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**PROMOTING THE USEFUL ARTS: HOW CAN CONGRESS PREVENT THE ISSUANCE OF  
POOR QUALITY PATENTS?**

**Hearing Before the Senate Committee on the Judiciary  
Subcommittee on Intellectual Property**

Wednesday, October 30, 2019

**Testimony of Melissa F. Wasserman**

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Chairman Tillis, Ranking Member Coons, and distinguished members of the Subcommittee:

Thank you for inviting me to testify. My name is Melissa Wasserman and I am a professor of law at the University of Texas. My research has focused on understanding the determinants of United States Patent and Trademark Office's decision-making. As I explain in the statement that follows, I believe there are three proposals that the Agency could adopt that would increase the quality of patents it issues.

The United States 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 an important social function (Moser 2004). However, it is becoming increasingly difficult for the Agency to accomplish its mission. The Patent Office, which processes over half-a-million 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 culminate in the issuance of a large number of invalid patents—i.e., patents issued on an existing technology or on an obvious technological advancement.

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 (National Research Council 2004; National Research Council 2006; Federal Trade Commission 2003). 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 sixty years.

Despite the general agreement that the Patent Office is granting too many invalid patents, the policy discussion has—until recently—not been informed by compelling empirical evidence regarding particular Agency features that bias it towards 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 may actually be leading to the granting of invalid patents, policymakers are left trying to fix the patent system without understanding the root causes of the system’s shortcomings.

I 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. My testimony draws heavily upon these recent empirical analyses to recommend three changes designed to eliminate structural features of the patent system that bias the Patent Office towards granting patents of questionable validity. More specifically, my testimony draws heavily upon work that I have co-authored with Michael D. Frakes, law professor at Duke University School of Law. As a result, the proposals set forth in my testimony reflect both of our opinions.<sup>1</sup>

First, the Patent Office’s fee schedule should be restructured to minimize the risk that the Patent Office’s revenues will be insufficient to cover its operational costs and to diminish the Agency’s 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. However, these fees fail to cover even half of the Agency’s examination costs. To make up for this deficiency, the Agency relies heavily upon two additional fees that are collected *only in the event that a patent is*

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<sup>1</sup> Much of my testimony is drawn from *Decreasing the Patent Office’s Incentive to Grant Invalid Patents*, THE HAMILTON PROJECT (December 2017), which was co-authored by Michael Frakes.

*granted*: (1) issuance fees, which are paid at the time a patent is granted, and (2) renewal fees, which are 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 the revenue of the Patent Office. I am not aware of any other federal agency with a similar funding structure—that is, how the agency decides on its primary task has such a huge impact on its budget. It is certainly not the case that the Food and Drug Administration receives an extra fee when it approves a new drug application.

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 application filings (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, as it can then increase its revenue and close the gap by granting more patents and thereby collecting more issuance fees, as well as additional renewal fees in the future. This generates unnecessary costs for society to the extent that it involves granting some number of legally invalid patents. Recent research has validated these concerns, producing evidence that the Patent Office acts upon this incentive to grant more patents 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 only acts on the financial incentive to grant patents when its fee income fails to cover its operational expenses, the Agency's incentive towards granting patents should be extinguished (Frakes and Wasserman 2013). Nonetheless, if this is incorrect and even a financially healthy Patent Office might 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, which perform a valuable social function of effectively shortening the lifetime of a patent, given that a patent whose renewal fees lapse becomes part of the public domain. However, we do propose to decouple the renewal fee income from the Agency's funding process, reducing still further any incentive to grant invalid patents.

Our second proposal is that the Patent Office limit repeat applications. Unlike its foreign counterparts, 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.<sup>2</sup>

The Patent Office does collect fees when repeat applications are filed, but these additional filing fees are set at levels substantially below the costs incurred by the Agency in reviewing repeat filings. If the Agency finds itself in a situation where its costs are outpacing its fee collections, repeat applications may compound these 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 number of 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 nineteen 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 as to why an application fails to meet the requirements. Thus, if examiners are systematically not given enough time, they may be in a position where they are forced to allow a number of patents that they might otherwise reject if they were given more time

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<sup>2</sup> Changes to Practice for Patent Filings, 72 Fed. Reg. at 46,718.

to conduct the necessary searches and perform their reviews. Recent empirical evidence validates this concern and suggests that examiners are indeed given insufficient time to fully vet patent applications (Frakes and Wasserman 2107).

