

2011

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Recommended Citation

Peritz, Rudolph J.R., "Competition Within Intellectual Property Regimes: The Instance of Patent Rights" (2011). *Articles & Chapters*. 900.
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COMPETITION *WITHIN* INTELLECTUAL PROPERTY REGIMES: THE INSTANCE OF PATENT RIGHTS

Rudolph J R Peritz

Introduction

This chapter describes an emergent jurisprudence and a residual economics that converge to support the reconceptualization of US patent policy as a competition regime. Its approach is inspired by an opinion that Justice Sandra Day O'Connor wrote for a unanimous Supreme Court some 20 years ago. The Court's recent patent jurisprudence sounds an echo of the opinion, which described the foundation of patent policy this way—'... [F]ree exploitation of ideas will be the rule, to which the protection of a federal patent is the exception.' There is, Justice O'Connor explained, a '... baseline of free competition upon which the patent system's incentive to creative effort depends.'

The chapter develops this proposition in three sections. The first explicates the economics of incentive theory, both its limits and its residual value. The second analyses the jurisprudence of recent decisions by the Supreme Court and Federal Circuit Court of Appeals—the speciality court for patent and trademark. The third section presents some instances of progressive change that would come of extending the reconception of the patent system as fundamentally a competition regime, an extension inspired by Justice O'Connor's image but informed by the failure of incentive theory as the economic logic for patent protection.

A. Crisis, Stalemate, and Progress

Intellectual property¹ protection and free competition have long been viewed as alternative means to encourage inventive activity and, through it, promote progress in the form of economic growth. Their relationship as means has sometimes been characterized as conflicting and other times as congruent. The same can be said about the progress they are intended to promote. In the United States, mainstream policy cabins these tensions of means and ends by treating IP protection as a domain of exclusionary rights and by removing free competition to a separate domain, to the domain of antitrust. With this bifurcation, the problem has been largely transformed into a question of adjudicating the relationship between two separate bodies of public policy.

Nonetheless, some competition doctrines linger within the IP realm. These doctrines, such as patent misuse and copyright fair use, have been characterized as intruders in the domain of exclusionary rights. Patent misuse is labelled an historical anomaly that properly belongs in antitrust, if anywhere at all, while copyright fair use is described as an interloper—either an alien article of political faith in First Amendment Speech Rights or a commercial artefact of market failures that temporarily limit the author's fundamental right to exclude.² Since the 1980s, IP policy makers have settled the problem of malingering doctrine by favouring exclusionary rights over free competition and by propertizing and otherwise extending IP rights.

This dynamic of bifurcation, preference, and expansion rests on the asserted superiority of exclusionary rights over open access in encouraging invention, a superiority that derives from reliance on an IP economics that holds neither in theory nor in practice.

There has long been trouble brewing in the IP economics that prevails in the United States. The trouble with IP economics recently reached boiling point with an admission by William Landes and Richard Posner, the Chicago School's dynamic duo of law and economics, that there is no ground for the dominant view of IP economics, no ground for the view that incentive theory can justify, explain, or rationalize IP rights. They made this confession in their book entitled *The Economic Structure of*

¹ Unless otherwise specified, intellectual property refers only to the rights granted under patent and copyright statutes enacted by Congress in accord with the Constitution's call to promote progress, though the term can plausibly be understood as referring as well to trade secret and trademark protection insofar as they have been increasingly justified in similar instrumentalist terms. The distinction is made in this chapter because the analysis of the patent domain takes account of Constitutional origin.

² See eg. DJ Gifford, 'Antitrust's Troubled Relations with Intellectual Property' (2003) 87 *Minnesota L Rev* 1695 (patent); WJ Gordon, 'Fair Use as Market Failure: A Structural and Economic Analysis of the Betamax case and its Predecessors' (1982) 82 *Columbia L Rev* 1600 (copyright).

IP Law.³ The book has received wide attention and much praise. But the public confession of incentive theory's failure has been largely ignored.

At virtually the same moment, a related but separate development was bubbling to the surface of IP jurisprudence—in a recent series of surprising opinions, the US Supreme Court weakened patent protection and in the process expanded the role of free competition as an internal engine for promoting economic progress. The opinions were surprising because they run against the dominant view that pits an IP domain of exclusionary rights against an exogenous antitrust domain of free access. The recent opinions have destabilized this binary opposition between IP rights and free competition.⁴

In tandem, the failed economics and unstable jurisprudence have thrown the dominant approach to IP rights into crisis. The crisis is an emergent form of a long-term problem at the heart of both the economics and the jurisprudence, and it cannot be easily resolved.

On the economics side, informed policy makers have long recognized that economic progress is driven by the twin engines of IP monopoly and free competition. As economist Kenneth Arrow wrote in his landmark 1962 paper, the great difficulty lies in determining an optimal balance between them. Economist Joseph Schumpeter had earlier sought to merge the two engines in his vision of competition as serial monopoly, his perennial gale of creative destruction.⁵

As for the jurisprudence, the US Constitution presents a corresponding legal challenge to balance the exclusionary rights of IP protection and the open access of

³ WM Landes and RA Posner, *The Economic Structure of Intellectual Property Law* (Cambridge, Massachusetts: Harvard University Press, 2003).

⁴ This chapter takes up patent law as a competition regime, a theme that with respect to copyright, trade secret, and trademark as well is explored in my earlier writing, beginning with *Report to the IP Academy of Singapore* (2002–2003) (revised and published sub nom 'Competition Policy and its Implications for Intellectual Property Rights in the United States' in SD Anderman (ed) *The Interface Between Intellectual Property Rights and Competition Policy* (Cambridge: CUP, 2007) and variously investigated in other writing). The theme is a special case of the complex relationship between property rights and competition policy in American political economy, which I first developed in the domain of antitrust; see, eg, 'A Counter-History of Antitrust Law' in *Symposium: The Frontiers of Legal Thought* [1990] Duke LJ 263; 'The "Rule of Reason" in Antitrust Law: Property Logic in Restraint of Competition' (1989) 40 Hastings LJ 285, excerpted in ET Sullivan (ed) *The Political Economy of the Sherman Act: The First Hundred Years* (New York: Oxford University Press, 1990) 116, reprinted in R Graves (ed) *Competition Law* (Burlington: Dartmouth Publishing Co, 2003), reprinted in *Competition Law* (London: Ashgate Publishing, 2004). The theme was extended to other domains in *Competition Policy in America: History, Rhetoric, Law* (New York: Oxford University Press, 1996 rev edn 2001). This chapter on patent policy is part of a larger project, whose working title is *The Political Economy of Progress: IP Rights and Competition*.

⁵ J Schumpeter, *Capitalism, Socialism and Democracy* (New York: Harper & Row, 1942, 3rd edn 1950); KJ Arrow, 'Economic Welfare and the Allocation of Resources for Invention' in R Nelson (ed) *The Rate and Direction of Inventive Activity: Economic and Social Factors* (Princeton: Princeton University Press, 1962) 609. It should be noted that Arrow wrote about invention while Schumpeter emphasized innovation—that is, the commercialization of invention.

free competition.⁶ The Constitution empowers Congress to enact copyright and patent protection for the explicit purpose of promoting ‘... the Progress of Science and useful Arts.’ So copyright and patent are not rewards, not natural rights. They are incentives—private means to a public end. But when does the private incentive of property protection promote the public benefits of progress? In both economic and jurisprudential terms, when does such protection produce more progress than would otherwise accrue with free competition? The answer to this question has proved elusive to both theorists and empirical researchers.⁷

Despite this indeterminacy, mainstream IP economics still rests on incentive theory, which holds that the scale and scope of IP rights should be determined by the degree to which they promote economic progress. Incentive theory’s incapacity to guide such determinations results in an analytical stalemate between the exclusionary rights of IP protection and the open access of free competition, a stalemate because both produce economic growth but to indeterminable degrees. In this light, neither alternative deserves priority as the better means to promote economic progress.

This stalemate, this open question at the very core of IP policy, has put analysts and decision makers, including federal judges, between a rock and a hard place—on the one side, policy makers are pressed to make decisions; on the other, they are blocked from making reasoned decisions because there is no analytical methodology at hand. Policy makers have sought to extricate themselves from this predicament by taking a fall-back position, the position that maximizing the means maximizes the ends, that greater IP protection naturally leads to more invention and thus to more progress. In my view, this fall-back position explains the so-called proprietization of IP rights, the normative shift to a Lockean entitlement from an instrumentalist (or means-ends) evaluation.

This fall-back into natural rights is not surprising, given the powerful ideology of private property rights in the United States. But it makes no logical sense. Nor is it supported in theory or fact. Indeed, it is well-known that too much IP protection as well as too little can stifle invention and impede economic progress. So both the economics and the law present IP policy makers with a Goldilocks problem. But there is no calculus for determining what amount of IP rights is ‘just right,’ particularly in a unitary system that does not discriminate among different kinds of inventions. And, of course, there is the other side of the indeterminacy coin; economic justification is equally lacking for simply eliminating IP rights entirely as a means for encouraging invention and thus promoting economic progress.

⁶ United States Constitution, Art. I, Sec. 8, cl 8 states: ‘Congress shall have Power: . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.’

⁷ For close analysis of these issues, see my essay ‘Thinking about Economic Progress: Arrow and Schumpeter in Time and Space’ in J Drexel (ed) *Liber Amicorum: for Hanns Ullrich* (Bruxelles: Larcier Pub, 2009).

So, what's to be done? In my view, the answer is clear—change the fall-back position. Reverse the presumption. When confronted with jurisprudential or economic indeterminacy, adopt the presumption that free competition better promotes the progress called for by constitutional directive. Given the indeterminate economic value of both free competition and IP rights in encouraging invention, policy analysis should begin with the presumption of free competition. In choosing between two rules or standards, policy makers should adopt the one that better expresses the policy of free competition.

Why adopt the presumption of free competition? In economic terms, because competition produces a tie-breaker for its indeterminacy stalemate with IP rights. The tie-breaker is competition's superior distributional outcome. When patents and other IP rights produce monopoly prices, they create welfare losses in both static and dynamic terms. In the short run, consumers pay higher prices or go to second best substitutes. In the longer run, subsequent inventors also pay higher prices or turn to second best substitutes, causing some combination of decline and path-diversion in follow-on inventive activity.⁸ In this light, a rule or policy that would strengthen IP rights should first be shown to promote greater progress than would otherwise occur.

B. Patent Economics: Incentive Gap, Stalemate, Presumption of Free Competition

This part begins by examining the state of mainstream IP economics in the United States, particularly the failure of incentive theory as the economic justification for IP protection, and proceeds by sketching the IP economics that remains viable. The section closes with discussion of the IP economics of competition.

