January 30, 2017

Mr. Raul Tamayo,
Senior Legal Advisor, Office of Patent
Legal Administration, U.S. Patent & Trademark Office
Via email: ExternalExaminationTimeStudy@USPTO.gov

Re: **Examination Time Goals, Docket No. PTO–P–2016–0040.**

I hereby submit my comments in response to the U.S. Patent and Trademark Office ("PTO") public notice at 81 *Fed. Reg.* 73383 (October 25, 2016) (the "Notice"). The comment period was subsequently extended to January 30, 2017. 81 *Fed. Reg.* 86323 (November. 30, 2016).

Subject to the limited scope of PTO's ability to implement changes to the examination time as described below, I applaud the efforts by the Office to investigate means for improving examination quality. As the Notice correctly recognizes, setting examination time is inextricably linked to examination quality. Moreover, optimal allotment of examination resources should depend on application complexity attributes. For example, while the Office collects fees for excess claims and pages in applications, the examiners receive no credit in counts, nor are they given time in accordance with such application attributes and fee collections.

In my comments on examination quality in Docket No.: PTO–P–2010–0004, I presented a detailed proposal for a method for setting examination time per Art Unit and for revising the examiner count system to incorporate application attributes based on empirical measurements of examiner performance. These prior comments including attachments are attached at the end of the instant comments.

My proposal demonstrates how the PTO can derive new Art Unit targets for examination time and a related count "correction factor" based on selected application attributes, *while keeping the average counts over the examining corps (and thus average examination time per application) at a fixed level*. In other words, through empirical measurements, the method optimizes reallocation of resources between applications and art units so as to achieve uniform (minimum) examination error rate.

While the PTO has authority to reallocate examination resources or devise ways to use them more efficiently, it lacks Congressional authority to *increase* them across the board (i.e., it cannot increase the cost of examination per application) even for the laudable purpose of improving examination quality. This is explained below.

1 Setting patent examination quality level (average cost per application) is a substantive policy matter reserved for Congress

The framers of the U.S. Constitution created a patent system that would encourage individual enterprise, in the belief that the pursuit of private returns would lead to the greatest social returns. As a matter of policy, Congress was mindful of the importance of making the patent system affordable to all. When Congress established the patent examination system under the Patent Act of 1836, it set application fees at $30.[1] With this cost, Congress deliberately maintained patent application fees affordable. This was in contrast with the prohibitive application fees then prevailing in other countries, in which patenting was a "sport of kings" inaccessible to persons of average means.[2] Congress anticipated that examination under finite Office resources commensurate with these fees would not be error-free. Indeed, it would accept an application rejection error rate (as perceived by applicants) of 5%.[3] In the first years of the Office's examination operations, the Office was fully funded by user fees,[4] the level of which inevitably constituted a substantive Congressional *policy balance* between affordable patenting costs and reasonable examination quality compliance rate.

Over the years, Congress regularly set patent user fees by statute and appropriated the funds to the PTO, which set examination resources accordingly. Thus, through patent fee legislation, it is Congress — not the PTO — that sets the examination quality level. The policy balance on this issue is substantive and of great impact on the American innovation economy. For example, the high cost of obtaining a patent is cited by startup companies as the top ranking reason for not pursuing a patent.[5] Accordingly, observing that only about 1% of issued patents are litigated, Congress in its wisdom may have decided that *further* private resources should be focused only on such disputed patents for enhanced scrutiny rather than *further* increase patenting costs for *all* patent applications.

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[1] Patent Act of 1836, Ch. 357, 5 Stat. 117 (Jul. 4, 1836) Sec. 9.

[2] Senate Report Accompanying Senate Bill No. 239, 24th Cong., 1st Sess. (April 28, 1836) (Application fees for the three kingdoms of England, Ireland, and Scotland were $1,680. They were $309 in France; $292 in Spain; and $208 in Austria).

[3] *Id.* ("In nineteen cases out of twenty, probably, the opinion of the Commissioner, accompanied by the information on which his decision is founded, will be acquiesced in. When unsatisfactory, the rights of the applicant will find ample protection in an appeal to a board of examiners, selected for their particular knowledge of the subject-matter of the invention in each case.")

