

CBA AT THE PTO

JONATHAN S. MASUR†

ABSTRACT

What are the costs and benefits of patent laws? While Congress and the courts are often able to evade this difficult question, there is one institutional actor that is not only well-advised but also required to consider costs and benefits: the Patent and Trademark Office, which—as an administrative agency—is required by executive order to conduct cost-benefit analysis of all economically significant regulations. Yet the agency’s efforts have been less than satisfactory. In its cost-benefit analysis, the PTO overlooks crucial functional considerations, misunderstands basic precepts of patent economics, and resists quantification when quantification is required. In combination, these shortcomings suggest that the PTO has not correctly measured the social costs and benefits of the rules it creates, in part because it has adopted an overly limited view of the welfare effects of intellectual property and the agency’s own role in promoting or discouraging IP. In other instances, the PTO has promulgated rules that will likely have tremendous economic significance without recognizing their importance or conducting a cost-benefit analysis. These errors cast doubt on whether the PTO’s regulations will increase or diminish social welfare. Before the PTO is granted any additional substantive authority, reform will be necessary.

TABLE OF CONTENTS

Introduction	1702
I. Cost-Benefit Analysis: A Brief Primer	1705
II. The PTO’s Fee-Setting Rule	1707
A. The Rule’s Framework	1708
B. Patent Costs and Benefits	1709
1. <i>PTO Operation Costs</i>	1710

Copyright © 2016 Jonathan S. Masur.

† John P. Wilson Professor of Law and David & Celia Hilliard Scholar, University of Chicago Law School. I thank Rochelle Dreyfuss, John Golden, Stuart Graham, Daniel Hemel, Judge Kimberly A. Moore, Jennifer Nou, Lisa Ouellette, Eric Posner, Arti Rai, and participants in the 2016 *Duke Law Journal* Administrative Law Symposium for helpful comments, Kevin Wang for excellent research assistance, and the David and Celia Hilliard Fund for support.

2. <i>The Benefits and Costs of More and Faster Patents</i>	1710
C. Qualified vs. Quantified Benefits.....	1718
III. Errors of Omission: The PTO's Procedural Rules	1722
IV. Cost-Benefit Analysis of Patent Rules.....	1727
A. Costs and Benefits, in Theory.....	1727
B. Calculating Costs and Benefits.....	1728
Conclusion.....	1734

INTRODUCTION

What are the costs and benefits of changes to the rules governing patents? This question would seem crucial to sound stewardship of the patent system, whether that stewardship is undertaken by courts, Congress, or the Patent and Trademark Office (PTO). Yet it is surprisingly difficult to answer with any accuracy. Not only are the dynamic effects of patents complex and challenging to measure empirically,¹ but there is often wide theoretical disagreement as well.² Accordingly, it is not surprising to see Congress and the courts proceeding with legal reform without a full understanding of the new patent rules' costs and benefits. Neither institutional body typically attempts to understand or calculate costs and benefits before making law.³ In the case of courts, many judges (and commentators) believe that consideration of costs and benefits is outside of, or even inimical to, the judicial role.

However, there is one institutional actor that is not only well-advised but also *required* to consider costs and benefits: the PTO. In 1981, President Reagan mandated by Executive Order that all administrative agencies perform cost-benefit analysis (CBA) of all “economically significant” regulations that they issue.⁴ That mandate has remained in force across every subsequent presidential administration.⁵ An “economically significant” rule is one that creates an economic impact of at least \$100 million.⁶ Of course, one might

1. See Lisa Larrimore Ouellette, *Patent Experimentalism*, 101 VA. L. REV. 65, 75–77 (2015).

2. See Tom Nicholas, *Are Patents Creative or Destructive?*, 79 ANTITRUST L.J. 405, 405–06 (2014).

3. See Jonathan S. Masur, *Regulating Patents*, 2010 SUP. CT. REV. 275, 276–78 (2011).

4. Exec. Order No. 12,291, 3 C.F.R. 127 (1982).

5. See Exec. Order No. 12,866, 3 C.F.R. 638 (1994) (Clinton); Exec. Order No. 13,563, 3 C.F.R. 215 (2012) (Obama).

6. 3 C.F.R. 638, 641.

suppose that major rules rarely, if ever, emanate from the PTO. The PTO is not typically considered a source of important administrative regulations. Unlike canonical administrative agencies such as the Environmental Protection Agency (EPA), the PTO lacks the power to promulgate substantive rules of law through regulation.⁷ For this reason, it is widely assumed that whatever rules the PTO produces must be insignificant, and those rules have received little attention.

The PTO does, however, produce regulations, many of which could significantly impact the shape of patent law and the types of patents granted, despite the fact that they are not “substantive” legal rules in the typical sense. Of particular importance are the PTO’s rules setting patent application fees.⁸ These rules affect the number and types of patent applications filed with the PTO, and thus the number and types of patents the agency will grant. In fact, the PTO deemed its fee-setting regulations economically significant, triggering the agency’s obligation to conduct cost-benefit analysis.⁹ This cost-benefit analysis provides a window into the PTO’s own perceptions of the costs and benefits of intellectual property and the ways in which it believes its actions will affect social welfare. The picture that emerges is disquieting.

Although the PTO deserves commendation for attempting CBA in such a complex field, its analysis is deeply flawed in several respects. It overlooks crucial functional considerations, misunderstands basic precepts of patent economics, and resists quantification when quantification is required (though surely difficult). In combination, these shortcomings suggest that the PTO has not correctly measured the social costs and benefits of the rules it creates, in part because it has adopted an overly limited view of the welfare effects of intellectual property and the agency’s own role in promoting or discouraging IP.

In other cases, the PTO has promulgated rules that will likely have tremendous economic significance without recognizing their importance. One example is the set of rules governing patent office

7. Masur, *supra* note 3, at 279. At the same time, some commentators see the PTO as being heavily involved in making patent law via formal adjudication. See, e.g., Melissa F. Wasserman, *The Changing Guard of Patent Law: Chevron Deference for the PTO*, 54 WM. & MARY L. REV. 1960, 1978 (2013).

8. Setting and Adjusting Patent Fees, 78 Fed. Reg. 4212 (Jan. 18, 2013).

9. U.S. PATENT & TRADEMARK OFFICE, REGULATORY IMPACT ANALYSIS, SETTING AND ADJUSTING PATENT FEES IN ACCORDANCE WITH SECTION 10 OF THE LEAHY-SMITH AMERICA INVENTS ACT, FINAL RULE 3 (2013).

procedures, including the procedures for *inter partes* Review (IPR), Post-Grant Review (PGR), and Covered Business Methods (CBM).¹⁰ Although the PTO seems to think of these rules as mere procedural housekeeping, early experience has already demonstrated that even small procedural adjustments can have enormous legal and economic impacts. Had the PTO properly understood the law and economics of patents and the role its own procedures play in promoting or diminishing innovation, the significance of these procedural choices would have been made clear. The agency must adapt its CBA procedures to account for its central role in patent policy.

Finally, numerous scholars have called on Congress to afford the PTO substantive rulemaking authority over patent law, much as agencies ranging from the EPA to the Department of Energy possess substantive rulemaking authority over the areas of law they oversee.¹¹ If the PTO were ever granted such authority, it would have to dramatically expand and improve its cost-benefit processes and procedures. This would be a difficult but not impossible task and could yield valuable information regarding the innovation economy.

This Article proceeds in four Parts. The first Part briefly describes the history and practice of cost-benefit analysis. The second Part analyzes and critiques the PTO's cost-benefit analysis of its fee-setting regulations. The third Part explores the PTO's procedural rulemaking and discusses the economic impact of the PTO's procedural rules, as well as the reasons why the PTO appears to have underestimated that impact. In the fourth Part, the Article closes by theorizing as to how the PTO might expand and improve its cost-benefit practices to accommodate cost-benefit analysis of major substantive legal rulemaking.

10. Patent and Trademark Office, Changes to Implement Inter Partes Review Proceedings, Post-Grant Review Proceedings, and Transitional Program for Covered Business Method Patents, 77 Fed. Reg. 48,680 (Aug. 14, 2012).

11. See Stuart Minor Benjamin & Arti K. Rai, *Who's Afraid of the APA? What the Patent System Can Learn from Administrative Law*, 95 GEO. L.J. 269, 272 (2007) (suggesting that standard administrative law principles should govern PTO activities); John M. Golden, *Patentable Subject Matter and Institutional Choice*, 89 TEX. L. REV. 1041, 1097–1111 (2011); Masur, *supra* note 3; see generally Stuart Minor Benjamin & Arti K. Rai, *Fixing Innovation Policy: A Structural Perspective*, 77 GEO. WASH. L. REV. 1 (2008) (proposing a centralized innovation-focused agency).

I. COST-BENEFIT ANALYSIS: A BRIEF PRIMER

Cost-benefit analysis is a technique developed by economists in the middle of the twentieth century for measuring the economic benefits and harms of a given law, policy, regulation, or project.¹² As the name indicates, a policymaker employing cost-benefit analysis calculates the expected benefits and costs of a policy or project, typically in monetary terms. The policymaker should then pursue only projects whose benefits will exceed their costs, and ideally those projects that will maximize benefits net of costs. Cost-benefit analysis first became part of the administrative state in 1981, when President Reagan mandated by executive order that agencies perform cost-benefit analysis before promulgating major regulations.¹³ That mandate has been maintained by every president since Reagan, including Presidents Clinton¹⁴ and Obama.¹⁵

Proponents have offered a number of justifications for cost-benefit analysis, but the most persuasive is that it operates as a welfarist decision procedure.¹⁶ That is, cost-benefit analysis provides substantial information regarding whether a given policy will increase or decrease social welfare. It does not offer a complete answer, because CBA typically measures costs and benefits in monetary terms.¹⁷ For example, if a proposed regulation would save 100 lives but require the installation of an expensive piece of equipment, CBA would require a policymaker to place monetary values on the lives saved and the cost of installing the equipment, and then compare the two. Accordingly, cost-benefit analysis is best understood as

12. See Jonathan S. Masur & Eric A. Posner, *Unquantified Benefits and the Problem of Regulation Under Uncertainty*, 102 CORNELL L. REV. (forthcoming 2016) (manuscript at 7), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2646063 [<https://perma.cc/ZNW7-P9ZU>] (describing the history of cost-benefit analysis and the administrative state); ORG. FOR ECON. COOPERATION & DEV., COST-BENEFIT ANALYSIS AND THE ENVIRONMENT: RECENT DEVELOPMENTS 16, <http://www.oecd.org/greengrowth/tools-evaluation/36190261.pdf> [<http://perma.cc/QAY3-ZB95>] (last visited on Jan. 15, 2016) (describing the history of cost-benefit analysis).