Incentive theory and its critiques

In the United States, the current economics of progress has adopted a mythical origin not unlike that of Athena, the Greek goddess of wisdom and culture who sprang fully formed from the head of Zeus. Like Athena, the economic logic of progress is seen as springing fully formed from the divine thinking of Kenneth Arrow, whose eminence was established even before his award in 1972 of a Nobel Prize in Economics. His eminence stems from his canonical 1962 paper entitled *Economic Welfare and the Allocation of Resources for Invention*.⁹

⁸ The dynamic effects are a decrease in inventor welfare that results from the increased cost of new information or the denial of access at any price. See Peritz 'Freedom to Experiment: Toward a Concept of Inventor Welfare' (n 67 below).

⁹ Arrow (n 5 above).

Of course despite such mythology, there is a substantial pre-history that posed fundamental questions and deep criticism of IP protection, much of it still pertinent today. Virtually all the questions emerged in the widespread European debates of the 19th century over patent protection; many of the criticisms were sharpened in the trenchant analysis of Sir Arnold Plant in his 1934 article entitled *The Economic Theory Concerning Patents for Inventions*¹⁰ and in a companion piece on copyright. Plant raised many of the searching questions later addressed by American economists. The most difficult question concerned the opportunity cost of invention. Plant asked, when is use of society's resources to invent '... superior to alternative uses from which they are diverted[?]'

The opportunity cost of invention opens a wide gap in the incentive logic of IP rights, a gap between the private value and the public benefits of IP rights. There is little doubt that IP rights create a private incentive to invent—indeed, few could afford simply to give time to the enterprise of invention without remuneration. Yet the private value of IP rights has no necessary logical or economic relationship with their public benefits, benefits that depend on a wide array of factors. The opportunity cost of invention is but one powerful admonition to take account of what can be called the Incentive Gap. Ignoring it produces the category error of equating IP rights' private value with their public benefits. Taking the Incentive Gap into account transforms the question into an empirical inquiry.

None of this had noticeable impact in the United States before economist Fritz Machlup authored his 1958 Report to Congress, entitled *An Economic Review of the Patent System*. His was the most influential of 15 reports commissioned by a Congress concerned whether the costs of the patent system were justified. Here is Machlup's summary of the economic literature:

None of the empirical evidence at our disposal and none of the theoretical arguments presented either confirms or confutes the belief that the patent system has promoted the progress of the technical arts and the productivity of the economy.¹¹

¹⁰ A Plant, *Selected Economic Essays and Addresses* (London: Routledge Kegan Paul, 1974 reprint [1934]) 35. Compare F Machlup and E Penrose, 'The Patent Controversy in the Nineteenth Century' (1950) 10 *J Economic History* 1 (chronicling the European debates).

¹¹ Study of the Subcommittee on Patents, Trademarks, and Copyrights of the Senate Judiciary Committee, 85th Cong., 2d Sess., *An Economic Review of the Patent System*, Study no. 15 (Comm. Print 1958) (written by Fritz Machlup) 79 (hereinafter 'Machlup Report'). The Machlup Report observes that '... there is no functional relation between the earnings under a patent. ... and the "social usefulness" of the invention which it covers.' Machlup Report 30. In this line of analysis, the Machlup Report observes that:

The question is no longer whether the patent system stimulates inventive talents to use more of their time and energy than they otherwise would for the development of new technology, but rather whether it stimulates business corporations to hire more of these talents than they otherwise would for this task. If this is affirmatively answered, the second question arises whether this use of the talents is superior to the alternative uses from which they are diverted. (Machlup Report 36)

What's to be done? 'Muddle through', wrote Machlup. Why? Because there has been '... a patent system for a long time', he declared, '... it would be irresponsible, on the basis of our present knowledge, to abolish it.'¹² There could be no weaker rationale for keeping patent protection.

It was under this cloud of indeterminacy that Kenneth Arrow published his landmark paper four years later. Like so many other sacred texts, Arrow's paper has become the touchstone for theorists and others who identify themselves with the orthodox approach as well as those who oppose it.

Arrow questioned the impact of competition on incentives to invent. For economists, perfect competition is the Holy Grail. Its miraculous power produces allocative efficiency by taking society's resources and putting them to their highest and best uses. But Arrow argued that perfectly competitive markets fail. They fail by discouraging inventors from inventing.

Arrow's story has become a commonplace—without patent protection, inventions are easily copied or imitated. Free access to their ideas discourages inventors from inventing and, thus, harms society. Patent rights correct this market failure by allowing inventors to profit and society to benefit from increased invention. Patent protection and the profits it generates are the means to an end. Patents are private rights that produce the public benefits of technological advancement and economic progress.

The dominant camp relies on the following quotation to support their call for stronger patent protection—'[Invention that is]. ... available free of charge. ... provides no incentive for investment in research.'¹³

Those who call for more access and thus more competition rely on this quotation—'... the incentive to invent is less under monopolistic than under competitive conditions.'¹⁴

Both statements are accurate quotations from Arrow's landmark article. So it turns out both camps are right; and both are wrong. Why? Because reliance on one or the other quotation ignores Arrow's recognition that an incentive theory of patent protection creates a dilemma for welfare economics. The dilemma is that both patent rights and competition promote economic progress. And both impede it. Here is how Arrow described the dilemma,

Note that this is a modern form of the question posed in the 19th century European debates about what we would term the opportunity costs of diverting scarce resources. Compare Peritz, 'Patents and Progress: The Incentive Conundrum' in A Kur (ed) *Intellectual Property Rights: Does one Size Fit All* (Aldershot: Edward Elgar Publishing, 2009) (selected papers, 2008 ATRIP Annual Conference, Max-Planck Institute, Munich, Germany, 21 July 2008).

¹² Machlup Report (n 11 above) 80.

¹³ Arrow (n 5 above) 609.

¹⁴ Arrow (n 5 above) 619.

In a free enterprise economy, inventive activity is supported by using the invention to create property rights; precisely to the extent that it is successful, there is an underutilization of the information.¹⁵

In short, patent protection is the private incentive necessary to spur invention and at the same time the social cost that prevents its optimal use. Arrow transformed this dilemma of IP rights and competition into a trade-off over time—pay more now for better products in the future.¹⁶

Let's call this Arrow's Trade-Off. Arrow posed the social welfare question as a trade-off over time insofar as the current costs of patent monopoly pay for the future benefits of increased invention.

But in the end, Arrow's Trade-Off encompassed only part of the problem of IP's social value. It addressed the narrow question of IP's private value and its relationship to direct public costs and benefits but not its indirect effects, including opportunity costs. In consequence, the analysis did not speak to the Incentive Gap between the private value and the overall public costs and benefits of IP protection. The subsequent economic literature continued to pursue the broader question. But the theoretical scholarship largely rehearsed the European debates and Arnold Plant's economic analysis.

Empirical investigation

Ultimately the theoretical impasse resolved into empirical inquiry. What of the empirical literature that followed?¹⁷

A wide array of studies, almost all involving patents, developed various data sets to investigate different proxies for economic progress. Researchers have interviewed corporate decision makers; they have measured research and development expenditures and patenting activity on the input side, and productivity gains and economic growth on the output side. Studies have looked at single sectors, individual countries, and across countries.

¹⁵ Arrow (n 5 above) 617.

¹⁶ '[A]n incentive to invent can exist even under perfect competition in the product markets, though not, of course in the "market" for the information contained in the invention.' Arrow (n 5 above) 619. In his hypothetical world, Arrow does even better than transform a dilemma into a trade-off. He creates a model that neatly eliminates the present cost of the trade-off. He posits perfectly monopolistic markets for invention that provide inventors the greatest profit incentive and buyers in perfectly competitive markets for goods provide consumers the widest distribution at the lowest price. It's the best of all possible worlds though it is not the real world. In the real world, monopoly prices do not dissolve into the thin air of economic models. The hypothetical is perfected by Arrow's assumption that the invention is a new process that provides cost savings in the goods market that equal the monopoly prices paid for the new invention. Thus price and output in the goods market are not affected. Neat and tidy. But unlikely and perhaps economically illogical. See Peritz, 'Thinking about Economic Progress: Arrow and Schumpeter in Time and Space' (n 7 above).

¹⁷ A working paper that takes a closer look at the literature is available from the author: 'Patents and Progress: The Incentive Conundrum' (2008).

Patent economics: the residue

Where does that leave IP economics? Some alternatives to the mainstream approach have emerged, alternatives ranging from conservative incrementalism to radical repeal. Landes and Posner sit at the conservative end of the spectrum, where they argue that we should try to optimize the system and do the best we can with what we have. Economists Michele Boldrin and David Levine have been the latest to lay claim to the radical end, where they argue that IP rights are not necessary because free competition produces adequate profits to attract the invention necessary to promote economic progress. Of course these positions as well as those between them are not new.²⁰

A moment's tarry at the Landes and Posner position is worthwhile, in my view, because it is likely to become the mainstream position, once the shock of incentive theory's demise has subsided. Landes and Posner take up the view espoused in Machlup's 1958 Report to Congress, the view that while the patent regime per se cannot be rationalized, changes can be evaluated for their effectiveness.²¹ For this, Machlup developed a nine-step analysis and provided an example. The example is an increase in the patent term. As the author pointed out, the analysis requires quantitative and qualitative assumptions at every step and, even then, it cannot take into account the opportunity cost of more investment in research and development. In short, even though the more confined analysis of changes in rules or standards benefits from having a defined baseline of current invention levels that is lacking in an analysis of the patent regime per se, other problems of experimental design and measurement remain. Machlup concluded that the analysis of whether an increase in the patent term increases economic growth depends on '... a complex set of probabilities, the magnitudes of which depend [on]... many unknown variables.'²²

Following Plant and Machlup, Landes and Posner reject incentive theory. In its place they adopt a series of more specific goals emphasizing reductions in, for example, transaction costs, rent seeking, and congestion externalities.²³ In their chapter on patent law, the authors proceed from the general point that patent protection '... makes economic sense because it curbs certain inefficiencies unavoidably created by trade secrecy.'²⁴ In their view, those inefficiencies derive from a number of sources,

²⁰ Compare Peritz, 'Patents and Progress: The Incentive Conundrum' (n 11 above).

²¹ Machlup (n 11 above) 64–7, discussed in Peritz, 'Patents and Progress: The Incentive Conundrum' (n 11 above) and a 2008 working paper (n 17 above).

²² Machlup (n 11 above) 64–7.

²³ Congestion externalities reflect a questionable reintroduction of tragedy-of-the-commons logic to public goods. The issue is of questionable importance for two reasons. First, because use of information (or invention, as Arrow called it) does not deplete its supply or quality; in that sense, there cannot be over-use. Second, because privatization presents an analogous problem, if there is one at all, in the form of the anti-commons—often called patent thickets. In sum, congestion is either a two-sided problem that does not resolve the question of property or it is no problem at all.