[4] During those years, user fees generated revenues well in excess of the Office's expenses. *See* U.S. Patent Office, *Annual report of the Commissioner of Patents for the year 1838*, Washington: G.P.O (1839), p. 56 (Net fee revenues of $38,424 versus expenses of $19,243).

[5] Ted Sichelman and Stuart J.H. Graham, "Patenting by Entrepreneurs: An Empirical Study, 17 *Michigan Telecommunications and Technology Law Review,* 111, 166-167 (2010) (in a survey of about 1,000 startup respondents, 57% indicated that the cost of getting a patent influenced their company's decision not to patent their most recent invention).

Laudable as it may be, reducing examination error rate by increasing the average patenting costs to applicants is a *substantive* policy choice which the PTO is not empowered to make. Rather, the issuance of procedural rules is the broadest scope of the PTO's authority under 35 U.S.C. § 2(b): it authorizes the PTO "to promulgate regulations directed only to 'the conduct of proceedings in the [PTO]'; it does NOT grant the [PTO] the authority to issue substantive rules."[6]

1.1 PTO authority under Section 10 of the AIA is limited

While the PTO is authorized under Section 10 of the America Invents Act ("AIA") to set and adjust fees, that authority permits the PTO to set fees "only to recover the aggregate estimated costs to the Office for processing, activities, services, and materials relating to patents."[7] It does not, however, authorize the PTO to *change its aggregate costs* per application and then set fees accordingly. Had Congress intended to vest the PTO with such untethered authority to change fees, there would have been no reason for it to *set* in Section 11 of the AIA an exhaustive fee schedule for all statutory fees as "a reference point for any future *adjustments* to the fee schedule by the Director."[8] Congress is presumed to have known the effect on examination quality of the fees it set in AIA § 11 — the fees prevailing at that time. In the few years prior to, and including 2011, the PTO's measure of examination quality compliance rate was about 95%.[9] This examination quality compliance rate during those years was in fact accepted and constructively adopted by Congress when it set the baseline fees in AIA § 11. As such, without Congressional specific delegation of power, the PTO cannot, for example, double the average examination time per application (increase its average cost per application) in order to achieve, say, a 98% quality compliance rate, and then raise its fees under AIA § 11 "to recover the aggregate estimated costs to the Office." Rather, the only aggregate cost increases that the PTO is authorized to recover through user fees are *exogenous* increases in its cost of production through the annual Consumer Price Index fee adjustment in 35 U.S.C § 41(f). The PTO does not possess plenary fee-setting authority simply because Congress has endowed it with *some* authority to set fees.[10]

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[6] *Merck & Co. v. Kessler*, 80 F.3d 1543, 1549–50 & n.6 (Fed. Cir. 1996); *Tafas v. Dudas*, 511 F. Supp. 2d 652, 663 (E.D. Va. 2007), *citing Merck* ("Section 2(b)(2) does not, however, vest the PTO with any general substantive rulemaking power."). *See also Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276, 1294 (Fed. Cir. 2011) (same).

[7] AIA § 10(a)(2).

[8] House Report 112–98, Part 1, p. 78 (June 1, 2011) (emphasis added).

[9] U.S. Patent and Trademark Office, *Performance and Accountability Report, Fiscal Year 2011.* p. 21 (See Patent Final Disposition Compliance Rate and In-Process Compliance Rate, Tables 6-7).

[10] *Railway Labor Executives' Association v. National Mediation Board.*, 29 F.3d 655, 670 (D.C.Cir.1994) (*en banc*) (An agency does not "possess[ ] plenary authority to act within a given area simply because Congress has endowed it with some authority to act in that area.")

As explained above, it is Congress' prerogative and *duty* to enact substantive policies for achieving certain examination quality levels. The Supreme Court explained that the constitutional separation of powers principle vests all legislative powers with Congress and that "Congress is not permitted to abdicate or to transfer to others the essential legislative functions with which it is thus vested."[11] In some circumstances, however, to delegate such power requires Congress to "lay down by legislative act an *intelligible principle* to which the person or body authorized to fix such rates is directed to conform."[12] Neither Section 10 nor Section 11 of the AIA "lay down by legislative act an intelligible principle to which the [PTO] is directed to conform" for changing its average examination cost per application to achieve a certain quality compliance rate.

