

ECONOMICS OF PATENT LAW REVISITED: POSITING A RETURN ON INVESTMENT PARADIGM

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I. INTRODUCTION

Patent law seeks to spur innovation by helping ensure that the inventor secures adequate compensation for his efforts. These incentives do not come without cost. Because the inventor is given a monopoly over the use of his invention, improvements on the invention may be stunted due to the *in terrorem* effect of possible infringement liability. With these concomitant externalities, prominent economists have argued that current patent law and jurisprudence fail to reach an optimal compromise between return to the investor and public welfare despite their lofty aims.

Several proposals have been put forth to rectify these issues. This paper seeks to put forth another possible solution. The proffered solution should not be considered *in vacuo* but should be implemented concurrently with those previously submitted by Professor Jaffe and others.

We first delve into the rationale for patent law and where its objectives intersect with antitrust law. We then consider whether current patent law is best suited for its *raison d'être*. Thereafter, we examine whether a shift to a variable patent term based on a return on investment paradigm would better serve the underlying rationale of patent law. We also explore possible objections to the proffered solution.

II. RATIONALE OF PATENT LAW

Until recently, patent and antitrust laws were deemed to be at loggerheads with each other. Antitrust law sought to spur competition; patent law gave the

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inventor monopoly power over his invention as a trade-off between the short-run disadvantages of monopoly with the possibly greater advantages of having new or better products not otherwise available.² Recent academic discourse has shown this incompatibility to be largely illusory. Professors now argue for a "Grand Unified Theory" of antitrust and intellectual property law - to maximize wealth by producing what consumers want at the lowest cost.³

There are several means by which current patent law seeks to achieve this goal. First, the patent system seeks to increase incentives for profit-oriented people to create new technologies.⁴ This is done by granting the inventor exclusive property rights⁵ which include: 1) manufacture of the patented product;⁶ 2) use of patented product;⁷ 3) sale, or offer to sell the patented product;⁸ 3) importation of the patented product;⁹ and 4) use of the patented process.¹⁰ The patent grant plays two investment-inducing roles, the "stimulus effect" and the "Lebensraum effect" roles, both of which must be taken into account in designing an optimal patent policy. In its stimulus effect role, an optimal patent policy seeks to induce investment through monopoly rents until marginal social gain from further cost reductions is equivalent to marginal social cost. In its Lebensraum effect role, the patent grant must persuade investors that competitive imitation will be deferred sufficiently to ensure that discounted monopoly rents exceed relevant costs.¹¹ Patents are limited to 17 year terms as a compromise between future benefits from new inventions, and costs of allowing present inventions to be controlled by patent holders.¹²

² WARD, BOWMAN JR., PATENT AND ANTITRUST LAW: A LEGAL AND ECONOMIC APPRAISAL 16-17 (1973).

³ *Id.* at 1-3, 11; 1 HERBERT HOVENKAMP ET AL., IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY LAW § 1.3 (2002); *See* Atari Games Corp. v. Nintendo of Am., 897 F.2d 1572, 1576 (Fed. Cir. 1990).

⁴ *See* Dawson Chemical Co. v. Rohm and Hass Co., 448 U.S. 176, 221, 100 S.Ct. 2601, 65 L.Ed. 696 (1980); Kewanee Oil Co. v. Bircon Corp., 416 U.S. 470, 480-81, 94 S.Ct. 1879, 40 L.Ed. 2d 315 (1974); Grant v. Raymond, 31 U.S. 218, 241-43, 8 L.Ed. 376 (1832); 1 JOHN SCHLICHER, PATENT LAW, LEGAL AND ECONOMIC PRINCIPLES § 1:1, § 2:10, § 2:15 (2nd ed., 2002).

