Framework for Analysis of U.S. Patent Fee Structure Options

Report to the U.S. Patent and Trademark Office
Pursuant to the Unleashing American Innovators Act of 2022

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Abstract. The USPTO is mandated by Congress to charge fees for its services that, in the aggregate, cover the costs of the patent process. Congress has also mandated discounts to most patent fees for small and micro entities. Other aspects of the fees for different services are set by the USPTO within the mandate for overall revenue balance. The choices that determine this *fee structure* involve tradeoffs among multiple goals and considerations. This paper lays out a framework for analytical consideration of these tradeoffs, and then highlights the specific tradeoffs that are affected by the major fee structure choices.

Keywords: fees, patent system, policy evaluation

This study received funding from the USPTO and was independently prepared as background material for the USPTO's report to the Committee on the Judiciary of the Senate and the Committee on the Judiciary of the House of Representatives, as required by the Unleashing American Innovators Act of 2022. The views expressed are solely those of the authors.

Executive Summary

The USPTO is mandated by Congress to charge patent fees for its services that, in the aggregate, cover the costs of the patent process. Congress has also mandated discounts for small and micro entities to fees for filing, searching, examining, issuing, appealing, and maintaining patent applications and patents.[1] Other aspects of the fees for different services are set by the USPTO within the mandate for overall revenue balance. The choices that determine this *fee structure* involve tradeoffs among multiple objectives. For example, collecting fees that cover all examination costs at the time of examination reduces financial uncertainty for the Office, but postponing collection of some of this fee burden later in the life of the patent increases flexibility for patentees and thereby reduces the cost of uncertainty about innovation outcomes. This paper lays out a framework for analytical consideration of tradeoffs such as this, and then highlights the specific tradeoffs that are affected by the major patent fee structure choices.

Fundamental to our approach is the recognition that there are many different fee structures that could be used to achieve the statutory goal of revenue balance. The choices among these different approaches have potentially significant consequences for important policy goals. Fee structure choices are therefore inherently intellectual property policy choices. Understanding the policy consequences and tradeoffs inherent in the fee structure is a starting point for making informed fee structure decisions.

The USPTO regularly issues Strategic Plans that define its mission and goals. In the interest of providing a framework that is useful into the future, we do not base this framework on the current Strategic Plan. Instead, we suggest that, in terms of the nexus with setting patent fees, the overarching objectives that determine the patent fee structure fall into three broad categories:

- Overall financial balance;
- Fostering innovation; and
- Inclusivity and fairness.

In pursuing these broad objectives, it is useful to track as intermediate objectives:

- Fostering general ease of access to patenting;
- Eliminating barriers to access for demographic groups that have historically been under-represented in patenting;
- Fostering competition;
- Fostering disclosure of technical information;
- Fostering follow-on innovation;
- Stability and predictability of revenue;
- Flexibility and ease of management of uncertainty for applicants and patentees;
- Avoiding distortion of the examination process; and

[1] Section 10(b) of the AIA, as amended by the UAIA

- Minimizing incentives for fraud.

Working from this framework of overarching and intermediate objectives, we discuss the most important tradeoffs to consider with respect to several specific fee structure design choices. We highlight the most significant of these points here; others are discussed in the main body of the report.

The magnitude of discounts for small and micro entities: Our companion report (de Rassenfosse and Jaffe, 2024) finds that these discounts do not increase *entry into patenting* by entities that have not previously patented. It is nonetheless possible that there are significant resource constraints for some subset of those who qualify for discounts, and we cannot rule out that the discounts increase the *number of applications* from that subset. The revenue lost through these discounts must be recovered through higher fees for applicants and patentees paying undiscounted fee rates. Whether this cross-subsidy increases or decreases the fairness of the system depends on one's perspective.

Allocation of fee burden across application filing, examination and post-examination: Collection of a significant fraction of the cost of examination through maintenance fees does create some financial risk for the USPTO, but the risk is manageable. The USPTO recovering its costs in this way fosters innovation by allowing applicants and patentees to better match the timing of their payment obligation to the timing of likely benefits from patenting and by shifting some of the cost of failed commercialization to successful patents. It fosters follow-on innovation by giving some incentive for patent holders to allow some patents to lapse.

Concern has been expressed that recovery of examination costs through maintenance fees distorts USPTO examination incentives, by allowing more patents in technologies that historically maintain patents at higher rates. This concern is based on a model of USPTO functioning that is no longer applicable, because the Office can now address potential revenue shortfalls directly through modification of the fee structure. There is therefore no reason to eschew this innovation-supporting fee structure out of concern for distortion of the examination process.

Consideration of utility patents that expire before all maintenance payments come due: Because utility patent expiration is based on domestic benefit date and maintenance payments are timed from grant date, patents with domestic benefit dates significantly before the time of grant may not have term long enough to require payment of all maintenance fees, and hence predictably fail to cover their cost of examination. There is no policy basis to subsidize the examination of this particular kind of application, so financial stability and fairness both suggest that some kind of additional fee should be imposed on these applications.

Generally seeking to match fees to costs: A recurring theme of our analysis is that *over the life of an average patent* the total fees paid should generally approximate the cost of processing a patent. There are statutory, policy and practical reasons why there will be cost variations at the level of individual patents that are not reflected in fees. But where decisions made by certain

applicants systematically and predictably increase costs, it is worth trying to identify these behaviors, and considering application of additional fees corresponding to the additional costs.

Continuation of USPTO fee-setting authority: Our analysis underscores a more general point about the USPTO fee policy. Assuming that Congress wishes to continue the policy of having overall Office revenues balance overall Office costs, giving the USPTO the flexibility to determine the structure of different fees within that mandate has significant policy benefits. It allows the fee burden to be met in a way that is most conducive to achieving policy goals.

1. Overview and Approach

The USPTO is mandated by Congress to charge patent fees for its patent services that, in the aggregate, cover the costs of the patent process. Congress has also mandated discounts for small and micro entities to fees for filing, searching, examining, issuing, appealing, and maintaining patent applications and patents.[2] Other aspects of the fees for different services are set by the USPTO within the mandate for overall revenue balance.

All or most USPTO fee structure choices involve balancing tradeoffs among multiple objectives. Higher fees allow more resources to be devoted to examination, which may increase patent quality; but higher fees may also be a burden on innovators and be a barrier to the use of the patent system for some. Easing the fee burden during the initial application and examination of each patent application makes initial access to patenting less burdensome. However, it may increase financial uncertainty for the USPTO, because a funding model that relies on patent maintenance fees relies on either consistency in the ratio of patents renewed to patents filed or the flexibility to adjust fee rates as this relationship changes. Different categories of fees are borne to varying degrees by different classes of applicants, and so in setting the fees for different services (within the overall revenue balance constraint) the USPTO is also affecting the distribution across different users of the burden of financing the Office.

Balancing such tradeoffs has to be done by USPTO decision-makers with public input, advice and recommendation from Public Advisory Committees, and oversight from Congress. In this paper, we lay out a framework for analyzing and considering the important tradeoffs. We use the empirical analysis we have undertaken, together with principles and findings from the economic literature, to structure a framework for decision-makers to think systematically about the tradeoffs presented by fee structure choices.

Our analysis focuses on the objectives, tradeoffs and choices arising with respect to utility patents. We have not undertaken any systematic analysis of design or plant patents.

Fundamental to our approach is the recognition that there are many different fee structures that could be used to achieve the statutory goal of revenue balance. The choices among these different approaches have potentially significant consequences for important policy goals. Fee structure choices are therefore inherently intellectual property policy choices. Understanding the

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[2] Section 10(b) of the AIA, as amended by the UAIA
SMALL AND MICRO ENTITIES.—The fees set or adjusted under subsection (a) for filing, searching, examining, issuing, appealing, and maintaining patent applications and patents shall be reduced by 60 percent with respect to the application of such fees to any small entity that qualifies for reduced fees under section 41(h)(1) of title 35, United States Code, and shall be reduced by 80 percent with respect to the application of such fees to any micro entity as defined in section 123 of that title (as added by subsection (g) of this section).

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policy consequences and tradeoffs inherent in the fee structure is a starting point for making informed fee structure decisions.