2 The PTO lacks authority to tradeoff pendency for examination time per application

In its background material for its Notice, the PTO provided a misleading straw-man scenario, framing the question of setting examination time as one in which the Office would make a tradeoff between examination time per application and pendency. It stated that "[p]roperly calibrated examination time is critical for establishing optimal pendency and quality levels."[13] The Office solicited comments on this straw-man scenario and presented graphics showing that it can tradeoff between examination time per application and pendency.[14] Framing the issue in this way is profoundly infirm for two fundamental reasons.

First, the PTO's focus on *pendency* impact is a disguise for an increase in the average cost of examination per application. Pendency increases would clearly be due to reduced average disposal rate per examiner, as examiners would be spending more time per application. But the figure in the PTO background presentation is deceiving because it does not show that the backlog will grow indefinitely such that *no fixed* pendency can be sustained. Therefore, the purported tradeoff with pendency appears as a disingenuous concealment of the real impact—higher cost per application. The PTO indirectly admits as much in a footnote stating that "pendency can be maintained at baseline by adjusting Key Inputs such as Hiring."[15]

Second, as explained above, the PTO has no authority to increase average examination time per application (unless it gets rid of commensurate overhead

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[11] *A.L.A. Schechter Poultry Corp. v. United States*, 295 U.S. 495, 529 (1935) (holding the statute in question to be unconstitutional delegation of legislative power).

[12] *J.W. Hampton, Jr., & Co. v. United States*, 276 U.S. 394, 409 (1928) (emphasis added).

[13] PTO, *Examination Time and the Production System*, p.3, at www.uspto.gov/sites/default/files/documents/Examination%20Time%20and%20the%20Production%20System.pdf .

[14] *Id.*, at 7.

[15] *Id.*

costs), and therefore no trading off with average pendency is even possible under current law. The PTO is only empowered to improve examination quality by more efficient use of congressional-appropriated resources, improved training, and optimal reallocation of resources.

3 Conclusion

To the extent that this inquiry is hypothetical and intended to establish a factual record with which the PTO intends to approach Congress with requests for legislation, it is applauded. I offer the detailed attachment describing methods for meeting the PTO goals in this case, or preferably in the case where aggregate examination resources are kept at real present levels while optimally reallocating resources to maximize examination quality compliance rates.

My hope is that this is not a pretext to engage in creeping unauthorized examination cost increases, justified as "quality improvements," followed by fee increases to recover those extra costs.

Respectfully submitted,

Ron D. Katznelson, Ph.D.

Encinitas, CA.

March 8, 2010

The Honorable David Kappos
Under Secretary of Commerce for Intellectual Property
Director, United States Patent and Trademark Office
Alexandria, VA 22314

Via email: patent_quality_comments@uspto.gov.

Re: Comments on Enhancement in the Quality of Patents
Docket No.: PTO–P–2010–0004

Dear Director Kappos:

I am pleased to submit these comments on enhancements in the quality of examination. As my comments below further explain, the Office's mere choice for the name for these proceedings, "Quality of Patents", is indicative of its bias, focusing on quality of allowances while largely ignoring the quality of rejections. As explained in my comments, the term should be "Quality of Examination." I show analytically that rejection errors are more harmful to consumer welfare than allowance error.

In my comments, I propose a method for improving examination quality by adjusting the time allotted for examination based on objective quality criteria. A modification of the examiner count system that takes into account patent application attributes is also proposed.

Respectfully submitted,
By

/*Ron Katznelson*/

Ron D. Katznelson, Ph.D.
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I. Examination quality measures

I.A. The harmful asymmetry in examination quality review

The U.S. Patent & Trademark Office (USPTO) is often criticized for its insufficient examination quality in issuing patents. Consumer welfare losses due to patent application examination errors are considered as social costs that are the aggregate of the costs for applicants, the USPTO, third parties and society as a whole. Examination errors can occur by erroneously allowing an application that does not meet statutory patentability requirements, or by erroneously rejecting an application that does.