²⁴ Landes and Posner (n 3 above) 294.

including the following—first, from the very nature of trade secrecy, which keeps information out of the market. Second, from the higher costs of trade secret licensing. But these assertions turn out to be controversial. As to the first, Landes and Posner themselves develop an elegant analysis of the relationship between patent and trade secret that belies the impact on information. In the chapter on trade secrets, they assert patents are preferable only to the extent an invention is self-disclosing or likely to be invented independently.²⁵ That is, patents tend to disclose information that has lowest public value. As to the higher cost of trade secret licensing, the authors identify a number of higher costs associated with patents that seem to offset the advantage in licensing costs. Most telling, patent disclosure may lower the time to invent around or, perhaps worse, enable infringement that triggers expensive litigation with a substantial risk of finding patent invalidity.²⁶

Landes and Posner take the substantive patent regime as a given and seek to optimize its implementation, an enterprise that seems likely to become the mainstream approach even though it is rife with the indeterminacy that devastates incentive theory. In my view, sound economics calls for change in patent policy more severe than fine-tuning.

Surprisingly, there might be a place in patent policy for a more limited conception of incentive theory, a conception that takes account of its limitations as well as the primacy of the free competition baseline. In this view, incentive theory becomes a sharp instrument of focused industrial policy, one applied to target particular goals. Patent rules might be changed to channel specific inventive activity toward green technology, cancer research, equality-inducing business methods, or other specific goals. Such targeting would introduce a qualitative dimension to economic progress. These judgments would place bets on particular social welfare consequences, political economic judgments that do not purport to serve the quantitative goal of economic growth. Thus, neither large scale nor narrow gauge cost-benefit analysis would ensue. The question would be whether the added incentive would increase the targeted inventive activity beyond the current rate. But targeted incentives would be bets and would raise difficulties of evaluation discussed above. Still, as Arrow recognized in his landmark paper, governments both here and abroad have long made these sorts of bets.

In addition to the risks of unsuccessful research and development, such judgments bring the danger of unintended consequences. One current example is the unintended anti-competitive impact of the Hatch-Waxman Act, the 1984 amendment to the Food and Drug Act that was intended to increase the incentive to produce patented drugs by extending the patent term and at the same time increase competition by opening the door to early market entry by generics manufacturers who claimed

²⁵ Landes and Posner (n 3 above) 355–6.

²⁶ Landes and Posner (n 3 above) 357.

their generics did not infringe valid patents. In actual experience, such generic filings are quickly answered with patent infringement cases filed by branded manufacturers. These cases have often produced settlements that include reverse payments of large sums from plaintiff branded pharmaceutical companies to defendant generics manufacturers in exchange for promises to keep their generic drugs off the market. Courts have approved the settlements and rejected antitrust claims of agreements in restraint of competition, finding them not only consistent with the general law that encourages settlements but also within the exclusionary rights of the contested patents. In consequence, consumers pay billions of dollars in higher prices and follow-on inventors are given the perverse incentive to invest resources that position them to litigate and settle rather than develop and commercialize generic drugs.²⁷

Certainly, patents can serve as a more focused instrument for targeted industrial policy. But even there, risks of failure and unintended consequences call for careful analysis to overcome the presumption that free competition better serves the goal of promoting progress.²⁸ While the dynamic efficiency effects of both free competition and patent rights are indeterminate, distributional effects provide a tie-breaker. Patents that actually have economic value produce monopoly prices and, with them, welfare losses in both static and dynamic terms. Not only consumers but subsequent inventors are worse off. In this light, a rule or policy that would strengthen patent rights should first be shown to promote greater progress than would otherwise occur.

C. Patent Jurisprudence: Ends, Means, Emergent Emphasis on Competition

The frailties of patent economics leave policy makers in a quandary. On the one hand, there is no economic justification for patent protection as the primary means for promoting economic growth. Indeed, the residual economics points to free competition as the presumptive means. On the other hand, the constitutional instruction remains—Congress and the judiciary must formulate patent policy to promote progress. How can policy makers advance the constitutional purpose of patent protection in light of the economics?

²⁷ See eg, RJR Peritz, 'Three Statutory Regimes at Impasse: "Reverse Payments" in "Pay-for-Delay" Settlement Agreements between Brand-Name and Generic Drug Companies' in J Drexler, W Grimes, RJR Peritz, and E Swaine (eds) *More Common Ground for International Competition Law?* (Aldershot: Edward Elgar Publishing, forthcoming 2010); CS Hemphill, 'Paying for Delay' (2006) 81 *New York U L Rev* 1553; C Shapiro, 'Antitrust Limits to Patent Settlements' (2003) 34 *RAND J Economics* 31; M O'Rourke and JF Brodley, 'An Incentives Approach to Patent Settlements' (2003) 87 *Minnesota L Rev* 1767.

²⁸ In some circumstances, including the FDA example, there is no free competition to presume; there, the question becomes one of betting that one targeted incentive is better than its alternatives.

This section takes up patent jurisprudence, whose constitutional quandary is reflected in a pair of tensions in means and ends. The tension in means has been expressed in dominant and emergent strains of the jurisprudence. While the dominant strain continues to treat patents as the primary engine for promoting progress, an emergent alternative has recognized competition as the primary engine or, at the very least, an instrumentality that deserves more recognition for its value in promoting progress. These strains parallel the tension in means earlier seen in Arrow's Trade-Off. At the same time, a second tension, this one in ends, lies entirely within the dominant approach. It is a tension between the goals of more public knowledge or more material benefits. After unravelling these tensions, the section closes by organizing the jurisprudence according to what can be called the patent life cycle. Patents are shown to move through a life cycle in three stages, each one characterized by its own mix of means and ends, and all of them driven by a fundamental commitment to competition.

The dominant approach: an internal tension in ends

The Supreme Court has long declared that patent policy is founded on an incentive theory, 'Since the primary aim of the patent laws is to promote the progress of science and useful arts, an arrangement which diminishes the incentive is said to be against the public interest.'²⁹ Last year the Federal Circuit Court of Appeals characterized an amendment to the Patent Act as a '... legislative effort to reinforce the value of the patent statute as an innovation incentive.'³⁰ Although these pronouncements might seem to be synonymous statements of patent policy, they are not. There is a subtle but significant difference between them.³¹ While the Supreme Court addressed the general enterprise of promoting progress, the Federal Circuit focused on innovation, which reflects only one aspect of progress. Innovation is not invention but rather its commercialization. The distinction between invention and innovation is important in two respects. First, because attracting investment to innovation can draw investment away from invention. Second, because a focus on innovation defines the primary form of progress as material advancement of day-to-day life through commercial development of extant invention.

Indeed, the Federal Circuit's focus on material advancement diverges from numerous statements by the Supreme Court that '... [t]he primary purpose of our patent system. ... is directed to disclosure of advances in knowledge which will be beneficial

²⁹ *Transparent-Wrap Mach Corp v Stokes & Smith Co*, 329 US 637, 646 (1947) (Douglas, J).

³⁰ *Cardiac Pacemakers, Inc v St Jude Medical, Inc*, 576 F3d 1348, 1371 (Fed Cir 2009).

³¹ There is a second subtle difference as well—note that the Supreme Court writes that '... an arrangement which diminishes the incentive is said to be against the public interest.' The Court is careful to avoid the implication that it adopted this view. This is consistent with the scepticism expressed in the text accompanying the next footnote.

to society; it is . . . an incentive to disclosure.³² In other words, patents make public new knowledge which would otherwise be hidden under the blanket of trade secrecy. The public value of new knowledge goes beyond the Enlightenment virtue of edification. It has use value for follow-on inventors—disclosure reduces the costs of competition by invention. Moreover, it accelerates the learning curve. In short, the public benefit of disclosure is the free competition that results from free riding on the patented efforts of prior inventors.³³

This divergence is embedded in the Constitution's language of promoting the 'Progress of *Science* and *useful Arts*.' A twenty-first century restatement of the constitutional language calls for promoting the progress of *knowledge* and *industrial technology*. Yet courts have seldom been asked to adjudicate the relationship between advancing knowledge and advancing the material conditions of everyday life. Here are two examples of court decisions whose outcomes turn on the choice of primary public benefit.

The first example involves a dispute between two researchers who filed patent applications for the same pharmaceutical compound. The first to file was a biochemist for a Japanese company but the first to invent was a professor at Cornell Medical School. As a general rule, patents in the United States are awarded to the first to invent. The time of invention dates back to the moment of conception. In the US patent system, the first to conceive the idea is supposed to win. It matters not who files first.

The professor should have won. But he lost. Why? The court refused to apply the standard US rule because it determined the professor did not proceed with 'reasonable

³² 'The primary purpose of our patent system is not reward of the individual but the advancement of the arts and sciences. Its inducement is directed to disclosure of advances in knowledge which will be beneficial to society; it is not a certificate of merit, but an incentive to disclosure.' *Sinclair & Carroll Co v Interchemical Corp*, 325 US 327, 330 (1945). 'The basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility.' *Brenner v Manson*, 383 US 519, 534 (1966). ' . . . the public may have the full benefit thereof, after the expiration of the patent term.' *Bonito Boats, Inc v Thunder Craft Boats, Inc*, 489 US 141, 147 (1989).

Yet the Supreme Court has long expressed some scepticism about the incentive value of IP rights. For example, in the *Marconi Wireless* case of 1943, the Chief Justice remarked—'For all I know the basic assumption of our patent law may be false, and inventors and their financial backers do not need the incentive of a limited monopoly to stimulate invention. But whatever revamping our patent laws may need, it is the business of Congress to do the revamping.' *Marconi Wireless T Co of America v US*, 320 US 1, 63–4 (1943).

Here is an economic analysis of disclosure: Patent right and its disclosure obligation present the right strategy for those inventions not adequately protected as trade secrets. In this light, patented inventions are those most likely to be disclosed anyway and so the public really gains very little if anything. Note the tension between this account and traditional norms and incentives to disclose in the scientific community, tensions exacerbated with increased propertization and thus increased incentive to withhold disclosure until the patent application is filed. Note also the patent regime's disincentives to read patents, especially intentional infringement liability for multiple damages.