Fees are, of course, only one dimension of patent policy. Other policy choices, such as patent duration or procedures for examination, affect policy goals at least as much as fees. Analysis of these broader policy choices is outside the scope of this report, but analysis of the effects of fees should be undertaken bearing in mind this broader policy structure.

2. Overarching policy objectives[3]

The interactions among patent fees, other aspects of patent policy and procedure, the decisions of potential and actual applicants, and the effect of those decisions on the economy and society are very complex. The goals or objectives that Congress and the USPTO are seeking to advance are also complex, and the effect of specific policy choices on these goals may take a long time to manifest and be difficult to predict. Because of the complexities often involved with overarching policy objectives and their impacts, it is common for administrative agencies to focus policy analysis on intermediate or operational objectives. Such intermediate objectives are effects or outcomes of policy choices that are not really valued for their own sake, but rather are believed to contribute to ultimately desirable outcomes and are relatively easy to measure and to connect to specific policy choices. That is, they are means to desired ends, rather than ends in and of themselves. For example, discussions of patent policy often consider the effect of policy choices on the extent and quality of disclosure in patents or the effect on competition. But neither disclosure nor competition are really valuable to society in and of themselves. We seek to foster them because we believe that they ultimately contribute to things we do care about, such as the overall rate of innovation and the extent to which the benefits of innovation are widely shared.

To foster analytically supported decision-making, we lay out a framework of articulated 'overarching' objectives, 'intermediate or operational' objectives, and the relationships that tie the intermediate or operational objectives to the overarching objectives. We suggest that the overarching objectives fall into three broad categories:

- Overall financial balance;
- Fostering innovation; and
- Inclusivity and fairness.

In pursuing these broad objectives, it is useful to track as intermediate objectives:

- Fostering general ease of access to patenting;
- Eliminating barriers to access for demographic groups that have historically been under-represented in patenting;
- Fostering competition;

[3] All USPTO actions are of course, governed by statute and judicial decisions. These legal requirements act as constraints to be met. Therefore, the Office's pursuit of policy objectives must always be understood to operate subject to these constraints.

- Fostering disclosure of technical information;
- Fostering follow-on innovation;
- Stability and predictability of revenue;
- Flexibility and ease of management of uncertainty for applicants and patentees;
- Avoiding distortion of the examination process; and
- Minimizing incentives for fraud.

We now proceed to elaborate what is meant by each of these, and what are the relationships between the intermediate and overarching objectives. For convenience, we summarize these relationships in Table One, in which the overarching objectives are the columns and the intermediate objectives the rows. An 'X' in a given cell indicates that a given intermediate objective has effects on that overarching objectives that should be considered. That is, 'ease of access' affects all three broad objectives, while fostering competition affects innovation but not the other broad objectives.

TABLE ONE THE IMPACT OF OPERATIONAL OBJECTIVES ON THE OVERARCHING OBJECTIVES			
	OVERARCHING OBJECTIVES		
	Overall Financial Balance	**Fostering Innovation**	**Inclusivity and Fairness**
OPERATIONAL OR INTERMEDIATE OBJECTIVES			
Ease of access to patenting (in general)	X	X	X
Eliminating barriers to access for demographic groups that have historically been under-represented in patenting	X	X	X
Fostering competition		X	
Fostering disclosure of technical information		X	
Fostering follow-on innovation		X	
Stability and predictability of revenue	X		
Flexibility and ease of management of uncertainty for applicants and patentees		X	X
Avoiding distortion of the examination process		X	X
Minimizing incentives for fraud	X		X

It is important to emphasize that this characterization of the goals and intermediate objectives is inherently subjective and fuzzy. As an example, we consider fostering innovation to be an overarching objective, but some might say it should really be considered as an intermediate objective that fosters the overarching objective of increasing the wealth and well-being of the citizenry. Conversely, some might suggest that avoiding incentives for fraud should be an objective in and of itself. The value of using a framework such as this is that it makes the analytical pathways used to reach particular conclusions clear. If someone finds the chosen structure uncompelling, they can think about whether the aspects they would change would lead to different analytical conclusions.

2.1. Overall financial balance

The USPTO operates under a Congressional mandate by which it has the authority to determine the structure of its fees,[4] so long as the overall revenue collected balances its costs.[5] This requirement to balance the budget specifically constrains the overall level of fees that the USPTO can charge. From an economic viewpoint, it is hard to conceive that such a rule coincides with the 'socially optimal' level of fees. The grant of a patent has social benefits (*e.g.*, encouraging innovation) and social costs (*e.g.*, creating market power for patentees). This means that the theoretically socially optimal patent fees could yield overall USPTO revenue substantially above or below its operating costs. The effort to determine such optimal fees and the resulting revenue would be analytically difficult, and the USPTO operates under the reality of its cost/revenue balance mandate, so we take that mandate as given for this analysis.

Even taking the mandate as given, financial balance remains an ongoing objective. The Office will always maintain a fee structure that is intended and predicted to achieve balance, but uncertainties about applicant and patentee behavior, and about underlying economic forces, will always introduce an element of uncertainty into achieving balance. As discussed further below, some fee structures create more financial uncertainty than others. This variation across fee structures in the degree of financial uncertainty is an important consideration, even if it does make sense in some cases to tolerate higher uncertainty in order to better achieve other policy objectives.

One could imagine, at least hypothetically, carrying out this mandate by charging fees for all interactions between the USPTO and applicants that mirror as closely as possible the actual costs for each specific interaction. This approach would significantly limit the USPTO's ability to use its fee structure to achieve the other two overarching objectives. As we will see below, a fee structure that balances revenue and costs overall but detaches some fees from specific costs creates important opportunities to better achieve and balance all three overarching objectives.

2.2. Fostering innovation

The importance for the patent system of fostering innovation can be traced back to its Constitutional foundation. The *possibility* of patent protection encourages inventive activity, and the *grant* of patent protection further encourages innovation by protecting investments that need to be made to convert an invention into a usable commercial product or process. The patent system also fosters innovation by encouraging the disclosure of technical information about

[4] SEC. 10. FEE SETTING AUTHORITY.
(a) FEE SETTING.—
(1) IN GENERAL.—The Director may set or adjust by rule any fee established, authorized, or charged under title 35, United States Code, or the Trademark Act of 1946 (15 U.S.C. 1051 et seq.), for any services performed by or materials furnished by, the Office, subject to paragraph (2).

[5] (2) FEES TO RECOVER COSTS.—Fees may be set or adjusted under paragraph (1) only to recover the aggregate estimated costs to the Office for processing, activities, services, and materials relating to patents (in the case of patent fees) and trademarks (in the case of trademark fees), including administrative costs of the Office with respect to such patent or trademark fees (as the case may be).

inventions, which supports the process of cumulative innovation, whereby subsequent inventors can build on the work of previous inventors.

The patent system can also inhibit innovation under some circumstances. Potential inventors or innovators may be discouraged from pursuing their ideas due to fear of possible infringement of existing patents. Ideally, we would like to tune the parameters of patent policy to maximize the ways in which it fosters innovation and minimize the ways in which it inhibits innovation.[6] Some possibilities of this sort with respect to fee structure are discussed below.

Other complexities of the innovation process enter into consideration of this objective. A policy change might encourage innovation in the short run, but discourage it in the long run, or vice versa. It might encourage it in some industries or technology domains, but discourage it in others. It might differentially affect domestic and foreign innovators. We will not attempt to analyze such variations exhaustively, but will mention such details when they seem important.

2.3. Inclusivity and Fairness

Given its constitutional basis in "promot[ing] the progress of science and useful arts", the USPTO should, to the extent possible, endeavor to make its services as widely available as possible, given statutory and judicial constraints. We will use the shorthand phrase "access to patenting" to denote the overall degree to which potential applicants are able to utilize the patent system in their innovative efforts.[7] By definition, any fee USPTO charges has the potential to limit the effective availability of patenting, as some potential applicants will conclude that the fee makes the application unavailable or unattractive. There is thus a fundamental tradeoff between this goal and the mandate for cost/revenue balance. This tradeoff cannot be avoided, but it can be managed. As discussed below, imposing fees in some contexts likely inhibits access more than in other contexts. By weighting fees towards contexts where they are less likely to inhibit access, the USPTO can achieve its revenue need with the least possible inhibition of access.