⁵ 1 SCHLICHER, *supra* note 3, §1:5, § 2:15; Kendall v. Windsor, 62 U.S. 322, 16 L.Ed. 165 (1858); Precision Instrument Mfg. Co. v. Automotive Maintenance Machinery Co., 324 U.S. 806, 816, 65 S.Ct. 993, 89 L.Ed. 1381 (1945); Graham v. John Deere Co. of Kansas City, 338 U.S. 1, 86 S.Ct. 684, 15 L.Ed. 2d 545 (1966); Bonito Boats, Inc. v. Thunder Craft Boats, Inc. 489 U.S. 141, 109 S.Ct. 971, 103 L.Ed. 2d 118 (1989); *See* BOWMAN, JR., *supra* note 1, at 2 (1973).

⁶ *See* 1 SCHLICHER, *supra* note 3, §1:58.

⁷ *Ibid.*

⁸ *Ibid.*

⁹ *Ibid.*

¹⁰ *Ibid.*

¹¹ Frederic Scherer, *Nordhaus' Theory of Optimal Patent Life: A Geometrical Reinterpretation*, 62 AM. ECON. REVIEW 424, 426 (1972).

¹² *See* 1 SCHLICHER, *supra* note 3, §1:5.

The patent system also benefits society by decreasing externalities in the production of technical information.¹³ The exclusive property rights granted by patents provide the inventor means to prevent “free riding” so that the employment of useful private resources may be remunerated.¹⁴ In the absence of a patent option, inventors would invest many more resources in maintaining trade secrecy, and inventive activity would be inefficiently biased towards inventions that can be kept secret. Moreover, it is likely that the patentee may not be the most efficient manufacturer of the invention, and that the invention may have other industry applications. In the absence of patent protection, the inventor may license his invention through trade secret law but would incur higher costs and would seek greater returns because of the risks of inadvertent disclosure or unprovable theft. The patent laws facilitate efficiency in manufacturing and give the patentee a more efficient manner of licensing his invention to another manufacturer. In addition, markets may tend to be organized along monopolistic rather than competitive lines in the absence of a patent regime since monopolists are in better position to take advantage of lead-time or learning-by-doing advantages which may act as proxies for patent protection.¹⁵

It is also argued that the patent system aids in creating further inventions by inducing people to reveal descriptions of inventions to the public,¹⁶ and prevents information in the “public domain” from being removed from the “public domain.”¹⁷ As explained by the Supreme Court in *Kewanee Oil*:¹⁸

When a patent is granted and the information contained in it is circulated to the general public and those especially skilled in the trade, such additions to the general store of knowledge are of such importance to the public weal that the Federal Government is willing to pay the high price of 17 years of exclusive use for its disclosure, which disclosure, it is assumed, will stimulate ideas and the eventual development of further significant advances in the art.

¹³ 1 SCHLICHER, *supra* note 3, § 2:18; GEORGE STIGLER, THE CITIZEN AND THE STATE, ESSAYS ON REGULATION 104-105 (1975); BOWMAN, JR., *supra* note 1 (1973).

¹⁴ BOWMAN, JR., *supra* note 1 (1973); See John Lunn, *Roles of Property Rights and Market Power in Appropriate Innovative Output*, 14 JOURNAL OF LEGAL STUDIES 423, 427 (1985).

¹⁵ WILLIAM LANDES & RICHARD POSNER, THE ECONOMIC STRUCTURE OF INTELLECTUAL PROPERTY LAW 328-330 (2003).

¹⁶ 1 SCHLICHER, *supra* note 3, § 1:1, § 2:11; See *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257, 262, 99 S.Ct. 1096, 59 L.Ed. 2d 296 (1979): “...it promotes disclosure of inventions to stimulate further innovation and to permit the public to practice the invention once the patent expires.”; *Kewanee Oil Co. v. Bircon Corp.*, 416 U.S. 470, 480-81, 94 S.Ct. 1879, 40 L.Ed. 2d 315 (1974): “...disclosure, it is assumed, will stimulate ideas and the eventual development of further significant advances in the art.”

¹⁷ 1 SCHLICHER, *supra* note 3, § 2:12; See *Sears, Roebuck & Co. v. Stiffel Co.*, 376 U.S. 225, 231, 84 S.Ct. 784, 11 L.Ed. 2d 661 (1964); *Compco Corp. v. Day-Brite Lighting, Inc.*, 376 U.S. 234, 237-238, 84 S.Ct. 779, 11 L.Ed. 2d 669 (1964); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.* 489 U.S. 141, 109 S.Ct. 971, 103 L.Ed. 2d 118 (1989).