³³ Of course the incentive problem re-emerges. Should patent rights be shaped to encourage publication of new knowledge or encourage internalization of pecuniary benefits?

diligence' from the time he conceived the new idea to the time he reduced it to a practical invention. In the court's view, there was unreasonable delay in his waiting for outside research funding and for his chosen graduate student to enter the programme. Confronted by a conflict between '... the interest in rewarding and encouraging invention [and] the public's interest in the earliest possible disclosure',³⁴ the court chose 'earlier disclosure over earlier invention' because it saw 'early public disclosure [as] the "linchpin of the patent system"'.³⁵ The outcome appears very European or very Japanese insofar as the first to file was awarded the patent. But the rationale reflects a uniquely American issue characterized as a conflict between the goals of advancing knowledge and advancing industrial technology.³⁶

The second example of patent jurisprudence that seeks to adjudicate this conflict of ends is even more dramatic. It is more dramatic because it involves the entire relationship between the patent and trade secret regimes, between the federal requirement of patent disclosure and the state trade secret requirement of secrecy. In the United States, the Constitution expresses a general principle of harmonization in what is called the Supremacy Clause. When a state law conflicts with federal law, the federal law prevails; the state law is unconstitutional and thus unenforceable.

In practical terms, the Supreme Court had to find a way to harmonize two regimes that had co-existed for more than 100 years; throwing out the trade secret laws of 50 states was unacceptable.³⁷ What to do? The Court characterized patent and trade secret protection as harmonious because they both encourage technological advancement. In this view, they share the same goal. As for the conflict in disclosure, the Court reduced its importance to triviality by asserting without foundation that an inventor would always choose stronger patent over weaker trade secret protection. But in some circumstances trade secrecy can provide stronger protection.

³⁴ *Griffith v Kanamaru*, 816 F2d 624 (Fed Cir 1987). More specifically, the date of invention generally relates back to the date of conception. The first inventor is the first to conceive the idea. But here, there was the unacceptable delay between the professor's conceiving the idea and his reducing it to practice. And so the reduction date was treated as the date of invention. As for the commercial researcher, there was no evidence to support either a date of conception or a date of reduction—both of them irrelevant in the Japanese as well as EU patent regimes. And so the patent filing date was used as the date of invention. The Japanese filing date preceded the professor's reduction date, each of them proxies for the date of invention.

³⁵ *Horwath v Lee*, 564 F2d 948, 950 (Crt Customs & Patent App 1977).

³⁶ Before going to my second example of the conflict between encouraging invention and encouraging its disclosure, between advancing technology and advancing knowledge, I want to take a quick look at the court's treatment of reasonable diligence. The professor's seeking necessary outside funding and awaiting the return of his graduate student do not seem unreasonable per se. Still, the court refused these typical academic reasons, stating that only personal reasons such as family illness, personal finances, or vacation time would excuse delay, even though arguments were made that outside funding was a university research policy to validate projects through outside competitions for funds. In that sense, there was no delay but rather another kind of evaluation or even competition that was going on. Without explanation, the court seemed much more approving of the commercial research environment.

³⁷ *Kewanee Oil Co v Bicorn Corp*, 416 US 470 (1974).

Indeed, market studies have found that many inventors prefer trade secret protection for reasons IP economics, including the work of Landes and Posner, has made clear.³⁸

And so the orthodox patent jurisprudence has sought to mediate a tension within the constitutional incentive logic of promoting progress, the tension in ends between advancing knowledge and improving the material conditions of life. The mediation has affected adjudication of questions both narrow and broad—our two examples, the narrow question of whom to deem the inventor of a particular product and the broad question of how to characterize the relationship between the patent and trade secret regimes. In each case, the choice of end affected the outcome, changed the circumstances of inventive enterprise, and defined the conditions of competitive activity—first in prosecuting patent applications and second in making strategic choices between patent or trade secret protection.

The emergent approach: three recent patent cases and their countenance

While the dominant approach has grappled with a conflict in ends, the constitutional logic for promoting progress has produced a second tension as well. Recent Supreme Court jurisprudence has shown signs of an approach different from the orthodoxy, an emergent approach that raises questions about patent protection as the presumptive means for promoting progress, questions that parallel those raised in IP economics. This emergent approach is more properly termed a re-emergent strain of IP jurisprudence insofar as the recent decisions summon the policy stated in Justice O'Connor's opinion some 30 years ago for a unanimous Court, the statement that there is a '... baseline of free competition upon which the patent system's incentive to creative effort depends.' In short, '... free exploitation of ideas will be the rule, to which the protection of a federal patent is the exception.'³⁹

This line between patent monopoly and free competition is drawn by the statutory requirements for patentability, most notably the requirement that a patented invention be non-obvious in light of prior art.⁴⁰ Beginning in the 1980s, the non-obviousness requirement was increasingly trivialized. For example, in 1999, the Federal Circuit Court ordered that the US Patent Office issue a patent to an applicant who decorated large black plastic garbage bags with orange pumpkin faces. The Federal Circuit declared that this combination of garbage bags and Halloween decoration, each element itself obvious, was a non-obvious combination that merited a patent.⁴¹

³⁸ See discussion accompanying n 48 below for the economic analysis of Landes and Posner on strategic choices between trade secrecy and patent protection.

³⁹ *Bonito Boats, Inc v Thunder Craft Boats, Inc*, 489 US 141, 145–7 (1989). Note that Justice O'Connor poses the baseline imagery within the orthodox view of incentive theory. But, as the first section demonstrates, the baseline metaphor itself has an economic logic that does not depend on the orthodoxy.

⁴⁰ Patent Act § 103(a).

⁴¹ *Re Dembiczak*, 175 F3d 994 (Fed Cir 1999).

In 2003, the Federal Trade Commission issued a widely praised Report criticizing patent protection's descent into triviality.⁴²

Then, in 2007, the Supreme Court published the *KSR* decision, which elevated the non-obviousness requirement for the largest category of patents, those like the Halloween garbage bag that involve combinations of prior art. The decision instructed the Patent Office to reject applications for combination that show only 'ordinary creativity'.⁴³ The Patent Office has since rejected on the ground of obviousness a number of applications for combination patents, and the courts have regularly upheld those rejections.

The Court in *KSR* took issue with the Federal Circuit's '... transform[ation of a] general principle into a rigid rule that limits the obviousness inquiry.' The patent principle holds that a combination is obvious to '... a person of ordinary skill in the relevant field' when the prior art '... demonstrate[s] a teaching, suggestion, or motivation to combine known elements' into that combination.⁴⁴ The Federal Circuit rigidified the principle '... by overemphasis on the importance of published articles and the explicit content of issued patents.' This approach failed to take account of 'common knowledge and common sense', which consider a larger body of public knowledge, including 'design need and market pressure', knowledge which seldom finds its way into the literature of prior art. Justice Kennedy observed that a '... person of ordinary skill is also a person of ordinary creativity, not an automaton'.⁴⁵ This observation brings to the fore the difficulty of separating ordinary creativity from the non-obvious type because '... inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.'⁴⁶

The practical question, then, is what to do about the great bulk of inventions that lie in the bandwidth between the obviously ordinary and the obviously non-obvious. In expanding the range of references for determining prior art, the Court in *KSR* raised the level of non-obviousness required for patentability. Now, a combination may be found obvious even without a reference in the prior art to 'teaching, suggestion or motivation to combine known elements'.

⁴² See Federal Trade Commission, 'To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy' (October 2003) <<http://www.ftc.gov/os/2003/10/innovationrpt.pdf>> accessed 2 September 2010; see also, JH Barton, 'Non-Obviousness' (2003) 43 IDEAJ L and Technology 475; Working Group on the New Economy, American Antitrust Institute, 'Antitrust and the New Economy: Comments to the Antitrust Modernization Commission, Washington, D.C.' (July 2005). <http://govinfo.library.unt.edu/amc/public_studies_fr28902/new_economy_pdf/050715_AAI-New_Economy.pdf> accessed 2 September, 2010.

⁴³ *KSR Int'l Co v Teleflex Inc*, 127 S Ct 1727, 1743 (2007) (hereinafter '*KSR*').

⁴⁴ *KSR* (n 43 above) 1741, 1742.

⁴⁵ *KSR* (n43 above) 1743 (citing *DyStar Textilfarben GmbH & Co Deutschland KG v CH Patrick Co*, 464 F3d 1356, 1367 (Fed Cir 2006)) (internal quotation marks omitted).

⁴⁶ *KSR* (n 43 above) 1741.

It should be noted that the very process of determining non-obviousness in the course of patent application is in effect a contest in ideas, a competition between prior art and the prosecuted invention. The standard is whether the invention embodies an advance in ideas that is not obvious in the light of prior art. *KSR* raises the level of difficulty for the new arrival to win this competition in ideas.⁴⁷

Given that the heightened standard will exclude a class of combination inventions that met the old standard for non-obviousness but fail the new one, what are the likely effects? Some of the newly obvious combinations, especially those involving processes, can be hidden from public view and, thus, their owners can seek trade secret protection. In this instance, public information about such combinations will be lost until the secrets are discovered. Owners of newly obvious combinations which are self-disclosing on sale or use will proceed in reliance on licensing provisions, first-mover advantages, or simply the benefits of the new combination when they outweigh the competitive costs of imitation by others. The resulting mix of secret and public combinations is an empirical question.

Moreover, there is a strategic question that sheds some light on the matter. As Landes and Posner have observed, the choice between patent and trade secret protection depends on their relative value.⁴⁸ On the cost side, patents are more expensive to obtain. And patent disclosure provides the very information rivals need to invent around more cheaply or simply infringe when that makes strategic sense. On the benefit side, a patent becomes more valuable than trade secret protection as the risk of disclosure, reverse engineering, or independent invention increases. As a general matter, the inventor is more likely to seek patent protection for inventions that are more likely to become public knowledge or otherwise legally available to rivals. Inventions whose secrecy is more readily maintained are less likely to be patented.⁴⁹

In sum, *KSR*'s heightened standard for non-obviousness increases the play of competition, either immediately by direct imitation or eventually by investigation, independent discovery, or reverse engineering. The Court has denied patent protection for inventions that reflect only 'ordinary creativity' and, in consequence, expanded access to inventions that were protected under the old rule.⁵⁰ The result is that

⁴⁷ The statutory requirement of usefulness assures that the invention is not a disembodied idea: 35 USC § 101. For further discussion of this point, see Peritz, 'Patents and Progress: The Incentive Conundrum' (n 11 above).

⁴⁸ Landes and Posner (n 3 above) 354–71. Note as well that patents are less expensive to maintain and license.

⁴⁹ In this light, the loss of public knowledge from patent publication should not be overestimated. Nor should a decline in public knowledge resulting from the heightened standard of patentability.

⁵⁰ The extent of access to competitors under the new approach deserves further comment insofar as it depends on the character of prior art embodied in the combined elements. If no elements are protected by patents still in force, then access to the new combination is entirely free and competition is simply extended. If, however, any element is still protected, then use of the new combination requires a licence from each patent holder. But no patent licence is required to practice the combination. The net effect in either case is free access to the combination and, with it, lower bargaining and licensing costs.

competitors now have free access to make, use, and sell inventions that would have been protected by combination patents under the lower level of creativity.