Further, certain fees or fees in general might inhibit access more for some categories or types of applicants and patentees. Congress has mandated discounted fees for defined groups of 'small' and 'micro' entities, indicating a particular concern about access for those groups.[8] It is true that while small firms represent a large share of overall economic activity, patenting is dominated by large firms; but it is also true that these large firms also undertake most (measured) R&D investment (Mezzanotti and Simcoe, 2023). Thus it is not possible to determine if the current rate

[6] Because fostering innovation is the constitutional basis of the patent system, it is generally presumed that on balance patents foster rather than deter innovation. But because we cannot really compare innovation rates with and without patent systems, it is actually difficult to say empirically whether overall maintaining a patent system encourages innovation. See Jaffe, 2000.

[7] There is a bigger question about access to the innovation system more broadly. It is certainly possible that patent rules and fee structures affect the extent to which people and firms consider or undertake innovation at all. Such effects would be very difficult to identify in practice, so we limit our analysis to questions of how and to what extent innovators can and do use the patent system.

[8] For detailed definitions of small and micro entities, see https://www.uspto.gov/web/offices/pac/mpep/s509.html#d0e30961

of application from these entities represents under-use of the patent system by innovators, or is below what it 'should' be based on some normative judgment. But it is nonetheless widely perceived that maintaining or enhancing the ability of small and micro entities to obtain and maintain patents is an important policy goal.

Scholars have examined the extent to which demographic groups that have been historically under-represented in other aspects of professional life are under-represented in patenting. The USPTO does not have a statutory mandate to collect demographic information on its applicants, so reliably documenting the extent of such under-representation is difficult. Studies that attempt to infer race and gender based on inventor names do seem to show that women and African-Americans are less common among inventors than in the U.S. population as a whole (e.g. Cook, 2019; USPTO 2019), though patenting activity by women has been increasing in recent years (USPTO, 2022). Since there is no reason to believe that these groups are inherently less capable of invention than others, this suggests a loss to the country of unrealized innovation potential.

Unlike the other objectives laid out above, it is difficult to conceive of fee schedule design choices to directly foster access to patenting by particular racial, ethnic, or gender groups. Indeed, if such policies could be identified, they might be difficult to reconcile with current affirmative action jurisprudence. Hence, at a practical level, policy to foster broader inclusion has to focus generally on improving access to patenting—and, in particular, access to patenting by entities that have not themselves previously been patent applicants. Fostering such new entry into the system may be the closest we can get to directly fostering entry by under-represented groups.

The 'patent system' is broader and more complicated than just the USPTO, including patent attorneys, the federal court system, and other agencies such as the International Trade Commission (ITC) and the Food and Drug Administration (FDA), whose policies affect the use of patents and the costs of commercialization. Barriers to the use of these other parts of the system by particular groups may be effectively more significant than USPTO fee decisions. We limit our analysis to possible consequences of USPTO fee choices, but we should recognize the limits of what can be accomplished with patent fees with respect to the broad issues of inclusivity.

Finally, as a public agency it seems reasonable that the USPTO should seek a fee structure that is fair and equitable, and is perceived as such. The fee structure and changes in the fee structure can affect the real or perceived fairness of the USPTO aside from inclusivity in the sense of numerical rates of patenting. Because different types of users use different services to different degrees, fee structure choices affect the distribution of the burden of financing the Office's costs. Different distributions of this cost burden are perceived as more or less fair by various parties. Many participants perceive 'fair' narrowly in terms of consequences for themselves. More generally, perceived fairness is often in the eye of the beholder. Thus 'fairness' is difficult to specify as an objective, but it remains important to consider perceptions of fairness together with other objectives.

3. Intermediate or operational objectives

In this section, we flesh out the substance of the intermediate objectives, and their relationship to the broader objectives.

3.1. Ease of access to patenting (in general)

3.1.1. Cost to applicants

USPTO fees for application filing, search, and examination are about $2,000 (undiscounted), while attorney fees and other non-USPTO expenses are typically in excess of $10,000.[9] USPTO fees might matter on the margin, particularly for small and micro entities.

3.1.2. The complexity of the process as perceived by applicants

In addition to the costs, the complexity of the application process may discourage or deter some (particularly small) entrants. This effect could be direct (applicants find themselves unable to navigate complexity and abandon application efforts) or indirect (applicants are unable to determine how difficult or expensive the application process will be and do not attempt it). Thus, when considering fine-tuning application parameters to achieve multiple objectives, consideration should also be given to whether the resulting complexity is too high.

More generally, because the USPTO fees are a small fraction of the dollar cost of applying for a patent application, it is likely that non-fee aspects of patent policy are more important to overall ease of access than the fees themselves. Even if the system is not overly complex, if there are specific requirements of the application process that are difficult for certain applicants to satisfy, that will create a barrier to application that cannot be overcome by a fee discount. For example, the USPTO introduced electronic filing as an alternative to paper filing in 2001; it is possible that this increased flexibility was more important for access than any change in fees.

[9] See, e.g., https://www.bitlaw.com/guidance/patent/what-does-a-patent-application-cost.html : "In most cases, you should budget between $15,000 and $20,000 to complete the patenting process for your invention."

3.1.3. Relationship to overarching objectives

The relationship of ease of access to the overarching objectives is more complicated than it might seem. Easy access may facilitate more inventions being patented. To the extent that patenting on balance fosters innovation, this implies that ease of access fosters innovation. But easier access, in addition to increasing the number of applications, may change the nature of applications submitted. In particular, it may encourage patent applications for low-quality inventions that would otherwise not be pursued. We noted above that the effect of patenting on innovation involves a balance between the positive effect of the incentive to innovate and the negative effect of barriers to subsequent innovation created by fear of infringement. The more marginal the invention, the greater the likelihood that the value of the incentive will be more than offset by the future burden from fear of infringement. This means that at some point, making it too easy to patent will start to discourage rather than encourage innovation. Unfortunately, it is difficult to say whether we are in danger of reaching this point, but it is worthwhile to keep in mind that easier access may not always be a desirable objective.

An increase in the overall rate of patent application due to easier access also affects the costs and revenues of the USPTO. Assuming the applications that would not otherwise be filed have similar characteristics to the applications filed before this increase, this should not impact the USPTO's overall financial balance. However, the differential character of additional applications fostered by easier access may also be relevant here. If the additional applications are of a character that require more examiner time and effort to determine their patentability, then costs may increase more than revenues. Lower quality applications should be allowed at a lower rate; if allowed they may be less likely to be maintained for the full patent life. Such changes could have additional effects on the overall revenue balance.

A potentially important consideration is whether a generalized improvement in access ends up generating a disproportionate increase in applications from small and micro entities. Because of the discounts, the fees from such entities do not cover the cost of examination, and those uncovered costs have to be recovered from fees on undiscounted entities. Thus an improvement in access that generated a disproportionate increase in applications from discounted entities would potentially increase costs more than revenues, requiring some kind of fee structure adjustment to return to cost/revenue balance.

3.2. Eliminating barriers to access for demographic groups that have historically been under-represented in patenting

Generalized improvements in ease of access to the system might improve access by these groups, but given the current empirical reality, changes in the fee structure or other marginal changes in general ease of access to patenting seem unlikely to have a major impact on these groups. On the other hand, specific policies designed to differentially favor these groups may not be legal.

If there are specific barriers that inhibit access for all groups, but which are of particular importance for these historically under-represented groups, eliminating barriers of this kind

might be a possible route to furthering this objective. For example, the USPTO has a program that helps individual inventors and small business owners find pro bono legal assistance (https://www.uspto.gov/patents/basics/using-legal-services/pro-bono/patent-pro-bono-program).[10] The USPTO's outreach and education efforts may also help, to the extent that lack of familiarity with and knowledge of the Office's services is a relevant barrier to participation. The difficulty is reliably identifying such barriers, and developing policy actions that effectively mitigate those barriers.