13. Exec. Order No. 12,291, 3 C.F.R. 127 (1982).

14. Exec. Order No. 12,866, 3 C.F.R. 638 (1994).

15. Exec. Order No. 13,563, 3 C.F.R. 215 (2012); see also John Bronsteen, Christopher Buccafusco & Jonathan S. Masur, *Well-Being Analysis v. Cost-Benefit Analysis*, 62 DUKE L.J. 1603, 1606 (2013) (noting the failings of traditional cost-benefit analysis and proposing an alternative well-being based analysis).

16. MATTHEW D. ADLER & ERIC A. POSNER, NEW FOUNDATIONS OF COST-BENEFIT ANALYSIS 62 (2006).

17. Bronsteen et al., *supra* note 15, at 1612.

measuring whether a given policy or regulation is efficient—whether it will increase wealth, rather than welfare. For this and other reasons, cost-benefit analysis has been widely criticized.¹⁸ In response, CBA’s defenders have argued persuasively that policies based on cost-benefit analysis will produce greater social welfare over the long run than policies that are not put to a cost-benefit test or are based on an inferior substitute.¹⁹ Most importantly, this normative back-and-forth has not shaken CBA’s position in the administrative state. Cost-benefit analysis is firmly entrenched and shows no signs of relinquishing its position.

The Patent and Trademark Office is a branch of the Department of Commerce. As an executive-branch agency, it operates subject to executive orders mandating cost-benefit analysis of all regulations with an annual economic impact of at least \$100 million.²⁰ However, unlike agencies such as the EPA that have been regulating and performing cost-benefit analyses for years, the PTO is a relative newcomer to the process. The PTO has not typically possessed significant rulemaking authority and thus has had little reason to perform CBA in the first place. That changed to some extent with the 2011 America Invents Act (AIA),²¹ which vested the PTO with authority over its own fees and several new administrative processes (in addition to other legal changes).²² The result was a suite of new PTO regulations. The following Parts analyze two of those regulations—one that involved a CBA, and one that did not. The

18. See generally, e.g., FRANK ACKERMAN & LISA HEINZERLING, PRICELESS: ON KNOWING THE PRICE OF EVERYTHING AND THE VALUE OF NOTHING (2004) (arguing that cost-benefit analyses have been used to justify bad policies, particularly in the healthcare and environmental regulation contexts).

19. See, e.g., ADLER & POSNER, *supra* note 16, at 6; Matthew D. Adler & Eric A. Posner, *Rethinking Cost-Benefit Analysis*, 109 YALE L.J. 165, 225–38 (1999); Cass R. Sunstein, *Cognition and Cost-Benefit Analysis*, 29 J. LEGAL STUD. 1059, 1060 (2000); see generally RICHARD L. REVESZ & MICHAEL A. LIVERMORE, RETAKING RATIONALITY: HOW COST-BENEFIT ANALYSIS CAN BETTER PROTECT THE ENVIRONMENT AND OUR HEALTH (2008) (arguing that uniform use of cost-benefit analysis throughout the administrative state will result in more efficient and fair regulations); Jonathan S. Masur & Eric A. Posner, *Against Feasibility Analysis*, 77 U. CHI. L. REV. 657 (2010) (arguing that cost-benefit analysis is superior to feasibility analysis).

20. Exec. Order No. 12,866, 3 C.F.R. 638 (1994).

21. Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 10, 125 Stat. 284, 316–17 (2011) [hereinafter AIA].

22. The other most significant legal change enacted by the AIA was to switch the United States from a “first to invent” patent system to a “first to file” system. See 35 U.S.C. § 102 (2012).

PTO's use of cost-benefit analysis, and even the explanation for its decision *not* to use cost-benefit analysis, shed significant light on how the agency understands patents' benefits and harms for innovation and society.

II. THE PTO'S FEE-SETTING RULE

The AIA gave the PTO the power to set its own fees for the first time in the agency's history.²³ Pursuant to this authority, and after engaging in notice-and-comment rulemaking, in 2013 the agency promulgated a major rule setting fees for the myriad services it provides to patent applicants and owners.²⁴ Applicants file hundreds of thousands of patents each year, and each filed patent generates thousands of dollars in fees (if not tens of thousands).²⁵ The total amount of money collected by the PTO is substantial. The PTO estimated that it would collect approximately \$14 billion in fees from private parties between 2013 and 2017, the five years covered by the rule.²⁶ Because of the large amount of money at stake, the PTO deemed the rule a "significant regulatory action," which triggered its obligation to conduct cost-benefit analysis.²⁷ So far as can be determined, this was the first full-scale cost-benefit analysis the PTO has ever conducted. It thus provides a unique opportunity to examine the PTO's own conception of the social and economic effects of patents and how it understands the benefits and harms of its legal choices.

The PTO is to be commended for its efforts to produce a reliable cost-benefit analysis, especially considering that this was its first effort. Nonetheless, as this Part will explain, the PTO's CBA includes two fundamental errors, which render it essentially useless as an indication of the actual costs and benefits of changes in patent rules. First, the PTO seems to have adopted an extraordinarily narrow view of patents' costs and benefits, overcounting and undercounting benefits and costs in a variety of ways. At bottom, it is not clear that

23. AIA § 10.

24. Setting and Adjusting Patent Fees, 78 Fed. Reg. 4212 (Jan. 18, 2013).

25. See U.S. PATENT & TRADEMARK OFFICE PATENT TECH. MONITORING TEAM, U.S. PATENT STATISTICS CHART, CALENDAR YEARS 1963–2014; Setting and Adjusting Patent Fees, 78 Fed. Reg. at 4218 tbl.2.

26. Setting and Adjusting Patent Fees, 78 Fed. Reg. at 4213.

27. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 3; Exec. Order 12,866, 3 C.F.R. 638 (1994).

the PTO even understands how patents produce social costs and benefits. Second, the PTO did not quantify any of the costs and benefits of its rule, choosing instead to report only “qualitative” costs and benefits. It is easy to sympathize with the agency’s decision. Quantifying the costs and benefits of changes to patent rules is a devilishly difficult exercise, as the agency itself acknowledges. However, in several instances the failure to quantify leaves the PTO entirely at sea when deciding between two similarly structured fee schedules. It is thus impossible to have any confidence that the PTO has chosen the optimal fee rules, even among the few alternatives it considered.

A. *The Rule’s Framework*

The PTO’s fee-setting decisions were driven by two competing considerations. First, the agency hoped to accomplish a number of substantive goals, most importantly (1) encouraging innovation, while (2) improving its own operations, and in particular decreasing the time it takes the agency to review and examine patent applications.²⁸ Second, the PTO is required to fully fund its own operations through the fees it collects. Accordingly, the agency needed to set its fees so that the revenue it collects would fully cover the costs of examining the patent applications it receives.

The PTO imposes dozens of different fees, from \$23,000 for requesting IPR to \$40 for registering a patent assignment (sale) by nonelectronic means.²⁹ For present purposes, however, there were only two design choices of great consequence. First was the PTO’s decision to raise initial application fees—the suite of fees it charges patent applicants when they first submit patent applications—but nonetheless hold them below the PTO’s costs. The PTO raised initial application fees from \$1260 to \$1600—an increase of 27 percent—but kept them well below the PTO’s own costs of examining a newly filed patent.³⁰ The PTO’s second design choice was made to fill this budget shortfall: it raised patent renewal fees—the fees that patent owners must pay after 3.5, 7.5, and 11.5 years if they wish to keep their patents valid—well above their current levels and well above the levels needed to cover the agency’s costs of maintaining these

28. Setting and Adjusting Patent Fees, 78 Fed. Reg. at 4222.

29. *Id.* at 4223–26.

30. *Id.* at 4224.

patents.³¹ To be specific, the PTO raised the 3.5-year maintenance fee by 39 percent, the 7.5-year maintenance fee by 24 percent, and the 11.5-year maintenance fee by a whopping 54 percent.³² It is not saying much to note that these fees are well in excess of the PTO's costs; the cost of "maintaining" a patent that was granted years ago is trivial. It is essentially just a matter of accurate recordkeeping, which is done electronically at low cost.

With these two design choices, the PTO chose to implement a system that coupled low up-front application fees with high back-end renewal fees, believing that such a fee structure would best promote innovation while still allowing the agency to fund its own operations.³³ In addition, the PTO argued that the overall increase in fees would allow it to hire more examiners.³⁴ This would in turn permit the agency to examine patents more quickly, diminish the backlog of patent applications awaiting PTO attention, and reduce the average pendency of applications. The PTO has been widely criticized for taking a long time to examine and grant patents, and the agency believed that these steps would allow it to accelerate its operations.³⁵

These design choices drove the PTO's cost-benefit analysis. Nonetheless, the PTO's analysis of its own rule is dubious, as the next two sections will explain.

B. Patent Costs and Benefits

In performing its cost-benefit analysis, the PTO grouped the benefits and costs of the rule into three distinct categories. First, there are the costs of PTO operations—for example, the costs involved in hiring PTO examiners to scrutinize patent applications.³⁶ Second, the PTO considered any grant of a patent to be a benefit, and thus any reduction in the number of patents that the agency would grant was

31. *Id.* at 4225.

32. *Id.*

33. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 14–19.

34. *Id.* at 53.