Costs of allowance errors are incurred by applicants who pursue licensing or litigation on invalid patents; by the USPTO – in costly proceedings for reissue/reexamination and in public ridicule; by third parties – in unnecessary R&D to design around invalid claims, in deterring downstream innovations erroneously deemed infringing, and in unwarranted litigation and other legal costs; by society as a whole – in harm to the public's perception of the value of patents and the merits of investing in patented inventions.

Costs of rejection errors are incurred: by applicants – who need to file RCEs and/or appeal briefs, in delays in obtaining patent protection they deserve, and in their loss of statutory rights (if the rejection succeeds); by the USPTO – in RCEs and appeals workload increases; by third parties – in delaying public notice of issued claims; by society as a whole (if the rejection succeeds or even merely delays issuance of a patent to which the applicant is entitled) – in discouraging private investments and development of inventions, in reducing inventors' incentives to disclose inventions and teach new knowledge and discoveries, and in generally failing "to promote the progress of useful arts."

The patent literature is replete with enunciation of the harm associated with the first type of examination errors – allowance errors. Scholarship and media attention have reflected this inherent bias, focusing largely on erroneous allowances and much less on erroneous rejections. Treatises and books on the social cost of "bad" patents, "questionable" patents, patents of "dubious validity," or the need to improve "patent quality" abound. While there is no doubt that there would be benefits to improved patent quality *ceteris paribus*, empirical statistical support for assertions that the USPTO issues "bad" patents is often based on fundamentally flawed studies,[1] and fails to consider the costs that past attempts to raise patent quality have inflicted on the economy, and totally ignores adaptive responses that businesses and investors will take if the suggested policies are implemented.

Unfortunately, the relative costs of rejection errors compared to allowance errors have been largely ignored. This is likely due to the fundamental asymmetry in the resulting ***observable*** impact of examination errors. Assertion of an alleged "bad patent" can result in public outcry

[1] Ron D. Katznelson, Bad Science in Search of "Bad" Patents, *Federal Circuit Bar Journal*, Vol. 17, No. 1, pp. 1-30, (August 2007). Available at http://works.bepress.com/rkatznelson/1/; *See also* Patrick A. Doody, What is A Bad Patent?, 73 *Pat. Trademark & Copyright J.* (BNA) 525, 525 (Mar. 2, 2007) ("If we cannot define a bad patent, we cannot expect to solve the problems such patents are alleged to have caused.").

from entire industries. In contrast, an erroneous rejection is not widely published and is only clearly visible to one party – the applicant. However, the social costs of rejection errors, while largely invisible, have ripple effects: inventions are not exploited, startups may go belly-up and no one is left to tell the story, underinvestment in innovative research and disruptive advances which cannot be adequately distinguished from overinvestment in incremental and less risky developments that require no new patent protection. Thus, the observable data have an inherent bias: allowance errors are reflected in bad things that happen, while rejection errors exert their greatest cost in good things that do not.

Some electronics and software manufacturers created massive "patent quality" lobbying campaigns that found their way into national editorials, agency and congressional hearings and elsewhere. These campaigns have had substantial influence on public policy makers and on focusing patent scholarship and USPTO operations solely on allowance errors and not rejection errors. The Office (intentionally or unintentionally) created a default philosophy of rejection that resulted in plummeting application allowance rates. There is evidence that such "enhanced rejection practices" are used at the expense of substantial rise in rejection error rates, resulting in skyrocketing number of RCEs and appeal brief filings.[2]

Nothing exhibits the degree of asymmetry in discourse more than the prevailing biased vocabulary on the subject. The most commonly used term is "***patent quality***." However, rejected applications are not patents and a ***patent*** must have been issued for its ***quality*** to be evaluated. Thus, this term is strictly a measure of ***allowance*** errors. The term that should be used instead is "***examination quality***" because it is unbiased between allowance and rejection errors and because it correctly identifies the problem: ***examination*** - not patents. It also more accurately reflects the USPTO's legal obligations: applicants are "entitled" to patents, and if on examination "***it appears***" that the applicant is entitled to a patent under the law, the USPTO "***shall***" issue them, unless the USPTO carries out its legal obligation to make a *prima facie* showing of non-entitlement.[3]

This allowance quality bias and asymmetry has long been instilled in USPTO operations. In its quality control, the Office reviews more than 5,000 allowances per year to estimate and publish the allowance error rate. If the USPTO makes any similar study of final rejection errors, it publishes no statistics on those error rates. The Office's "second pair of eyes" review program applies only to allowances – never to final rejections. In examiners' merit reviews, erroneous allowances may lead supervisors to take adverse actions, whereas virtually no adverse actions are taken against examiners due to final rejection errors.

