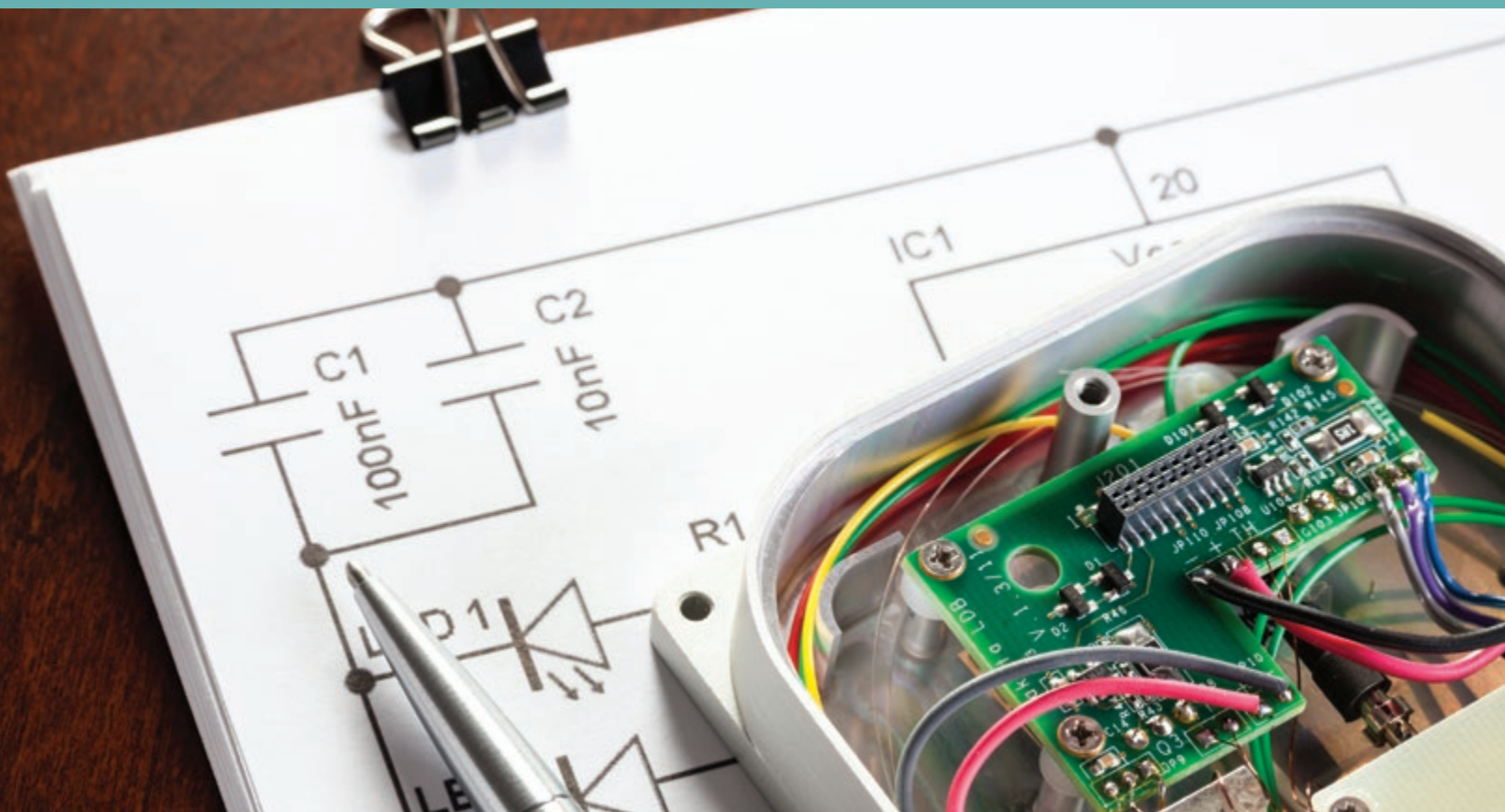


Decreasing the Patent Office's Incentives to Grant Invalid Patents

Michael D. Frakes and Melissa F. Wasserman



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This policy proposal is a proposal from the author(s). As emphasized in The Hamilton Project's original strategy paper, the Project was designed in part to provide a forum for leading thinkers across the nation to put forward innovative and potentially important economic policy ideas that share the Project's broad goals of promoting economic growth, broad-based participation in growth, and economic security. The author(s) are invited to express their own ideas in policy papers, whether or not the Project's staff or advisory council agrees with the specific proposals. This policy paper is offered in that spirit.

BROOKINGS

Abstract

There is general agreement that the U.S. Patent and Trademark Office (Patent Office or Agency) is issuing too many invalid patents that are unnecessarily reducing consumer welfare, stunting productive research, and discouraging innovation. Concerns regarding the Agency's over-granting tendencies have recently spurred the Supreme Court to take a renewed interest in patent law and have driven Congress to enact the first major patent reform act in more than 60 years. However, patent policy reforms have been overly reliant on anecdotes and hunches. Until recently, there has been little to no compelling empirical evidence that any feature of the patent application system causes the Patent Office to allow the granting of invalid patents.

New empirical studies of the administrative process for granting patents provide a basis for policy reform. Based on these studies, we propose three changes to the patent system that would reduce the issuance of patents of questionable validity: (1) restructuring the Patent Office's fee schedule to minimize the risk that fee collections will be insufficient to cover its operational costs, while also diminishing its financial incentive to grant patents when collections are insufficient; (2) limiting the number of repeat applications that applicants can file for the same invention; and (3) increasing the time examiners spend reviewing patent applications.

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Chapter 1. Introduction

The U.S. Patent and Trademark Office's (Patent Office or Agency) primary task is to review inventions to determine whether they merit the grant of a patent. The Agency seeks to provide both timely and high-quality review of patent applications. Given that patents play a critical role in promoting innovative activity and shaping the direction of technological growth, the Patent Office performs important social and economic functions (Moser 2004). However, it is becoming increasingly difficult for the Agency to accomplish its mission. The Patent Office, which processes more than 500,000 patent applications a year, routinely faces budgetary shortfalls, high patent examiner turnover, and a crushing backlog of patent applications. Given this challenging environment, it is not surprising that the patent examination process generates some degree of error, including errors that result in a large number of invalid patents being issued.¹

Indeed, invalid patents are unnecessarily reducing consumer welfare, stunting productive research, and discouraging innovation. These concerns have been the subject of multiple reports by the National Academies and the Federal Trade Commission (Federal Trade Commission 2003; National Research Council 2004, 2006). Policy makers are also responding: the Supreme Court has taken a renewed interest in patent law, while Congress has enacted the first major patent reform act in nearly 60 years, the America Invents Act of 2011.

Despite the general agreement that the Patent Office is granting too many invalid patents, until recently the policy discussion has not been informed by compelling empirical evidence regarding particular Agency features that bias it toward granting patents. Rather, the patent reform discussion has been driven by inadequate data and anecdotes of a few infamously issued patents. Without sound guidance as to which features of the patent process might actually be leading to the granting of invalid patents, policy makers are left trying to fix the patent system without understanding the root causes of the system's shortcomings.

We hope that this is about to change. Recent research employs a range of empirical techniques to show a causal connection between certain features of the Agency and its granting practices. Our proposal draws heavily on these recent empirical analyses to recommend three changes designed to

eliminate structural features of the patent system that bias the Patent Office toward granting patents of questionable validity.