35. See, e.g., Dennis Crouch, *A Few Problems at the PTAB*, PATENTLY-O (Aug. 4, 2014), <http://patentlyo.com/patent/2014/08/few-problems-ptab.html> [<http://perma.cc/KP9W-98C7>]; *Backlog*, THE PATENT PROSPECTOR (Dec. 14, 2008), <http://www.patenthawk.com/blog/2008/12/backlog.html> [<http://perma.cc/3GWL-4FX7>]; *Patent Office Faces Backlog Crisis: Criticism Heats Up As the PTO Scrambles to Cope*, HIGHBEAM RESEARCH (Jan. 10, 2005), <https://www.highbeam.com/doc/1G1-127873376.html> [<http://perma.cc/N577-X5V2>].

36. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 15.

counted as a cost.³⁷ Third, and relatedly, the agency treated any delay in the granting of a patent—any time that elapsed between the moment of application and the moment the patent was granted—as a cost as well.³⁸ Accordingly, any reduction in patent pendency—that is, any decrease in the time it took for a patent to be granted—was viewed as a benefit. The next Sections consider these costs and benefits in turn.

1. *PTO Operation Costs.* The PTO's first step in tallying costs and benefits was an astute one. The PTO rightly noted that fees paid to the agency by applicants are neither costs nor benefits but merely transfers from private parties.³⁹ These fees, by themselves, do not increase or decrease social wealth. They move wealth from one party to another. But when the fees are used to hire PTO examiners, who then invest time and labor examining patents, those expenditures are considered costs. The examiner's time, a valuable resource, is being consumed. This is analogous to a firm being forced to hire a compliance officer to help the firm conform to a new regulation, or hiring a contractor to install newly mandated safety equipment. In all cases, a regulation is mandating that valuable labor be consumed. Of course, the cost of examining patents is due not to the PTO's fee collection but to the fact that it examines patents in the first place. Nonetheless, the amount of fees that the PTO collects determines how many examiners it can hire, and thus determines the cost of its operations. The PTO's treatment of this cost was on target.

2. *The Benefits and Costs of More and Faster Patents.* It is with the second and third categories of costs and benefits that the PTO ran into difficulty. The PTO's second source of costs and benefits was based on the number of new patent applications that would be filed during the period when the new fees were in effect.⁴⁰ The PTO understood that an increase (decrease) in filing fees would decrease (increase) the number of new patent applications filed. As fees rose, some applicants might elect not to pursue a patent in the belief that it was not worth the cost of filing. Critically, the PTO viewed each new patent application as a source of social welfare: "Lost patent value

37. *Id.*

38. *Id.* at 16–17.

39. *Id.* at 34.

40. *Id.* at 15.

represents the Office's assessment of the cost to society from the expected decrease in successful patent application filings (serialized applications) due to an increase in filing . . . fees."⁴¹ Thus, the agency viewed any increase in projected patent filings (compared with the status quo ante) as a benefit and any decrease in projected filings as a cost.

The PTO's third category of costs and benefits is closely related. For purposes of its cost-benefit analysis, the PTO treated delays in granting a patent as a cost.⁴² The PTO reasoned that while a patent was pending before the PTO, the putative owner could not obtain any value from it.⁴³ Accordingly, a patent granted after one year would produce greater value for its owner than a patent granted after two years. Together, these two categories of costs—the quantity of patents granted, and the speed at which they are granted—shed light on how the PTO understands the costs and benefits of patents. In the PTO's analysis, more patents, and shorter review periods, are always better. Anything that prevents inventors from applying for patents, or anything that slows down patent grants and deprives inventors of longer patent terms, creates costs.

The PTO's analysis suffers from two fundamental errors. The first significant problem with the PTO's approach is that it improperly conflates the private value of patents to their owners with the value of patents to society at large.⁴⁴ To be sure, every time a private actor is granted a patent, that actor has received a benefit. Similarly, if a firm receives a patent one year after filing, instead of two, the firm is better off.⁴⁵

But these are only private benefits that accrue to the patent holder, not social benefits. A patent is a means of extracting rents: the owner of a patent can often exclude others from the market and thus

41. *Id.*

42. *Id.* at 16–17.

43. *Id.* at 13. In addition, the PTO counted any uncertainty during a patent's pendency regarding whether it would be granted (and the scope it would cover) as a cost. This cost is largely redundant to the cost of delay itself.

44. See Jonathan S. Masur, *Costly Screens and Patent Examination*, 2 J. LEGAL ANALYSIS 687, 689–91 (2010) (making this distinction); Lisa Larrimore Ouellette, *Patent Costs and Benefits*, WRITTEN DESCRIPTION (July 2, 2013), <http://writtendescription.blogspot.com/2013/07/costs-benefits.html> [<http://perma.cc/8AV3-CLQZ>] (same).

45. A patent is valid for twenty years from the date the application is filed. 35 U.S.C. § 154(a)(2) (2012). Accordingly, if a firm is granted a patent after only one year of examination instead of two, the firm will have nineteen years of patent exclusivity, rather than eighteen years.

charge higher (monopolistic) prices. These monopoly rents are not social gains. They are merely transfers from consumers or other producers to the patent owner. The revenue from selling a patented product provides some indication of the social value of the product, even when the product is sold for a monopoly price. But this is a measure of the social value of the *product* (or the innovation behind it), not the *patent*. After all, the product might well have come into existence without the patent ever being granted. At the same time, the fact that the patent owner is charging monopoly prices means that some consumers, who would otherwise consume the patented product if it were priced competitively, will be excluded from the market. This creates deadweight loss, which is an economic cost when measured against a baseline of competitive pricing.⁴⁶ Thus, from a static perspective, looking only at what consumers must pay at a given moment in time, patents represent only social costs, not benefits.⁴⁷ And for a government agency seeking to maximize overall efficiency (or welfare or some similar quantity), social costs and benefits—not private benefits—are what matter.

If there are social benefits to patents, they must derive from the dynamic incentives they create.⁴⁸ If firms and individuals believe that they will be able to obtain patents covering their inventions, they will be more likely to innovate in the first place because the rewards will

46. Jonathan Masur, *Patent Inflation*, 121 YALE L.J. 470, 480 (2011).

47. To be sure, the profits from a patented invention provide a rough estimation of that invention's social value, or at least the producer surplus it generates. But, again, this is the value of the *product*, not the value of the *patent*. The invention might have come into existence at the same point in time without the patent, in which case the patent produces zero social benefits and only costs (in the form of deadweight loss). The social benefit of the patent, if any, derives from innovation that would not have taken place (or would not have taken place so quickly) but for the patent.

48. Scholars have put forth a number of alternative theories regarding the social benefits of patents. See generally, e.g., Edmund W. Kitch, *The Nature and Function of the Patent System*, 20 J.L. & ECON. 265 (1977) (offering a "prospect" theory of patents in which the first parties to receive patents in a field can efficiently organize and coordinate follow-on research); Stephen Yelderman, *Coordination-Focused Patent Policy* (Aug. 15, 2014) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2481025 [<http://perma.cc/P67H-7F5Z>] (analyzing patent policy in terms of its ability to encourage coordination between firms). Patents were also conventionally thought to provide the benefit of disclosing valuable technical information, but that view has fallen into disfavor. Compare Jeanne C. Fromer, *Patent Disclosure*, 94 IOWA L. REV. 539 (2009) (arguing for the importance of the disclosure function in the patent system to stimulate innovation), with Lisa Larrimore Ouellette, *Do Patents Disclose Useful Information?*, 25 HARV. J.L. & TECH. 545 (2012) (describing the need to reframe the debate over the disclosure function of the patent system). I do not mean to minimize these other theories; I mean only to focus on what most scholars believe are the primary benefits of patents, and the principal reason for their existence.

be greater. (This is of particular importance when competitive pricing would not allow firms to recover the up-front costs of research and development.) Thus, if there are social benefits from granting patents and granting them more quickly, they are a step removed from the grant itself. Moreover, these benefits depend on the behavior not only of the parties who obtain the patents, but also other putative innovators who observe the PTO's behavior and make research and development decisions based upon that behavior.

At various moments the PTO appears to understand the point that private patent benefits are not equivalent to social benefits. It describes the benefit from reducing the amount of time the PTO takes to grant a patent as an “[i]ncrease in private patent value from a decrease in pendency.”⁴⁹ The PTO also describes the costs and benefits of rules that will lead to granting more or fewer patents in private-value terms: “Granted patents are also considered to evaluate the change in private patent value.”⁵⁰ At another point in its cost-benefit analysis the PTO is even more explicit: “The Office assumes that if these unfiled applications had been granted, total private value would have increased consistent with the change of patent value.”⁵¹

These statements are correct: reducing the time a patent is pending will increase its private value (to its owner), and granting more patents will increase the amount of private value being created for the patent owners. Any time a government agency creates a property right and distributes it to an owner, it provides a private benefit to that new owner. The problem is that those benefits are only one piece of a cost-benefit analysis, which should focus on overall social costs and benefits, not merely the private costs and benefits to certain parties.⁵² And yet the PTO includes them wholesale in its cost-benefit analysis.

This error seems so fundamental that one wonders how the intelligent economists and lawyers at the PTO could ever have made it.⁵³ It is possible that the agency did not believe that it could

49. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 4 tbl.1-1; *see also id.* at 6 (“Long patent application pendency negatively affects private patent value . . .”).

50. *Id.* at 21.

51. *Id.* at 28.

52. ADLER & POSNER, *supra* note 16, at 6.

53. Of course, it is possible that the error was introduced in the course of OMB review, rather than in the PTO. It is also possible that the CBA was conducted by personnel at the PTO who were not lawyers or economists. These aspects of the process are opaque to the general public.

successfully tabulate social costs and benefits, so it decided to report on private costs and benefits instead. This conjures up the old joke about the economist behaving like the drunk who looks for his keys underneath the lamp post, not because they were dropped there but because it's the only place where there's light. But it does not explain how such an error made it into a final Regulatory Impact Analysis (RIA), or how it made it past the Office of Information and Regulatory Affairs (OIRA), which is in charge of scrutinizing cost-benefit analyses. Another possibility is that the PTO's focus on private costs and benefits is political, rather than economic. The PTO famously (or infamously) has described patent applicants as its "customers," and it seems to understand its mission to be serving the interests of the parties who apply for patents.⁵⁴ The false equation of private and social benefits might be a political statement regarding which interests the PTO sees as important or an effort to mollify the patenting community. Regardless, the error is glaring.