¹⁸ *Kewanee Oil Co v. Bircon Corp.*, 416 U.S. 470, 480-81, 94 S.Ct. 1879, 40 L.Ed. 2d 315 (1974).

III. OBJECTIONS TO THE CURRENT PATENT LAW

A. DOES NOT SIGNIFICANTLY INCREASE THE RATE OF INNOVATION

Though it is commonly argued that the patent system increases the rate of innovation, a survey conducted by Professor Mansfield indicates that these alleged benefits are very small in a great majority of industries, with the pharmaceuticals and chemical industries as the notable exceptions.¹⁹

A majority of managers do not regard patents as crucial because these only have limited effects on the rate of entry by imitators. In Mansfield's study, a majority of the sampled firms felt that patents had delayed the entry of imitators by less than a few months. Although patents generally increased the imitation costs, this did not have an appreciable effect on the rate of entry. Patent protection was estimated to have delayed the time when the first imitator entered the market by 4 years or more for only 15% of the innovations sampled.²⁰

These findings are due in large part to how rapidly development decisions and product information are obtained by an inventor's rivals and the relation of imitation and innovation costs and times. Professor Mansfield points out that a company's rivals are generally aware of a company's development decisions within 12 to 18 months after the decision is made, with information leaking out to rivals within 6 months for 20% of firms.²¹ With regard to details of a new product, information is within the hands of competitors within 12 months, with over 33% of these competitors becoming aware of this information within 6 months. For processes, information leaks out more slowly, but the length of time to do so generally does not exceed 15 months. Chemical processes are the major exception as these can be kept secret for several years.²² As regards imitation and innovation costs and times, surveys indicate that the former is significantly smaller in a majority of cases.²³ On average, the ratio of imitation cost and innovation cost was 0.65, with the ratio of imitation time and innovation time being 0.70. In about 1/7 of cases, imitation cost was no less than innovation cost.²⁴

¹⁹ See Edwin Mansfield, *Patents and Innovation: An Empirical Study*, 32 JOURNAL OF THE INSTITUTE OF MANAGEMENT SCIENCES 173, 180 (1986).

²⁰ Edwin Mansfield et al., *Imitation Costs and Patents: An Empirical Study*, 91 THE QUARTERLY JOURNAL OF THE ROYAL ECONOMIC SOCIETY 907, 916 (1981).

²¹ Edwin Mansfield, *How Rapidly Does New Industrial Technology Leak Out?*, 34 THE JOURNAL OF INDUSTRIAL ECONOMICS 217, 219 (1985).

²² *Id.* at 219-221.

²³ Mansfield et al., *supra* note 19, at 909-910.

²⁴ *Ibid.*

Despite these disincentives, companies continue to invent new products because of other barriers to entry that discourage potential imitators. Even with pervasive information leaks, imitation of inventions does not occur immediately. It often takes considerable time to invent around patents, to develop prototypes, to alter or build plant and equipment, and to engage in the manufacturing and marketing start-up activities required to introduce an imitative product or process.²⁵

On top of these benefits, first-mover and learning curve advantages accrue to inventors, which ensures that the innovation will still be profitable though imitators begin to appear in a relatively few years.²⁶ Proof of this can be found in the pharmaceutical industry, where companies retained the ability to maintain prices of branded drugs after the expiration of the relevant patents due to first-mover advantages. Doctors and patients grew accustomed to the name-brand product and remained reluctant to substitute for unknown generic brands when the patent expired. The sales of the branded drug would gradually fall, but the profit per unit would remain high, and the aggregate profit would continue to be healthy.²⁷ On the other hand, learning curve advantages are best illustrated by the industrial sector where the cost of imitation often repels would-be imitators.²⁸

Professors Landes and Posner likewise argue that a vast amount of intellectual property was produced before intellectual property rights were created, and much would still be produced even if intellectual property rights did not exist. They reason that intellectual property rights are produced by inventors without pursuing financial gain, financed by alternative means such as government or private sector grants, and created because costs can be recouped before imitation by competitors because ordinary rights to privacy and physical property protect the preparatory stages in the creation of intellectual property.²⁹