Given the legal and empirical difficulties of specifically fostering access by under-represented groups, an alternative approach is to identify policies that might improve access to the system by individual entities that have not previously applied for a patent. For example, there is a pilot program that expedites the first step in the examination process for inventors who are first-time filers, https://www.uspto.gov/initiatives/first-time-filer-expedited-examination-program. There is, of course, no guarantee that any such new entrants come from any particular group. However, we know that certain groups are under-represented among existing system participants, so increasing applications from entities that have never before applied seems more likely to increase applications from under-represented groups than increasing applications from the population that is already participating in the system.

3.2.1. Relationship to overarching objectives

As noted above, the underuse of the patent system by particular groups represents a loss of innovation potential. Improved access would, therefore, likely increase innovation. Note that the problem (discussed above) that the additional inventions resulting from easier access might be lower quality does not apply in this case: because these groups are under-represented in the current application flow, there is no reason to expect that additional applications that might be brought forth would be of lower quality. Thus, improving access for under-represented groups is more likely to increase overall innovation than an equal-sized improvement in overall access.

Similarly, improved access by these groups would likely increase both revenues and costs, but there is no reason to worry that costs would rise more than revenues because the additional applications would not likely be significantly different from the current applications.[11]

Finally, improved access by these groups would, by definition, further the goal of increasing the inclusiveness of the system.

3.3. Competition

Patents can foster competition. An applicant with an invention that would create new competition in a given market may not be able to bring that new competition to bear without

[10] USPTO makes a variety of resources available that may be of particular usefulness to entities unfamiliar with the patent system. See, e.g. https://www.uspto.gov/patents/training/start ; https://www.uspto.gov/learning-and-resources/inventors-entrepreneurs-resources ; https://www.uspto.gov/initiatives/equity/ci2.

[11] If improved access leads to a disproportionate increase in applicants who qualify for discounted fees, this could have potential consequences for cost/revenue balance. This is discussed in Section 4.2 below.

significant investment in product development and scale-up. A patent may be necessary protection to bring forth the resources necessary for that investment (Jaffe and Lerner, 2011). Inventors or businesses who come up with a new idea for a market in which they do not compete (or compete only at the margins) might have difficulty getting that idea into the market, because they are unknown to buyers in the market and may lack complementary assets necessary for production and distribution. A patent on an invention embodying the new idea can facilitate getting the invention into the market in one of two ways. The patent may provide enough protection for the innovator to enter the market themselves, using the patent to differentiate themselves and protect themselves from incumbents' stealing the idea. In other cases, the innovator might choose to sell or license the patent to an existing firm, allowing that firm to use its market presence and other assets to bring the innovation to market.

But patents can also inhibit competition.[12] A patent is the right to prevent others from working an invention, which by definition reduces the amount of competition that would otherwise occur. More generally, a firm with an idea for a new product may decide that they cannot introduce it because some aspect of its features or manufacture infringes on a claim in an existing patent. Or even if they believe that their product would not infringe, there may be enough uncertainty about infringement that they decide it is not worth the risk of introducing the product and risking infringement litigation.

3.3.1. Relationship to overarching objectives

Competition is generally viewed as economically desirable, as it maximizes the extent to which the benefits of economic activity are passed through to consumers. Competition also generally fosters innovation, which grows the economy and creates benefits for both producers and consumers. Where possible, patent policy should seek to maximize the entry-facilitating effects of patents and minimize the entry-deterring and other anticompetitive effects of patents.

3.4. Fostering disclosure of technical information

As noted above, disclosure of technical elements underlying inventions is a key aspect of the public benefits of the patent system. This disclosure facilitates the process of cumulative innovation as potential inventors can use each other's findings to facilitate the pursuit of their own ideas. (Bryan and Williams, 2021). Disclosure is facilitated as firms choose to patent inventions rather than relying on trade secrets.

3.4.1. Relationship to overarching objectives

[12] The classic paper on patents inhibiting competition is Phillips, 1966: "It is impossible fully to reconcile existing patent policy with the objectives of the antitrust laws." See also, e.g., Benelto, Rochina-Barrachina and Sanchis, 2014: "by lowering competition, patents in an industry exert an indirect effect on innovation besides their direct effect" and Ilić , 2024: "there is a complex interplay between patents and competition, addressing both their pro-competitive and anti-competitive effects"

By facilitating knowledge spillovers from an invention to future invention, disclosure contributes to the overall objective of fostering innovation. Therefore facilitating better disclosure is desirable, but the patent fee structure does not have significant direct effects on the disclosure objective. Patent policy choices such as examination processes and allowance standards likely affect the quality of the disclosure in patent documents, but these policies are outside the scope of this report. We include disclosure in our taxonomy of objectives for completeness.

3.5. Fostering follow-on innovation

While patenting can facilitate follow-on innovation through disclosure of relevant technical information about the invention, the exclusionary rights associated with the patent can also inhibit follow-on innovation (Galasso and Schankerman, 2015). As discussed below, the patent fee structure likely affects follow-on innovation through the effect of maintenance fees on the extent to which patentees maintain their patents to their full term. If patents expire and hence are 'free to use,' this could foster follow-on inventions because their inventors will not have to worry about potential infringement claims from the expired patents. So if higher maintenance fees encourage patentees to allow more patents to expire, this could facilitate follow-on innovation.

3.5.1. Relationship to overarching objectives

Because follow-on innovation is an important aspect of the social benefits of innovation, fostering follow-on innovation contributes to the overall objective of fostering innovation.

3.6. Stability and predictability of revenue

The bulk of USPTO costs are associated with patent examination. As discussed further below, the USPTO fee structure distributes the collection of revenue to cover examination cost across multiple fees. This means that fee collections are separated from when the USPTO incurs examination costs in several ways. They are separated across time, as some patents cover their examination costs to a significant extent through maintenance fees paid over the life of the patent. They are separated across patents, as examination costs of patents that are not maintained are covered in part by revenues from patents that are maintained. They are separated across types of services, as some services are intentionally priced below the cost of delivery, leaving the uncovered costs to be recovered through other fees.[13] They are also separated across patentees, as the cost of examination of patents of small and micro entities are covered in part by fees from patents of entities not entitled to discounts. These disconnects between incurring of costs and collection of revenues respond to Congressional mandates and/or create policy flexibility. This flexibility allows the USPTO to achieve policy objectives to a much greater extent than if it did not have the ability to set its fees in this way.

3.6.1. Relationship to overarching objectives

[13] An example is the costs of *ex parte* appeals at the Patent Trial and Appeals Board (PTAB).

Whether mandated by Congress or chosen in pursuit of other policy objectives, any disconnect between cost incurrence and cost recovery creates the issue of a potential mismatch between overall revenue and overall costs. Because costs are covered on average from multiple distinct sources, the overall balancing of costs and revenues is dependent to some extent on the Office's ability to predict ongoing revenue from different sources. Fluctuations in applicants' decisions may cause actual revenues to deviate from predicted revenues, potentially leading to overall under- or over-recovery of costs. USPTO maintains an operating reserve that is used to mitigate the consequences of such deviations. But reserve funds are finite, so minimization of revenue and cost fluctuations and the resulting financial risks is, therefore, a contributor to overall financial balance.

3.7. Flexibility and management of uncertainty for applicants and patentees

Returns on investments in innovation are highly uncertain. It is a basic principle of corporate finance that more uncertain investments are more expensive to undertake. This higher cost for greater uncertainty can be manifest explicitly, in terms of higher financing costs if external finance is used, or implicitly as equity markets discount the value of more uncertain returns. Because uncertainty increases the cost of undertaking innovation, it reduces how much innovation is undertaken.

Flexibility in how patent costs need to be covered can help to mitigate this uncertainty and its adverse consequences for innovation. In particular, in the early life of an invention (when application and examination fees are typically incurred), patent holders cannot be sure how valuable an invention will be, and they typically will not yet be earning any revenues from the invention. Later—typically after the patent is granted—it will become clearer how valuable it is, and at some point revenue may be earned from it. Thus shifting fee obligations from early in the process to later in the process reduces uncertainty by allowing applicants and patent holders to pay some fees only after they know if the patent is going to pay off, and after there is revenue to cover those fees. Again, USPTO fees are a small fraction of the overall cost of innovation, so this effect is not likely to be large, but it may matter in particular cases.