The PTO's second significant mistake is that it entirely ignores the costs that accompany patents. The most salient of these is the deadweight loss that monopoly prices impose upon consumers. The entire purpose of a patent is to allow an inventor to recoup the costs of research and development by pricing its innovative product above cost. These higher prices create deadweight loss when consumers who would otherwise purchase the product (or service), if it were priced competitively, elect not to purchase it at the monopoly price. Thus, there is an immediate first-order cost to every patent the PTO grants. In theory, these costs are exceeded by the dynamic benefits of patents in encouraging further innovation. But a cost-benefit analysis that does not consider these obvious costs is not really worthy of the name.

The deadweight loss from monopoly patent pricing is not the only cost of granting patents. Patents—in particular, large numbers of patents—can also inhibit follow-on innovation. Most if not all inventions incorporate prior innovations and thus implicate existing patents. This means that a new innovator often must assemble significant numbers of patent licenses (or pay damages to a large

54. See U.S. TRADEMARK & PATENT OFFICE, WORKING FOR OUR CUSTOMERS: A PATENT AND TRADEMARK OFFICE REVIEW 12 (1994), www.uspto.gov/web/offices/com/annual/1994/pg1-5.pdf [<http://perma.cc/5XJV-EQCD>].

number of patent owners) for each new product it produces.⁵⁵ This is the problem of a patent anticommons.⁵⁶ The costs of doing so—the licensing fees or damages themselves, as well as the transaction costs involved—can be prohibitive and suppress innovation. Relatedly, new innovators often do not wish to fall victim to holdup by patent owners who appear and demand payment after the innovator has already invested in a new product.⁵⁷ The solution is to determine ahead of time which patents might tread on the innovator’s new product and negotiate licenses before undertaking any product-specific investment. Yet as the number of existing patents increases, this process becomes more difficult. New innovators and market entrants must comb through the “patent thicket,” looking for relevant patents amidst a bramble of property rights.⁵⁸ Like the anticommons problem, the transaction costs involved in solving the patent thicket problem imposes a tax on innovation and deters market entrance. Importantly, anticommons and patent thicket effects operate whether or not the patents the PTO grants are valid and of high quality. That is to say, all patent grants impose costs; only certain patent grants confer benefits.

Amazingly enough, the PTO recognized that “uncertainty regarding the claimed invention and scope of patent rights for patentees, competitors, and new entrants” can inhibit innovation.⁵⁹ Yet the PTO treated this uncertainty as a cost created by *pending patent applications*, as if the cost disappears entirely when the patent is granted.⁶⁰ In reality, the opposite is true: a patent has no legal force unless and until it has been granted. And even granted patents can have highly uncertain scope and boundaries.⁶¹ The PTO’s analysis was entirely backward.

55. The issue is exacerbated by the fact that patent damages and licensing fees are often uncertain and difficult to calculate. *See generally* Jonathan S. Masur, *The Use and Misuse of Patent Licenses*, 110 NW. U. L. REV. 115 (2015).

56. Michael A. Heller & Rebecca S. Eisenberg, *Can Patents Deter Innovation? The Anticommons in Biomedical Research*, 280 SCIENCE 698, 699 (1998).

57. *See* Mark A. Lemley & Carl Shapiro, *Patent Holdup and Royalty Stacking*, 85 TEX. L. REV. 1991, 1993 (2007); Jonathan S. Masur, *Patent Liability Rules as Search Rules*, 78 U. CHI. L. REV. 187, 191–92 (2011).

58. *See* Ian Ayres & Gideon Parchomovsky, *Tradable Patent Rights*, 60 STAN. L. REV. 863, 871–72 (2007).

59. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 13.

60. *See id.* I thank Rochelle Dreyfuss for noting this point.

61. Dan L. Burk & Mark A. Lemley, *Fence Posts or Sign Posts? Rethinking Patent Claim Construction*, 157 U. PENN. L. REV. 1743, 1745 (2009).

Accordingly, I have suggested in prior work that the high cost of obtaining a patent, including the fees charged by the PTO, might be performing the beneficial function of reducing the number of patent applications and grants.⁶² Absent these up-front costs, there might be many more patents and much higher anticommons and patent thicket costs to innovators.⁶³ That analysis led to a prescription of higher up-front patent fees, on the theory that these fees would mitigate anticommons and patent thickets problems by weeding out largely worthless patents without preventing inventors from obtaining patents on genuinely valuable innovation.⁶⁴ In failing to account for the costs created by patent anticommons and thickets, the PTO errs by treating lower fees—and greater numbers of patents—as an unalloyed good.

The PTO's error is particularly galling because in other parts of its analysis the agency appeared to recognize the value of eliminating patents. The PTO noted that higher back-end renewal fees will lead patent owners to renew fewer patents.⁶⁵ The agency then explained that “this decrease in maintenance fee renewals could facilitate commercialization because subject matter previously covered by a patent would become available in the public domain to improve upon and spur innovation.”⁶⁶ This is true, but it is equally (or more) true for patents that were never applied for or granted in the first place.⁶⁷

In counting only the benefits and not the costs of granting more patents, it is as if the PTO is operating under two grand assumptions: (1) Congress, the courts, and the agency itself have correctly calibrated the substantive rules governing patents; and (2) the PTO is properly following those rules. In theory, Congress and the courts have tried to balance the static costs and dynamic benefits of patents

62. David Fagundes & Jonathan S. Masur, *Costly Intellectual Property*, 65 VAND. L. REV. 677, 686 (2012); Masur, *supra* note 44, at 711–12.

63. Masur, *supra* note 44, at 711–12.

64. *Id.* at 712–16.

65. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 21.

66. *Id.* at 21–22.

67. It is possible that the patent itself provides some useful information to the public that aids in further development or commercialization of the invention, and this is one potential reason why it might be preferable for a patent to be filed and then not renewed than never filed at all. However, most scholars agree that patents provide very little useful disclosure. See sources cited *supra* note 48. Any minor value from disclosure would likely be outweighed by the costs to innovation of having the patent in force for some number of years.

so as to maximize welfare.⁶⁸ If they have done so properly, then patents should lead to welfare gains. So long as the PTO is correctly applying these substantive rules and granting only the patents that the unerring Congress and the courts believe should be granted, more patents will lead to greater welfare gains. In other words, if Congress and the courts have done their job correctly, and if the PTO accurately applies the rules they have set, then there is no need for further cost-benefit analysis. Congress and the courts have *already* done the cost-benefit balancing in setting patent rules, and the benefits outweigh the costs. The PTO need only apply these rules faithfully.

Almost needless to say, this is as heroic as assumptions can be. There is absolutely no reason to believe that Congress and the courts have properly tuned the patent rules to maximize welfare (or innovation, or anything else).⁶⁹ Moreover, at this point it is impossible to conclude that patents are even increasing innovation, rather than retarding it. There is an ongoing controversy on this point, with no decisive resolution in sight.⁷⁰ The constant tweaking of patent law by the courts⁷¹ and Congress⁷² is evidence that those bodies themselves do not feel as though patent law is properly calibrated at any given instant. And few assumptions are as heroic as to believe that the PTO follows the rules properly and grants only the patents that it should be granting. There is ample reason to believe that the agency regularly allows invalid patents to slip through the cracks, creating costs for consumers and innovators that are not balanced by any benefits.⁷³

68. Christopher Buccafusco & Jonathan S. Masur, *Intellectual Property Law and the Promotion of Welfare 1* (Dec. 22, 2015) (unpublished manuscript) (on file with the *Duke Law Journal*).

69. *See* Masur, *supra* note 3, at 278–79 (arguing that the courts lack the institutional capacity to design such rules, even if they wished to, and observing that Congress has failed to imbue the PTO with agency rulemaking authority).

70. *See* Nicholas, *supra* note 2, at 406.

71. From 2005 through 2015, the Supreme Court alone decided twenty-three patent cases, most of which involved significant changes to the law. Dennis Crouch, *Most Cited Supreme Court Patent Decisions*, PATENTLY-O (Mar. 11, 2015), <http://patentlyo.com/patent/2015/03/supreme-court-cases.html> [<http://perma.cc/MUF9-J6DN>]. Additionally, the Federal Circuit decides hundreds of patent cases each year.

72. The America Invents Act is just one example of these efforts. *See* Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011).

73. *See generally* Robert P. Merges, *As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform*, 14 BERKELEY TECH. L.J. 577 (1999).

All of this is to say that the PTO cannot rely upon the intrinsic accuracy of the patent laws to justify its unmitigated emphasis on more and more patents. Patents create both benefits and costs, and in some cases the costs undoubtedly outweigh the benefits. Those costs likely become greater as the number of granted patents increase and exacerbate anticommons and patent thickets problems. By ignoring the costs of patents, the PTO described only half of the picture.

C. *Qualified vs. Quantified Benefits*

One of the most remarkable facts about the PTO's cost-benefit analysis is that both benefits and costs are presented only in qualitative, not quantitative, terms. The PTO does not attach numbers to any of the costs or benefits it describes. Instead, it designates those benefits or costs as “[s]ignificant,” “[m]oderate,” or “[m]inimal,” and then uses these qualitative designations to compare benefits and costs across the various regulatory options it considers.⁷⁴

The PTO offered two separate explanations for this decision, neither of which is persuasive. At one point, the agency asserted that the rule “is considered to be a transfer payment from one group to another”⁷⁵ and thus under Office of Management and Budget (OMB) Circular A-4, the agency is permitted to limit its discussion of costs and benefits to qualitative terms. OMB Circular A-4 is one of the principal guidance documents for agencies performing cost-benefit analysis. As the PTO claims, Circular A-4 states that agencies need not quantify costs and benefits for transfer payments: “You should not include transfers in the estimates of the benefits and costs of a regulation. Instead, address them in a separate discussion of the regulation’s distributional effects.”⁷⁶ As I noted above, the fees collected from patent applicants by the PTO are indeed transfer payments. Per Circular A-4, they need not be included in a cost-benefit analysis.⁷⁷ But the other costs and benefits of the rule—the labor resources required to examine patents, and the benefits (or

74. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 4 tbl.1-1.