Academics suggesting remedies for the "patent quality" problem have been similarly biased towards allowance errors. Several scholars have proposed to remove the clear and convincing

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[2] Ron D. Katznelson, The Perfect Storm of Patent Reform? *Fenwick & West Lecture Series Inaugural Symposium*, UC Davis School of Law, Davis, CA. (Nov. 7, 2008), available at http://works.bepress.com/rkatznelson/54/ (Slides 11-17).

[3] 35 U.S.C. §§ 102 and 151; *In re Oetiker*, 977 F.2d 1443, 1445 (Fed.Cir.1992) (The U.S. Patent Office bears the initial burden of presenting a prima facie case of unpatentability, and until it does so, an inventor is "entitled" to grant of the patent).

evidence standard for the presumption of validity under 35 U.S.C. § 282[4] because they believe that "too many" patents are issued improvidently.[5] Curiously, these proposals would leave intact the presumption of correct examiner rejections including the strong deference the agency receives on judicial review under the substantial evidence standard of administrative law.[6] If examination is not robust enough to warrant the presumption of validity, what makes its fact-finding more reliable to warrant a presumption of correct rejection?[7] Note also that many alleged examiner errors do not raise fact-finding questions, but are rather due to failure to follow agency procedures or the law, which should receive no deference on judicial review, and should not be tolerated by the agency itself.

Despite some commentators' qualitative acknowledgement of the importance of social costs due to rejection errors, there is no published discussion (at least none that I know of) of the ***relative***

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[4] *Cf. SRAM Corp. v. AD-II Eng'g, Inc*., 465 F.3d 1351, 1357 (Fed. Cir. 2006) ("Under the patent statutes, a patent enjoys a presumption of validity, see 35 U.S.C. § 282, which can be overcome only through facts supported by clear and convincing evidence.").

[5] Doug Lichtman and Mark A. Lemley, Rethinking Patent Law's Presumption of Validity, 60 *Stanford Law Review*, 45 (2007); Alan J. Devlin, Revisiting the Presumption of Patent Validity, 37 *Southwestern University Law Review*, pp. 323-369, (2008); Fed. Trade Comm'n, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* 8-10 (2003), http://www.ftc.gov/os/2003/10/innovationrpt.pdf (calling the presumption "unjustified" and saying that the "burden can undermine the ability of the court system to weed out questionable patents"); Matthew Sag & Kurt Rohde, Patent Reform and Differential Impact, 8 *Minn. J.L. Sci. & Tech.* 1, 63 (2007) (recommending the preponderance of the evidence standard for initially granted patents but a higher standard for patents surviving post-grant opposition proceedings); F. Scott Kieff, The Case for Registering Patents and the Law and Economics of Present Patent-Obtaining Rules, 45 *Boston College Law Review*, 55 (2003) (advocated patent registration reform that removes the presumption of validity); Michael Abramowicz,& John F. Duffy, Ending the Paternity Monopoly, 157 *U. Pa. L. Rev*. 1541 (June 2009) (proposing a patent granting system employing private examination institutions conferring lower presumption of validity levels); *but see* Etan S. Chatlynne, The Burden of Establishing Patent Invalidity: Maintaining A Heightened Evidentiary Standard Despite Increasing "Verbal Variances," 31 *Cardozo L. Rev*. 297 (2009) (concluding that the presumption of validity - and the clear and convincing standard for establishing factual predicates of invalidity - should not be altered).

[6] Applicants' burden in overcoming the deference the agency receives in its claim rejections is elevated to even higher levels of asymmetry by the "broadest reasonable interpretation" claim construction standard used at the USPTO. *See* Dawn-Marie Bey & Christopher A. Cotropia, The Unreasonableness of the Patent Office's 'Broadest Reasonable Interpretation' Standard, 37 *AIPLA Quarterly Journal*, ___ (July 16, 2009). Available at SSRN: http://ssrn.com/abstract=1434918.