3.7.1. Relationship to overarching objectives

Aspects of the USPTO fee structure and procedures that provide applicant and patentees with mechanisms to reduce uncertainty therefore foster innovation. They may also foster inclusivity and fairness, to the extent that the uncertainty surrounding innovation is particularly difficult for some participants, such as those without previous patents.

3.8. Avoiding distortion of the examination process

The examination process is at the heart of the operation of the patent system. Applicants and other participants in the broader innovation system rely on examination being objective and not affected by inappropriate influences. Suppose, hypothetically, the examiners received a percentage of the patent issue fee, or were paid a bonus for a disallowance. Parties could rightly worry that the examiner's decisions were distorted by the resulting personal financial incentive. Of course, examiners do not receive any payments of this sort. But the overall relationships among examination decisions, applicant decisions and the patent fee structure are complex. It is conceivable that a particular patent fee structure could indirectly and inadvertently create incentives that would have an inappropriate influence on examiner or applicant behavior. Even an indirect and inadvertent distortion would undermine the legitimacy of the whole process, and therefore should be avoided.

3.8.1. Relationship to overarching objectives

A transparent, fair, and consistent examination process is important to fostering innovation because a process that is perceived to be unfair or inconsistent may discourage applicants from using the system. It is also important to achieving inclusivity and fairness, which includes treating all applicants in a fair and consistent manner. This means that patent fees and policies should be structured in a way that does not create real or perceived distortions in examiner behavior.

3.9. Minimizing incentives for fraud

The patent system is a human system, and so it is inevitable that some participants will engage in fraud or other non-compliance actions, for example, by pretending to be a small entity to qualify for the associated fee discount. While the USPTO tries to ensure that all rules are followed, it is realistic to recognize that it may not be able to detect and punish all violations.[14] A fee structure and other policies that minimize the *incentive* for rule violations may make violations less likely and thereby reduce the suspicion by participants that others are routinely cheating.

[14] There is no statutory requirement for applicants to disclose the information necessary to confirm that they qualify for small and micro discounts, so the agency's ability to detect this kind of fraud is limited.

3.9.1. Relationship to overarching objectives

If applicants commit fraud against the USPTO, or reasonably suspect that others are getting away with fraud, this could inhibit innovation and diminish equity in the same way as distortions of the examination process. Fraud may also affect USPTO's financial stability by reducing revenues below what should be collected.

4. Application of the framework to specific fee policy choices

In this section, we consider various specific USPTO fee structure choices, and describe what aspects of the intermediate and overarching objectives come into play in considering each fee issue. We draw on empirical analysis that we have conducted and reported separately (de Rassenfosse and Jaffe, 2024, hereinafter "our companion report"), as well as empirical evidence from previous research and general principles of economic analysis.

In principle, the Office could set fees for application, search, examination, publication and other services to approximate as closely as possible the actual cost of providing that service. Such fees would have to reflect the average service cost—over applicants and over some period of time, as the costs themselves (largely examiner salaries) are not really incurred service by service. Even under this kind of fee structure, the USPTO would always face issues of balancing costs and revenues, since both the fees and the Office's costs are somewhat fixed in the short run. But a fee structure that closely tied the fees for each interaction with the USPTO to the costs that the Office bears for that interaction would mitigate the concern about a potential mismatch between costs and revenues if actual behavior over time differs from predicted behavior, for instance, because of macroeconomic shocks.[15] Such a cost-recovery-based approach may also be perceived as the most equitable because it minimizes cross-subsidization as each application bears fees that cover the USPTO's cost of providing given services on average.

In practice, however, the burden of covering the USPTO's costs is shifted in a variety of different ways away from a strict cost-recovery approach. Each of these deviations from direct cost-recovery raise the potential issue of financial risk if revenues deviate from predictions, and each also has potential consequences for other policy objectives. In this section we consider several of the major choices for fee setting and identify the most important policy considerations.

In considering possible changes in fees, it is important to note the distinction between marginal and non-marginal changes in fees. In general, empirical analysis can elucidate the effect of marginal changes, *i.e.*, modest deviations from the levels that are empirically analyzed. A key example is the finding discussed in our companion report and further below that changes in fee levels do not seem to affect entry into patenting by entities that have not previously patented. This means that modest changes in existing fees are not likely to enhance or inhibit access to patenting. But we cannot infer from this analysis what would happen if fees were changed by a

[15] See "unit cost recovery" analysis at https://www.uspto.gov/sites/default/files/documents/Regulatory%20Impact%20Analysis-FY2020%20Final%20Rule.docx

significant amount. Such non-marginal changes may have effects, the possibility of which is not tested by the empirical analysis, which looked only at marginal changes.

4.1. The magnitude of discounts for small and micro entities

In our companion report, we examined empirically the effect of application fees on applicants' participation rates. Overall, the evidence is fairly robust that marginal changes in the fee levels have no measurable effect in terms of the entry into patenting by entities that have not previously participated in the patent system. This means that the discounted fees made available to small and micro entities do not have a *first-order* effect on the overall ease of access to patenting.

Given the available data, we are not able to test whether the fees differentially affect the ease of access for historically under-represented groups. It is possible that entities with participation from these groups are particularly resource-constrained and, hence, are affected by the fee levels in a way that is not visible in our analysis because these entities are a small fraction of the total.

Small entity discounts were first introduced in 1982. Congress explained:

> There are those who maintain that proposed fee increases will discourage individual inventors and small businesses from using the patent system. H.R. 6260 would clearly alleviate that concern in that it provides a 50 percent reduction in all patent fees for independent inventors, small businesses, and nonprofit organizations…"[16]

An even greater discount for 'micro' entities was introduced in 2011:

> The current statute provides for a significant reduction in certain fees for small business entities. The Committee was made aware, however, that there is likely a benefit to describing--and then accommodating--a group of inventors who are even smaller, in order to ensure that the USPTO can tailor its requirements, and its assistance, to the people with very little capital, and just a few inventions, as they are starting out.[17]

Thus Congress expressed specific concern about individual inventors, "small" business, non-profits, and people with "very little capital and just a few inventions". The specific qualifying characteristics for the discounts include individual inventors and non-profits. They reflect the concern for small firms via a maximum of 500 employees and a limit on the number of patents held.

The vast majority of all U.S. firms, including many highly-profitable and well-capitalized ones have fewer than 500 employees; Harvard is a non-profit but it has a $50 billion endowment. Thus some number of qualifying entities are not "people with very little capital." Of course, at the same time there are presumably other qualifying applicants that indeed have very little capital. While the

[16] Congressional Record (June 8, 1982) p. H12915.
https://www.congress.gov/97/crecb/1982/06/08/GPO-CRECB-1982-pt10-4-2.pdf
[17] H. Rept. 112-98 - AMERICA INVENTS ACT
https://www.congress.gov/congressional-report/112th-congress/house-report/98/1

results in our companion report suggest fees do not have a measurable impact on whether or not individuals and organizations engage in patenting, we cannot rule out that fees may have some effect on the overall ability of these low-resourced entities to engage in innovative and competitive activities, even though there are firms qualifying for the discounts that are not significantly resource-constrained.

Considering the discounts from the other direction, the existence of these discounts means that the fees for entities that do not qualify for any discount must be higher than they would otherwise be because the overall revenue balance constraint forces the revenue that is lost through discounts to be collected somewhere else. The finding that fees do not have a measurable effect on participation in the patent system suggests that the additional fee burden on undiscounted entities does not have a major effect on their participation in the patent system. But it could still be discouraging patenting on the intensive margin. That is, undiscounted entities are not abandoning the USPTO because of the higher fees, but they may be filing marginally fewer patents than they would if their fees covered only the costs that their own filings impose on the Office.

Whether or not the magnitude of the fees for different groups does affect behavior, the existence of discounts may nonetheless affect the perceived fairness and equity of the system. This effect could go in either direction. The existence of such discounts may be perceived as unfair: given that they do not correspond to any difference in the examination cost, they are, in effect, a subsidy running from non-qualifying applicants to qualifying applicants.[18]

On the other hand, even without affecting behavior, the discounts could be viewed as enhancing fairness and equity, if one views these through a lens of relative or percentage cost. As non-qualifying entities are generally larger, they will likely be spending more on average per patent for R&D and patent prosecution. This means that a fee structure with no entity-size discounts would charge a fee that is a smaller *percentage* of the overall cost for large entities than for small entities. If this fees-as-a-percentage-of-overall-cost framing is judged to be appropriate, then discounts for smaller entities could be seen as equity-enhancing. This line of argument is somewhat undercut, but perhaps not defeated, by the imperfect way that the existing qualification criteria limit the discounts to resource-constrained entities.