75. Setting and Adjusting Patent Fees, 78 Fed. Reg. 4212, 4213 (Jan. 18, 2013); *see also* U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 31 (describing various fee calculations).

76. OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, CIRCULAR A-4, at 38 (2003).

77. *Id.* It is worth noting that the PTO did not address the distributional effects of these transfer payments, as required by Circular A-4. *Id.* The distributional effects may not be insignificant, as in many cases the PTO is collecting four- or even five-figure fees from “small” and “micro” entities that often have few resources.

costs) of more and faster patents—are not transfer payments, as the PTO’s own RIA makes clear.⁷⁸ Accordingly, they should have been quantified.

The PTO’s RIA offers a different explanation. That document explains that “[t]he overall impact of the costs and benefits arising from fee adjustment are difficult to monetize or quantify. Therefore, this RIA analyzes the change in qualitative costs or benefits”⁷⁹ When the agency states that the costs and benefits are difficult to monetize or quantify, it is underselling the point. Patent costs and benefits are extraordinarily difficult to quantify because they involve multiple dynamic economic effects and the interaction of a variety of different market participants. Part IV will explore this point in greater detail.

Yet the difficulty of quantifying costs and benefits does not diminish the importance of doing so. In other work, Eric Posner and I have described the frequency with which agencies fail to fully quantify costs and benefits.⁸⁰ In at least one case, this failure to quantify contributed to the Supreme Court striking down the regulation.⁸¹ In many other cases, the failure to fully quantify costs and benefits likely led the agency to underregulate or overregulate, possibly by a significant margin. The problem is both epistemic and conceptual. If the agency does not quantify costs and benefits, how can it know that the rule it adopted is superior to alternatives?⁸² If cost-benefit analysis is meant to guide policymaking, and the agency does not know the costs and benefits of its regulation, then on what basis is it purporting to select a policy?

These concerns are fully present in the PTO’s fee-setting regulation. In promulgating the regulation, the PTO considered four alternative fee structures. Alternative 1 is the option the agency selected: it raised up-front application fees, while holding them below cost, and set renewal fees well above cost.⁸³ Alternative 2 would have set most application fees equal to the PTO’s costs, which is to say higher than the up-front fees in Alternative 1.⁸⁴ It would have then

78. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 12–18.

79. *Id.* at 12.

80. Masur & Posner, *supra* note 12, at 2–4.

81. *Michigan v. EPA*, 135 S. Ct. 2699, 2711 (2015); *see also* Masur & Posner, *supra* note 12, at 1–2, 39–43 (describing the impact of the EPA’s failure).

82. *See generally* Masur & Posner, *supra* note 12, at 2.

83. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 57–64.

84. *Id.* at 64.

held renewal fees much lower than Alternative 1, such that it would have generated substantially less overall revenue for the agency.⁸⁵ This would have meant fewer patent applications, due to the higher application costs. It would have also meant a slower application process and increased application pendency because the PTO would not have been able to hire as many additional examiners. Given the PTO's view of patent benefits—more and faster patents are always better—it was easy for the agency to conclude that Alternative 1 was superior to Alternative 2 even without quantifying benefits.

With respect to the other alternatives, however, the picture is not so clear. Alternative 3 would have simply adjusted existing fees for inflation based on the Consumer Price Index.⁸⁶ This would have held down application fees (compared with Alternative 1) and thus encouraged more patent applications. However, it would not have generated enough revenue for the PTO to hire more examiners, contributing to delays in examination and increased patent pendency.⁸⁷ The PTO concluded that Alternative 1 was superior to Alternative 3,⁸⁸ but it is hard to be confident in this conclusion even on the PTO's own terms. After all, according to the PTO, more patents represent a benefit. Longer wait times before patents are granted represent a cost. Do the costs of longer pendency outweigh the benefits of more patents? Without quantifying these costs and benefits, it is simply impossible to know.⁸⁹

Lastly, Alternative 4 employed the same basic structure as Alternative 1: increased up-front application fees that were nonetheless priced below cost, coupled with increased renewal fees that would allow the PTO to hire more examiners and reduce the patent backlog.⁹⁰ The difference between Alternative 1 and Alternative 4 was the size of the fee increase: Alternative 4 would have raised fees even more than Alternative 1.⁹¹ This would have reduced the number of patent applications (compared with

85. *Id.*

86. *Id.* at 72.

87. *Id.* at 72–73.

88. *Id.* at 57.

89. This is, of course, not to speak of the fact that more patents may not be a benefit, and longer wait times may not be a cost. Here, I take the PTO's vision of costs and benefits at face value, despite the fact that it is demonstrably incorrect. *See supra* notes 58–60 and accompanying text.

90. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 79.

91. *See id.*

Alternative 1) but also brought in more fee revenue.⁹² The PTO initially proposed implementing Alternative 4 in its Notice of Proposed Rulemaking but backtracked and settled on Alternative 1 after protests from technology firms that thought the fee increases were too substantial.⁹³ Notably, the PTO did not plan to hire more examiners under Alternative 4 than under Alternative 1.⁹⁴ The excess fee revenue would instead have gone into the PTO's general budget, not used to reduce the patent backlog.⁹⁵ Accordingly, it was straightforward for the PTO to justify its choice of Alternative 1 over Alternative 4. Alternative 4 would reduce patent applications by imposing higher up-front fees without any corresponding benefits.⁹⁶

Of course, the fact that the additional fee revenue would disappear without producing any benefits is an artifact of the PTO's budget, not an inherent aspect of the Alternative 4 fee schedule. If permitted by Congress, the PTO could have devoted the additional revenue to hiring more examiners, enabling the agency to reduce the patent backlog even more rapidly and cut the average pendency between application and grant. Indeed, the PTO is required by law to collect fees only to fund its operations, not for any other purpose. Had the PTO spent the additional fees on hiring more examiners, it would have faced a difficult choice between Alternatives 1 and 4: more patents under Alternative 1, but faster patents under Alternative 4. If one again takes the PTO's view of patent costs and benefits at face value, there is no obvious way to make this choice without quantifying costs and benefits.

* * *

In sum, the PTO's cost-benefit analysis is plagued by both conceptual and epistemic errors. The agency does not understand the costs and benefits of patents, and thus it does not properly count the benefits and ignores the costs. The agency also failed to quantify any of the costs or benefits of its rule, leaving it completely at sea when

92. Compare *id.* at 62 tbl.5-3 (showing application filings ranging from 395,226 in FY 2013 to 467,499 in FY 2017, and fee revenue ranging from \$2,479 in FY 2013 to \$2,909 in FY 2017 under Alternative 1), with *id.* at 83 tbl.5-10 (showing application filings ranging from 391,411 in FY 2013 to 453,578 in FY 2017, and fee revenue ranging from \$2,491 in FY 2013 to \$3,088 in FY 2017 under Alternative 4).

93. See *id.* at 79–80.

94. See *id.* at 88, 104 (showing that both alternatives allowed hiring 1000 new patent examiners in FY 2013).

95. *Id.* at 79–80.

96. *Id.* at 129.

choosing between reasonable alternatives. It is not difficult to sympathize with the PTO, because calculating the costs and benefits of patents is extraordinarily difficult. But without any real understanding of costs and benefits, the PTO has no reason to believe that its new fee schedule will do more good than harm and no defensible basis for selecting one set of fees over another.

III. ERRORS OF OMISSION: THE PTO'S PROCEDURAL RULES

The AIA also created a trio of new administrative proceedings by which patents can be challenged, located within the PTO and presided over by administrative patent judges. *Inter partes* Review (IPR) allows any party to bring an adversarial challenge to a patent, even while that party is embroiled in litigation over the same patent;⁹⁷ Post-Grant Review (PGR) permits a party to challenge a patent as improvidently granted within nine months after the PTO has issued the patent;⁹⁸ and Covered Business Method (CBM) patent review offers a specialized process for challenging business method patents.⁹⁹ In addition to creating these three new proceedings, the AIA delegated authority to the PTO to establish procedural rules governing them.¹⁰⁰ The result was a lengthy rule promulgated by the PTO on August 14, 2012.¹⁰¹

In addition, this rulemaking included one critical rule that the PTO classified as procedural but is better understood as substantive. Consistent with longstanding PTO practice,¹⁰² the agency decided that for purposes of IPR, PGR, and CBM proceedings, the agency will give the claims of the patent at issue their “broadest reasonable interpretation.”¹⁰³ This is as opposed to trying to find the “best” or most appropriate construction of the claims, as the federal courts

97. 35 U.S.C. § 311 (2012).

98. *Id.* § 321.

99. *Id.* § 321 note (Transitional Program for Covered Business Method Patents).

100. *Id.* §§ 316–326.

101. 37 C.F.R. § 42 (2015).

102. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004) (referring to this practice); *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984) (referring to this practice as originating from a case from the early 1980s).