First, we propose restructuring the Patent Office's fee schedule to minimize the risk that its revenues will be insufficient to cover its operational costs and to diminish its financial incentive to grant more patents when revenues fall short. The overwhelming majority of Patent Office costs are attributed to reviewing and examining applications. To help cover these expenses, the Agency charges examination fees to applicants. These fees fail to cover even half of the Agency's examination costs, however. To make up for this deficiency, the Agency relies heavily on two additional fees that are collected *only in the event that a patent is granted*: (1) issuance fees, paid at the time a patent is granted; and (2) renewal fees, paid periodically over the lifetime of an issued patent as a condition of the patent remaining enforceable. Combined with examination fees, these fees account for nearly all of the Patent Office's revenue.

One immediate concern with this back-ended fee schedule is that it creates a risk that the Agency's fee income will fail to cover its examination expenses. Unexpected dips in renewal fee income, unanticipated declines in the quality of applications (leading to declines in patent issuances), or unforeseen increases in patent applications (leading to higher examination costs) can all result in a budgetary shortfall for the Agency.

An equally troubling concern with this back-ended fee schedule is that it gives the Agency a strong incentive to grant patents. This is particularly relevant when the Agency finds itself in a budgetary shortfall, because it can then increase its revenue and close the gap by granting more patents and thereby collecting more issuance fees, in addition to renewal fees in the future. This generates unnecessary costs for society to the extent that it involves granting some number of legally invalid patents. Research has validated these concerns, producing evidence that the Patent Office acts on this incentive to grant more patents during periods when it is financially strained (Frakes and Wasserman 2013).

Specifically, we propose that the Agency increase its examination fees to equal its examination costs while simultaneously abolishing issuance fees. With examination fees sufficient to meet the costs of reviewing applications, the financial risks facing the Patent Office would be significantly

reduced. And, because empirical evidence suggests that the Agency acts on the financial incentive to grant patents only when its fee income fails to cover its operational expenses, the Agency's bias toward granting patents should be extinguished (Frakes and Wasserman 2013). Nonetheless, if this is incorrect and even a financially healthy Patent Office might be inclined to issue additional patents to raise more funds, our proposed elimination of issuance fees would further limit the incentive to issue additional patents. Notably, we do not propose eliminating renewal fees; these fees perform a valuable social function of effectively shortening the lifetime of a patent, given that an invention whose patent renewal fees lapse becomes part of the public domain. We propose to decouple the renewal fee income from the Agency's funding process, however, reducing still further any incentive for it to grant invalid patents.

Our second proposal is that the Patent Office limit repeat applications. Unlike its counterparts in other countries, the U.S. Patent Office can never truly reject a patent application. Currently, rejected applicants can always choose to restart the application process by filing a repeat application. The consequences of this option can be overwhelming for the Patent Office, which has stated that repeat filings are "having a crippling effect on the Office's ability to examine . . . applications". Over 40 percent of the Agency's already cumbersome backlog of patent applications constitute repeat filings (U.S. Department of Commerce 2007, 46718).

The Patent Office does collect fees when repeat applications are filed, but these repeat filing fees are set at levels substantially below the costs that it incurs in reviewing repeat filings. If the Agency finds itself in a situation where its costs are outpacing its fee collections, repeat applications could compound its financial woes. With insufficient resources to process all the applications, the result will be growth in the backlog of applications awaiting review. Unfortunately, one effective strategy for combatting this application backlog is to grant more patents, even if this means issuing some invalid patents. Empirical evidence suggests that, in the face of mounting backlogs and financial pressures, the Patent Office is acting on this incentive and increasing its tendency to grant patents (Frakes and Wasserman 2015).

Our third proposal is to increase the amount of time allocated to patent examiners. Patent examiners spend, on average, only 19 hours reviewing an application (Frakes and Wasserman 2014). Because a patent application is legally presumed to

comply with the patentability requirements when filed, a patent must be granted if a patent examiner does not explicitly set forth reasons why an application fails to meet the requirements. Thus, if examiners are systematically not given enough time, they might be in a position where they are forced to grant patents that they might otherwise reject if they were given more time to conduct the necessary searches and reviews. Recent empirical evidence validates this concern and suggests that examiners are indeed given insufficient time to fully vet patent applications (Frakes and Wasserman 2017).

In addition, empirical analysis demonstrates that an individual examiner's grant rate rises dramatically as she experiences promotions that result in reductions in the time allocated for her to review each patent application. As patent examiners rise from pay grade GS-7 to GS-14 along the General Schedule (GS) Pay Scale—a progression whereby they see their examination times cut in half—their grant rates increase by as much as 13 to 29 percent. This pattern suggests that time allocations might, in fact, pose meaningful constraints on examiners. Because time constraints appear to be more binding for more-experienced examiners, we propose that time allocations for these examiners in particular be increased.

Importantly, the Patent Office has the legal authority to adopt the majority of our proposals on its own. The Agency has fee-setting authority and could promulgate rules to implement some of our fee restructuring proposals; however, other proposals would require congressional action. It is also clearly within the Agency's scope of authority to set the time allocations of patent examiners.

We acknowledge that the features of the Patent Office that we address in this paper involve a broader range of considerations beyond its incentives to grant patents. For instance, the Agency's optimal fee schedule must balance the incentives it creates for its decision making against public welfare concerns and incentives it creates for patent applicants. Likewise, the time allocations given to patent examiners to review patent applications involve a trade-off between the Agency's examination capacity and patent quality (holding constant the size of its budget). That is, for a given amount of money, the longer the Patent Office allows examiners to spend on an application, the fewer patent applications it will be able to process. We are mindful of the complexity involved in these trade-offs and subsequently discuss them in more detail.

Chapter 2. The Challenge

There is general agreement that the Patent Office grants too many patents that are invalid and that unnecessarily impose costs on society (Federal Trade Commission 2003; National Research Council 2004; National Research Council 2006). Most importantly, invalid patents can result in higher prices and diminished use of the patented invention. Although patents encourage innovation by helping inventors to recoup their research and development expenses, this comes at a cost—consumers pay higher prices and have less access to the patented invention. Although society can accept such consequences for a properly issued patent, an invalid patent imposes these costs on society without providing the commensurate benefits from additional innovation because, by definition, an invalid patent is one issued for an existing technology or an obvious technological advancement. Invalid patents provide no innovative benefit to society because the public already possessed the patented inventions.

In addition to this harm, erroneously issued patents can stunt innovation and competition (Federal Trade Commission 2003; Galasso and Schankerman 2015). Competitors might forgo research and development in areas covered by improperly issued patents to minimize the risk of expensive and time-consuming litigation. There is growing empirical evidence that invalid patents can increase so-called patent thickets—dense webs of overlapping patent rights—that in turn raise the cost of licensing and complicate business planning (Cockburn and MacGarvie 2009). Because a firm needs a license to all of the patents that cover its products, other firms can use questionable patents to opportunistically extract licensing fees. There is mounting evidence that nonpracticing entities—commonly known as patent trolls—use patents of questionable validity to assert frivolous lawsuits and extract licensing revenue from innovative firms (Cohen, Gurun, and Kominers 2014). Invalid patents can also undermine the business relations of market entrants because customers might be deterred from transacting with a company out of fear of a contributory patent infringement suit (Leslie 2006). Finally, erroneously issued patents can inhibit the ability of start-ups to obtain venture capital, especially if a dominant player in the market holds the patent in question (Federal Trade Commission 2003).

The quality of granted patents has become such an important and visible issue that both the judiciary and Congress have

intervened. The Supreme Court has recently strengthened the doctrine of nonobviousness, making it easier for the Agency to reject invalid patents.² In 2011 Congress enacted the first major patent reform bill in more than six decades.³ In part, this act was aimed at increasing the quality of patent examination. Although major changes to the patent system are being driven by concerns regarding the quality of issued patents, they have generally not been informed by evidence about the causes of low-quality patents.

Recent research has provided some of the first reliable evidence bearing on the reasons behind the Patent Office's issuance of invalid patents. This section draws heavily on this research and outlines three features of the patent system that are contributing to the issuance of invalid patents.