In a second recent patent decision, a unanimous Supreme Court in *eBay* tightened the requirement for obtaining an injunction against a patent infringer. A more stringent requirement means that infringing competitors are not so easily restrained from making, using, or selling patented inventions; instead, the remedy of compulsory licences opens competition to patent infringers who would otherwise have been excluded from the market.⁵¹

The unified Court in *eBay* once again rejected an instance of the Federal Circuit's rigid jurisprudence of expansive patent rights, this time its '... general rule that courts will issue permanent injunctions against patent infringement absent exceptional circumstances.' In rejecting this general rule, the Court held that issuance of permanent injunctions summons '... familiar principles [of equity that] apply with equal force to disputes arising under the Patent Act.'⁵² Justice Thomas' opinion for the Court provides a clear and unembellished basis for a more flexible approach,

As this Court has long recognized, 'a major departure from the long tradition of equity practice should not be lightly implied.' Nothing in the Patent Act indicates that Congress intended such a departure. To the contrary, the Patent Act expressly provides that injunctions 'may' issue 'in accordance with the principles of equity'.⁵³

While the opinion for the Court does not venture beyond the statutory text and equity doctrine to make plain the outcome, two concurring opinions offer differing policy analysis for support. Both address an issue raised in the opinion by Justice Thomas, particularly in a passage that rejected the Federal Circuit's reasoning for its general rule for issuing permanent injunctions. The Federal Circuit had concluded that the Patent Act's explicit definition of a patent as '... having the attributes of personal property', particularly '... the right to exclude others from making, using, offering for sale, or selling the invention. . . alone justifies its general rule'. Justice Thomas quoted specific statutory language that provides for the judicial discretion associated with traditional equity practice, observing that '... the creation of a right is distinct from the provision of remedies for violations of that right'.⁵⁴ The two

In all circumstances, however, the intervention of trade secret protection must be taken into account, with consequences as described in the text accompanying this footnote.

⁵¹ *eBay Inc v MercExchange, LLC*, 126 SCt 1837 (2006) (hereinafter '*eBay*'). Of course the infringing user must bear a reasonable royalty as determined by the court. This can be understood as shifting from the patent holder to the court the power to determine royalties. In consequence, the patent holder cannot hold up would-be competitors in what is typically a one-sided monopoly bargaining scenario that does not promise the efficient solution generally attributed to settlements and bargain contracts more generally, per the Coase Theorem.

⁵² *eBay* (n 51 above) 1839 (both quotations in the paragraph).

⁵³ *eBay* (n 51 above) 1839 (citations omitted).

⁵⁴ *eBay* (n 51 above) 1840 (citing 35 USC. §§ 261, 154(a)(1)).

concurring opinions assert sharply different rationales for treating the distinction between the exclusionary nature of property rights and the exclusionary remedy of injunction.

Chief Justice Roberts understood the relationship between right and remedy reflected in the statutory provisions to be reflected in a 'long tradition of equity practice' to grant injunctions 'upon a finding of infringement in the vast majority of patent cases' on account of 'the difficulty of protecting a right to *exclude* through monetary damages that allow an infringer to *use* the invention against the patentee's wishes.'⁵⁵ In sum, Justice Roberts was instructing federal judges not to stray from that 'long tradition' of recognizing patents as fundamentally property rights to exclude, rights to empower individual choice about how to practice the invention, or whether to practice it at all.

Justice Kennedy in his concurring opinion gave a diametrically opposed rationale for the Court's declaration that the statutory definition of patent as property right does not necessarily define the remedy for its violation. At the outset, Justice Kennedy rejected the Chief Justice's view that the difficulty of fully protecting patent rights with monetary damages underlies a 'long tradition' that calls for judges to conserve the property rights in patents. In sharp contrast, Kennedy's opinion looks forward rather than back. It invests the equitable nature of injunctive relief with a progressive ability to adjust to change, '[I]n many instances the nature of the patent being enforced and the economic function of the patent holder present considerations quite unlike earlier cases.' Two examples are given—first, 'industries in which firms use patents not as a basis for producing and selling goods but, instead, primarily for obtaining licensing fees'; second, 'patents over business methods', which raise significant questions of 'vagueness and suspect validity'.⁵⁶ Both examples reflect concerns that patent rights to exclude can be questionable barriers to the market entry needed for competition to flourish.

It is no accident that Justice Kennedy's source for both examples is the Federal Trade Commission report entitled 'To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy'. A balance between access and exclusion is required because experience and economics tell us that both competition and patent rights can promote innovation as well as the invention that precedes it. In this light, injunctive relief for patent infringement should not be granted, particularly to patent trolls or business patent holders, when it results in less progress than competition or compulsory licensing.⁵⁷ Justice Kennedy cautions against the dangers of excessive

⁵⁵ *eBay* (n 51 above) 1840 (joined by Justices Ruth Bader Ginsberg and Antonin Scalia) (emphasis in original).

⁵⁶ *eBay* (n 51 above) 1842 (Justice Kennedy joined by Justices Stevens, Souter and Breyer) (for all quotations in the paragraph).

⁵⁷ *eBay* (n 51 above) 1842 (based on the FTC Report).

patent protection and, with it, inadequate regard for competition as a powerful means to promote progress through innovation.

In the third recent case, the competition logic driving Justice Kennedy's concurrence emerges even more emphatically in Justice Stephen Breyer's dissent from the *Metabolite* decision. Justice Breyer's opinion questions the wisdom of dismissing the writ earlier granted in a case that addresses the fundamental patent imperative to '[e]xclude from . . . patent protection . . . laws of nature, natural phenomena, and abstract ideas.'⁵⁸

What is so important about this issue? In Justice Breyer's view, granting a 'monopoly over a basic scientific relationship' upsets a careful balance embodied in patent rights, '. . . [S]ometimes too much patent protection can impede rather than "promote the Progress of Science and useful Arts," the constitutional objective of patent and copyright protection.'⁵⁹

Justice Breyer was concerned about public access to ' . . . the basic tools of scientific and technological work' and, as such, to ' . . . part of the storehouse of knowledge and manifestations of laws of nature as free to all men and reserved exclusively to none.' The rationale for free access lies in the public policy to promote progress by encouraging 'development and the further spread of useful knowledge itself.'⁶⁰

What exactly is this careful balance embodied in patent rights? Justice Breyer incorporates it by reference to Justice O'Connor's *Bonito Boats* opinion for a unanimous Court,

The Patent Clause itself reflects a balance between the need to encourage innovation and the avoidance of monopolies which stifle competition without any concomitant advance in the 'Progress of Science and useful Arts.' . . . [T]he stringent . . . novelty and nonobviousness requirements express a congressional determination that the purposes behind the Patent Clause are best served by free competition and exploitation of either that which is already available to the public or that which may be readily discerned from publicly available material.⁶¹

Justice Breyer was reminding readers that the patent regime begins, as Justice O'Connor put it, with 'the baseline of free competition . . . [from] which the protection of a federal patent is the exception.'⁶² And so Justice Breyer concluded his opinion in *Metabolite* with references to competition policy—not only the *Bonito Boats*

⁵⁸ *Lab Corp of Am Holdings v Metabolite Labs, Inc*, 126 SCt 2921, 2922 (2006) (hereinafter '*Metabolite*') (Justice Breyer, joined by Justices John Paul Stevens and David Souter, dissenting from opinion to dismiss writ of certiorari as improvidently granted).

⁵⁹ *Metabolite* (n 58 above) 2925 (citations omitted).

⁶⁰ *Metabolite* (n 58 above) 2923 (citations and internal quotation marks omitted).

⁶¹ *Bonito Boats, Inc v Thunder Craft Boats, Inc*, 489 US 141, 146, 150 (1989) (hereinafter '*Bonito Boats*'); *Metabolite* (n 58 above) 2926 (citing *Bonito Boats* 146).

⁶² *Bonito Boats* (n 61 above) 156, 151.

decision but also the FTC Report and former FTC Commissioner Robert Pitofsky's article on antitrust and intellectual property rights.⁶³

Each of these patent cases expresses an aspect of an emergent jurisprudence—first, granting rights to exclude competitors only with respect to non-obvious inventions; second, determining the propriety of exclusionary remedies by equitable principles rather than by the property logic of patent ownership; and finally, maintaining public access to 'laws of nature, natural phenomena, and abstract ideas'. Every one of these propositions limits the exclusionary power of patent protection. Each one widens public access to inventions or to the knowledge embodied in those inventions. The result is increased weight attributed to the patent regime's internal policy of free competition as an engine to promote progress.

These recent calls to competition are not exceptional.⁶⁴ Patent monopoly has long been disfavoured in the United States. As Thomas Jefferson put it over 200 years ago, the patent system must draw '... a line between the things which are worth to the public the embarrassment of an exclusive patent, and those which are not.'⁶⁵ Indeed, the Supreme Court is currently considering a closely-watched case that presents questions posed by Justices O'Connor, Kennedy, and Breyer, questions about the scale and scope of patentable subject matter and thus the reach of exclusionary rights in information technology.⁶⁶

The patent life cycle: three stages of competition

The twin tensions reflected in the patent jurisprudence, the tensions in means and ends, resolve differently in the course of what can be called the patent life cycle. Patents move through three stages, each one comprising a technological and a legal component. Schumpeter, FM Scherer, and other economists have characterized technological change as the well-known steps of invention, innovation, and imitation or diffusion.⁶⁷ The legal component of the patent life cycle runs through the stages of patent prosecution, patent term, and patent expiry.

⁶³ *Metabolite* (n 58 above) 2929.

⁶⁴ For a recent trade dress decision that echoes Justice O'Connor's call to a baseline of competition, see *Wal-Mart v Samara*, 529 US 205, 213–14 (2000). The opinion was written by Justice Antonin Scalia, usually the Court champion of property rights and freedom of contract.

⁶⁵ 13 Writings of Thomas Jefferson (Memorial ed 1904) 335, cited in, eg, *Bonito Boats* (n 61 above) 148. This passage and others suggest the possibility that for the 18th century founding fathers, property rights had a natural incentive effect. In this view, there was no fundamental distinction between property as natural rights and as incentives.

⁶⁶ *Re Bilski*, 545 F3d 943 (Fed Cir 2008), cert. granted sub nom *Bilski v Doll*, 129 SCt 2735 (2009).