103. Changes to Implement Inter Partes Review Proceedings, Post-Grant Review Proceedings, and Transitional Program for Covered Business Method Patents, 77 Fed. Reg. 48,680, 48,690 (Aug. 14, 2012). The PTO uses “broadest reasonable interpretation” and “broadest reasonable construction” interchangeably. *See* 37 C.F.R. § 42(b)–(d) (2015).

do.¹⁰⁴ This rule is likely to have a marked effect on patent challenges before the PTO. The “broadest reasonable interpretation” standard will, as the name indicates, lead the PTO to adopt broad constructions of challenged claims whenever it is reasonable to do so. The broader a patent’s claims, the more susceptible it is to being invalidated as obvious or not novel in light of prior art.¹⁰⁵ This rule will thus place patent claims in greater jeopardy than if they were adjudicated under the standard employed by the federal courts.¹⁰⁶ Indeed, the Federal Circuit described the difference between the “broadest reasonable interpretation” standard and its own approach as “outcome determinative” in one appeal from an IPR.¹⁰⁷ Scholars have also noted that the “broadest reasonable interpretation” standard provides patent defendants with an opportunity to take two bites at the apple: they can argue for a broad construction that invites invalidity during an IPR or PGR, then reverse course and pursue a narrower construction to defeat a claim of infringement if they are sued in federal court.¹⁰⁸

Two of these three administrative processes have proven to be quite popular in their first few years. As of September 30, 2015, the PTO had received 3,578 petitions for IPR, along with 382 petitions for CBM review.¹⁰⁹ (There have been only 13 PGR petitions filed during the same time period.)¹¹⁰ In addition, patent challengers have enjoyed substantial success in these proceedings. Of the 575 IPRs where the PTO reached a final determination on the merits, 414 of them (72

104. See, e.g., *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005).

105. Roger Allan Ford, *Patent Invalidity Versus Noninfringement*, 99 CORNELL L. REV. 71, 95 (2013).

106. Patent owners also benefit from a presumption of validity in federal court and lose that presumption in IPR, PGR, and CBM proceedings. *Id.* at 92. But this is a matter of Federal Circuit law and not the subject of the PTO’s rulemaking. See *id.*

107. *PPC Broadband v. Corning Optical Commc’ns RF, LLC*, Nos. 2015-1361, 2015-1369, 2015-1366, 2015-1368, 2016 WL 692386, at *4-5 (Fed. Cir. Feb. 22, 2016) (“Thus, while the Board’s construction is not the correct construction under Phillips, it is the broadest reasonable interpretation of ‘continuity member,’ and because this is an IPR, under our binding precedent, we must uphold the Board’s construction of ‘continuity member’ and ‘electrical continuity member.’”).

108. See, e.g., Gregory Dolin, *Dubious Patent Reform*, 56 B.C. L. REV. 881, 904-05 (2015).

109. U.S. PATENT & TRADEMARK OFFICE, PATENT TRIAL AND APPEAL BOARD STATISTICS 2 (2015); Ryan Davis, *USPTO Eyes Fee Hikes for AIA Petitions, Patent Filings*, LAW360 (Nov. 2, 2015), <http://www.law360.com/ip/articles/721965> [<http://perma.cc/9M55-YP3X>].

110. U.S. PATENT & TRADEMARK OFFICE, *supra* note 109, at 2.

percent) ended with *all* of the claims at issue being cancelled,¹¹¹ compared with an invalidity rate in federal court that hovers near 50 percent.¹¹² Even if that rate of invalidation drops over time, the relevant point is that the PTO's new administrative proceedings have already significantly impacted the patent landscape. The "broadest reasonable interpretation" standard is a substantial part of the reason.

Nonetheless, when it promulgated the regulation the PTO was not required to conduct a cost-benefit analysis (and did not do so). OIRA did not deem the regulation to be economically significant, believing the regulation's annual impact on the economy to be less than \$100 million.¹¹³ OIRA reached this conclusion based upon information and analysis provided by the PTO itself.¹¹⁴

The PTO's analysis of the regulation's economic impact is striking in that it displays a type of myopia very different from that present in its fee-setting CBA. The only costs or benefits the PTO included as part of its economic significance analysis were the costs of *filing or defending the IPR petitions*.¹¹⁵ In other words, the agency only tabulated the administrative costs, which fell below \$100 million. It ignored entirely the costs and benefits that would result from patents—in some cases very valuable patents—being invalidated (or upheld) in IPR and other proceedings.¹¹⁶

This approach makes no sense even if one adopts the assumptions undergirding the PTO's cost-benefit analysis of its fee-setting rule—that more and faster patents are always better, or that Congress, the courts, and the PTO have calibrated the patent rules properly.¹¹⁷ If the PTO creates benefits whenever it grants a patent, then an administrative procedure designed to invalidate already-granted patents must be creating costs. Alternatively, if Congress and the courts have properly tuned the patent rules, then any mechanism that enables those rules to operate more smoothly or

111. *Id.* at 9; see also Brian J. Love & Shawn Ambwani, *Inter Partes Review: An Early Look at the Numbers*, 81 U. CHI. L. REV. DIALOGUE 93, 94 (2014) (analyzing earlier IPR data).

112. John R. Allison & Mark A. Lemley, *Empirical Evidence on the Validity of Litigated Patents*, 26 AIPLA Q.J. 185, 234–40 (1998).

113. Changes to Implement Inter Partes Review Proceedings, 77 Fed. Reg. 7041, 7056 (proposed Feb. 10, 2012). Recall that to be deemed economically significant (and trigger a cost-benefit analysis), a regulation must have an annual impact of at least \$100 million. Exec. Order No. 12,866, 3 C.F.R. 638 (1994).

114. Changes to Implement Inter Partes Review Proceedings, 77 Fed. Reg. at 7056.

115. *Id.* at 7050.

116. *Id.*

117. See *supra* Part II.

comprehensively must be creating benefits. Regardless, the PTO's decision to count only administrative costs could be correct only if the agency believed that *zero* patents would be invalidated via the IPR, PGR, and CBM processes—in other words, that those procedures would have no substantive impact on any patent right. Perhaps the agency thought that its examiners were infallible, and that review of their work would turn up no improvident patent grants. But this assumption seems a bridge too far for the PTO.

In the context of patents, the threshold for a regulation to qualify as economically significant is surprisingly low. A regulation must have an “annual effect on the economy of \$100 million or more.”¹¹⁸ In the course of its IPR and PGR proceedings, the PTO adjudicates dozens if not hundreds of patents worth tens of millions of dollars every year, and undoubtedly some patents worth hundreds of millions or even billions of dollars.¹¹⁹ If the PTO's regulation causes even one of these patents to be invalidated when it would otherwise be upheld, it has had an effect well in excess of \$100 million.¹²⁰ And the “broadest reasonable interpretation” standard is not the only aspect of the regulation that might affect the likelihood of success on the merits in an administrative proceeding. As noted above, the PTO's regulation also instantiates a detailed set of procedural rules, many of which provide litigation advantages to one party or the other. If any of these procedural rules tilts the scale enough to be dispositive, that too would represent a significant regulatory impact on the economy.

Of course, if the PTO invalidates a patent with \$200 million in annual sales, that does not mean that it has created a \$200 million cost (or benefit). As I explained at length above, these annual revenues represent merely a private benefit to the patent owner, not the type of social benefit CBA is meant to take into account.¹²¹ But the trigger for an agency's obligation to perform a cost-benefit analysis is not that a regulation create \$100 million in costs or benefits, but rather

118. Exec. Order No. 12,866, 3 C.F.R. 638 (1994).

119. See, e.g., Joseph Walker & Rob Copeland, *New Hedge Fund Strategy: Dispute the Patent, Short the Stock; Hayman Capital Seeks to Invalidate Patents While Betting on a Drop in Target's Shares*, WALL ST. J. (Apr. 7, 2015), <http://www.wsj.com/articles/hedge-fund-manager-kyle-bass-challenges-jazz-pharmaceuticals-patent-1428417408> [http://perma.cc/R4WQ-T3RS] (describing a challenge to a “Jazz Pharmaceuticals PLC patent for Xyrem, a narcolepsy drug with sales of \$779 million” in 2014).

120. OFFICE OF INFO. & REG. AFFAIRS, REGULATORY IMPACT ANALYSIS: FREQUENTLY ASKED QUESTIONS (FAQS) 1 (2011) (“The \$100 million threshold applies to the impact of the proposed or final regulation in *any one year*, and it includes *benefits, costs, or transfers*.”).

121. See *supra* Part II.

that it have an impact on the economy of at least \$100 million. These are not the same thing. If a drug's sales increase with the demise of the patent on the drug, the economy has been affected in the amount of the increase in sales. For example, the PTO's fee-setting regulation was deemed economically significant because of the hundreds of millions of dollars in fees paid to the PTO under the regulation. This was despite the fact that the PTO properly classified these fees as a transfer payment, rather than a cost or benefit. The economic impact analysis is separate from the cost-benefit analysis, and here it is almost impossible to believe that the PTO's regulation would not have had an annual impact of at least \$100 million. What is more, the AIA explicitly directs the PTO to "consider the effect of any such regulation [governing IPR procedures] on the economy, the integrity of the patent system, the efficient administration of the Office, and the ability of the Office to timely complete proceedings instituted under this chapter."¹²² Even the statute itself seems to be directing the agency to evaluate costs and benefits. The PTO had substantial flexibility in designing the procedures governing IPR, PGR, and CBM review.¹²³ It could have structured these procedures so as to promote a variety of patent policy goals. A cost-benefit analysis would have been the appropriate vehicle for determining the effects of such legal choices, and the PTO should have conducted one.

Again, it is easy to sympathize with the PTO. Conducting a full cost-benefit analysis of changes to the patent rules is hardly a trivial exercise, as the agency itself has acknowledged.¹²⁴ Yet the agency's assessment of its rule, and thus of its obligation to engage in CBA, falls well short of what one might expect from such an expert federal agency. Moreover, it only reinforces the troubling questions raised by the fee-setting regulation regarding how the PTO understands the costs and benefits of patents and their impact on the economy. Could this really be how the PTO conceives of patents' role in spurring innovation and producing social welfare gains? Such views would cast serious doubt upon the substantial authority the agency has already been afforded, not to mention proposals for vesting even greater lawmaking power within the PTO.¹²⁵

122. 35 U.S.C. § 316(b) (2012). I thank Judge Kimberly A. Moore for drawing this provision to my attention.

123. See 35 U.S.C. §§ 316–326.

124. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 12.

125. See *supra* note 11 (noting proposals for granting the PTO additional rulemaking authority).

IV. COST-BENEFIT ANALYSIS OF PATENT RULES

What, then, should the PTO be doing? Performing an accurate cost-benefit analysis of changes to patent law is a fraught exercise, but that does not mean that it presents an entirely unsolvable problem. In this Part, I sketch the contours of a cost-benefit analysis of patent rules. I use the PTO's fee-setting regulation as an example, but this type of cost-benefit analysis could (and should) be employed for any major change in patent law, including changes enacted by Congress.

A. *Costs and Benefits, in Theory*

The starting point of a proper cost-benefit analysis is to understand the costs and benefits of patents. As described above, the primary benefits of patents are the increased dynamic incentives to invent, which in turn should (in theory) lead to more and better innovations. In theory, these inventions would then produce social welfare gains.

