explains the reluctance to adopt a system of publication before the examination process is completed, for this forces an uneven bargain should the subject matter be held unpatentable. Some say that this will become more serious if we adopt a first-to-file system. I don’t intend to enter that debate.

Inventing Around Patented Information

Although "inventing around" is a misunderstood concept, the patentee's success indeed can encourage others to develop competing products
and to improve their own products. The creator of a new product or process may show the way to new markets, or new economies of production, or occasionally entirely new industries. Others may build on this knowledge and compete in the field opened by the patentee.

Leapfrogging is credited with speeding up technical advance, to the public benefit. The result is a more productive economy, a greater diversity of goods, increased competition, and overall technological and economic growth. The theory thus encourages authentic technical advance. The theory is also invoked, however, to justify free riding by those who have made no inventive contribution, but have found a way to avoid the patent. Economic analysis may help to understand wherein lies the public interest.

You in this business know all these theories, and regularly apply them. But I find formal analysis to be useful. It has enlarged my understanding, in searching for the correct application of the law. In 1818 Justice Story called patent law “the metaphysics of law.” In the Marconi wireless case, the Supreme Court referred to “intuition and a kind of conscience.” I don’t see that intuition and conscience have been eliminated.