⁶⁷ 'Invention to [Schumpeter] was the act of conceiving a new product or process and solving the purely technical problems associated with its application. Innovation involved the entrepreneurial functions required to carry a new technical possibility into economic practice for the first time—identifying the market, raising the necessary funds, building a new organization, cultivating the market, etc. Imitation or diffusion is the stage at which a new product or process comes into widespread use as one producer after another follows the

During the patent prosecution stage, the claimant must persuade the patent examiner that there is an invention and that it merits protection.⁶⁸ The applicant is free to engage in innovation and further invention during prosecution. The process is confidential.⁶⁹ Diffusion of knowledge is delayed until the application and file folder are published by the Patent Office—until the patent is issued though even sooner in many cases.⁷⁰ Patent prosecution can be understood as a competition in ideas pitting the invention against the body of prior art in a contest refereed by a patent examiner according to a strict set of rules and guidelines. If the invention is useful and proper subject matter, if it is clearly described, and, finally, if it is not anticipated by the prior art, if it is not obvious, then it embodies new knowledge whose embodiment is worthy of patent protection.⁷¹ The competition in this phase of the life cycle produces the private right to exclude and what can be called the patent's public knowledge benefit.

The knowledge benefit's crucial importance to the prosecution stage can be seen in the strict requirement that the description of the invention in the patent application be clear and complete, and that it enable those reasonably skilled in the art to make and use it. The applicant must also include any additional knowledge concerning the best mode of making and using the invention. The description and enablement requirements provide two kinds of public knowledge benefit. First, the description requirement separates the idea from its embodiment, the public benefit from the private property by assuring that the applicant has reduced the idea to practice. Without a strict description requirement, there would be the danger of patenting the idea, of turning the public benefit into private property. Second, as the Supreme Court stated long ago, if the description is so vague and uncertain that no one can

innovating firm's lead.' F Scherer, *Industrial Market Structure and Market Performance* (1970) 350.

The three steps are not mutually exclusive. Indeed, they are best understood as overlapping and intertwined. Compare Peritz, 'Freedom to Experiment: Toward a Concept of Inventor Welfare' (2008) 90 *J Patent and Trademark Office Society* 245.

⁶⁸ Though the statute states that patent '... will be granted unless', in practical terms most applications are rejected initially and thus the burden falls on the applicant.

⁶⁹ In some circumstances, provisional rights to damages are available for third party use during the prosecution stage, but only after the patent has been issued. Patent Act § 154(d).

⁷⁰ 'Publication of patent applications is required by the American Inventors Protection Act of 1999 for most plant and utility patent applications filed on or after 29 November 2000. On filing of a plant or utility application on or after 29 November 2000, an applicant may request that the application not be published, but only if the invention has not been and will not be the subject of an application filed in a foreign country that requires publication 18 months after filing (or earlier claimed priority date) or under the Patent Cooperation Treaty. Publication occurs after the expiration of an 18-month period following the earliest effective filing date or priority date claimed by an application. Following publication, the application for patent is no longer held in confidence by the Office and any member of the public may request access to the entire file history of the application.' USPTO, 'General Information Concerning Patents' <<http://www.uspto.gov/web/offices/pac/doc/general/#pub>> accessed 2 September, 2010. Patent Act § 122.

⁷¹ Of course, in addition to non-obviousness, requirements of utility, novelty, and proper subject matter must be met.

tell, except by independent experiment, how to construct the patented device, the patent is void.⁷² In other words, the information must be sufficient to enable subsequent inventors to learn from the description. With less stringent requirements of description and enablement, the patent prosecution phase would produce the worst of all possible outcomes—private commercial rights to an idea and public knowledge without use value. The domain of ideas would shrivel while monopoly in commercial markets would expand.

The life cycle's second stage begins when the patent is issued. During the patent term, the owner holds a right to exclude others from using the invention for any purpose including innovation and further invention.⁷³ This right to exclude is the condition underlying the patent holder's power to license the technology and in consequence take advantage of downstream efficiencies of development, production, and distribution. Licensing the technology or otherwise using the invention is of course subject to general legal requirements and restrictions. A private right to the commercial benefits of the invention promises a public benefit—the material benefit of improved conditions of everyday life. In this stage of the life cycle, two kinds of competition are anticipated. First, the patent holder is encouraged to commercialize the invention and offer it on the market. Nonetheless, a material benefit from commercial competition is not guaranteed because the patent holder has no obligation to work the patent and even if she does, consumers might not buy it. Second, competitors have access to the new knowledge and often the invention itself, and can make practical use of it by improving or inventing around it. However, this competition by experimental use is severely restrained in the United States.⁷⁴

The third stage of the patent life cycle begins with the grant's expiry. The patent's limited term creates a further material benefit when, after 20 years in the case of a utility patent, the invention itself falls into the public domain. This reversion to public use⁷⁵ triggers a general privilege to use the invention and, in so doing, invites commercial competition by imitation that promises to lower prices and, thus, to disseminate more widely the invention's material benefits. Moreover, to the extent invention follows imitation, there is further competition in both ideas and commerce.

⁷² The Incandescent Lamp Patent, 159 US 465 (1895). The patenting of computer software raises important questions about the knowledge benefit. The description element is satisfied by language of general means that does not require publication of source code. The result is patents that are too broad and information that is too vague to be useful. My approach would not permit the current approach to software patents.

⁷³ In the United States, there is virtually an absolute ban on unlicensed experimental use. Peritz, 'Freedom to Experiment: Toward a Concept of Inventor Welfare' (n 67 above).

⁷⁴ Peritz, 'Freedom to Experiment: Toward a Concept of Inventor Welfare' (n 67 above).

⁷⁵ The public's future interest is a reversion to the transferor in the constitutional sense that patents are not common law property rights but rather statutory grants for a term of years that reserve a reversionary interest in the public.

Each stage of the patent life cycle reflects a different sort of competition, each one conditioned by the regime's rules and policies, which express resolutions of the tensions in means and ends. As discussion of the *Griffith* and *Kewanee Oil* decisions has shown, resolving the tension in ends by (not) privileging the knowledge benefit over the material benefit can have dramatic consequences. In similar fashion, taking competition as the presumptive starting point for adjudication of patent rights can also have powerful effects. For instance, in making it more difficult to obtain an injunction remedy for patent infringement, the Supreme Court in *eBay* weakened the patent holder's property right to exclude and thereby opened the market to increased competition in the second stage of the patent life cycle. Similarly, when the *KSR* decision raised the standard of non-obviousness for combination patents in the patent prosecution phase to change the conditions of competition in ideas, it effectively cut back the scope of exclusionary rights and increased commercial competition in the second stage. And when Justice Breyer in his *Metabolite* dissent explicitly called for protection of the public knowledge benefit by limiting the subject matter of patent rights, the intended effect was to change the prosecution stage's conditions for competition in ideas and thereby extend the reach of public access to subject matter that would otherwise fall under the private control of patent holders.

These recent cases present not only a common dynamic of tensions, but a common resolution. They reflect an underlying commitment to competition policy expressed in the patent regime. Their approach resonates with the political economy described in Justice O'Connor's *Bonito Boats* opinion for a unanimous Court. That is not to say this sample of opinions provides enough data to infer a new orthodoxy in patent jurisprudence, one that recognizes the illogic of an IP economics founded on incentive theory. Indeed, Justice O'Connor's opinion itself presents the baseline of free competition as the necessary condition for an incentive theory of patents. But the sample is enough to say there is an emergent strain of patent jurisprudence that reveals a preference for competition policy, an emergent strain of patent jurisprudence that converges with a residual IP economics of competition, an economics that does not depend on an unfounded incentive theory as the logic for privileging exclusionary rights to promote economic progress.

D. Patents as a Competition Regime: Some Consequences

This section concludes the chapter by suggesting some additional changes that would result from extending the patent regime's emergent jurisprudence and the residual economics of competition.

The recent Supreme Court decisions discussed offer examples of what complexity theorists call the 'butterfly effect'—a small change in initial conditions that produces a radical change in system behaviour. It takes its name from the familiar image of a butterfly in New York City's Central Park, a butterfly whose fluttering wings alter the

course of an entire weather system in the Amazon rain forest.⁷⁶ A presumptive shift in patent jurisprudence to competition policy is a small change, a change well within the traditional view that both exclusionary rights and free competition drive economic progress. The same can be said for privileging the public knowledge benefit over the material benefits anticipated from the patent regime. These changes in initial conditions are incremental, not radical. They are small but, as recent decisions demonstrate, they can effect sharp and surprising turns in patent policy.⁷⁷

Further changes, large and small, could come of this shift in initial conditions, a procedural shift in patent jurisprudence to the presumption that free competition promotes progress, a shift supported by the residual economics. Each stage of the patent life cycle would be understood as reflecting a baseline of competition, a primary commitment to the public knowledge benefit,⁷⁸ a narrowly targeted version of incentive theory, and in sum a patent policy that serves the constitutional purpose of promoting progress. Here are three further instances of such changes, the last one extended into a specific example derived from the EU *Microsoft* case.

The first involves the 'experimental use' defence to patent infringement. Almost 25 years ago, the Federal Circuit transformed unauthorized experimental use of another's patented invention into patent infringement. The rationale lay in a questionable extension of the already questionable logic of incentive theory. The court determined that a patent holder's power over the invention should extend beyond commercial profit to control of its every use. Why? The court began by attributing a 'business interest' to everyone from garage tinkerers to research scientists, a business interest that was itself seen as endangering the incentive value of patents. An unlicensed researcher could overcome this powerful presumption of a business interest only when the purpose was literally the 'idle curiosity' of a

⁷⁶ This effect can be called radical incrementalism, meaning that small differences in the initial condition of a dynamic system may produce large variations in its long-term behaviour. The concept of sensitive dependence on initial conditions was developed by French mathematician R Thom, *Structural Stability and Morphogenesis: An Essay on the General Theory of Models* (Reading, Mass: Benjamin, 1975) and was popularized later as Catastrophe Theory in EC Zeeman, *Catastrophe Theory*, (April, 1976) *Scientific American* 65. It was a precursor to Chaos Theory and Complexity Theory. On Complexity Theory and dynamic efficiency, see Peritz, 'Dynamic Efficiency' in A Cuccinotta, R Pardolesi, & R Van den Bergh (eds) *Post-Chicago Developments in Antitrust Law* (Aldershot: Edward Elgar Publishing, 2002) 108 fn 30 and accompanying text.

⁷⁷ The shift in IP economics, however, would not be perceived as small. This effect is an extreme form of the tipping phenomenon derived from mathematician René Thom's Catastrophe Theory: a sudden and irreversible change in direction from a preceding course that appeared steady and reversible. Examples include stock market volatility, fight and flight reactions to danger, and the last straw.

⁷⁸ Of course a primary commitment to the public knowledge benefit would call for reconsideration of the *Kewanee Oil* decision. For discussion, see Peritz, 'Patents and Competition: Toward a Knowledge Theory of Progress' in LM Genovesi (ed) *Intellectual Property Rights and Market Power* (2009) (selected papers from ATRIP annual conference, Parma, Italy, September 2006).