B. DEFENSIVE PATENTING AND PATENT SUPPRESSION

Patents are often sought by inventors, not because they consider patenting a more effective method of recapturing fixed costs of innovation than trade secrecy or lead time, but because they want to prevent others from obtaining a patent that might be used to prevent the inventors from using their innovations without paying someone else a licensing fee.³⁰ This is legally feasible because patents can be

²⁵ Mansfield, *supra* note 20, at 221.

²⁶ Mansfield et al., *supra* note 19, at 910.

²⁷ LANDES & POSNER, *supra* note 14, at 312-314.

²⁸ *Ibid.*

²⁹ LANDES & POSNER, *supra* note 14, at 21-22.

³⁰ LANDES & POSNER, *supra* note 14, at 320.

assigned freely and utilization is not required for patents to retain their validity.³¹ Alternatively, inventors may publish their inventions in the hope that this will convince the PTO to turn down any application to patent it on the ground of lack of novelty. Typically, a firm will patent substitute products and preempt potential entrants whenever the difference between monopoly profits with the patent, and profits when entry is allowed to occur, exceeds the cost of securing the patent.³² The more readily patents are granted and are upheld in court, and the broader the legal protection they confer, the greater the incentive for defensive patenting.³³ These fears are not unjustified. Studies demonstrate that firms with high litigation costs appear less likely to patent in the same subclass as rivals, particularly where patents have been granted to firms with low litigation costs.³⁴

There are also well documented cases of patent suppression. This occurs when firms acquire or develop a new technology, patent it, and decide not to make or license the patented product though it is otherwise commercially promising. Patent suppression may occur for several reasons. A company may fear that patent licensing would allow its competitor to develop a better technology and leapfrog it. Other causes may be the cost of calculating licensing fees that would protect the company from being harmed by such an event, or the danger of revealing these concerns to the competitor during negotiations for licensing fees. The company may also doubt that the production cost or adoption of the new process will be commensurate with expected returns. As such, defensive and suppressive patenting casts additional doubt on the efficiency of the patent system as a means of optimizing the rate and direction of inventive activity.³⁵

C. FIXED PATENT TERM LEADS TO SUBOPTIMAL RESULTS

Another objection to the current patent system is directed at the use of a fixed, finite length for all granted patents. Governments establish a finite patent length to spur innovation while preventing the aggregation of excessive monopoly

³¹ See Robert Merges, *Antitrust Review of Patent Acquisitions: Property Rights, Firm Boundaries, and Organization*, in COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY 111, 126-127 (Robert Anderson & Nancy Gallini eds., 1998).

³² See Richard Gilbert & David Newbery, *Preemptive Patenting and the Persistence of Monopoly*, 72 THE AMERICAN ECONOMIC REVIEW 514, 516 (1982).

³³ LANDES & POSNER, *supra* note 14, at 320.

³⁴ See Josh Lerner, *Patenting in the Shadow of Competitors*, 38 THE JOURNAL OF LAW & ECONOMICS 463, 466, 489-490 (1995).

³⁵ See LANDES & POSNER, *supra* note 14, at 321; See also Gilbert & Newbery, *supra* note 31, at 518.

power.³⁶ Economists have long argued that fixed patent terms lead to a suboptimal result, but have differing views on what the most advantageous patent model would be. Professor Mansfield argues that it is more desirable to vary the term of the patent grant for different kinds of inventions, give long grants to inventions involving expensive technological breakthroughs, and graduate the patent period downward to a very short period of protection for routine inventions because of the wide variations in the costs of achieving different sorts of useful innovative activity from the profit-motivated sector.³⁷

Professor Scherer agrees that the life of each patent should be tailored to the economic characteristics of its underlying invention, but his approach does so without varying the patent term itself. Instead, he puts forth a flexible system of compulsory licensing where the patent recipient bears the burden of showing why his patent should not expire or be licensed at modest royalties to all applicants three or five years after its issue.³⁸