[7] One author who does addresses the allocation of relative deference accorded to USPTO in allowances and rejections argues that the significant institutional bias in favor of grants should overcome any strong presumption in favor of agency competence in the fact-finding associated with such grants. This conclusion lacks factual support and is apparently derived through misapprehension of USPTO examination procedures. *See* Arti K. Rai, Allocating Power over Fact-Finding in the Patent System, 19 *Berkeley Tech. L.J*. 907 (2004) (Arguing at 911that examiners are "unlikely to deny even questionable applications" because of time shortages and because of examiners' prevailing bias in favor of granting patents – erroneously asserting that it is much easier for examiners to secure a final disposition by granting a patent than by denying one under the examiner incentive system (which counts both a final rejection and an allowance as a disposal); erroneously asserting at 917 that the examiner cannot provide evidence for the record about common knowledge in an industry, ignoring 37 C.F.R § 1.104(d)(2) and MPEP § 2144.03 that are specifically designed to permit examiners to rely on common knowledge and personal knowledge for entering examiner affidavits in evidence; arguing at 912 without support that when the USPTO denies a patent, "the fact-finding associated with the USPTO's analysis is much more likely to be accurate," an assertion that would not be shared by the experience of many patent prosecutors; and mischaracterizing rejections as the only type of agency decisions supported by evidence, ignoring the fact-finding role in allowances and in 37 C.F.R § 1.104(e), under which examiners may identify for the record the ***facts*** leading to an allowance.).

costs of allowance and rejection errors. This has perpetuated the status quo at the USPTO, as no guidance seemed forthcoming as to the degree of changes required in USPTO's examination policy, procedures and incentives. To that end, a study attached in Appendix A, provides a definitive quantitative answer: ***rejection errors are more harmful to consumer welfare than allowance errors***.[8]

When the USPTO employs an examination quality measure that is proportional to the probability of examination errors and sets policies to minimize such a measure, it implicitly adopts a social cost model wherein the cost is monotonic in Q_0 and Q_1, the allowance and rejection probabilities of error respectively. Consider such a model, wherein C, the average social cost of examination errors, is directly proportional to Q_0 and Q_1, namely, $C = W_0Q_0+W_1Q_1$, and wherein W_0 and W_1 are the weights for each error type respectively. Without any apparent basis, the USPTO examination policies appear predicated on the premise that Q_0 (the probability that an application is allowed when it should not be allowed) dominates social costs compared to Q_1 (the probability that an application is rejected when it is allowable). Thus, under USPTO's current implicit model, its policies are based on highly imbalanced weights, that the social cost of an allowance error is far higher than the social cost of a rejection error, $W_1 << W_0$. However, the study in Appendix A establishes a definitive ***basis*** for the Office to correct this historic imbalance, as explained below.

A key data point used in the study to discover a bound on the relative weights W_0 and W_1 is the fact that societies that employ no resources to examine patent applications prefer a patent registration system over a system with no patents at all. Various countries have run the "natural experiment," and repeatedly and uniformly found social costs of abolishing patents (that is, a policy favoring making rejection errors) exceed social costs of registering patents, wherein validity is determined in court with no prior presumption (that is, a policy favoring making allowance errors). A survey of countries which currently have, or have had at some time, a patent registration system shows that this preference is not limited to the early history of national patent systems and that it applied to industrial societies who have had a registration system and shifted only recently to a patent examination system. This non-examination system data-point on relative social costs is used in a simple method to derive the social cost bound $W_1 > W_0$, which also applies for patent systems that do employ examination. This means that the average social costs of making a rejection error are ***higher*** than that of making an allowance error.

Perhaps it is not surprising that our patent statute is actually consistent with the inequality of weights, $W_1 > W_0$ (that is, that the social cost of a rejection error is higher than the social cost of an allowance error): "The Director shall cause an examination to be made of the application and the alleged new invention; and if on such examination ***it appears*** that the applicant is entitled to a patent under the law, the Director ***shall*** issue a patent therefor." 35 U.S.C. § 131 (emphasis added). It is significant that the statute does not command: "and if on such examination it appears that the applicant is ***not*** entitled to a patent under the law, the Director shall ***deny*** a patent therefor."