In addition, empirical analysis demonstrates that an individual examiner's grant rate rises dramatically as they experience promotions that bring with them reductions in the time allocated to review a patent application. As patent examiners rise from pay grade GS-7 to GS-14 along the General Schedule 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 may, in fact, pose meaningful constraints on examiners. Because time constraints appear to be more binding for more experienced examiners, we propose that their time allocations be particularly 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 the Patent Office's incentives to grant patents. For instance, the Agency's optimal fee schedule must balance the incentives it creates for the Patent Office's 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 the Agency's 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 the Agency will be able to process. We are mindful of the complexity involved in these tradeoffs and subsequently discuss them in more detail.

## **I. Incentives to Grant Invalid 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 upon these analyses and outlines three features of the patent system that are contributing to the issuance of invalid patents.

### **A. The Patent Office's Fee Structure**

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 the Patent Office's fee revenue will fail to cover its operational costs. Second, the Agency's fee schedule creates an incentive to grant patents rather than deny them. 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 (AIA) granted the Patent Office fee-setting authority with the restriction that the Agency's aggregate fee revenue not exceed its operational costs.<sup>3</sup> 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 utilize 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, the Agency will experience a budgetary shortfall, as Congress does not provide the Agency with the difference. In contrast, if the Patent Office's fee collections surpass its spending authority, the excess fees are not immediately available to the Patent Office. In the past, Congress utilized 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

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<sup>3</sup> Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 10, 125 Stat. at 316-20 (to be codified at 35 U.S.C. § 41).

AIA severely limited the practice of fee diversion through the creation of the Patent and Trademark Fee Reserve Fund (PTFRF).<sup>4</sup> Excess fee collections are routed to the PTFRF, earmarked only for use by the Patent Office, and potentially available to the Agency 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. Examination fees are paid at the time the application is filed (and are not refunded if an application is denied), issuance fees are paid at the time a patent application is granted, and renewal fees are paid periodically over the lifetime of an issued patent so that the patent can remain enforceable.

While examination fees account for approximately 30 percent of the Patent Office's budget, these fees fail to cover the actual cost incurred by the Patent Office to examine applications. In fiscal year 2016 the Patent Office estimated that the average cost of examining a patent application was approximately \$4,200 (U.S. Patent and Trademark Office, 2016).<sup>5</sup> At that same time, the examination fee was set at only \$1,600 for large for-profit corporations; \$800 for individuals, small firms, non-profit corporations, or other enterprises that qualify for "small entity" status; and \$400 for individuals, small firms, non-profit corporations, or other enterprises that qualify for "micro-entity" status.<sup>6</sup>

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

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<sup>4</sup> *Id.* at § 22.

<sup>5</sup> The Patent Office appears to stop reporting the average cost of examining a patent application after the fiscal year of 2017, in which it reported the average cost of examining a patent application was approximately \$4,300. U.S. Patent and Trademark Office, 2017.

<sup>6</sup> 37 C.F.R. §§ 1.16(1)(1), 1.16(k), and 1.16(o). Entities defined by the PTO as "small" include individuals, nonprofit corporations, or corporations which qualify as small businesses under the Small Business Act. 37 C.F.R. § 1.27(a)(1)-(3). Entities defined by the Patent Office as "small" include individuals, nonprofit corporations, or corporations which 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 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 assigned rights in the application to a non-micro-entity. Alternatively, an applicant qualifying as a small entity may establish micro entity status by certifying that the applicant's employer, from which she obtains the majority of her income, is an institution of higher education or the applicant has assigned or conveyed her patent rights to an institution of higher education. 35 U.S.C. §§ 123(a) and (d).

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 3 ½, 7 ½, and 11 ½ years after patent issuance were \$1,600, \$3,600, and \$7,400, respectively.<sup>7</sup> 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 including examination expenses.