Professor Denicolo asserts that an optimal patent regime must consider both patent length and breadth.³⁹ In product markets with inefficient competition, he argues, the more likely that the issuance of broad and short patents will be socially optimal.⁴⁰

Other factors which are relevant to determining optimal patent life have been identified by writers. Inelastic demand, lower initial production cost, and lower time discount rate all militate toward a shorter optimal patent life.⁴¹ Complications arising from risk, imperfect product markets, and inventing around patents generally point to longer rather than shorter optimal patent life.⁴²

IV. ALTERNATIVE PATENT REGIMES

A. RATE-FIXING PATENT REGIME

³⁶ See Vincenzo Denicolo, *Patent Races and Optimal Patent Breadth and Length*, 44 THE JOURNAL OF INDUSTRIAL ECONOMICS 249 (1986); Scherer, *supra* note 10, at 424; Paul David & Trond Olsen, *Technology Adoption, Learning Spillovers, and the Optimal Duration of Patent-Based Monopolies*, 10 INTERNATIONAL JOURNAL OF INDUSTRIAL ORGANIZATION 517, 531 (1992).

³⁷ EDWIN MANSFIELD, *THE ECONOMICS OF TECHNOLOGICAL CHANGE* 210 (1968).

³⁸ Scherer, *supra* note 10, at 427.

³⁹ Denicolo, *supra* note 35, at 257.

⁴⁰ Denicolo, *supra* note 35, at 264.

⁴¹ See David & Olsen, *supra* note 35, at 539.

⁴² See William Nordhaus, *The Optimum Life of a Patent*, 62 AM. ECON. REVIEW 428, 431 (1972).

If patent law seeks to maintain a compromise between providing incentives to inventors and minimizing deadweight losses to consumers, then a patent system which regulates the inventor's profit directly through rate fixing would seem to be a more intuitive solution than setting a static patent term. Rate fixing schemes are far from novel, as they have been applied in public utility regulation for a number of decades. In view of the foregoing, one could argue that shifting patent law to a rate fixing method would simply tap into a proven body of knowledge and minimize the attendant risks of changing a long applied system.

To detractors of patent rate fixing proposals, these benefits are largely a mirage. Professor Schlicher argues that a rate fixing patent model would create uncertainty, reduce the level of invention, and increase transaction costs. He points out that identifying the costs to be included in calculating the rate base raises a Pandora's box of issues and that the underlying premise for public utility regulation does not apply to patents because only the former is granted for an unlimited term. In addition, he doubts that the U.S. Patent and Trademark Office (PTO) would have the capability to fix the optimal price given its present deficiencies.⁴³

These concerns cannot be easily dismissed. Any rate fixing scheme would require far greater monitoring than currently conducted by the PTO. Rates for public utilities are regularly adjusted to compute whether the public utility has not strayed from its statutory limits. This task is made easier due to the limited number of public utilities in a given market. In contrast, a general rate fixing mechanism for patent law would require the PTO to monitor millions of patents. With the present strain on the PTO's present structure and budget, a move to a rate fixing mechanism could possibly be the straw that breaks the PTO's back.

Even setting aside structural and budgetary hurdles, the conundrum of properly accounting for income and expenses for each patented invention remains. At present, no method exists for attributing costs and revenue to specific patents that is wholly objective and reliable.

A rate-fixing patent scheme also assumes for the most part that a single IP right covers a single commercial product that occupies a distinct market in the economic sense. This is almost always an inaccurate assumption as the typical commercial product is covered by multiple patents.⁴⁴ This gives rise to two implications: 1) rights are difficult to transfer by themselves; and 2) when they are transferred, they very seldom bestow power in a distinct economic market.⁴⁵

⁴³ 1 SCHLICHER, *supra* note 3, § 2:29; *See also* BOWMAN, JR., *supra* note 1, at 49-50.

⁴⁴ Merges, *supra* note 30, at 125, *in* COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY 111 (Robert Anderson & Nancy Gallini eds., 1998).