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[8] Ron D. Katznelson, "Patent Examination Policy and the Social Costs of Examiner Allowance and Rejection Errors," *Stanford Technology Law Review Symposium on PTO Reform*, Stanford, CA. (Feb. 26, 2010). Attached as Appendix A hereto and available at: http://j.mp/Examination-Quality.

I.B. USPTO must balance examination quality measures and include with no lesser weight rejection error measures in examiner incentives

In view of the findings described above, it is recommended that the USPTO augment its allowance error measures with final rejection error measures and adopt a weighted examiner incentive system that matches the supportable and unbiased social costs of both error types. Even the adoption of equal weights ($W_1 = W_0$) will highly improve the alignment of examiners' implicit examination error tradeoff with that corresponding to the optimal tradeoff of social costs. Under such a system, USPTO policies must ensure that the consequences to examiners for making allowance errors should be no more adverse than making rejection errors.

I.C. The USPTO must align allotted resources with examination burdens required to achieve acceptable examination error rates

Examination with finite resources cannot be made error-free. The USPTO should commence a thorough review and conduct serious statistical performance studies and measurements in order to design a better examiner production-goal system. The current system appears to be based on unpublished ad hoc agreement with examiners adopted by the Office in 1966 with no objective measurements of the number of hours required to achieve acceptable level of errors in relation to application attributes. Section 2 of the article attached hereto as Appendix B[9] reviews the history of the examiner production goal system. It shows in Figure 6 evidence suggesting that, on average, the examiner goal system fails to provide the minimum baseline examination time required in many technology workgroups ***regardless of technology.*** In particular, examiner performances in workgroups that are allotted an average of fewer than 25 hours per application appear unreliable, with wide spread in error rates. The results in Figure 6 are rather charitable to the Office because they contain no data on rejection errors. The conclusion is clear: examiners do meet their production goals – but at the expense of quality.

When the USPTO and the General Accountability office (GAO) were repeatedly called upon to reevaluate the production allotment goals, it appears that none of the attributes studied by USPTO and GAO have had much to do with the substantive merits or suitability of the examiner production goal system. For the most part, both agencies had failed to identify the relevant factors that should help ascertain how realistic the examiner production goals are. They interviewed examiners about the reasonableness of the goals but avoided asking the basic question: What objective factors should help determine whether the production goals are realistic? As shown below, these are quality measurement facts.

[9] Ron D. Katznelson, My 2010 wishes for the U.S. Patent Examiner, (January 8, 2010). Available at http://j.mp/RDK-2010-wishes

II. Outline for setting an improved examiner production system

II.A.1. Measuring final rejection errors

An essential element of the proposed approach is the Office's adoption of a quality measure to evaluate across each art unit the probability of rejection error Q_1 in addition to Q_0, the probability of allowance error. This would require substantial expansion of the Office's quality control team. In this regards, it should be noted that the definition of Q_0 is slightly different than the definition of the allowance error rate used by the USPTO, although they are proportional. The allowance error rate that the Office measures is the ratio between the number of erroneous allowances to all allowances, whereas the probability of allowance error Q_0 is the fraction of erroneous allowances in all applications that should have been rejected. Similarly, Q_1 is the fraction of erroneous rejections in all applications that should have been allowed. See Slides 17-18 in Appendix A.

II.A.2. Establishing a balanced examiner incentive system

During the experiments contemplated under this proposal, it would be important to set up a merit system that diminishes examiner rewards proportionately to examiner allowance and rejection errors. A weighted examiner incentive system that applies equal weights ($W_1 = W_0$) to allowance probability of error and rejection probability of error is essential for meaningful measurements of examination errors dependence on allotted examination time. This is because it controls for variance in examiner behavior and preferences to summarily reject or allow cases when there are no consequences. Under such a system, USPTO policies must ensure that the consequences to examiners for making allowance errors should be no more adverse than making rejection errors.