THE PATENT OFFICE'S FEE SCHEDULE

The first of these features is the Patent Office's fee schedule, which gives rise to two major concerns. First, the structure of the Agency's fees creates a risk that its fee revenue will fail to cover its operational costs. Second, the Agency's fee schedule creates an incentive for examiners to grant rather than deny patents. To illustrate both of these concerns, a more detailed description of the Agency's budgetary process, fee levels, and operational costs is necessary.

Since 1991 the Patent Office has been funded through user fees. From 1991 to 2012 Congress was the sole arbiter of the Agency's fee levels. In 2013 the America Invents Act granted the Patent Office fee-setting authority with the restriction that the Agency's aggregate fee revenue not exceed its operational costs.⁴ The Patent Office, however, does not have the right to immediately spend its fee collections. Instead, the Agency must receive congressional approval through annual appropriations to use its fee revenue.

Prior to 2004 Congress routinely set the Agency's budget below both its estimated and actual fee collections. Since 2004 the Agency's spending authority has been capped at its projected revenue stream. When the Patent Office's fee collections fall below its appropriated budget, it will experience a budgetary shortfall because Congress does not provide it with the difference. In contrast, if the Patent Office's fee collections surpass its spending authority, the excess fees

are not immediately available to it. In the past, Congress used these excess fees to fund other government operations. This practice, known as fee diversion, first occurred in 1992 and appears to have peaked in the late 1990s to the early 2000s. In 2013 the America Invents Act severely limited the practice of fee diversion through the creation of the Patent and Trademark Fee Reserve Fund (PTFRF).⁵ Excess fee collections are routed to the PTFRF, earmarked for use only by the Patent Office, and potentially available in the next appropriation cycle.

Roughly 85 percent of the Patent Office's patent operating budget is generated through three types of fees: (1) filing, search, and examination fees (collectively referred to as examination fees); (2) issuance fees; and (3) renewal fees (as shown in box 1). The applicant pays examination fees (which are nonrefundable if an application is denied) when filing the application, issuance fees when the Agency grants a patent application, and renewal fees periodically over the lifetime of an issued patent so the patent can remain enforceable.

The vast majority of the Agency's revenues are generated by fees that it collects only if a patent is granted.

Examination fees account for approximately 30 percent of the Patent Office's budget, but fail to cover its actual costs to examine applications. In fiscal year 2016 the Patent Office estimated that the average cost of examining a patent application was about \$4,200 (U.S. Patent and Trademark Office 2016). The examination fee that year was set at only \$1,600 for large for-profit corporations; at \$800 for individuals, small firms, nonprofit corporations, or other enterprises that qualify for small-entity status; and at \$400 for individuals, small firms, nonprofit corporations, or other enterprises that qualify for micro-entity status.⁶

As a result, the Patent Office is heavily dependent on issuance fees and renewal fees, which account for over 50 percent of the Patent Office's patent budget, to fund its operations. These post-allowance fees (i.e., fees collected after the Patent Office gives notice of intent to allow a patent) are typically larger than the examination fees. In fiscal year 2016 the issuance fee was set at \$1,510, and the renewal fees due at three and a half, seven and a half, and eleven and a half years after patent issuance were \$1,600, \$3,600, and \$7,400, respectively.⁷ As with examination

fees, small entities pay half of these amounts and micro-entities pay one-fourth of these amounts. Because the expenses associated with issuing and maintaining a patent are minimal, these post-allowance fees are almost exclusively used to fund other Agency activity, primarily examination expenses.

The back-ended fee structure of the Agency threatens its financial sustainability. Because the Patent Office is paying for patent examination using fees generated by post-allowance activities, revenues could fall out of step with examination demands. Any unexpected decline in the rate at which applicants pay renewal fees or in the quality of incoming applications (which helps determine how many patents are granted and the corresponding issuance fees paid) or any unexpected increases in the number of patent applications filed can have a negative effect on the Agency's ability to cover its operational costs with its fee revenue.

In addition to creating potential budgetary problems, the Patent Office's fee structure creates a clear incentive to grant patents. The vast majority of the Agency's revenues are generated by fees that it collects only if a patent is granted. A Patent Office that experiences a budgetary shortfall might grant additional patents in an effort to raise its fee revenue through additional issuance fees and future renewal fees. To be clear, we do not assume that the Patent Office systematically seeks to maximize revenues from fees. Rather, we posit that when the Patent Office is unable to cover its operational costs through the fees generated at its current patent grant rate, it might grant additional patents, even if this means issuing more invalid patents, in an effort to generate additional fee income.

Not every patent grant will generate the same revenue for the Patent Office, however. A financially strained Patent Office has the incentive to grant patents that yield the highest fees. While renewal fees do not vary across technology classifications, patent recipients elect to pay these fees at dramatically different rates across such classifications. A cash-strapped Patent Office therefore stands to gain more financially by granting patents in technologies that are likely to be renewed at a higher rate relative to those likely to be renewed at a lower rate. Moreover, small-entity status allows independent inventors, small businesses, and nonprofit organizations to pay 50 percent reduced patent fees; micro-entity status allows independent inventors, small businesses, and nonprofit organizations to pay 75 percent reduced patent fees. Thus, the Agency's fee structure creates an incentive not only to grant additional patents, but also to grant patents in technologies with historically high renewal rates as well as to large entities that pay the highest fees.

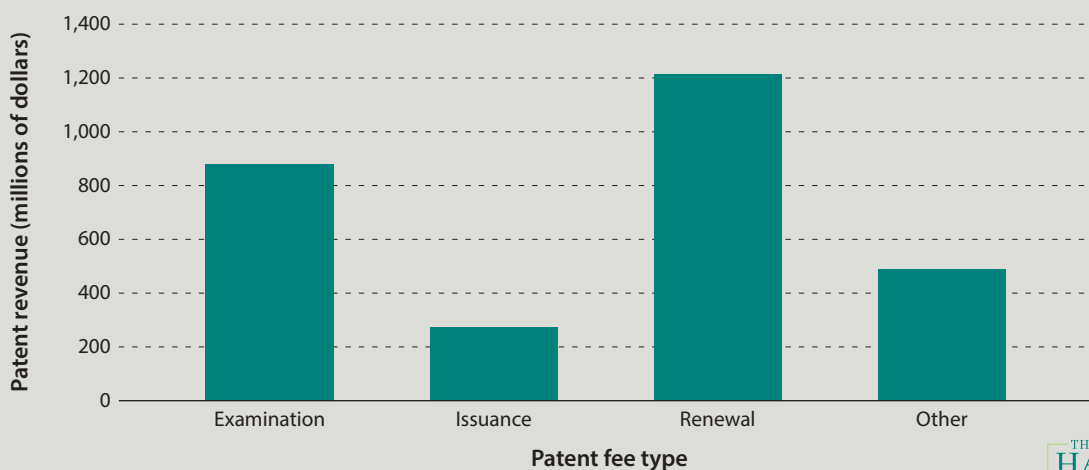
BOX 1.

Patent and Trademark Office Budget in Fiscal Year 2016

In fiscal year 2016 the Patent Office collected fees amounting to \$3.063 billion. Of this revenue, approximately \$2.86 billion were patent fees, with the remainder consisting of trademark fees. The Agency collected approximately \$880 million in patent examination fees, \$274 million in patent issuance fees, \$1,214 million in patent renewal fees, and \$700 million in other fees such as late payment fees, extra claim fees, etc. This revenue was approximately \$200 million less than the Patent Office was authorized to spend, however. To cover the shortfall, the Patent Office was able to draw on \$148.2 million from the PTFRF to partially offset the \$200 million budgetary shortfall. Although the PTFRF helps increase the financial stability of the Agency, it does not fully protect the Agency’s financial health or address the incentive to grant patents when revenue falls short of expenses.