The back-ended fee structure of the Agency threatens the Patent Office's financial sustainability. Because the Patent Office is paying for patent examination using fees generated by post-allowance activities, revenues could grow out of step with examination demands. Any unexpected decline in the rate at which applicants pay renewal fees, the quality of incoming applications (which helps determine how many patents are granted and the corresponding issuance fees paid), or 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 an incentive to grant patents. The vast majority of the Agency's revenues are generated by fees that the Agency collects only if a patent is granted. A Patent Office that experiences a budgetary shortfall may 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, the Agency may grant additional patents, even if this means issuing more invalid patents, in an effort to generate additional fee income.

However, not every patent grant will generate the same revenue for the Patent Office. 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

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<sup>7</sup> 37 C.F.R. §§ 1.18(a), 1.20(e-g).



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 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 TABLE 1.

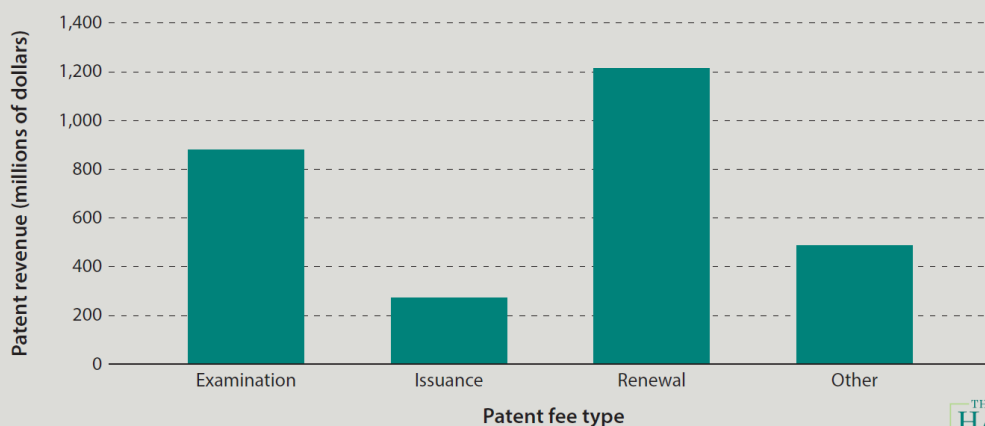
## Fiscal Year 2016 Patent Fee Schedule

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.

## BOX FIGURE 1.

## Patent Revenues in Fiscal Year 2016, by Fee Type



Source: Patent Office 2016.

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 an approximately twenty-year period, exploring whether the Patent Office granted patents at higher rates during budgetary shortfalls. Because grant rates may change over time for a number of reasons unrelated to the financial status of the Agency—e.g., the quality of the underlying applications may change from year to year—we did not rely solely on a comparison of patent approval rates at different times.

Rather, 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: first, patent applicants in technologies that have historically exhibited higher renewal rates, along with applicants that did not qualify for fee reductions (i.e., large entity applicants). Second, applicants in technologies that have lower renewal rates as well as applicants that qualified for fee reductions (i.e., small-entity applicants).<sup>8</sup> Because the Patent Office would profit more from granting patents to the first group, it may be particularly inclined to raise its approval rate of these types of applications upon experiencing a budgetary shortfall.

The advantage of this approach is that other factors that change over time and that impact grant rates, like 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.<sup>9</sup> More broadly, the parameters of its fee schedule appear to affect the

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<sup>8</sup> Micro-entity status did not exist during the time period of our study.

<sup>9</sup> Technologies with historically high renewal rates include information and communication technologies and health related technologies (such as semiconductor devices and genetics) and technologies associated with high incidence of large entities filings include information and communication technologies (such as computer peripherals and information storage).

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. Should the fee structure encourage more patent grants overall (or more grants during times of budgetary shortfalls), the result is the issuance of patents lacking legal validity, potentially leading to the types of social harms described previously.

## **B. 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 may create an incentive to grant patents in order to reduce costs. In particular, we consider repeat applications filed when initial applications are 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) 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 U.S. generally fall in one of two categories: continuation applications and Requests for Continued Examination. While 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. There is growing evidence that this is already occurring. Roughly 550,000 applications are currently awaiting substantive review by the Patent Office. Considering that roughly 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 the Agency's 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 and 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 filing rates could in principle be addressed by expanding the Agency's examination capacity using the collected application fees. However, examination fees currently cover less than half of the costs incurred by the Agency when evaluating applications. 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 can 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 may 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 for two groups—defined by their average tendency to file repeat applications—before and after periods of budgetary shortfall and application backlog. Our findings suggested that when the Patent Office begins to face mounting backlogs, it does appear to act upon its incentive to grant patents at higher rates for technologies that are associated with higher rates of repeat application.<sup>10</sup> 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.