These benefits must be balanced against three principal types of costs.¹²⁶ First, patents can simultaneously discourage innovation by forcing follow-on innovators to navigate an undergrowth of pre-existing property rights. Patent thickets and anticommons can retard innovation, and more generally, patents can serve as taxes on innovation when they are used to extract rents from innovative firms or individuals. In some industries, such as pharmaceuticals, the dynamic benefits of patents likely outweigh the costs. In others, such as software, the reverse is plausibly true.¹²⁷

Second, there is the deadweight loss created when patented products and services are priced above marginal cost. Here, the social cost is not the higher prices that consumers must pay. If a pharmaceutical drug costs \$100 (patented price) instead of \$20 (marginal cost), the extra \$80 that a consumer must pay the producer is not a social cost. It is merely a transfer payment.¹²⁸ The social cost is

126. As with patent benefits, there are other theories as to how patents can create social costs. See, e.g., Mark F. Grady & Jay I. Alexander, *Patent Law and Rent Dissipation*, 78 VA. L. REV. 305, 308 (suggesting that patents can lead to socially wasteful races that can consume much of the value of the innovation). I do not mean to minimize alternative theories, only to focus on what I believe to be the most widely agreed-upon sources of social costs from patents. See Masur, *supra* note 46, at 480.

127. See DAN L. BURK & MARK A. LEMLEY, *THE PATENT CRISIS AND HOW THE COURTS CAN SOLVE IT* 156–57 (2009).

128. The transfer payment could have distributional effects and might lower overall welfare if the consumer is less well off than the owners and employees of the producing firm. This

the welfare loss to consumers who would have purchased the drug for \$20 but cannot or will not purchase it for \$100. For instance, if there is a consumer who values the drug at \$50, then that consumer will realize a gain of \$30 if she is able to purchase the drug for \$20. Raising the price from \$20 to \$100 deprives the consumer of this opportunity and causes a welfare loss of \$30 measured against the baseline of competitive (nonpatented) pricing.

Third and finally, there are the costs of administering the patent system. These can be significant, as the fee-setting and procedural rules demonstrate. Nonetheless, the sums of money spent to examine patents and administer PTO proceedings are dwarfed by the sums used to purchase or license patents or paid by consumers to the producers of patented products. In most cases, administrative costs will represent only a fraction of the overall costs and benefits—which only accentuates the PTO's error in viewing them as the *only* economic impact from its procedural rule.

B. *Calculating Costs and Benefits*

Conceptualizing the costs and benefits of patents is the easy step. The harder part is measuring and predicting the effect of a rule change on those costs and benefits. This involves a great deal of empirical uncertainty that the PTO cannot currently surmount. But the agency is much closer to being able to perform a credible cost-benefit analysis than it seems to realize.

As an organizing example, consider the PTO's fee-setting regulation discussed in Part II. Suppose the agency is performing a cost-benefit analysis of switching its fee schedule to Alternative 1 (the option the agency eventually adopted). The first step is to determine the effect of these rules on patent applications, patent grants, and

distributional effect is relevant to any true welfare analysis, and in other work I have advocated that agencies account for it when analyzing regulations and projects. *See generally* Bronsteen et al., *supra* note 15. Nonetheless, distributional effects are not typically accounted for in cost-benefit analysis, perhaps on the theory that the best way to maximize welfare is to promulgate efficient regulations and then tax and transfer to improve distributional outcomes. Louis Kaplow & Steven Shavell, *Why the Legal System Is Less Efficient Than the Income Tax in Redistributing Income*, 23 J. LEGAL STUD. 667 (1994); David A. Weisbach, *Distributionally-Weighted Cost-Benefit Analysis: Welfare Economics Meets Organizational Design 3* (July 7, 2014) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2450142 [<https://perma.cc/47US-EZPJ>]. *But see* Lee Anne Fennell & Richard H. McAdams, *The Distributive Deficit in Law and Economics*, 100 MINN. L. REV. 1051, 1054 (2016). Regardless, because distributional effects are not part of conventional cost-benefit analysis, I exclude consideration of them here in order to simplify the challenge for the PTO.

patent renewals. The PTO has already gathered much of this information: the regulation includes estimates of the numbers of patent applications under the status quo and the proposed alternative.¹²⁹ The PTO projects seventy thousand fewer patent applications over the first five years under the new (higher) schedule of fees.¹³⁰ However, it expects to grant sixty thousand more patents during that time due to increases in the speed of patent examination.¹³¹ At the same time, the PTO predicts that higher renewal fees will lead to a 3.5 percent reduction in the number of patents renewed after 3.5 years, a 3 percent reduction in the number of patents renewed after 7.5 years, and a 6.2 percent reduction in the number of patents renewed after 11.5 years.¹³² There were approximately 2.5 million patents in force as of October 2014, of which approximately two million were younger than 11.5 years.¹³³ A rough back-of-the-envelope calculation yields an estimate of approximately 85,000 patents that will not be renewed under the new fee schedule.¹³⁴ In the net, this will mean twenty-five thousand fewer patents in force.

Next, the agency must determine the effect—positive or negative—that the changes in patent applications, grants, and renewals will have on incentives to innovate. This is a tricky question to answer,¹³⁵ and the overall effects of patents in encouraging or discouraging innovation are the subject of much debate within the field.¹³⁶ Nonetheless, there is a significant quantity of empirical research on the subject.¹³⁷ Even without conducting its own studies,

129. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 42 tbl.4-2.

130. *Id.*

131. *Id.*

132. *Id.*

133. Dennis Crouch, *The Number of U.S. Patents in Force*, PATENTLY-O (Oct. 23, 2014), <http://patentlyo.com/patent/2014/10/number-patents-force.html> [<http://perma.cc/37B3-F7EY>].

134. To arrive at this estimate I averaged the reduced rates at the three renewal points and multiplied by two million patents. $2,000,000 \times (3\% + 3.5\% + 6.2\%)/3 = 84,667$ patents. Of course, the exact figure will depend on the precise ages of all of the patents—information that the PTO has readily at hand. This calculation is just meant to provide a very rough estimate and demonstrate that such an analysis is not beyond the PTO's capacity.

135. *See generally* Ouellette, *supra* note 1.

136. *See generally* Nicholas, *supra* note 2 (describing studies on both sides).

137. *See generally* JAMES BESSEN & MICHAEL JAMES MEURER, PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATORS AT RISK (2009); Eric Budish, Benjamin N. Roin & Heidi Williams, *Do Firms Underinvest in Long-term Research? Evidence from Cancer Clinical Trials*, 105 AM. ECON. REV. 2044 (2015); Ryan Lampe & Petra Moser, *Do Patent Pools Encourage Innovation? Evidence from the Nineteenth-Century Sewing Machine*

the PTO could leverage that research to arrive at a plausible conclusion regarding the effects of its proposed fee increases. For instance, in the field of biopharmaceuticals, Eric Budish, Benjamin Roin, and Heidi Williams have demonstrated that longer effective patent terms will induce greater R&D investments;¹³⁸ Bhaven Sampat and Heidi Williams have shown that genomics patents do not seem to inhibit follow-on innovation;¹³⁹ and Darius Lakdawalla and Tomas Philipson have established that the quantity of a prescription drug consumed by patients does not significantly increase after the patent covering the drug expires, which implies that the patent was not creating much deadweight loss.¹⁴⁰ In combination, these findings suggest that more and faster pharmaceutical patents will lead to greater innovation without substantially restricting follow-on innovation or creating deadweight loss. The result will likely be an increase in social welfare.

At the same time, results in other technological fields might be quite different. There are by now strong reasons to believe that patents may do little to encourage innovation or may even hamper it in some technological fields such as software.¹⁴¹ A critical question, then, is which technology areas will see the greatest decreases in patent filings or renewals from increased fees. The PTO may have

Industry, 70 J. ECON. HIST. 898 (2010); Shih-tse Lo, *Strengthening Intellectual Property Rights: Experience from the 1986 Taiwanese Patent Reforms*, 29 INT'L J. INDUST. ORG. 524 (2011); Petra Moser, *How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs*, 95 AM. ECON. REV. 1214 (2005); George Selgin & John L. Turner, *Strong Steam, Weak Patents, or the Myth of Watt's Innovation-Blocking Monopoly, Exploded*, 54 J.L. & ECON 841 (2011); Heidi L. Williams, *Intellectual Property Rights and Innovation: Evidence from the Human Genome*, 121 J. POL. ECON. 1 (2013); Ryan Lampe & Petra Moser, *Patent Pools, Competition, and Innovation – Evidence from 20 U.S. Industries Under the New Deal* 29 (Stan. L. & Econ. Olin, Working Paper No. 417, 2013), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1967246 [<https://perma.cc/JDY3-YHSE>]; Bhaven N. Sampat & Heidi L. Williams, *How do Patents Affect Follow-On Innovation? Evidence from the Human Genome* (Nat'l Bureau of Econ. Research, Working Paper No. 21666, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2679705 [<https://perma.cc/LL7K-K8FP>]; Joan Farre-Mensa, Deepak Hegde & Alexander Ljungqvist, *The Bright Side of Patents* (2016) (unpublished manuscript), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2704028 [<https://perma.cc/UBX5-YEMN>]. *But see* Lisa Larimore Ouellette, *The Difficulty of Measuring the Impact of Patent Law on Innovation*, WRITTEN DESCRIPTION (Sept. 24, 2015), <http://writtendescription.blogspot.com/2015/09/the-difficulty-of-measuring-impact-of.html> [perma.cc/H6F3-4USQ] (casting doubt on Professor Shih-tse Lo's analysis).

138. See generally Budish et al., *supra* note 137.

139. See generally Sampat & Williams, *supra* note 137.

140. Darius Lakdawalla & Tomas Philipson, *Does Intellectual Property Restrict Output? An Analysis of Pharmaceutical Markets*, 55 J.L. & ECON. 151 (2012).