⁴⁵ *Ibid.*; *See generally* LANDES & POSNER, *supra* note 14, at 374-375.

It is also claimed that a production system that bases its reward on the particular costs a particular producer incurred for a particular purpose would be a subsidy to inefficiency. Moreover, it is stressed that in any highly uncertain activity where odds of success are low and odds of failure high, even the relatively high indirect costs of mistakes should be added to the possibly low direct costs of success.⁴⁶ In this case, accounting for these indirect costs would pose another impediment to implementing a rate fixing regime.

B. VARIABLE PATENT LENGTH AND BREADTH

A number of economists have pushed for the adoption of a variable patent term regime because of suboptimal results generated by a fixed patent regime.⁴⁷ Professors Landes and Posner note that an ideal patent regime should classify different forms of intellectual property according to the additional output likely to be produced with the grant of the patent, and grant patents with varying length and breadth to areas where output would be seriously suboptimal without it. Yet, in the same breath, they caution that empirical studies required to implement this classification have never been undertaken. They also expressed the fear that this form of classification would present the danger of politically favored producers of intellectual property being granted broader rights than others.⁴⁸ On top of these weighty concerns, one should also note that Professor Schilcher's objections apply with equal force to this scheme. It may even be argued that this proposal would be more complicated to administer than a rate fixing patent model.

V. MODIFIED RETURN ON INVESTMENT MODEL

A. EXPOSITION AND ADVANTAGES

From the foregoing discussions, it is apparent that the debate centers on the optimal compromise between inventor's incentives and consumer welfare. A

⁴⁶ BOWMAN, JR., *supra* note 1, at 29.

⁴⁷ See MANSFIELD, *supra* note 36; Scherer, *supra* note 10, at 427; Denicolo, *supra* note 35, at 257; David & Olsen, *supra* note 35, at 539; Nordhaus, *supra* note 41; BOWMAN, JR., *supra* note 1, at 52.

⁴⁸ LANDES & POSNER, *supra* note 14, at 24; See also ADAM JAFFE & JOSH LERNER, INNOVATION AND ITS DISCONTENTS 204 (2004).

fixed term patent regime is a blunt, arbitrary instrument which produces suboptimal results. At the other end of the spectrum, a free form variable patent regime raises questions of administrative feasibility and the possibility of abuse of discretion by government authorities.

The present model seeks to mediate a compromise between the two regimes. This scheme does not mean to overhaul existing antitrust and patent law but is meant to be concurrently implemented with present laws.

We advert to the observation that patents very seldom bestow power in a distinct economic market.⁴⁹ In these cases, competition between firms will act to drive down the cost of licenses and will inure to the ultimate benefit of the consumer. However, in the rare cases where a patent confers market power, the patentee will have the ability to raise price, which in turn creates a deadweight loss. Note that obtaining a patent which confers market power does not constitute a *per se* antitrust violation. This would fall squarely within the purview of *Alcoa* which exempts from antitrust scrutiny those situations where a monopoly emerges merely due to superior skill, foresight and industry.⁵⁰ While inroads may be made into the patent monopoly by competitors inventing around the patent, a patentee may subvert these initiatives through defensive or suppressive patenting schemes. In addition, only established firms with low litigation costs are likely to invent around a patent because of the threat of infringement litigation.⁵¹ Given these facts, it appears that the most productive area to advocate regulatory reforms would be situations where market power is created by the grant of a patent over an invention.

To determine whether a patent confers substantial market power, the regulatory agency may make use of economic principles already used in antitrust law. These indicia of market power include, but are not limited to, market share, product differentiation in the relevant market, market and product elasticities, and barriers to entry (e.g. sunk costs, government regulation, potential product repositioning, and possibility of inventing around the patent).⁵² Where economic analysis yields an affirmative result, the regulatory agency may choose to apply the return on investment model.

To determine the base against which the patentee's return will be measured, the patentee shall have the burden of proving that expenses for research and development and other expenses to bring a product to market are attributable to a particular patent. Accurate disclosures may be further ensured by requiring the patentee to present audited financial statements based on generally accepted

⁴⁹ See Merges, *supra* note 30, at 125, in *COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY* 111 (Robert Anderson & Nancy Gallini eds., 1998); LANDES & POSNER, *supra* note 14, at 374-375.