BOX FIGURE 1.

Patent Revenues in Fiscal Year 2016, by Fee Type



Source: Patent Office 2016.



BOX TABLE 1.

Fiscal Year 2016 Patent Fee Schedule

Fee Type	Fee Amount
Examination	\$1,600
Issuance	\$1,050
Renewal (3.5 years)	\$1,600
Renewal (7.5 years)	\$3,600
Renewal (11.5 years)	\$7,400

Source: 37 C.F.R. §§ 1.16, 1.18, 1.20.

Our prior research suggests that the Agency acts on its financial incentive to grant patents when it is facing financial turmoil (Frakes and Wasserman 2013). In that work, we used patent processing data for all 4,733,263 patent applications filed with the Patent Office over approximately 20 years, exploring whether the Patent Office granted patents at higher rates during budgetary shortfalls. Because grant rates might change over time for a number of reasons unrelated to the financial status of the Agency—for example, the quality of the underlying applications might change from year to year—we did not rely solely on a comparison of patent approval rates at different times.

Instead, we implemented a design that allowed us to accurately isolate the contribution of specific incentives related to the Agency’s fee structure. We compared two groups: (1) patent

applicants in technologies that have historically exhibited higher renewal rates, and (2) applicants in technologies that have lower renewal rates. In an alternative approach, we compared applicants that did not qualify for fee reductions—i.e., large-entity applicants—with applicants that did qualify for fee reductions—i.e., small-entity applicants.⁸ Because the Patent Office would profit more from granting patents to the first group in each comparison set—either applicants in high renewal-rate technologies or large-entity applicants—it may be particularly inclined to raise its approval rate of these types of applications after experiencing a budgetary shortfall.

The advantage of this approach is that other factors that change over time and that impact grant rates, such as changing application quality, would be expected to affect both groups of

applicants in the same way. By looking at how a Patent Office budgetary shortfall differentially affects the grant rates of the two groups, we are able to identify the impact of the Agency's financial incentives on its patent approval decisions.

As theory predicts, the Patent Office does indeed grant patents at notably higher rates to large entities and applicants from high renewal rate technologies when it finds itself in a position of insufficient fee revenue.⁹ More broadly, the parameters of its fee schedule appear to affect the way in which the Patent Office applies the legal patentability requirements. This is concerning, given that the granting decision should be based solely on whether the application meets the legal patentability standards. If the fee structure were to encourage more patent grants overall (or more grants during times of budgetary shortfalls), the result could be the issuance of patents lacking legal validity, potentially leading to substantial social harms. Box 2 discusses potential mechanisms the Patent Office could use to adjust grant rates.

REPEAT APPLICATIONS

Having just addressed a particular feature of the Patent Office that likely creates an incentive to grant patents in order to generate more revenues, we now address a feature that might create an incentive to grant patents in order to reduce costs. In particular, we consider repeat applications filed after an initial application has been rejected. Because there is no limit on reapplication, the Patent Office can never definitively reject an application. The Agency can diminish the stream of repeat filings (and associated examination costs), however, by simply allowing more patents in the first place. To better illustrate this incentive, we offer a

detailed description of repeat filings as well as the Patent Office's examination infrastructure and operational costs.

The fact that rejected patent applicants can always restart the examination process by filing repeat applications is indeed an oddity of the U.S. patent system; other patent systems typically contain limits on such applications. Repeat applications in the United States generally fall into one of two categories: (1) continuation applications or (2) requests for continued examination. Although the two types of repeat application are different in some respects, they are both used to seek an additional chance for a patent grant.

Repeat filings have the potential to seriously undermine the examination system, and there is growing evidence that such harm is already occurring. Roughly 550,000 applications are currently awaiting substantive review by the Patent Office. Considering that about 40 percent of the applications filed in fiscal year 2016 are repeat applications (up from 11 percent in 1980), a substantial percentage of the Patent Office's backlog can be attributed to its inability to definitively reject applications.

Repeat filings do not necessarily have to wreak havoc on the examination system. The Patent Office has been effectively fully user-fee funded since 1991; applicants pay an examination fee for every application filed, whether initial or repeat. If the Patent Office collected enough in examination fees to fully cover the cost of reviewing an application, any uptick in application rates could in principle be addressed by expanding the Agency's examination capacity using the collected application fees. Examination fees currently cover less than half of the costs

BOX 2.

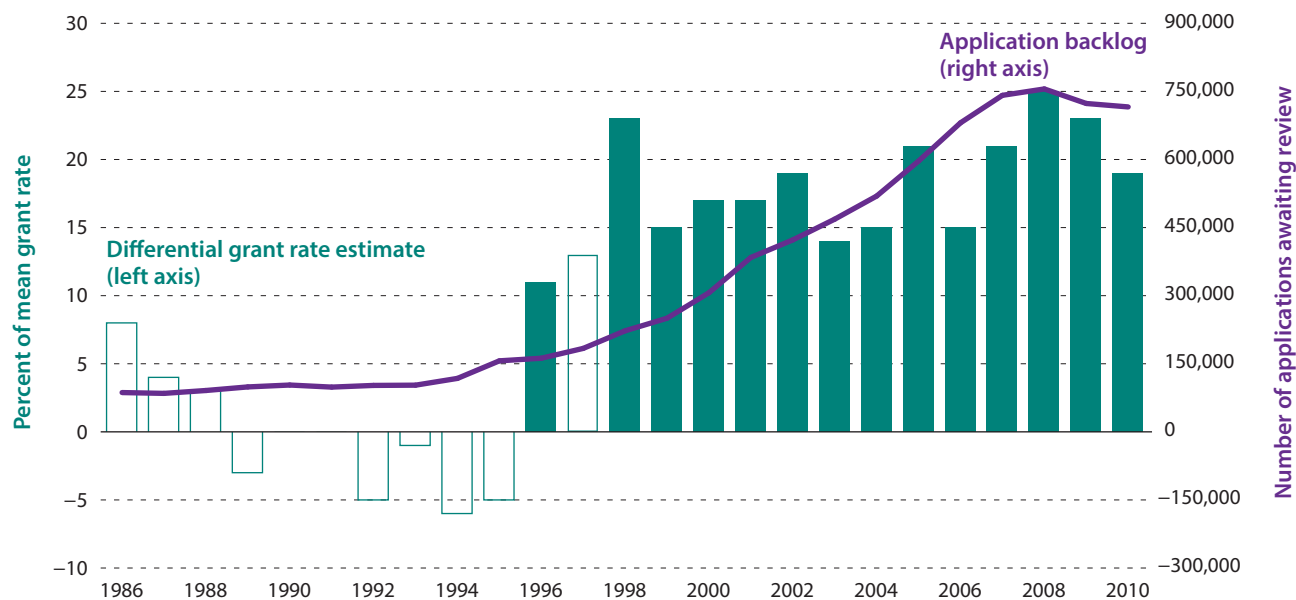
Mechanisms the Patent Office Could Use to Adjust Grant Rates

We believe there are at least two different mechanisms, which are not necessarily mutually exclusive, by which the Patent Office could encourage the issuance of certain patent types over others. The first is a top-down channel, wherein high-level officials instruct examiners to preferentially grant patents of certain types, such as patents in high-continuation-rate technologies. The Patent Office's ability to extend such categorical or technology-specific instructions is facilitated by its organizational structure, which is itself largely based on technological divisions. If the mechanism the Patent Office is using to adjust its granting tendencies is indeed a top-down channel, one might suspect that the elevated grant rate of an affected technology group (known as an Art Unit) would be distributed across all patent examiners within that group.¹⁰ That is, both senior examiners and junior examiners in an Art Unit with high repeat filings (or an elevated tendency to pay renewal fees) would demonstrate an inflated grant rate during times when the Agency's resources were insufficient to meet its expected examination demand.