141. See BURK & LEMLEY, *supra* note 127, at 156–58.

estimates of this, though it does not disclose that information in the rule or the regulatory impact analysis.¹⁴²

In addition, there may be useful analytic shortcuts available to the agency. The patent applications that will not be filed or renewed under the higher fees but would have been filed or renewed under the lower status quo ante fees are most likely the lowest-value patents, those whose projected value barely exceeded the old fees and fall just short of the new fees. This is of particular importance with respect to patents that are not renewed. If a patent owner would choose to renew a patent after 3.5 years under the old fee schedule (for a fee of \$1150) but would not choose to renew the same patent under the new fee schedule (for \$1600), that patent cannot have been especially valuable.¹⁴³ These patents are unlikely to lead to much new innovation or produce significant social welfare gains.¹⁴⁴ On the other hand, these lower-value patents will contribute as much to the creation of patent thickets as any relevant property right.¹⁴⁵ Accordingly, the PTO might adjust downward any estimates of the positive—but not the negative—dynamic effects of these patents.

At the same time, the PTO believes that the new rules will reduce the time it takes to obtain a patent from 21.0 months to 18.8 months.¹⁴⁶ This reduction in patent pendency accounts for the projected increase in patents granted despite the projected drop in the number of new applications. It is possible that these earlier patent grants will induce some firms to innovate more than they otherwise would have, particularly in fast-moving industries where patents are out of date after a short period of time.¹⁴⁷ These quicker patent grants might also make it easier for an innovative firm to signal—to competitors, partners, venture capital firms, and so forth—that it has a promising business model.¹⁴⁸ At the same time, 2.2 additional months represents only approximately 1 percent of a patent's

142. See Setting and Adjusting Patent Fees, 78 Fed. Reg. 4212 (Jan. 18, 2013); U.S. PATENT & TRADEMARK OFFICE, *supra* note 9.

143. See Setting and Adjusting Patent Fees, 78 Fed. Reg. at 4225 tbl.4.

144. Masur, *supra* note 44, at 689.

145. *Id.*

146. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 42 tbl.4-2.

147. See BURK & LEMLEY, *supra* note 127, at 156–65 (describing software and consumer electronics as industries in which patents quickly become obsolete).

148. See Stuart Graham & Ted Sichelman, *Why Do Startups Patent?*, 23 BERKELEY TECH. L.J. 1063, 1067 (2008); Clarisa Long, *Patent Signals*, 65 U. CHI. L. REV. 625, 627 (2002); Farre-Mensa et al., *supra* note 137, at 5.

expected lifetime.¹⁴⁹ It is impossible to know the precise elasticity of innovation with respect to patent term, but it seems unlikely that a 1 percent increase in patent lifespan would produce a substantial increase in inventive activity.

Once it has calculated the dynamic benefits and costs of the regulation, the PTO must estimate the static deadweight losses (or gains). Again, the regulation is expected to result in 25,000 fewer patents in force. In theory, this should lead to a reduction in the deadweight loss created by patents, amounting to a social benefit from the new fee rules. However, as with the issue of patents' dynamic effects, this question depends strongly upon the quality and value of the patents granted or not renewed. If the only patents affected by the changes in fees are largely valueless, then it is unlikely that they would affect products with significant market share.¹⁵⁰ If a \$1600 fee is enough to deter a patent owner from renewing her patent after 3.5 years, that patent owner was not earning much in the way of monopoly rents nor creating much in the way of deadweight loss. This is not to say that the effect will be zero; it may be that some firms will refrain from applying for patents that turn out to cover valuable technology, enabling consumers to purchase that technology at marginal cost. But the effect will likely be small.

Finally, there are the administrative costs of examining patents and operating the PTO. The agency estimated that its operating budget for the first five years after the fee increase would total \$13.579 billion.¹⁵¹ By comparison, the PTO's operating budget in 2012, the last year under the old fee schedule, was \$2.320 billion.¹⁵² If the old fee schedule had remained in effect (and remained static), the total operating budget over five years would have been \$11.24 billion. The new rule thus represents \$2.359 billion in additional patent operations costs over five years.

149. A patent is valid from the date it is granted until 20 years (240 months) after the date on which it is filed. 35 U.S.C. § 154 (2012). Prior to the implementation of this rule, the average patent was pending for 21 months before being granted. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 42 tbl.4-2. Accordingly, the typical patent was in force for 240 – 21 = 219 months. An additional 2.2 months represents an increase of approximately 1 percent of lifetime validity.

150. It is of course possible that a court will incorrectly construe a worthless patent to cover a valuable invention that does not rely upon the patent. The PTO should take such effects into account.

151. See Setting and Adjusting Patent Fees, 78 Fed. Reg. 4212, 4215 (Jan. 18, 2013).

152. U.S. PATENT & TRADEMARK OFFICE, PERFORMANCE AND ACCOUNTABILITY REPORT, FISCAL YEAR 2012, at 2 (2012).

This brief outline of a PTO CBA immediately highlights the importance of attempting to quantify the costs and benefits at hand. How should the PTO balance the potential benefits of thinning the patent thicket, and the potential gains (or losses) to innovation from the dynamic effects of more and faster patents, against the increased costs of patent operations? Moreover, even if the PTO concludes that its alternative fee structure is superior to the status quo, how can it know whether it is superior to other options? For instance, this sketch indicates that the reduction in valid patents brought about by higher renewal fees could represent a critical source of benefits. Perhaps the PTO should have raised renewal fees even more and then transferred the funds to the general federal fisc rather than spending them on patent operations.¹⁵³ This would reduce the costs of patent thickets and anticommons without driving up the costs of patent operations. Curing the “patent backlog” is a politically popular cause and one of the few reforms that nearly all patent stakeholders support, but it may not be a wise use of resources.¹⁵⁴ Granting patents more quickly surely increases the private value of those patents to their owners, but it is much less clear whether it creates social benefits great enough to justify the added expenditures. This is precisely the sort of question a CBA is designed to answer.

These issues are not merely hypothetical. Recall that the PTO initially proposed to adopt a similarly structured fee schedule with higher overall fee rates—Alternative 4. The PTO rejected this option in favor of the more modest Alternative 1, apparently under political pressure from patent filers. The agency wrote that “many patent stakeholders viewed the rapid pace for building the operating reserve under Alternative 4 (and the required higher fees to support this effort) as too aggressive.”¹⁵⁵ The interests of these stakeholders—who represent just the patent ownership side of the equation—may not have been well aligned with the interests of society at large, including consumers of patented products and firms that produce goods

153. See Masur, *supra* note 44, at 724 (offering a similar suggestion); Email from Professor Brian J. Love to the Hon. Michelle K. Lee, Re: Requests for Comments on Enhancing Patent Quality (May 6, 2015), http://www.uspto.gov/sites/default/files/documents/2015quality_f_love_06may2015.pdf [<https://perma.cc/78KF-23Z7>] (suggesting that the PTO raise application fees in order to weed out patents asserted by patent trolls); James E. Bessen & Brian J. Love, *Make the Patent “Polluters” Pay: Using Pigovian Fees to Curb Patent Abuse*, 4 CALIF. L. REV. CIRCUIT 84, 86 (2013) (same).

154. See Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1496 (2001).

155. U.S. PATENT & TRADEMARK OFFICE, *supra* note 9, at 80.

without seeking IP. Higher fees might have been even more successful in reducing the patent thicket and minimizing patent deadweight loss without overly diminishing incentives to innovate.¹⁵⁶ One of the primary purposes of cost-benefit analysis is to ensure that agencies regulate on the basis of sound policy and the general interests of society, rather than the particular goals of the interest groups that have the agency's ear.¹⁵⁷ This may be an instance in which a cost-benefit analysis would have revealed that the PTO should have acted far more aggressively, even over the objections of the agency's "customers."¹⁵⁸

Nonetheless, it would be error to overstate the ease of performing a complex cost-benefit analysis with dynamic patent effects at its center. As I have repeatedly noted, this is a difficult economic question about which there is no empirical or theoretical consensus. At the same time, agencies frequently complete cost-benefit analyses where the science and economics are in some dispute.¹⁵⁹ As I have argued in other work, agencies should make educated guesses when they are uncertain about a cost or benefit, and those educated guesses should be updated over time as the agency is able to gather further information.¹⁶⁰ Such an approach might have led the PTO to craft a fee-setting rule that more effectively furthered innovation while protecting consumers and producers from the costs of excessive patenting. The PTO owes all of its stakeholders nothing less.

CONCLUSION

The Patent and Trademark Office deserves credit for undertaking the devilishly complex task of performing a cost-benefit

156. One commenter even suggested such an approach to the PTO during the notice-and-comment period prior to the promulgation of the rule. *See* Setting and Adjusting Patent Fees, 78 Fed. Reg. at 4252 ("A commenter noted that the Office's goal of 'fostering innovation' fails to take into account the externalities that marginal (i.e., low value) patents impose on producing companies, other innovators, and the public . . ."). The PTO responded to this point with boilerplate language about measures it has taken to improve patent quality and a repetition of its argument linking lower fees to increased patenting and greater innovation. *Id.*

157. ADLER & POSNER, *supra* note 16, at 6.

158. *See supra* note 54 and accompanying text.

159. *See, e.g.*, Jonathan S. Masur & Eric A. Posner, *Climate Regulation and the Limits of Cost-Benefit Analysis*, 99 CALIF. L. REV. 1557, 1561, 1577 (2011) (describing and analyzing an Interagency Working Group calculation of the social cost of carbon, an issue subject to great scientific and economic uncertainty).

160. Masur & Posner, *supra* note 12, at 4.

analysis on changes to patent rules. Nonetheless, the result falls well short of what a CBA should accomplish even under the most difficult of circumstances. The PTO does not seem to understand how patents actually produce costs and benefits, which leads it to confuse private benefits and costs for social ones and to ignore crucial categories of costs and benefits as well. The result is one cost-benefit analysis that sheds little light on the regulation it is meant to describe, and another regulation that should have been analyzed in cost-benefit terms but was not. Proper cost-benefit analysis might well have revealed that one or both of these regulations should have been substantially revised. For all of the economic uncertainty that surrounds patents, it is not beyond the PTO's powers to conduct a proper CBA. The agency should endeavor to do so, lest it squander the rulemaking authority it has been granted and convince Congress not to make the same mistake again.