⁵⁰ See *United States v. Aluminum Co. of America*, 148 F.2d 416 (2d Cir. 1945).

⁵¹ See Lerner, *supra* note 33.

⁵² See 1 HOVENKAMP ET AL., *supra* note 2, § 4.3.

accounting principles (GAAP) to the relevant government agency to discharge the evidentiary burden.

Concurrently with these proceedings, the regulatory agency will fix an appropriate multiplier after taking into account market and operations risks of the venture and the risk-free interest rate. Again, it shall be the burden of the patentee to present evidence proving the elements in determining the multiplier. The appropriate return of investment may be computed by obtaining the product of the multiplier and the attributable expenses of the relevant patent.

When the regulatory agency has set the return on investment base, the patentee shall make periodic annual filings of audited financial statements and other documents necessary for the regulatory body to determine whether royalty and product revenue has met or breached the return on investment ceiling. Where the inventor has reached or exceeded the return on investment base, the regulatory agency shall notify the patentee and the public of the expiration of the intellectual property rights over the said invention. Conversely, where the inventor fails to breach the return on investment base, the patent shall terminate upon its expiration of its 17-year statutory term. This may occur where a subsequently patented invention diminishes market power and results in rent erosion.

There are several advantages that this hybrid system has over the two alternative patent regimes earlier mentioned. First, this system takes better account of the need for incentives to spur innovation than the rate-fixing model, and applies the factors mentioned by Professor Nordhaus in determining optimal patent life.⁵³ Whereas rate-fixing schemes limit the royalties one may charge at any given time for the patent or profit on a product which utilizes the patent, the hybrid system does not hamstring the inventor to the same degree. Instead, it allows the inventor to charge the rate that the market will bear but limits the aggregate profits that accrue to the inventor over the life of the patent by reducing this in direct proportion to the patented invention's rate of profit. Thus, there remains an incentive for the inventor to reach the maximum limit on return on investment at the earliest possible time because of the present value of money.

In conjunction with recognizing the need for profit incentives, the hybrid system addresses public welfare concerns and encourages breakthrough inventions. As the inventor charges the monopoly price for his product or in licensing the patent, the inventor's total profits approaches the return on investment ceiling at an increasing rate, and the shorter the patent duration. This allows businesses to freely utilize or improve upon the invention as it becomes part of the public domain upon expiration of the invention's patent protection. The proposed system also increases incentives for revolutionary inventions by diminishing incentives to "invent around" existing patents. It is likely that customers would rather use the invention whose patent has expired rather than pay royalties for an invention with only

⁵³ See Nordhaus, *supra* note 41; See also David & Olsen, *supra* note 35, at 539.

incremental advantages. Thus, there are increased incentives for prospective inventors to ensure that their inventions are not only patentable, but have distinct advantages over inventions in the public domain to justify customers paying royalties for the new invention.

In the case of listed companies, the hybrid model would have the additional benefit of a self-policing function. Publicly listed companies holding patents governed by the hybrid system will have a disincentive to cheat the system by underreporting royalty earnings as this will depress its stock market price and raise its cost of capital. The same holds true for companies seeking to hold an initial public offering of their securities.

B. WEAKNESSES AND POSSIBLE SOLUTIONS

This is not to say that a hybrid system is without its problems. Opponents of the hybrid model could point out that the system would subsidize inefficiency since its reward is proportional to the production costs for the invention.⁵⁴ A possible answer to this objection would be to set a return on investment base industry standard which would be centered on the investment by an “average” industry player for an innovation. In this manner, efficient firms would be rewarded for keeping costs below the return on investment base in the form of quicker recoupment of actual costs.

Many of the objections expressed by Professor Schilcher would equally apply to the hybrid model. A greater degree of monitoring is required due to the increased number of factors for the PTO to consider. In turn, this will place greater burdens on an already overworked and understaffed PTO. Proper implementation will necessarily require greater funding and training for the PTO, but whether this would be forthcoming remains to be seen in view of past legislative lethargy on the matter.