The second possible mechanism for favoring certain patent types over others is an examiner-driven channel, whereby patent examiners themselves take action without necessarily receiving prompting from supervisors. In contrast to the top-down channel, the examiner channel would be more likely to manifest within senior patent examiners to the extent that they more fully internalize the negative impact of Patent Office resource shortfalls. Indeed, we find evidence that senior examiners are more likely than junior examiners to respond to downturns in Agency health by elevating their grant rates (Frakes and Wasserman 2015). This result provides some support for an examiner-driven mechanism, though we acknowledge that both channels might be working in tandem.

FIGURE 1.

Differential Grant Rate Between High- and Low-Repeat Filing Technologies and Application Backlog, 1986–2010



Source: Frakes and Wasserman 2015.

Note: Hollow bars are not statistically significant at the 5 percent level.



incurred by the Agency when evaluating applications, however. As a result, the Agency lacks the funds necessary to address the backlog of repeat filings through additional hiring efforts.

A resource-constrained Patent Office could attempt to combat this backlog of applications by approving more initial patent applications. Even if this means allowing some invalid patents, the Patent Office would be able to turn off the spigot of repeat filings and slow the growth of its backlog of patent applications.

Not all patent grants are equally likely to forestall the filing of a continuation application. Because repeat filings vary dramatically by technology, a resource-constrained Patent Office might prefer to grant more patents in technologies with historically high repeat-filing rates.

To test this prediction, we used an approach similar to the one described previously in the context of fee-schedule incentives (Frakes and Wasserman 2015). Specifically, we compared the Agency’s patent grant rate across different groups of applicants based on the tendency of their associated technologies to file repeat applications; importantly, we performed this across-technology comparison for two groups—defined by their average tendency to file repeat applications—before and after periods of budgetary shortfall and increases in application backlog. Our findings suggested that when the Patent Office begins to face mounting backlogs, it appears to act on its incentive to grant patents at higher rates for technologies that are associated with

higher rates of repeat application.¹¹ In figure 1, we replicate a figure from Frakes and Wasserman (2015), demonstrating that the Patent Office indeed began to grant at differentially higher rates for high repeat-filing technologies during the mid-1990s, a moment in time when the Patent Office’s application backlog began to increase considerably year-by-year. Again, this analysis is alarming because it suggests that factors other than the underlying quality of applications are affecting the Patent Office’s decision to allow patents.

PATENT EXAMINER TIME ALLOCATIONS

Having investigated certain aspects of the Patent Office’s fee and cost structures, we now turn our attention to a key aspect of its personnel policies. There is an abundance of anecdotal evidence that patent examiners are given insufficient time to adequately review patent applications. On average, a U.S. patent examiner spends only 19 hours reviewing an application, including reading the application, searching for prior art, comparing the prior art with the application, and (in the case of a rejection) writing a rejection, responding to the patent applicant’s arguments, and often conducting an interview with the applicant’s attorney (Frakes and Wasserman 2014). Because patent applications are legally presumed to comply with the statutory patentability requirements when filed, the burden of proving unpatentability rests with the Agency. That is, a patent examiner who does not explicitly set forth reasons why the application fails to meet the patentability standards

must then grant the patent. To the extent that examiners are given insufficient examination time, one might expect them to conduct limited reviews of applications, leaving them in a weaker position to identify proper bases of rejections. Accordingly, the amount of time allocated to examiners might be a fundamental determinant of the number of invalid patents issued by the Patent Office.

The Patent Office sets time allocations according to two key factors: the technological field in which the examiner is working, and the examiner’s position on the GS Pay Scale. A patent examiner in a more complex field is provided more hours to review an application than an examiner of the same pay grade who is working in a less complex field. The higher the pay grade of an examiner within a technology area, the fewer number of hours the Patent Office extends to that examiner to review an application.

To demonstrate the degree to which time allocations vary by pay grade and technology area, we present in table 1 the time allocation for a patent examiner working in one of the least complex fields, compound tools, and one of the most complex fields, artificial intelligence. A promotion to each subsequent pay grade roughly corresponds to a 10 to 15 percent decrease in the number of allocated examination hours. Examiners operating at GS-7 are given the greatest amount of time—19.7 hours and 45.1 hours—to review a patent in compound tools and artificial intelligence, respectively, whereas examiners operating at GS-14 are expected to review the same patents in approximately half that time (Frakes and Wasserman 2017).

Even if these allocations were to afford enough time to conduct thorough reviews, it is possible that this reform might not reduce the number of invalid patents issued by the Patent Office. However, our recent research suggests that this is not the case, and that these time constraints do cause examiners to issue a large number of invalid patents per year (Frakes and Wasserman 2017). To arrive at this conclusion, our study made use of two aspects of the Agency’s examination procedures: first, examination times decrease upon certain types of examiner promotion; and second, patent applications are randomly assigned to patent examiners within the same Art Unit (Frakes and Wasserman 2017).¹² We followed individual examiners throughout the course of their careers, tracking the evolution of their behavior as they experienced promotions that diminished their time allocations, while accounting for possibly relevant variables such as degree of supervision.

The results of this research suggest that the less time given to an examiner to review an application, the less active she is in searching for prior art, the less likely she is to make time-intensive rejections, and the more likely she is to grant the patent. The magnitude of the results is quite striking: a patent examiner who has been promoted to GS-14 has a grant rate that is 13 to 29 percent higher than it was when she was at a GS-7. Because

TABLE 1.
Examination Hours Allocated to Examiner,
by GS-Level and Technological Field

GS-level	Compound tools	Artificial intelligence
GS-7	19.7	45.1
GS-9	17.3	39.5
GS-11	15.3	35.1
GS-12	13.8	31.6
GS-13	12.0	27.5
GS-14	10.2	23.4

Source: Frakes and Wasserman 2017.

patent applications are randomly assigned to examiners within an Art Unit, there is no reason to believe that examiners at higher GS levels are being assigned applications that are more patent-worthy than those assigned to their colleagues at lower GS levels.

Moreover, while our results demonstrate clear increases in grant rates upon promotions to the next GS level, they also demonstrate a tendency toward reduced grant rates as examiners garner more experience within a given GS level.¹³ Examiners appear to learn over time how to form more-effective bases of rejection, only to have this learning process interrupted by occasional promotions that diminish the amount of time they have to formulate such rejections. Our analysis implies that if all examiners were allocated as many hours as are extended to GS-7 examiners, the Patent Office’s overall grant rate would fall by roughly 20 percent, amounting to roughly 40,000 fewer patents issued per year.

What is the nature of these 40,000 patents? Are they valid or invalid? To answer this question, we relied on the fact that many U.S. applicants likewise file for patent protection with the European Patent Office (EPO) and the Japan Patent Office (JPO), two offices that are known to invest substantially more resources per application than the U.S. Patent Office in the examination process, while having similar patentability standards (Picard and van Pottelsberghe de la Potterie 2011). Accordingly, we examined the sample of issued patents in which the U.S. applicant also sought protection at the EPO and the JPO. Outcomes at these foreign offices were used as a benchmark—albeit an imperfect one—to assess what the outcome at the U.S. Patent Office would have been if the U.S. examiners were given more time and resources to assess an application. We found evidence that U.S. examiner promotions were associated with a reduced rate of success in securing patent protection at the EPO and the JPO. This implies that the additional patents being issued as a result of examiner time constraints are indeed of questionable legal validity.