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<sup>10</sup> These technologies include information and communication technologies (such as software, business methods, and information storage) and health-related technologies (such as surgical and medical instruments and genetics).

## BOX 2.

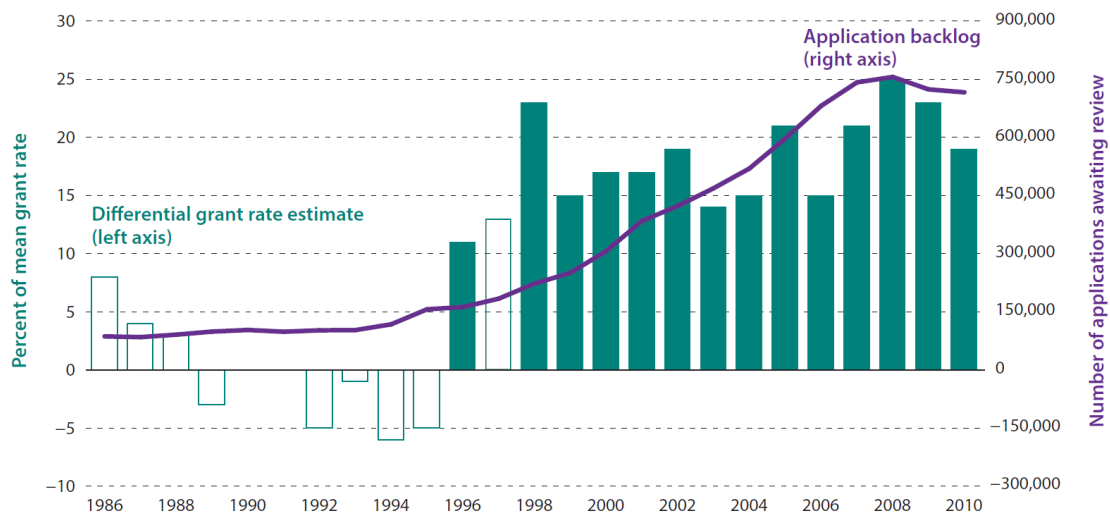
## Mechanisms the Patent Office Could Use to Adjust Grant Rates

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.<sup>10</sup> 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.

### **C. 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 nineteen hours reviewing an application, including reading the application, searching for prior art, comparing the prior art with the application, 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 may 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 in the general schedule (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 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 most complex fields, artificial intelligence, and one of the least complex fields, compound tools. A promotion to each subsequent pay grade roughly corresponds to a ten to fifteen percent decrease in the number of allocated examination hours. Examiners operating at GS-level 7 (equivalent to a salary between \$43,684 and \$56,790 in Washington, DC in fiscal year 2016) 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-level 14 (equivalent to a salary between \$108,887 and \$141,555 in Washington, DC in fiscal year 2016) are expected to review the same patents in approximately half that time (Office of Personnel Management 2016).

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.

Supposing that these allocations afford more than enough time to conduct thorough reviews, giving examiners even more time might not lead to any reductions in 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, a group of 8 to 15 patent examiners who review

applications in the same technological field (Frakes and Wasserman 2017).<sup>11</sup> We followed individual examiners throughout the course of their careers, tracking the evolution of their behavior as examiners experienced promotions that diminished their time allocations, while accounting for possibly relevant variables like 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 becomes in searching for prior art, the less likely she becomes to make time-intensive rejections, and the more likely she becomes to grant the patent. The magnitude of the results is quite striking. A patent examiner who has been promoted to GS-level 14 has a grant rate that is 13 to 29 percent higher than it was when she was at a GS-level 7. Because 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 more patent-worthy applications than their peers 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 towards reduced grant rates as examiners garner more experience within a given GS-level. 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-level 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 upon 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 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

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<sup>11</sup> While it appears that in some Art Units a small subset of examiners may specialize in a subfield and hence be assigned all applications in those subfields, our interviews of SPEs and other officials at the Patent Office confirm that applications are never assigned—and in fact it would be almost impossible to do so—based upon patent worthiness.