It is also arguable that giving greater discretion to the PTO may open the door for political horse trading or other unwarranted benefits. It would appear that this concern equally applies to the current fixed patent regime for the reason that current standards for patentability are ostensibly objective but are actually subjective in implementation. Moreover, issues of possible abuse and agency capture are inextricably intertwined with accountability and public governance. As such, these issues appear to be better addressed by structural reforms in political law, such as campaign finance, rather than by limiting discretion of agency officials.

⁵⁴ See BOWMAN, JR., *supra* note 1, at 29.

Issues also arise in attributing revenue and costs to a particular patent.⁵⁵ Though it may appear otherwise, accounting is far from an exact science. This is particularly true in the case of intangibles such as intellectual property rights where accounting for cost and revenue is still an unresolved topic. While guidelines have been laid down by the Financial Accounting Standards Board, these hardly allay concerns regarding objectivity.⁵⁶ These quandaries become more pronounced for routine patent transactions. As noted earlier, the typical product is covered by multiple patents, which gives rise to the challenge of apportioning revenue among the patents.⁵⁷ Package licenses create difficulties in attributing revenue to particular patents for the same reasons.⁵⁸ Ideally, revenue from a product with multiple patents or a package license should be allotted based on the importance of the patent to the product or the licensee, but the inherently nebulous nature of “importance” standards counsels against the rule’s adoption. A more easily implemented, but admittedly arbitrary scheme, would be to distribute license revenue equally among the patents for purposes of the hybrid model. Another solution would be for the licensee to resort to the regulatory agencies and the courts for a possible cause of action for exclusionary practices under antitrust law by alleging that the bundling of patents by the licensor was designed to raise its rival’s costs instead of the regulatory agency determining which patent is “important” for purposes of allocating revenue.⁵⁹ Nonetheless, it is highly likely that this would be an unsatisfactory, if not unutilized remedy, given the cost and length of antitrust litigation.

Another conundrum arises where patents are transferred between parties which have different R&D cost structures. Assuming that revenue and costs can be accurately attributed to particular patents, whose return on investment base should be applied - the assignor’s or the assignee’s? One possible solution would be to use the purchase cost of the patent as a proxy for research and development costs in determining the return on investment base. Shifting from an *ad hoc* determination of return of investment base to an industry standard would also remedy this issue, but at the cost of a proportionally less accurate calibration of inventor incentives and consumer benefits.

On top of the foregoing concerns, the hybrid system provides some disincentive for defensive patenting and patent suppression but does not totally address these issues. A promising solution to this subject has been put forth by

⁵⁵ See generally ROBERT STERLING, THEORY OF THE MEASUREMENT OF ENTERPRISE INCOME 16 (The University Press of Kansas, 1970).

⁵⁶ See generally Statement of Financial Accounting Standards No. 2, 48 and 142.

⁵⁷ Merges, *supra* note 30, at 125, in COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY 111 (Robert Anderson & Nancy Gallini eds., 1998).

⁵⁸ See generally 1 HOVENKAMP ET AL., *supra* note 2, § 23.2.

⁵⁹ See Daniel Rubinfeld & Robert Maness, *The Strategic Use of Patents: Implications for Antitrust*, in ANITRUST, PATENTS AND COPYRIGHT: EU AND US PERSPECTIVES 85-102 (Francois Leveque & Howard Shelanski eds., 2005).

Professor Merges. He argues that these issues may be remedied by requiring courts to deny prayers for injunction where the plaintiff in an infringement suit does not actually practice the patent at issue. Another solution is to consider these practices as antitrust violations. Prospective plaintiffs would be deterred from prosecuting frivolous infringement suits because this would give the defendant a possible affirmative counterclaim for treble damages.⁶⁰

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⁶⁰ See Merges, *supra* note 30, at 126-127, in *COMPETITION POLICY AND INTELLECTUAL PROPERTY RIGHTS IN THE KNOWLEDGE-BASED ECONOMY* 111 (Robert Anderson & Nancy Gallini eds., 1998).