Chapter 3. The Proposal

In the previous section we described three structural features of the Patent Office that encourage it to grant more patents. First, the back-ended structure of the Patent Office's fee schedule creates financial instability for the Agency and an incentive for a resource-constrained Patent Office to grant additional patents, even if those patents are invalid. Second, its inability to definitively reject a patent application creates an incentive for a Patent Office experiencing a budgetary shortfall to grant more patents in an effort to slow the growth of its application backlog. Third, the insufficiency of time allocations causes patent examiners to allow invalid patents. Given these challenges, we now propose specific reforms to mitigate the problem of invalid patents.

MAKE THE AGENCY LESS RELIANT UPON POST-GRANT FEES

Empirical evidence suggests that too-low examination fees and too-high post-allowance fees negatively impact the financial health of the Agency, leading it to grant additional patents of questionable quality during periods of financial difficulty (Frakes and Wasserman 2013). We therefore propose restructuring the Agency's fee schedule to minimize the risk that the Patent Office's fee collections will be insufficient to cover its operational costs in the first place. One difficulty in setting the optimal fee schedule for the Patent Office is that the schedule has implications for the incentives of patent applicants as well as the Agency. Our proposal attempts to balance these differing interests.

Increasing Patent Office examination fees to match examination costs is an important part of addressing the problem of invalid patents. If the examination fees were sufficient to meet the costs of reviewing applications, then the Patent Office financial health would improve and its financial incentive to grant patents would be extinguished. Not only would the Agency be able to address any unexpected uptick in applications by using the associated examination fees to expand its examination capacity, but it would also be able to accommodate unexpected dips in its grant rate (due to unexpected declines in application quality) or in its renewal fee income. Because the empirical evidence suggests the Patent Office acts on the financial incentive to grant additional patents only when its fee collections are insufficient to cover its

operational costs, addressing its financial instability would be particularly helpful in eliminating any granting bias.

Examination fees were originally set below examination costs in order to increase access to the Patent Office. Thus, one concern is that a substantial increase in examination fees could have a negative effect on the number of high-quality patent applications filed. In evaluating this concern, it is important to note that the Patent Office has the lowest examination fees of any of the three major international patent offices.¹⁴ Furthermore, small increases in patent examination fees appear to have a negligible effect on the volume of patent filings (de Rassenfosse and van Pottelsberghe de la Potterie 2012). Because the actual fees paid to the Patent Office for the examination of a patent application are a fraction of the overall cost of securing a patent (which includes attorney fees), there is reason to believe that even a two-fold or three-fold increase in examination fees will not substantially impede access to the U.S. patent system. As a bonus, increasing examination fees will likely also result in raising the quality of patent applications filed with the Patent Office, as applicants become more judicious in selecting those inventions for which they choose to pursue patent rights.

Concerns regarding access to the patent system are arguably more important for patent applicants that qualify for small- and micro-entity status; empirical evidence suggests these entities are particularly innovative (Office of Advocacy 2010). Currently the Patent Act authorizes entities that qualify for small- and micro-entity status to pay reduced examination fees. Because we propose that the Patent Office align examination fees with patent application review costs, small and micro-entities would no longer receive a fixed examination fee discount. As we discuss later in the section, we propose to replace the current discounts with an alternative subsidy, funded by renewal fees.¹⁵

We also propose to abolish the Agency's issuance fees. These fees have been used to subsidize the examination costs of unsuccessful patent applicants, but this will no longer be necessary after the Patent Office increases its examination fees to cover its operational costs. Moreover, because the America Invents Act does not permit the Patent Office's aggregate fee income to exceed its operational costs, an increase in the level

of examination fees would necessitate a decrease in the level of post-allowance fees. This requirement would be partially satisfied by eliminating issuance fees.

Importantly, we do not advocate eliminating or diminishing renewal fees. Unlike issuance fees, renewal fees perform a valuable social function. Renewal fees effectively shorten the lifetime of a patent: when a patent holder opts not to pay a renewal fee, the invention becomes part of the public domain. This can prove socially beneficial in various ways, for example by freeing up other innovators who might now use this patented invention in their own work. An outright elimination of renewal fees could substantially increase the costs of patents to society by maintaining unnecessary obstacles to innovation.

Instead of eliminating renewal fees, we recommend that Congress decouple the renewal fee income from the revenue stream that the Patent Office can immediately access for funding. While this decoupling goal could be achieved in various ways, we propose the most straightforward approach: Congress would abolish the requirement that the Agency's aggregate fee income not exceed its operational costs. Renewal fees would then be allocated to a separate fund, similar to the Patent and Trademark Fee Reserve Fund, and earmarked for Patent Office use only. This fund would then be used to provide rebates to small and micro-entities. As a replacement for the guaranteed fee discount for any given small- or micro-entity application, the Agency's excess renewal fee income would be used to subsidize the small- and micro-entity examination fee.

LIMIT REPEAT APPLICATIONS

Empirical evidence suggests that the inability of the Patent Office to conclusively reject a patent application biases it toward allowing patents during times in which it is experiencing growing backlogs due to insufficient resources (Frakes and Wasserman 2015). To further reduce the Agency's incentive to grant patents under these conditions, we propose that it limit repeat filings.

If our previous proposal of increasing examination fees—both initial and repeat—is adopted, it will also serve to extinguish the Agency's incentive to grant patents stemming from its inability to finally reject a patent application. Because the Patent Office appears to act on the incentive only when it is resource constrained, its distortionary granting tendencies could be substantially diminished by increasing its overall financial health, mainly by setting examination fees at a level commensurate with examination costs.

If patent applicants were prohibited from repeatedly refile, the burden on the Patent Office's existing examination infrastructure would be substantially reduced. More importantly, a limit placed on the number of repeat filings would diminish the inclinations of the Agency to be overly

permissive in granting patents. Several scholars have suggested that repeat filings should be limited. Most prominently, Mark Lemley and Kimberly Moore have argued that repeat filings should be restricted, given that the benefits conferred by repeat filings are outweighed by the negative effects they have on the patent system (Lemley and Moore 2004). Lemley and Moore specifically argued that patent applicants abuse continuation practice by, among other things, modifying claim language to cover technology that arose after the patent application was filed or obtaining multiple patents covering the same invention. They also contend that continuation practice might wear down patent examiners, inducing the grant of a patent that the examiner would otherwise refuse to allow.

Commentators also generally agree that not all patent applicants abuse repeat applications. Some applicants file repeatedly in a good-faith belief that they are entitled to a patent that the patent examiner has refused to grant. Allowing repeat filings affords these applicants multiple opportunities to persuade the examiner to grant the patent. Additionally, repeat filings are frequently used in the pharmaceutical and biotechnology industries to further refine the scope of patent applications as more information about the product becomes available. Because these industries tend to file patent applications early—that is, before the invention in question has entered required clinical trials—further refinement of the patent application's scope is often desirable.

It is not clear, however, that giving patent applicants multiple bites at the apple benefits society, although it might benefit the patent applicant. Moreover, rejected patent applicants who reach a limit of repeat filings would still have an avenue to fight the examiner's patentability determination. Patent applicants can always appeal the decision of the examiner to the Patent Trial and Appeal Board, and from there to the U.S. Court of Appeals for the Federal Circuit or the U.S. District Court for the Eastern District of Virginia. This appeal process, not repeat filings, is how the patent system was intended to settle patentability disputes between the Agency and patent applicants.

Balancing the legitimate reasons for filing repeat applications with both the harms associated with repeat filings and with the availability of alternative means of redress, we propose that applicants be limited to only one use of a repeat-filing mechanism for each application.

The Patent Office, largely out of concern for its growing patent backlog, did attempt to limit repeat filings in 2007 (U.S. Department of Commerce 2007, 46716). After a protracted court battle, in which its authority to promulgate such regulations was questioned, the Patent Office ultimately rescinded the regulations.¹⁶ We encourage the Patent Office to again implement regulations limiting repeat filings, especially given the Supreme Court's recent rejection of the U.S. Court of Appeals for the Federal Circuit's narrow interpretation of the

Agency's legal authority to promulgate rules.¹⁷ If a court holds that the Patent Office has no such authority to limit repeat filings, then Congress should consider explicitly delegating such authority to the Agency.