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 European Patent Office and the Japan Patent Office. This implies that the additional patents being issued as a result of examiner time constraints are indeed of questionable legal validity. Moreover, a more recent study finds no evidence that giving examiners more time result in more erroneous denials of valid patents (Frakes & Wasserman, 2019).

## **II. The Proposal**

In the previous section, we described three structural features of the Patent Office that encourage the Agency to grant more patents. First, the back-ended fee 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, the inability of the Agency 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 down 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 three specific reforms to mitigate the problem of invalid patents.

### **A. 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 the Patent Office 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 are sufficient to meet the costs of reviewing applications, then the Patent Office financial health should improve and its financial incentive to grant patents would be extinguished. Not only would the Agency be able to address any unexpected uptick in application filings by using the associated examination fees to expand its examination capacity, but the Agency 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 only acts on the financial incentive to grant additional patents when the Agency's fee collections are insufficient to cover its operational costs, removing the Patent Office's financial instability would be particularly helpful in eliminating any over granting tendency.

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 to 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.<sup>12</sup> 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 for preparing and prosecuting a patent), there is reason to believe that even a two-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

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<sup>12</sup> To examine a patent application with twenty claims the European Patent Office would charge approximately \$5,000 and the Japanese Patent Office would charge approximately \$2,000. In comparison, U.S. Patent Office examination fees are \$1,600.

patent applications filed with the Patent Office, as applicants become more judicious in selecting the inventions for which they wish 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. 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.<sup>13</sup>

We also propose to abolish the Agency's issuance fees (i.e., the fee paid when a patent is granted). Issuance fees have been used to subsidize the examination costs of unsuccessful patent applicants. However, this will no longer be necessary when the Patent Office increases its examination fees to cover its operational costs. Moreover, because the AIA 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.

Renewal fees present one additional problem, in light of the requirement that fee collections equal aggregate Agency costs. 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—e.g., freeing up other innovators who may now use this patented invention in their own work. An out-right 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.

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<sup>13</sup> While 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.

While this decoupling goal may 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 microentity application, the Agency's excess renewal fee income would be utilized to subsidize the small-entity and micro-entity examination fee.

## **B. Limit Repeat Filings**

Empirical evidence suggests that the inability of the Patent Office to conclusively reject a patent application biases the Agency towards allowing patents during times in which the Patent Office 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 the Agency limit repeat filings.

If our previous proposal of increasing the Agency's 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 only act upon the incentive when it is resource constrained, the Patent Office's distortionary granting tendencies could be substantially diminished by increasing the Patent Office's overall financial health, mainly by setting examination fees at a level commensurate with examination costs.

If patent applicants were prohibited from continuously refiling applications, the burden placed 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 for other reasons. Most prominently, Mark Lemley and now-Judge 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). More specifically, Lemley and Moore argued that patent applicants abuse continuation practice by, among other things, modifying claim language to cover after-arising technology or obtaining multiple patents covering the same invention. They also contend that continuation practice may “wear down” patent examiners, inducing the grant of a patent that the examiner would otherwise refuse to allow.

At the same time, commentators generally agree that not all patent applicants utilize repeat applications in an abusive manner. Some applicants file repeatedly in a good-faith belief that they are entitled to a patent that the patent examiner refuses to grant. Allowing repeat filings affords these applicants multiple opportunities to persuade the examiner to grant the patent. Additionally, repeat filings are frequently utilized in the pharmaceutical and biotechnology industries to further refine the scope of their patents as more information about the product becomes available. Because these industries tend to file patent applications early—i.e., before the invention in question has entered required clinical trials—further refinement of the patent application is often desirable.

However, it is not clear that giving patent applicants multiple bites at the apple, though it may be desirable for the patent applicant, is best for society as a whole. 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.