It should be noted that it is possible that the magnitude of the discount also has consequences for the actual or perceived prevalence of non-compliance. One would expect that larger discounts are more likely to induce fraudulent attempts to qualify for the discount. As noted above, USPTO

[18] The magnitude of cross subsidy is actually even larger than that generated by the discounts themselves. As discussed below, the cost of examination is, for all entities, covered to a significant degree through the payment of maintenance fees over the life of the patent. Patents that are not maintained thus do not cover their examination costs, and are subsidized by those patents that are maintained to full term. Small and micro entities, on average, maintain their patents at modestly lower rates that non-discounted entities; given the overall need for revenue balance this increases the overall cross-subsidy. The differences in maintenance rates have, however, been decreasing, as maintenance rates for small and micro entities have been slowly rising while maintenance rates for non-discounted entities have been slowly declining.

does not have access to much of the information that would be necessary to measure the prevalence of fraud.

Considering the effects in terms of all policy objectives, the USPTO might conclude that neither increasing nor decreasing the current discount level would have significant effects overall on the Office's policy objectives. It is important to emphasize that even if this is the case, it does not follow that eliminating the discounts entirely would have no such effects. As discussed above, the effect of such non-marginal changes cannot be inferred from the observed effects (or lack thereof) of marginal changes. It is possible, for example, that eliminating all small and micro discounts would measurably reduce access despite the finding that marginal fee changes had no such effect.

In light of recent evidence that patenting is a privilege of the few (Mezzanotti and Simcoe 2023), cross-subsidization modestly helps to offset the imbalance of power resulting from the concentration of patenting activity. Furthermore, to the extent that broadening access is a policy objective worth pursuing, it would seem that more should be done to reach this objective, not less.

4.2. Allocation of fee burden across application filing, examination and post-examination

4.2.1. Back-loading of fees

4.2.1.1. Effect on applicants

Most of the USPTO's patent costs arise in patent examination. This means that a structure that ties fees closely to costs would place most, if not all, of the fee burden at the examination stage. From the applicants' perspective, however, the value of an invention at the time it is created is fairly uncertain. Most patents have very little value, while a small number turn out eventually to be extremely valuable (Jaffe, Trajtenberg and Hall, 2005; Gambardella, 2013; Kogan, et al, 2017; Higham, de Rassenfosse and Jaffe, 2021). But the benefits of securing a patent are realized over a longer time period. Many inventions require significant investment of time and resources after they are patented but before they produce significant profits, such as drugs that require expensive clinical trials (Wouters, et al, 2020) or manufactured goods that require production scale-up and market development (de Rassenfosse, Jaffe and Wasserman, 2022). Thus the benefits of patenting may, in many cases, come long after the time of examination—if ever.

It is this reality that suggests the potential superiority of a fee structure that captures only a portion of examination costs in application and examination fees and defers a significant fraction of the cost recovery to payment of maintenance fees that are collected over time if the applicant chooses to maintain the patent up to its statutory life. A fee structure that collects a significant fraction of examination costs over the life of the patent, rather than front-loading them at the time of examination, thus has significant potential benefit for patent applicants. It allows them to match the stream of payments to the potential earned profits from the innovation *over time*.

A structure that collects a portion of examination costs through maintenance fees also allows applicants to match the patent fee obligation to the earned profits *across inventions*. This is because payment of the maintenance fees can be avoided by allowing patents to lapse. It is often difficult for applicants to assess the value of their inventions at the time of patent application and examination; some patents turn out to be very valuable, but many turn out to be of little or no value. Ex-ante, it is worth applying for patents because, on average, the winners earn enough to cover the overall cost. But ex-post, some (perhaps many) patents turn out to have cost more than they were worth. For these 'losers,' the loss can be mitigated by not paying maintenance fees and allowing the patent to lapse.

Because the fee structure must be designed to raise revenue equal to cost on average, the fact that some patents are not maintained for their full life means that the total fees over the life of patents that are maintained to the end must exceed USPTO costs for those patents on average. Thus, successful patents (that is, those that are commercialized and have sufficient value to maintain) cross-subsidize unsuccessful patents (those that do not have enough commercial value to justify paying maintenance fees). This cross-subsidy does not impact the operations of the USPTO, because it collects overall revenues that cover overall costs. And applicants prefer this cross-subsidy because it allows them to mitigate somewhat the uncertainty that otherwise permeates the innovation process by paying lower fees in the end for those inventions that turned out not to be valuable.[19]

Thus back-loading of fees increases flexibility and reduces uncertainty for applicants, both for a given patent and across the patents in their portfolio. This means that back-loading allows patents to more effectively foster innovation.

A possible concern with back-loading fees is that it could theoretically encourage applicants to submit applications that are particularly marginal in terms of their likelihood of being granted. An application that is not granted does not, by definition, generate any maintenance fee revenue, despite the USPTO incurring examination costs that are not likely significantly below average. Thus, the subsidization of application costs through back-end fees may encourage applicants to take more chances with low-probability applications than they would if application fees covered the full cost of examination. If this phenomenon is significant, that would be undesirable both operationally and financially.

Note that our companion report finding that entry into patenting is not sensitive at the margin to application fees does not completely rule out this possibility. Even though lower fees are not effective in encouraging entry into patenting, they do have some effect on the number of patents

[19] Note that an increase in maintenance fees—in isolation—could be expected to cause fewer patents to be renewed and more patents to lapse (because of nonpayment of maintenance fee) before the full term. This decrease in the fractions of patents kept to full term reduces the value of patent protection. However, an increase in maintenance fees that is, on average, offset by a reduction in upfront fees cannot make the package less valuable to applicants because they always have the choice of keeping the patent to full term if that is optimal (i.e. they only pay those higher back-end fees on their most valuable patents).

that patenting entities apply for.[20] But the difficulty of reliably determining quality ex-ante limits this concern at current application fee levels.[21,22]

Placing a portion of the fee burden in the later life of the patent is also desirable in terms of encouraging competition and follow-on innovation. In the absence of maintenance fees, patentees would have no incentive to allow granted patents to lapse prior to the end of the patent's term, meaning that their effect in constraining competition and follow-on innovation would continue. To the extent that maintenance fees induce patentees to allow some patents to lapse, these effects are diminished.[23]

The empirical finding that application fees do not affect entry into utility patenting weakens somewhat the argument for back-loading the fee burden, but does not eliminate it completely. The argument is weakened because the reduction in application fees created by back-loading cannot be associated with any significant improvement in overall access to patenting that a reduction in up-front fees might have been expected to foster. But it remains true that back-loading of fees reduces overall uncertainty for applicants by shifting some of the fee burden later in the life of the invention, when its owner has more information about its commercial value. This overall reduction in uncertainty makes the innovation process overall effectively less expensive, and can therefore be expected to encourage innovation even if it is not associated with a measurable increase in participation in the patent system.[24]

4.2.1.2. Effect on the examination process

Frakes and Wasserman (2014) uses the USPTO during the period 1991–2010 to analyze the effect of user fees on the behavior of administrative agencies. They argue at a general level that the existence of such fees, and the revenue they generate, may distort administrative decision-making. It was not their purpose to analyze specifically the tradeoffs between covering costs through up-front versus back-loaded fees; at the time they were writing, USPTO did not have statutory authority to set or revise those fees. They take as given that a portion of the examination cost is recovered through maintenance fees, and suggest this has an undesirable effect on the examination process itself. Their argument is that reliance on maintenance fees creates an incentive for the office to grant more patents and/or grant them quickly, in order to generate the revenue expected from the maintenance fees. They support this argument with evidence that, in

[20] See discussion in the Introduction of our companion report.

[21] This concern would certainly be relevant if the USPTO were to consider eliminating application fees entirely.