'dilettante affair'.⁷⁹ Since the doctrine's announcement, not one published decision has reported a successful 'experimental use' defence to patent infringement.

The demise of the traditional privilege to engage in unauthorized experimental use of a patented invention is another instance of the propertization trend that has been expanding IP protection in the United States. It is a particularly harmful instance because experimental use is perhaps the most important form of competition during the patent term. If unauthorized experimentation were seen instead as presumptively competitive conduct, then the patent holder would be required to prove actual commercial injury and public harm, all of which results not from imagined intentions but from actual commercial conduct, from making, using, and selling. In short, a viable 'experimental use' defence would not harm patent holders' legitimate interests in exclusive rights to commercial profit during the patent term.

Moreover, the current stranglehold on unlicensed experiment disservices the public interest in three ways. First, it in effect extends the 20-year patent monopoly by the time necessary for rivals to engage in research and development of products for offer on the market.⁸⁰ Second, the current regime empowers patent holders to control too much of follow-on research, a power inconsistent with the unlimited availability of improvement patents to all who meet the statutory requirements. Patent's open door policy for follow-on research is in sharp contrast to the Copyright Act's treatment of derivative works, whose protection is available only to the holder of the underlying copyright.⁸¹ Third, the patent holder's control over research also channels and restrains the production of new knowledge intended to replenish the public domain. More widespread competition and cooperation in research during the patent term would produce public benefits by lowering the costs, expanding the field of improvement patents, opening the production of new knowledge, limiting the patent term to its statutory boundary, and, if relevant, serving the national interest by bringing the United States in line with most of the rest of the world, to which unlicensed research activities likely immigrate to escape the harsh US regime.

My second example involves purified forms of naturally occurring substances. Product patents have been granted for them regularly since an early 20th-century decision, which affirmed a grant for the purified hormone adrenalin on the ground that it was 'a new thing commercially and therapeutically'.⁸² While this rationale emerged from a focus on commercial markets, the actual effects were much broader

⁷⁹ *Roche Prods v Bolar Pharma Co*, 733 F2d 858 (Fed Cir 1984) (citing as most persuasive precedent *Pitcairn v US*, 547 F2d 1106 (Ct Cl 1976)). This expanded view of patent rights is a natural result of viewing them through the prism of property logic.

⁸⁰ Compare *Brulotte v Thys Co*, 379 US 29, 32 (1964) (licensing agreement extending beyond patent term per se violation of federal patent law); *Pitney Bowes, Inc v Mestre*, 701 F2d 1365 (11th Cir 1983) (same).

⁸¹ The current treatment of derivative works also reflects overprotection, in this author's view.

⁸² *Parke-Davis v Mulford*, 189 F2d 95 (SDNY 1911).

because of the standard scope of protection afforded product patents in the United States—the product patent practically encompassed the very idea of purified adrenalin insofar as it included not only the product but its equivalents for all uses not only known at the time but also discovered later.⁸³

An approach beginning with the presumption of competition as patent's baseline would begin by confining the scope of protection to what was actually invented—the new process of purification and the method of using purified adrenalin. Beyond the specific process and method of use, open competition would prevail. The product and with it the idea of purified adrenalin would be freely available in the public domain.⁸⁴

In a very recent decision that has attracted attention, a federal court in New York City ruled that isolated and purified DNA was not patentable because it lacked 'markedly different characteristics' from native DNA.⁸⁵ The plaintiffs referred to the *Adrenalin* case in arguing, 'Isolated DNA molecules should be treated no differently than other chemical compounds for patent eligibility.' But the court rejected the reference by distinguishing DNA from other chemical compounds in the body—while adrenalin and other compounds necessarily convey information, DNA encodes an entirely different kind of information, not about its own molecular structure involving its own biological function but rather about its biological function of directing the synthesis of other molecules in the body. This distinction was dispositive because, in the court's view, the isolated and purified DNA carried precisely the same information as the native DNA and thus lacked 'markedly different characteristics'.

The court recognized the importance of the case in stating,

The widespread use of gene sequence information as the foundation for biomedical research means that resolution of these issues will have far-reaching implications, not only for gene-based health care and the health of millions of women facing the specter of breast cancer, but also for the future course of biomedical research.

In short, competition and cooperation in gene research would not be controlled by patent holders. Despite the court's special treatment of DNA, the same could be said

⁸³ Only patents for improved or new production processes or methods of use were possible. The result would be blocking patents.

⁸⁴ With a targeted incentive theory, the question might be whether it would be good industrial policy to support the exclusionary regime of a product patent for adrenalin and a suitably defined category of naturally occurring substances in order to channel research and development in a direction that is currently neglected under what would otherwise be a regime of open access required by free competition. Since the question would call for a judgment about industrial policy, it would be for Congress to legislate some combination of general standards and specific rules for the Patent Office, which would promulgate guidelines for its examiners, who would provide technological expertise, as they do now, according to guidelines in the prosecution stage of the patent life cycle.

⁸⁵ *Association for Molecular Pathology v US Patent and Trademark Office*, SDNY, No 09 Civ 4515, 29 March 2010.

for generally denying product patents for purified forms of all naturally occurring substances.

The last example involves the description and enablement requirement already discussed in the jurisprudence section—here, the requirement as it applies to computer software. Ten years ago the Federal Circuit Court declared that a general functional description satisfies the requirement⁸⁶ for software patents. The practical consequence of these cases is lack of adequate description and enablement. The description is insufficient to assure that the claimant actually ‘has possession’ of the invention rather than simply a general idea about its function. Moreover, enabling a skilled programmer to make or use the software would require flow charts, source code, and the detailed descriptions that annotate modules, descriptions that computer programmers customarily include as documentation for others who subsequently need to understand, change, or fix the source code. Both protocols⁸⁷ and programmer comments are embedded in source code listings, while protocols also appear in software documentation. Why is a general functional description enough for the Federal Circuit Court and, thus, for the Patent Office though it does not meet industry standards? Because, according to the court, conversion of functional description into source code is ‘a mere clerical function to a skilled programmer’.⁸⁸

The court’s rationale rings hollow for anyone who has actually designed or written operating systems or complex applications software. Indeed, no judge sitting on the Federal Circuit could have taken the stated view after having any actual experience in the field. The author of this chapter spent some years designing and writing such software, and the experience evidences the reality that conversion of systems design specifications to source code is often challenging work that involves much more than mere clerical function. Nonetheless, the Federal Circuit in its nescience requires only a general description of the software process.

While general information about software function has some limited value, its satisfaction of the patent disclosure requirement creates two problems. First, general claims and descriptions produce software patents that are too broad and, as a result, foreclose too much competition as functional equivalents. This problem includes treatment of business method inventions, which are typically embodied in software. Second, there is insufficient information flow for subsequent inventors. The combination is deadly—broad patent rights and little public information about them. This situation is exacerbated by the acknowledged difficulty in locating and identifying prior art in the category of computer software.

⁸⁶ Patent Act § 112. The court acknowledged that more might be required in special cases.

⁸⁷ A protocol is a standard procedure and format that two computers or other devices must understand, accept, and use in order to communicate with one another. Examples include network log on procedures and html format.

⁸⁸ *Northern Telecom, Inc v Datapoint Corp*, 908 F2d 931, 942 (Fed Cir 1990) (citing *Re Sherwood*, 613 F2d 809, 817 fn 6 (CCPA 1980)).

If the patent regime is intended to encourage learning from prior art and thereby foster competition by invention, the level and quality of information must be improved. The current requirement of a general process description requires only a low level of information and, in consequence, erects a barrier to further invention, a barrier that benefits the patent holder by keeping rivals out, rather than an information flow that benefits society by enabling others to improve and surpass the invention.

Moreover, a surprising anomaly arises—despite the patent requirement of disclosure, specific code modules in patented software can be protected as trade secrets. The patent requirement of disclosure and anomaly of trade secrecy in its midst can co-exist because of the Federal Circuit's general description requirement. Recognizing the public knowledge benefit of competition in ideas during the prosecution stage of the patent life cycle would call for a more demanding description and enablement standard for computer software. The change would call for disclosure of the source code and system documentation that industry practices recognize as needed to enable subsequent work on the software.

Moreover, in the broader ambit of innovation policy, a proper patent requirement to disclose would obviate the need for antitrust litigation to resolve some issues of interoperability and disclosure through compulsory licensing of patented software. The EU *Microsoft* antitrust case provides a handy example because it involved computer software for which Microsoft asserted patent and trade secret protection as defences to antitrust liability for refusals to disclose information rivals needed for the continued interoperability of their software with Microsoft WINDOWS for PCs. How would the analysis of IP claims proceed if antitrust were no longer seen as the sole source of a conflicting competition policy? And if patent policy were no longer seen as driven exclusively by property rights to exclude competitors? Instead, let's look at policies of exclusion and access not in opposition to one another, not in antithetical domains of patent and antitrust, but rather in a joint venture to set the conditions for relationships of competition and cooperation.⁸⁹

⁸⁹ Wesley Hohfeld made the fundamental point that property rights can be best understood as relations between persons with respect to a thing rather than between a person and a thing. W Hohfeld, 'Some Fundamental Legal Conceptions as Applied in Judicial Reasoning' (1923) 23 Yale LJ 16; JW Singer, 'The Legal Rights Debate in Analytical Jurisprudence from Bentham to Hohfeld' (1982) Wisconsin L Rev 975. This chapter takes up this well-known relational conception of property rights and extends it to competition and cooperation. The extension is indebted to the voluminous literature about the interplay between competition and cooperation—whether literature relating directly to innovation and efficiencies or more broadly throughout the social and management sciences. Much of the literature is informed by game theory, from the simple prisoners' dilemma to complex multi-layered iterative games. For a brief introduction to a game theory approach to parallel commercial conduct, see Peritz, 'Doctrinal cross-dressing in derivative aftermarkets: Kodak, Xerox and the copycat game' (2006) 51 Antitrust Bulletin 287 and sources cited therein.

In the actual *Microsoft* case, the Court of First Instance (CFI), now the General Court, affirmed the Commission judgment that Microsoft abused its dominant position in the market for PC operating systems by leveraging WINDOWS' dominance into the market for work group server operating systems. The CFI concluded that Microsoft wrongfully applied this leverage in refusing to disclose to rivals in the server market information they needed for continued interoperation with work group PCs running WINDOWS.⁹⁰ The information included interface protocols and an 'Active Directory' ('Directory'), which organized the protocols in an arguably original way that allowed Microsoft's server software to interoperate smoothly and efficiently with WINDOWS. Microsoft claimed that patent and trade secret protection allowed them to deny access to this information.⁹¹

The CFI began its analysis by resolving what it treated as a conflict between competition policy and intellectual property rights. The conflict was resolved as follows—first, the Court simply assumed that Microsoft had patent and trade secret protection of the protocols and the Directory, despite some hesitation over the strength of the claims. Second, the Court affirmed the Commission's determination that, under exceptional circumstances, competition policy can trump patent and trade rights. The exceptional circumstances turned on the question of access to an indispensable asset controlled by a dominant firm, here WINDOWS protocols controlled by Microsoft. The protocols were deemed an essential facility for competition in the market for server operating system software. The CFI concluded that in the special circumstances competition policy trumped Microsoft's exclusionary rights in the absence of objective justification. It followed that the proper remedy was a decree compelling Microsoft to disclose the information to their competitors.