The Patent Office, largely out of concern for its growing patent backlog, did attempt to limit repeat filings in 2007.<sup>14</sup> After a protracted court battle, in which the Agency’s authority to promulgate such regulations was questioned, the Patent Office ultimately rescinded the

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<sup>14</sup> Changes to Practice for Continued Examination Filings, Patent Applications Containing Patentably Indistinct Claims, and Examination of Claims in Patent Applications, 72 Fed. Reg. 46,716, 46,716 (Aug. 21, 2007) (to be codified at 37 C.F.R. pt. 1).

regulations.<sup>15</sup> We encourage the Patent Office to again implement regulations limiting repeat filings, especially given the Supreme Court’s recent rejection of the United States Court of Appeals for the Federal Circuit’s narrow interpretation of the Agency’s legal authority to promulgate rules.<sup>16</sup> 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.

### **C. Increase Time Allocations to Patent Examiners**

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 suggests 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. However, the Patent Office must also provide timely review of applications with a limited budget.

At present, the Patent Office appears to be prioritizing examination capacity at the expense of patent quality concerns—that is, the Agency is allowing for insufficient 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 an examiner’s performance review. More

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<sup>15</sup> Press Release, PTO, USPTO Rescinds Controversial Patent Regulations Package Proposed by Previous Administration, PTO Press Release #09-21 (Oct. 8, 2009), *available at* [http://www.uspto.gov/news/09\\_21.jsp](http://www.uspto.gov/news/09_21.jsp).

<sup>16</sup> *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.

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 more difficult to measure and less visible metrics, such as patent quality (Holmstrom and Milgrom 1991). While decreasing hour allotments upon promotion is sensible—after all, seasoned and proven examiners are likely to complete a review of an application faster 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, providing 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, as similar applicants would be more likely to have similar patent office outcomes, regardless of the particular examiner chosen to process an application.

### **III. Questions and Concerns**

*Given that only a small fraction of patents are litigated or licensed, would it be preferable to rely upon those rare instances of litigation to make detailed validity determinations, rather than increase the resources of the Patent Office to provide 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. Some scholars have 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 (Lemley 2001). Instead, these scholars posit that it is more cost effective to rely upon litigation to make detailed validity determinations of those few patents that are economically important. More specifically, they have argued that the costs associated with doubling the Patent Office's hours to review patent

applications outweigh the social benefits gained by the resulting decrease in the number of invalid patents the Patent Office would issue. However, due to lack of empirical data available at the time, scholars had to guess certain key parameters of the cost-benefit exercise such as how many fewer patents the Agency would issue if time allocations were doubled and what reduction in the percentage litigation would ensue as a result of fewer patents being issued by the Patent Office. These guesses of the key parameters were determinant of these scholars conclusion we should rely upon the courts to weed out invalid patents.

One of our recent empirical studies, revisits this question and conduct a cost-benefit analysis of doubling examiner time allocation. However, instead of guessing how many fewer patents the Agency would issue and how much litigations savings would accrue, we are able to provide empirically driven estimates of these critical relationships by utilizing rigorous empirical methodologies, drawing from our own prior work and from that of others. (Frakes and Wasserman 2019). We estimate that it would cost the Patent Office \$660 million dollars in personnel expenses to double examiner time allocations. We also simulate that doubling examination time would result in federal litigation savings of \$491 million and PTAB litigation savings of \$112 million. Finally, we estimate that increasing examiner time allocations will result in \$301 million in savings in prosecution expenses to the patent applicant, driven by decreased rounds of reviews at the Patent Office. Though the \$660 million increase in costs is significant, this amount is still exceeded by the \$904 million that may be saved annually in (1) expenses covering litigation in federal court, (2) PTAB-related legal expenses, and (3) potential savings in prosecution costs (Frakes and Wasserman 2019). 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 Patent Office issuing fewer invalid patents.

*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-entity 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 may 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 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). 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 towards providing the Patent Office with a sustainable funding model and eliminating the incentives of the Agency to grant invalid patents.<sup>17</sup>

#### **IV. Conclusions**

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

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<sup>17</sup> Instead of removing issuance fees altogether, Congress and the Agency may also wish to simply treat issuance fees in the same manner we propose treating renewal fees—that is, retaining them but decoupling their revenues from the Agency funding process.

In the past few years, scholars of the U.S. patent system have investigated particular features of the Patent Office that may drive the Agency towards allowing patents. Drawing heavily upon these empirical analyses, we propose reforms to the U.S. patent examination process that aim to increase the quality of issued patents.

First, we propose modifying the Agency's fee structure 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.

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