[22] One argument in favor of attracting patent applications is that inventions covered in these patents will be disclosed instead of kept secret. However, the social value of disclosing low-quality inventions to the public is likely limited.

[23] The incentive effect of maintenance fees on renewal behavior does not appear to be large (Thompson 2017). This is not surprising given the modest size of the fees. But whatever effect there is operates in a socially desirable direction.

[24] As noted above, an increase in maintenance fees *without a corresponding decrease in application fees* might discourage patenting. There is limited empirical evidence on this question, but such effects appear to be quite small (Thompson, 2017), and do not undermine the argument above that holding constant the overall fee collection back-loading the fees encourages innovation.

this period, grant rates were higher and grant lags were lower across different technologies as predicted by the model in response to changes in financial risks faced by the USPTO.

In the Frakes and Wasserman model, it is suggested that the USPTO faces the risk of under-recovering its incurred costs, and the *only* "policy levers" available to it are (1) "prioritizing low-examination-cost technologies," and (2) "extending preferential granting rates to high-fee-generating patent types / technologies." They treat the Office as a unitary entity, in which the Office's incentives are automatically reflected in the behavior of examiners. Thus, when the Office faces a greater risk of financial shortfall, the examiners respond with behaviors that generate more revenue. While not addressed specifically in their work, behind such organizational behavior is an assumption that the USPTO management has ways of adjusting the incentives faced by examiners so that they will change their behavior in the way that the assumed unitary decision model predicts is optimal for the organization.

It is not clear exactly how this transmission of the overall Office incentives to the behavior of examiners would actually work. The decision to allow a patent application is based on whether the patent meets all of the statutory requirements and is not based on the size of patent backlogs or considerations about patent fees. By law (35 U.S.C. 102) the examiner must allow a patent unless the application fails to meet one or more specific statutory requirements. Therefore, this conceptualization of a grant decision process in which examiners behave according to high-level organizational financial incentives is difficult to describe in terms of the actual decision process that examiners undertake.

Frakes and Wasserman did not consider the alternative of USPTO adjusting application, examination, and maintenance fees to achieve long-run revenue balance because, at the time they were writing, the USPTO did not have the statutory authority to do more than adjust fees based on inflation. But it does today. In this environment, it makes much more sense for the Office to deal with any revenue concerns it might have directly, by adjusting fees in a way expected to remedy any foreseen shortfall, while also taking into account other stakeholder and policy concerns. Fee changes needed for revenue balance can be implemented at the Office level; they do not require manipulation of the incentives faced by examiners in order to change examination outcomes in a way that would potentially increase revenue. Fee changes can also be designed to increase revenue relatively quickly, whereas the most significant impact from manipulating grant rates to increase maintenance fees would be seen after the resulting patents come due for renewal years later. Hence, fee adjustment is a much more reliable and predictable tool for revenue stabilization, so there is no reason to expect that the Office would instead resort to the complex and uncertain mechanism of somehow manipulating examiner incentives.

4.2.2. Summary of tradeoffs in the distribution of fees across application, examination, and maintenance fees

The ability of the USPTO to distribute the fee burden associated with covering the cost of examination across application, examination, and maintenance fees significantly increases the Office's ability to recover its costs in a manner that minimizes any potential negative impacts of fees on the innovation process. In particular, back-loading the fee burden to some degree reduces

uncertainty for applicants and patent holders and allows them to better match their fee burden to the benefits they receive from the system. It does create a potential issue for the Office in terms of financial stress generated by the misprediction of maintenance revenues, but that risk can be mitigated through the use of operating reserves and fee adjustments. The theoretical issue of distortion in the examination process itself flowing from dependence on maintenance revenues is not likely to be significant, given the Office's fee flexibility.

This analysis underscores a more general point about the USPTO fee policy. Assuming that Congress wishes to continue the policy of having overall Office revenues balance overall Office costs, giving the USPTO the flexibility to determine the structure of different fees within that mandate has significant policy benefits. It allows the fee burden to be met in a way that is most conducive to achieving the Office's goals. Thus Congress should continue to allow the Office fee setting authority in order to maintain this flexibility and the benefits it generates.

4.3. Consideration of patents that expire before all maintenance payments come due

As noted above, the existing fee structure captures a significant portion of the cost of examination for a given utility patent through maintenance fees that are collected over the life of the patent. If a given patent turns out not to be useful, the patentee has the option of allowing that patent to lapse, avoiding some or all of the maintenance fees and, therefore, ultimately paying total fees that are less than the average examination cost. This shortfall for a given patent is not a problem for the USPTO, because it can set overall fees in such a way as to take into account, on average, the tendency for some patents to lapse and thereby not deliver all possible maintenance fees. And, as discussed above, it is beneficial from an overall innovation policy perspective because it reduces uncertainty for applicants and facilitates follow-on innovation.

There is, however, a category of utility patents for which full maintenance fees are *never* paid. Maintenance fees are due 3.5, 7.5, and 11.5 years after the date of the patent grant.[25] The life of a utility patent is generally 20 years *from the patent's actual filing date or any domestic benefit date to a prior nonprovisional application*.[26] For most patents, the filing date or domestic benefit date is a few years before the grant date, and if the patent is maintained for its maximum duration, all maintenance fees are paid. There are, however, some patents (mostly, but not entirely, continuation applications[27]) for which the domestic benefit date is long before the grant date. For these patents, it is clear at the time of grant—and predictable at the time of application for many applications—that the patent will lapse before all maintenance payments come due.

This raises a different set of issues from the situation where patents turn out ex-post to be not very valuable and, hence, are allowed to lapse before all maintenance fees are paid. For such

[25] Unlike most patent offices, the USPTO charges renewal fees at three points in a patent's life. Most patent offices have yearly renewal fees. Transitioning to a yearly renewal fee system could decrease the variability of revenues in case of unexpected events (because revenues are collected at more frequent intervals).

[26] For a more detailed discussion of patent term, see https://www.uspto.gov/web/offices/pac/mpep/s2701.html.

[27] A "continuation application" is a patent application that contains additional claims to an invention disclosed in an earlier application of the applicant (the "parent" application).

patents, at the time of application, the applicant faced an expected overall fee level based on the average life of patents (and average likelihood of paying each maintenance fee). When such a potential applicant decides whether or not to file an application, they do so balancing the expected value to them of the patent against the average cost of obtaining and maintaining that patent. Because the aggregate patent fees paid to the USPTO are equal to aggregate costs, the expected fees for an individual application cover examination costs (unless the applicant qualifies for a discount). Therefore, applicants will appropriately consider (in effect) the average cost of examination when making their decision on whether to pursue a patent. That is, to first order, a socially efficient framework for the application decision.

For a patent whose domestic priority date is well in the past, it is clear at the time of application that fees adequate to cover the cost of examination will never be collected. Because of the USPTO's mandate that costs must be covered by fee collections, this creates need for revenue to be collected elsewhere. And, unlike the small and micro entity discounts, there is no policy decision or purpose behind this cross-subsidy. From society's perspective, the potential applicant comes into the application decision knowing that its total fees, if the patent is granted, will be below the average cost of patent examination. This lower cost in terms of fees is out of line with the average cost of examination. While applicants will still make their filing decisions based on the expected value (to them) of the patent against their expected costs, the fees they expect to pay to the USPTO are now below the average cost of examination. Thus the interaction of the rules governing the life of the patent and the schedule for recovery of costs through maintenance fees creates an unintended and undesirable revenue shortfall and distortion of the patent process.

To remedy this disconnect, it would be desirable to impose, in some way, an additional fee or fees to be paid in connection with patents whose priority date is significantly before the filing date. There are a number of different ways this could be done, some of which would require Congressional action and some of which the USPTO could implement itself by rulemaking under its existing fee-setting authority.[28] The office could identify at the time of grant what maintenance payments will be made on any given patent if it is maintained for its full life; if there are any that will never be due, the remaining payments could be adjusted in some way so that if the patent is maintained for its maximum remaining life, the total of all payments will be the same as it would be if the end of patent life were beyond the usual last payment. Alternatively, the expected revenue deficiency could be made up in a single additional fee due with publication of the patent. A more radical change would be to make *all* renewal fees payable on a schedule based on the application date rather than the grant date, as is done by the EPO.[29] For this to capture full revenue from continuation patents, the application date used would have to be the domestic benefit date. This would in principle have the additional benefit of discouraging behavior that drags out the examination process.