The effect was a sharp change in the competitive and cooperative relationships between Microsoft and its rivals. Until the decision, both competition and cooperation were restrained by Microsoft's asserted property rights to refuse disclosure of interoperability information, an exclusionary right asserted under the aegis of trade secret and patent ownership. As is often the case, competition on the merits was not possible without some cooperation between participants. The CFI decision applied the competition

⁹⁰ The case also involved distribution of WINDOWS MEDIA PLAYER. As Professor Steven Anderman put it, four threads run through the CFI analysis:

'(1) The significance of the findings of "indispensability" of the interface protocols to interoperability in the "second market." (2) The significance of the finding that there was a "risk" of elimination of competition in the second market. (3) The "exceptional circumstances" in which competition law will find that a refusal to license an IPR will be an infringement of Art. 82 [now Article 102 TFEU]. (4) The finding of an absence of objective justification.' Anderman, Pro-Consumer Efficiencies in Antitrust Law and Practice (26 October 2007) LUISS University, Rome.

⁹¹ Case T-201/04 *Microsoft v Commission* [2007] ECR II-3601 (interoperability protocols for some front-end server software) (*Microsoft*); see also, *Lockwood v American Airlines, Inc*, 107 F3d 1565 (Fed Cir 1997).

policy of the then Article 82 EC (now Article 102 TFEU) to compel Microsoft to cooperate with rivals in order to allow competition on the merits of the server software rather than on the advantage derived from Microsoft's ownership of exclusive access to an essential component in PC networks comprising numerous components.

So much for EU competition policy and exclusionary rights. In the US, the outcome would have been in doubt. First, the Supreme Court has in effect gutted essential facility doctrine as a basis for antitrust liability. Second, turning on its head the EU view, patent rights trump US antitrust policy. And third, as a general matter, US courts are indisposed toward granting compulsory licences, seeing them as insults to the institution of private property. In sum, US antitrust is a weak voice for expressing competition policy.⁹²

Now comes the emergent view of the US patent domain as a distinct competition regime and, in consequence, a more rigorous requirement of description and enablement. How would this play out on the bare-bone facts of the EU *Microsoft* antitrust case?⁹³

As already discussed, the current description and enablement requirement for computer software calls only for a general description of the process. And so Microsoft is not currently required to specify the protocols or the Directory. In short, the information would likely be secret. But if the requirement were reformulated in consonance with the emergent view, then both the protocols and the Directory would be disclosed—the protocols as necessary to enable skilled practitioners to use the software and the Directory as reflecting the protocols' best mode of use.⁹⁴

A more demanding description and enablement would have two effects. First, it would improve the information flow during the patent term, the public knowledge benefit expected from the prosecution stage's competition in ideas. Second, it would define more clearly and more narrowly the metes and bounds of the patent monopoly. In relational terms, it would expand the patent holder's obligation to cooperate with rivals and other interested parties, a third party obligation enforced during the prosecution stage of the patent life cycle. As a result, it would change the conditions of competition during the patent term by having given rivals the information needed

⁹² See, eg, RJR Peritz, 'The Microsoft Chronicles' in L Rubini (ed) *Microsoft on Trial: Legal and Economic Analysis of a Transatlantic Antitrust Case* (Aldershot: Edward Elgar Publishing, forthcoming 2010); Peritz, 'Microsoft e il flusso di informazioni' (2007) 9 *Mercato, Concorrenza, Regole* 523 (Italian translation by Andrea Giannaccari).

⁹³ For an expansive introduction to patent, copyright, trade secret, and trademark as competition regimes, see Peritz 'Competition Policy and its Implications for Intellectual Property Rights in the United States' (2006) (n 4 above).

⁹⁴ For a demanding approach to the description requirement, see *The Gentry Gallery v The Berklene Corp*, 134 F3d 1473 (Fed Cir 1998). For criticism, see *Moba v Diamond Automation, Inc*, 325 F3d 1300, 1323 (Fed Cir 2003) (Rader, J, dissenting).

to compete on the merits. In sum, the relational changes would track those of the CFI decision in the EU *Microsoft* decision.

But the relational changes would not be identical. First, the patent resolution would require no litigation for disclosure. Second, it would involve no licensing, no judicial oversight, and thus no licensing fee, no bargaining or other transaction costs. Third, however, the use value of the information would depend on the scope of experimental use permitted. In the United States, the use under current law is for all practical purposes forbidden. But with a viable experimental use doctrine properly understood as competition during the patent term, experimentation short of commercial use would be permitted. Finally, unlike the compulsory licence in the EU case, patent disclosure of the Directory as the best mode of organizing the protocols would not necessarily permit its commercial use. Certainly second comers could use the protocols commercially because they lack invention; but if the Directory is a non-obvious invention, patent rights would block its commercial use. Here, the patent regime's compelled cooperation between Microsoft and its rivals should not include commercial use of the Directory, if determined a non-obvious invention, because commercial competition on the merits is possible without access. Indeed competition in the development of more efficient or otherwise superior protocol organization in other directories holds the promise of technological progress.

This final example has shown how the patent regime can be understood as an instrument of economic progress that shapes relationships of competition and cooperation. The analysis begins with the presumption that free competition promotes economic progress. Any policy or adjudication that would expand the scale or scope of patent rights requires evidence of its progressive value. What justifies this shift from the current patent regime's presumption that exclusionary rights promote progress? It begins with recognition of a policy stalemate that derives from the indeterminacy of incentive theory as the basis for preferring either patent protection or free competition as the superior engine of progress. This stalemate is broken by free competition's superior distributional effects, superior because competition generates more allocatively efficient outcomes and, with them, conditions more conducive to future inventive activity. At the same time, recent Supreme Court jurisprudence reflects an emergent strain of patent doctrine that recognizes an internal competition policy—what an earlier decision by a unanimous Court called 'a baseline of free competition'. More broadly, adopting a baseline of competition would change the current US view of IP and antitrust as antithetical regimes, as a binary opposition between monopoly and competition, between exclusion and access. What would emerge is a more progressive and more functional view of IP and antitrust as two intertwined regimes comprising policies of both exclusion and access, two sets of rules and policies that set the conditions for relationships of competition and cooperation to promote the progress of knowledge and industrial technology.

Conclusion

This chapter has sketched the orthodox view of the patent regime as founded on exclusionary rights to promote progress, its jurisprudence, and its dependence on a failed incentive theory, as well as an emergent view expressed in the jurisprudence and in a residual economics that converge to support the reconceptualization of patent protection as a competition regime. The emergent jurisprudence echoes an opinion by Justice Sandra Day O'Connor written some 20 years ago for a unanimous Supreme Court, an opinion that described the foundation of patent policy as a 'baseline of free competition'.

While the chapter adopts the baseline of free competition, it otherwise diverges from Justice O'Connor's opinion insofar as the chapter's ensuing analysis reflects the failure of incentive theory as the economic logic for patent protection, a failure that is not acknowledged in the opinion or in today's mainstream jurisprudence. Still there is a residual economic logic that is surprisingly straightforward despite its absence in the mainstream literature: while the dynamic efficiency effects of both free competition and patent rights are indeterminate, their distributional effects point toward free competition. Why? Because patents that actually have economic value produce monopoly prices and, with them, welfare losses in both static and dynamic terms. In consequence not only consumers but subsequent inventors are better off under a regime of free competition because it gives inventors open access to new information. The result is improved conditions for subsequent invention. In this light, a rule or policy that would strengthen patent rights should first be shown to promote greater progress than would otherwise occur. Yet patent protection can serve the public interest as a sharp instrument for targeted industrial policy though it fails as a magic potion for promoting economic progress. But even with patents as sharp tools of industrial policy, risks of failure and unintended consequences call for careful analysis to overcome the presumption that free competition better serves the public interest.

The longest series of studies developed interview data from senior executives in the research and development departments of commercial firms. Five studies between 1959 and 2001 all reached the same conclusion: The prospect of patent protection was typically a factor of third or fourth order importance to research and development decisions, with the exception of the drug industry and perhaps chemicals. Still, it must be understood that these studies investigated only the private value of patents; neither public benefits nor public costs were addressed.

Other recent studies *have* inquired into the public benefits by looking at the relationship between changes in patent protection and changes in research and development expenditures. Japanese and US studies found the data inconclusive. One study across 29 countries found a mild positive correlation and another across 60 countries found a weak negative one. Moreover, the findings have been mixed in studies of statistical correlation between patent protection and the ultimate economic goal of increasing growth.

A rare statistical study of copyright protection has just been published. Relying on data from 1870 to 2006, the authors conclude, 'Despite the logic of the theory that increasing copyright protection will increase the number of copyrighted works, the data do not support it.'¹⁸

In sum, the empirical literature on the public benefits of patent and copyright is at best inconclusive.¹⁹ This brings us full circle back to the theoretical impasse that preceded it. Small wonder, then, that so many policy makers in the United States have taken the fall-back position, the mistaken focus on the means itself—on maximizing IP protection in the erroneous belief that progress will be maximized as a natural result.

¹⁸ RSR Ku, J Sun, Y Fan, 'Does Copyright Law Promote Creativity? An Empirical Analysis of Copyright's Bounty' (2009) 62 *Vanderbilt L Rev* 1669.

¹⁹ Regardless of findings, all the empirical work confronts methodological difficulties. Here are two. First, the variables used are controversial. The uses of patent counts, citations, or renewal rates as measures of technological progress have all been criticized, as has the use of research and development expenditure data. Simply counting patents, or copyright registrations for that matter, does not take into account differences in their importance and social value. And more R&D spending does not necessary lead to more or better inventions.

There is a second methodological difficulty—the intractable problem of disentangling patent or R&D data from other sources of economic growth, sources including trade secrets, improved technical education, or increased production, to name a few. A noted American legal scholar put the general methodological problem this way, 'If a state of affairs is the product of n variables, and you have knowledge of or control over less than n variables, if you think you know what's going to happen when you vary "your" variables, you're a booby.' A Leff, 'Economic Analysis of Law' (1974) 60 *Virginia L Rev* 451 (comparing the first edition of Richard Posner's *Economic Analysis of Law* to Cervantes' *Don Quixote*). 'Booby' denotes a stupid person.