INCREASE PATENT EXAMINER TIME ALLOCATIONS

As examiners are given less time to review applications upon certain types of promotions, they tend to cite less prior art, are less likely to make time-consuming rejections, and are more likely to grant patents. Moreover, our results suggest that these marginally issued patents are of questionable validity (Frakes and Wasserman 2017). As a result, we propose that the Patent Office increase time allocations to all patent examiners.

We are aware that setting time allocations for review of patent applications involves a trade-off between patent quality and examination capacity. If we sought to maximize patent quality only, the hour allotments would be set much higher to ensure that examiner error is minimized. The Patent Office must also provide timely review of applications with a limited budget, however.

At present, the Patent Office appears to be prioritizing examination capacity at the expense of patent quality concerns by not allowing for sufficient examination time. Although patent examiners' performance appraisals include a patent quality component, the Agency does not have the resources to take a second look at more than a few patent applications

per examiner per year. In contrast, every patent application is an input to a patent examiner's productivity score, which is an important determinant of her performance review. More generally, institutions are likely to favor metrics that are highly visible and easily measured, such as the Agency's backlog of patent applications, relative to metrics that are less visible and more difficult to measure, such as patent quality (Holmstrom and Milgrom 1991).

Although decreasing hour allotments upon promotion is sensible—after all, seasoned and proven examiners are likely to complete a review of an application in less time than an examiner who has yet to demonstrate this competency—we nonetheless propose that the Patent Office adjust the rate at which it decreases time allocations upon examiner promotion. Our estimates of significantly higher grant rates upon reaching higher GS levels suggest that the current scaling of the time allotments upon promotion is too aggressive and provides insufficient time to more-senior examiners. We propose that the Patent Office adjust the scaling factors so that an examiner's grant rate does not increase so dramatically upon experiencing time-diminishing promotions. To the extent that these adjustments will create a more homogenous pattern of grant rates across examiners, such a change would increase the equity of the patent examination system, because similar applicants would be more likely to have similar patent office outcomes, regardless of the particular examiner chosen to process an application.

Chapter 4. Questions and Concerns

1. Given that only a small fraction of patents are litigated, would it be preferable to rely on those rare instances of litigation to make detailed validity determinations, rather than increase the resources of the Patent Office to provide a more thorough review of every patent application?

Both the Patent Office and the courts are tasked with the job of applying the patentability standards and assessing the validity of potential or actual patents. Lemley (2001) has argued that because so few patents are litigated or licensed, increasing Patent Office funding to facilitate more-rigorous up-front screening of all patent applications is ill-founded. Instead, he posits that it is more cost effective to rely on litigation to make detailed validity determinations of those few patents that are economically important. However, this view depends on a number of assumptions, including that a doubling of Patent Office time allocations would reduce patent litigation by only 10 percent (Lemley 2001).

One of our recent empirical studies included an estimate of the reduced litigation that would be associated with increasing examiners' time allocations (Frakes and Wasserman 2017). With the benefit of this estimate, we demonstrated that the savings in future litigation costs associated with giving examiners additional time per application more than outweighs the added payroll expenses (Frakes and Wasserman 2017). Moreover, because we ignore many of the social benefits associated with preventing the issuance of invalid patents—for instance, preventing patent trolls from opportunistically extracting licensing fees from innovators—our analysis likely underestimates the savings associated with the Patent Office issuing fewer invalid patents.

2. Why replace the guaranteed small- and micro-entity discounts with a subsidy paid from renewal fee revenue?

The difference between a guaranteed fee discount to small and micro-entities and a subsidy paid to those groups out of the proposed renewal fee funds comes down to risk. Under the current approach, regardless of the number of small- and micro-entity applications, those applicants will receive the same discount. Under our proposed approach, it is possible that if small- and micro-entity applicant pools grow disproportionately quickly, there could be a small reduction in the discount extended per application.

While our proposal offers the advantage of alleviating funding risks for the Agency and eliminating any granting bias arising from its fee structure, it also arguably creates a disadvantage in placing greater fee-level risks of this nature on the small- and micro-entity applicant pool. If this disadvantage proves too important, Congress could consider alternative means—unrelated to the Agency's user fees—to subsidize access to the patent system by small and micro-entities (e.g., subsidies paid out of general revenues).¹⁸ Finally, if Congress prefers to maintain the current examination fee schedule for small and micro-entities, we encourage aligning examination fees with costs for large entities, at a minimum. Given that the vast majority of patent applications are filed by large entities, aligning fees with costs for these entities would be a positive step toward providing the Patent Office with a sustainable funding model and eliminating the incentives of the Agency to grant invalid patents.¹⁹

Chapter 5. Conclusion

Evaluating patent applications is difficult. The Patent Office is asked to make more than 500,000 patentability decisions each year on a budget that is often insufficient to cover its operational expenses. Thus, it might not be surprising that the Patent Office issues too many invalid patents, unnecessarily draining consumer welfare and stunting innovation. Nonetheless, there are steps that the Patent Office and Congress can take to improve the patent process. In order to take such steps, however, it is critical to first understand the source of the existing problems.

In the past few years scholars of the U.S. patent system have investigated particular features of the Patent Office that might drive the Agency toward allowing patents. Drawing heavily on

these empirical analyses, we propose three reforms to the U.S. patent examination process that aim to increase the quality of issued patents.

First, we propose restructuring the Agency's fee schedule to increase its financial health and eliminate the financial incentive to grant patents. Second, we recommend that the Patent Office place limits on repeat applications. Third, we propose increasing patent examiner time allocations, with especially large increases for those examiners who currently have the most restrictive time allocations. These proposals would reduce the number of invalid patents, thereby promoting innovation.