[28] The USPTO has a rulemaking under way that would, in fact, address this issue. *See* 89 FR 23226 (April 3, 2024) at https://www.federalregister.gov/documents/2024/04/03/2024-06250/setting-and-adjusting-patent-fees-during-fiscal-year-2025, Section 2, "Continuing Application Fees".

[29] See https://www.epo.org/en/legal/guidelines-epc/2024/a_x_5_2_4.html.

If any of these approaches were adopted, potential applicants would face the appropriate cost/benefit tradeoff at the time they decide whether or not to apply. Because the grant lag is somewhat uncertain, they may not know exactly when the post-grant fees would be due, but in this regard they are in the same situation as other applicants.

4.4. The principle of matching fees to costs over the life of the patent

A recuring theme of our analysis is that *over the life of an average patent* the total fees paid should generally approximate the cost of processing a patent. This principle facilitates the Office fostering innovation to the maximum extent possible subject to the Congressional constraint of overall recovery of costs through revenue. Fees for small and micro entities are discounted from this average, and fees for undiscounted applications are above this average, because of the need to recover both the revenue lost through discounts and USPTO costs outside of the examination process itself. This exception to the principle is mandated by Congress, and may be useful in achieving the objective of inclusion and fairness.

In practice, there are other cross-subsidies among different patents because some applications will cost more to process and some less. Since everyone following a similar prosecution pathway pays approximately the average cost, some applications with expensive processing may be subsidized by applications with simpler processing. Some degree of such cross-subsidization is inevitable and not a problem in terms of policy objectives.

There are, however, situations that go beyond routine variations in processing cost, where decisions made by certain applicants systematically and predictably increase the cost of the examination. While the dividing line between 'routine' variation and 'predictable and systematic variation' is inherently somewhat fuzzy, it is worth trying to identify these behaviors, and considering application of additional fees corresponding to the additional costs. For example, the USPTO charges additional fees for the inclusion of a very large number of claims or multiple Requests for Continued Examination after the examiner has issued a Final Action. Charging fees of this kind can increase the efficiency of the system, by incentivizing applicants to make choices that increase examination costs only if the incremental benefit of doing so is greater than the incremental cost. The resulting reduction in cross-subsidy may also improve the perceived overall equity of the system.

Implicit in all of the above analysis is that as the USPTO seeks to recover its overall costs through a variety of fees, it can better achieve its overall objectives by considering the incentive effects of its choices, and generally charging lower fees for more socially desirable actions (*e.g.*, applying for a patent, with its associated disclosure function) and higher fees for more socially costly actions (*e.g.*, keeping an existing patent in force). This general concept could be extended to the creation or increase of fees for specific applicant and patentee decisions that are socially undesirable. For example, applicants have a statutory right to request non-publication of their application in certain circumstances. The applicant may have good reasons to desire that their application remain confidential, but non-publication is socially undesirable, as it diminishes disclosure and increases uncertainty for other potential innovators. Or the Request for Continued Examination—discussed above as an action that increases USPTO costs—also imposes costs on

society more broadly, as keeping an application pending rather than allowing the Final Office Action to stand again increases uncertainty for competitors and potential innovators.

In particular cases it may be judged that there are overarching Congressional or policy reasons not to burden these choices with additional fees. Further, it would be difficult or impossible to determine the empirical magnitude of the social cost created by these actions, so we cannot pretend that a socially optimal fee could be set. But overall, USPTO must recover its costs, and in general, it does that by charging fees that, to some extent, discourage *desirable* activities. Any fee charged for undesirable activities marginally decreases the level at which these other charges have to be set in order to meet the revenue requirement, so having some charge for undesirable actions is something to be considered.

It is possible that the objective of actual and perceived fairness in the USPTO process might weigh against raising fees to reflect social costs. While it is true, for example, that continuing examination after a Final Action creates uncertainty for other potential innovators, in some cases it represents a genuine belief on the part of the applicant that the examiner has erred in not allowing the patent. Raising the fee for what the applicant perceives to be a step necessary to correct a USPTO error may seem unfair. Such a possibility of perceived unfairness should be weighed against the social benefit of potentially reducing the frequency of socially undesirable decisions.[30]

4.5. Overall level of fees and quality of examination

The mandate that overall fee revenue should equal the overall costs of maintaining the patent system does not determine what that level of costs and revenues should be. A more thorough examination would increase total costs, which could be offset by an overall increase in fees. Conversely, the overall level of fees could be reduced, but this would necessitate a reduction in USPTO overall costs, which must eventually be reflected in less thorough examination or some other reduction in the level of Office services or support activities.

A more thorough examination would yield benefits to society in that it would reduce the frequency with which the monopoly patent right is granted for inventions that do not meet the standards for patentability. It should also yield benefits for at least some applicants because patents would be upheld in litigation more often. But since this higher quality costs resources to achieve, it should be sought only if the marginal value of the increase in quality is greater than the increase in costs and, therefore, fees.

[30] A better balance between social costs and perceived unfairness might be reached by charging fees for Requests for Continued Examination (and potentially PTAB appeals) that are higher than the current fees, but then refunding all or a portion of the fee if the patent is ultimately allowed. In theory, this could discourage strategic use of these procedures while not ultimately penalizing the applicant for Requests that had a legitimate basis. Whether this would, in practice have significant benefits and whether it would be perceived as more fair is hard to know. Additionally, the USPTO's current refund authority is limited to fees paid by mistake or in excess of that required; refunds based on outcomes would require additional statutory authority.

To illustrate, consider increasing the examination time for all patent applications by X%. For simplicity, let's assume that this policy will increase costs and, therefore, the fees, by X%. By how much would welfare increase? Some patents might be refused as a result, and some granted patents would be narrower. Fewer valid claims would be rejected. If examination quality is perceived to be too low and granted patents too obvious, too broad, or overlapping—such that the patent system does not fulfill its mission of encouraging innovation—and *if* these effects are the result of poor examination, then increasing examination time may very well increase welfare by more than X%. But if the patent system already works 'more or less,' the welfare analysis becomes tricky, if not impossible, to perform.[31] In addition, increasing examination time may not necessarily proportionally improve examination 'quality.' Legislative changes, better search technologies, or access to more prior art may have a large effect on examination quality without costing as much.

5. Conclusion

USPTO fee structure must comply with legal mandates; within those mandates different fee structure choices have different consequences for overarching goals of overall financial balance, fostering innovation and inclusivity and fairness. We have outlined a framework for analyzing how fees structure choices interact with applicant behavior and the larger innovation system to affect these goals. Using that framework, we suggest several specific conclusions about fee structure choices including, in particular:

- Modest changes in the small and micro entity discounts appear to have no effect on entry of new entities into the patent system, though they may affect the number of patent applications filed by these entities;
- The current practice of recovering a significant portion of examination costs through maintenance fees likely fosters innovation and does not distort the examination process or create significant financial risk for the Office;
- It would be appropriate to assess an additional fee on patents granted such that maintenance of the patent until expiration will not include payment of all maintenance fees;
- Maintaining the USPTO's flexibility to determine the structure of different fees within its cost/revenue balance mandate allows the fee burden to be met in a way that is most conducive to achieving the Office's goals.

The USPTO, Congress and other interested parties can use this framework to evaluate current and future fee structure choices. At the same time, it is important to recognize that patent fee structure is just one factor affecting how individuals and firms use or do not use the patent

[31] To the extent that examination errors do occur, they can be rectified within the USPTO through the PTAB procedure, and/or through litigation. Though these review processes are themselves expensive, they are invoked for only a very small fraction of patents. Because the Office itself must process hundreds of thousands of applications per year, it is efficient for it to do its review with only modest resources, recognizing that more careful and more resource-expensive review is still available for the small fraction of cases it is needed (Lemley, 2000). In practice, knowing where exactly is the right balance between costs and quality at the USPTO is very difficult.

system. In many cases, other aspects of patent policy and broader economic forces will have greater impact than changes to the fee structure.

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