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Endnotes

1. An invalid patent is one issued on an existing technology or on an obvious technological advancement.
2. See *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007).
3. Leahy-Smith America Invents Act of 2011, Pub. L. No. 112-29, 125 Stat. 284.
4. Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 10, 125 Stat. 316-20 (to be codified at 35 U.S.C. § 41).
5. *Id.* at § 22.
6. 37 C.F.R. §§ 1.16(1)(1), 1.16(k), and 1.16(o). Entities defined by the Patent Office as small include individuals, nonprofit corporations, or corporations that qualify as small businesses under the Small Business Act. 37 C.F.R. § 1.27(a)(1)–(3). To qualify as a micro-entity, the filer must be a small entity and not have filed more than four previous patent applications, have a gross income in the previous year of less than three times the medium household income, and not have assigned rights in the application to a non-micro-entity. Alternatively, an applicant qualifying as a small entity can establish micro-entity status by certifying that her employer, from which she obtains the majority of her income, is an institution of higher education; or that she has assigned or conveyed her patent rights to an institution of higher education. 35 U.S.C. §§ 123(a) and (d).
7. 37 C.F.R. §§ 1.18(a), 1.20(e–g).
8. Micro-entity status did not exist during the period of our study.
9. Technologies with historically high renewal rates include information and communication technologies, health-related technologies (such as semiconductor devices and genetics), and technologies associated with frequent large entities filings include information and communication technologies, such as computer peripherals and information storage.
10. An Art Unit is a group of 8 to 15 patent examiners who review applications in the same technological field.
11. These technologies include information and communication technologies (e.g., software, business methods, and information storage) and health-related technologies (e.g., surgical and medical instruments and genetics).
12. Although it appears that in some Art Units a small subset of examiners might specialize in a subfield and hence be assigned all applications in those subfields, our interviews of Supervisory Primary Examiners and other officials at the Patent Office confirm that applications are never assigned based on patent worthiness—and in fact it would be almost impossible to do so.
13. The efforts taken by Frakes and Wasserman (2017) to separate general examiner-experience effects from promotion-induced time-allocation effects are critical. In Box 2, we discuss one reason why examiner grant rates may change with experience at the Patent Office—that is, the longer an examiner stays with the agency the more she might internalize the budgetary woes of the agency. Broadly speaking, Frakes and Wasserman (2017) endeavors to disentangle the effects of time-allocation reductions from other factors that may generally be correlated with an examiner's ascension in the GS scales.
14. To examine a patent application with 20 claims the EPO would charge about \$5,000 and the JPO would charge about \$2,000. In comparison, the U.S. Patent Office would charge \$1,600.
15. Although aligning the examination fees with costs for large entities falls within the Patent Office's grant of fee-setting authority, Congress would need to abolish the statutorily mandated examination fee discount for small and micro-entities before examination fees for these entities could be aligned with costs.
16. Press Release, PTO, USPTO Rescinds Controversial Patent Regulations Package Proposed by Previous Administration, PTO Press Release #09-21 (Oct. 8, 2009), https://web.archive.org/web/20091012011042/http://www.uspto.gov/news/09_21.jsp (accessed via the Internet Archive index).
17. *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142–2143 (2016). Although *Cuozzo* interpreted a different grant of rulemaking authority than the one at issue in promulgating rules on repeat filings, the Supreme Court's rejection of the Federal Circuit's narrow interpretation of the Agency's legal authority suggests that the appellate court needs to revisit why the statutory language “conduct of proceedings in the office” in 35 U.S.C. § 2(b)(2)(A)—the relevant grant of rulemaking for repeat filing regulations—necessarily excludes rules that have some substantive effect.
18. Direct congressional funding of subsidies to small and micro-entities may also obviate difficult design choices regarding the timing of our proposed subsidies. Ideally, subsidies would be paid to small and micro-entities at the time of application, given the possibility of applicant liquidity constraints. At that time, the Patent Office would adjust the level of the subsidy in light of the current (and projected) status of the proposed renewal fee fund and in light of prevailing (and projected) small and micro-entity application levels.
19. Instead of removing issuance fees altogether, Congress and the Agency might consider simply treating issuance fees in the same manner we propose treating renewal fees—that is, retaining them but decoupling their revenues from the Agency funding process. After all, the issuance fee may be seen as the first renewal fee; it is often paid subsequent to the applicant being notified of the allowance of their patent.

References

- Cockburn, Iain, and Megan J. MacGarvie. 2009. "Patents, Thickets and the Financing of Early-Stage Firms: Evidence from the Software Industry." *Journal of Economics and Management Strategy* 18 (3): 729–73.
- Cohen, Lauren, Umit G. Gurun, and Scott Duke Kominers. 2014. "Patent Trolls: Evidence from Targeted Firms." Revised April 2016. Working Paper no. 20322, National Bureau of Economic Research, Cambridge, MA.
- de Rassenfosse, Gaetan, and Bruno van Pottelsberghe de la Potterie. 2012. "On the Price Elasticity of Demand for Patents." *Oxford Bulletin of Economics and Statistics* 74 (1): 58–77.
- Federal Trade Commission (FTC). 2003. "To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy." Federal Trade Commission, Washington, DC.
- Frakes, Michael D., and Melissa F. Wasserman. 2013. "Does Agency Funding Affect Decisionmaking?: An Empirical Assessment of the PTO's Granting Patterns." *Vanderbilt Law Review* 66 (1): 65–149.
- . 2014. "The Failed Promise of User Fees: Empirical Evidence from the U.S. Patent and Trademark Office." *Journal of Empirical Legal Studies* 11 (4): 602–36.
- . 2015. "Does the U.S. Patent & Trademark Office Grant Too Many Bad Patents?: Evidence from a Quasi-Experiment." *Stanford Law Review* 67 (3): 613–76.
- . 2017. "Is the Time Allocated to Review Patent Applications Inducing Examiners to Grant Invalid Patents?: Evidence from Micro-Level Application Data." *Review of Economics and Statistics* 99 (3): 550–63.
- Galasso, Alberto, and Mark Schankerman. 2015. "Patents and Cumulative Innovation: Causal Evidence from the Courts." *Quarterly Journal of Economics* 130 (1): 317–69.
- Holmstrom, Bengt, and Paul Milgrom. 1991. "Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design." *Journal of Law, Economics and Organization* 7: 24–52.
- Leahy-Smith America Invents Act of 2011, Pub. L. No. 112-29, 125 Stat. 284.
- Lemley, Mark. 2001. "Rational Ignorance at the Patent Office." *Northwestern Law Review* 95 (4): 1495–1532.
- Lemley, Mark A., and Kimberly A. Moore. 2004. "Ending Abuse of Patent Continuations." *Boston University Law Review* 84 (1): 63–124.
- Leslie, Christopher. 2006. "The Anticompetitive Effects of Unenforced Invalid Patents." *Minnesota Law Review* 91 (1): 101–83.
- Moser, Petra. 2005. "How Do Patent Laws Influence Innovation? Evidence from Nineteenth-Century World's Fairs." *American Economic Review* 95 (4): 1214–36.
- National Research Council. 2004. "A Patent System for the 21st Century." National Research Council, Washington, DC.
- . 2006. "Reaping the Benefits of Genomic and Proteomic Research: Intellectual Property Rights, Innovation and Public Health." National Research Council, Washington, DC.
- Picard, Pierre M., and Bruno van Pottelsberghe de la Potterie. 2011. "Patent Office Governance and Patent System Quality." Discussion Paper no. DP8338. Center for Economic Policy Research, Washington, DC.
- Office of Advocacy, 2010. "The Small Business Economy: A Report to the President." U.S. Small Business Administration, Washington, DC.
- U.S. Department of Commerce. 2007, August 21. "37 CFR Part 1: Changes to Practice for Continued Examination Filings, Patent Applications Containing Patentably Indistinct Claims, and Examination of Claims in Patent Applications; Final Rule." *Federal Register* 72, no. 161.
- U.S. Patent and Trademark Office (Patent Office or the Agency). 2009, October 8. "USPTO Rescinds Controversial Patent Regulations Package Proposed by Previous Administration." Press Release #09-21. U.S. Patent and Trademark Office, Washington, DC. https://web.archive.org/web/20091012011042/http://www.uspto.gov/news/09_21.jsp.
- . 2016. "Performance and Accountability Report." U.S. Patent and Trademark Office, Washington, DC.



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Highlights

In this paper Michael D. Frakes of the Duke University School of Law and Melissa F. Wasserman of the University of Texas School of Law argue that the U.S. Patent and Trademark Office (Patent Office) issues too many invalid patents. They draw on empirical evidence showing that certain features of the Patent Office cause it to grant invalid patents, and propose three changes designed to eliminate structural features of the patent system that bias the Patent Office toward granting patents of questionable validity.

The Proposals

Restructure the Patent Office's fee schedule by increasing examination fees and abolishing issuance fees. These steps would remove the Patent Office's incentive to grant invalid patents.

Limit repeat applications, which make up around 40 percent of the Patent Office's backlog. Repeat applications would be maintained, but in a reduced capacity to accommodate patent applications that benefit from some degree of iterative refinement.

Increase patent examiner time allocations. Reduce the rate at which time allocations are decreased with patent examiner promotion, thereby allowing sufficient time to conduct thorough searches of prior art and overall review of the application.

Benefits

Invalid patents unnecessarily reduce consumer welfare, limit productive research, and burden innovators. By modifying the incentives faced by the Patent Office during periods of financial strain, these proposals will reduce the number of invalid patents granted and contribute to a more effective U.S. innovation pipeline.



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