II.A.3. Measuring examination errors under various examination time-allotment constraints

A sufficiently large sample of examiners from all participating art units should be sequentially provided with three examination quota regimes with distinct average GS-12 equivalent time allotted per Production Unit (PU), tailored for each art unit. The three allotted time goals are denoted here by $T_j - d_j$, T_j, and $T_j + d_j$, wherein j runs over the index of participating art units. Operation under each of these three regimes would span several months each, in order to obtain statistically meaningful results. One of these allotment goals can be the current value for each respective art-unit - making it the first experiment of three, after the conditions and procedures in sections II.A.1 and II.A.2 have been established. In order to minimize examiner dependent results, it is highly desirable that the same examiners participate in each of the three examination quota experiments.

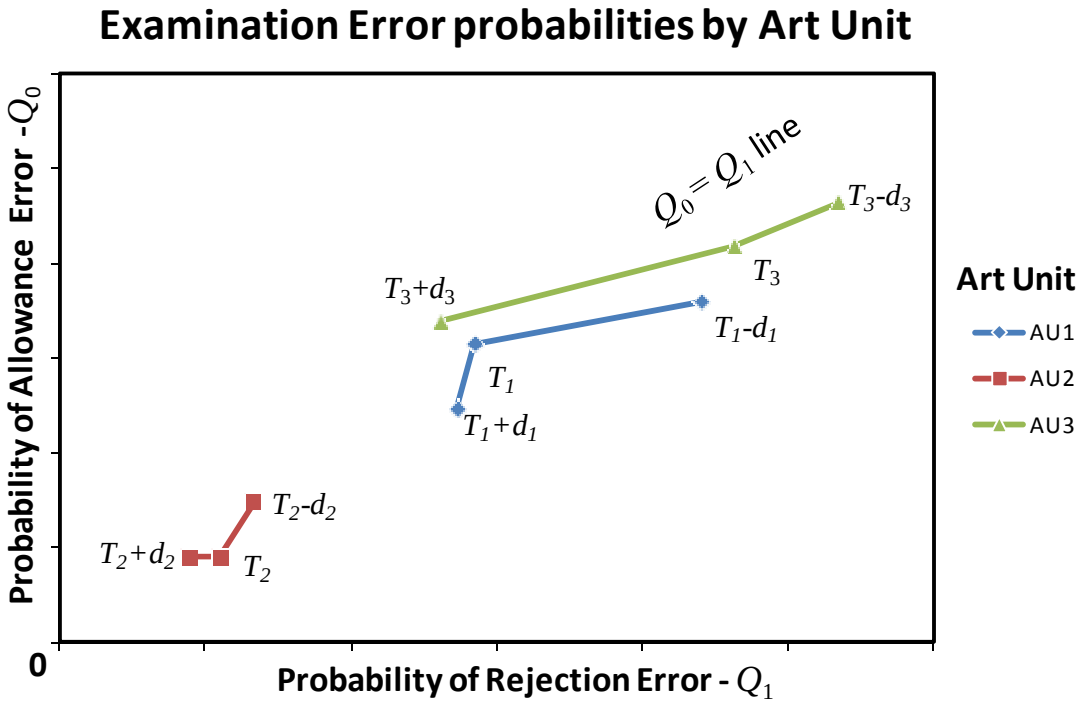


Figure 1 Tracking examination errors in three examination time-allotment regimes

During all three periods of the experiment, participating examiners would be filling more detailed bi-weekly time cards, indicating the breakdown of hours worked on each application by serial number. This will permit a regression analysis as described in II.A.5 based on attributes of the applications available on the PAIR system or on a separate database specifically set up for the experiment.

The quality control team can tabulate their results by art unit as shown in Figure 1, permitting an analysis of the improvements in each component of the error metric with each step in the additional average time allotted per PU. It would also permit a study of the efficacy of the balanced examiner incentive system, by evaluating the magnitude and reasons for deviations of the error metric components from the $Q_0 = Q_1$ line.

II.A.4. Deriving new art-unit targets for examination Hours/PU

Perhaps the most important part of the experiment is its ability to provide an objective quantitative correction for the archaic art-unit Hours/PU goals. This is shown in Figure 2, wherein the weighted probability of error for each art unit is plotted versus the time allotted per application in the respective art units. Three points per each art-unit are shown, corresponding to T_j - d_j, T_j, and T_j + d_j. The improvement trends can be observed and an assessment of the required changes in allotted examination time can be made.

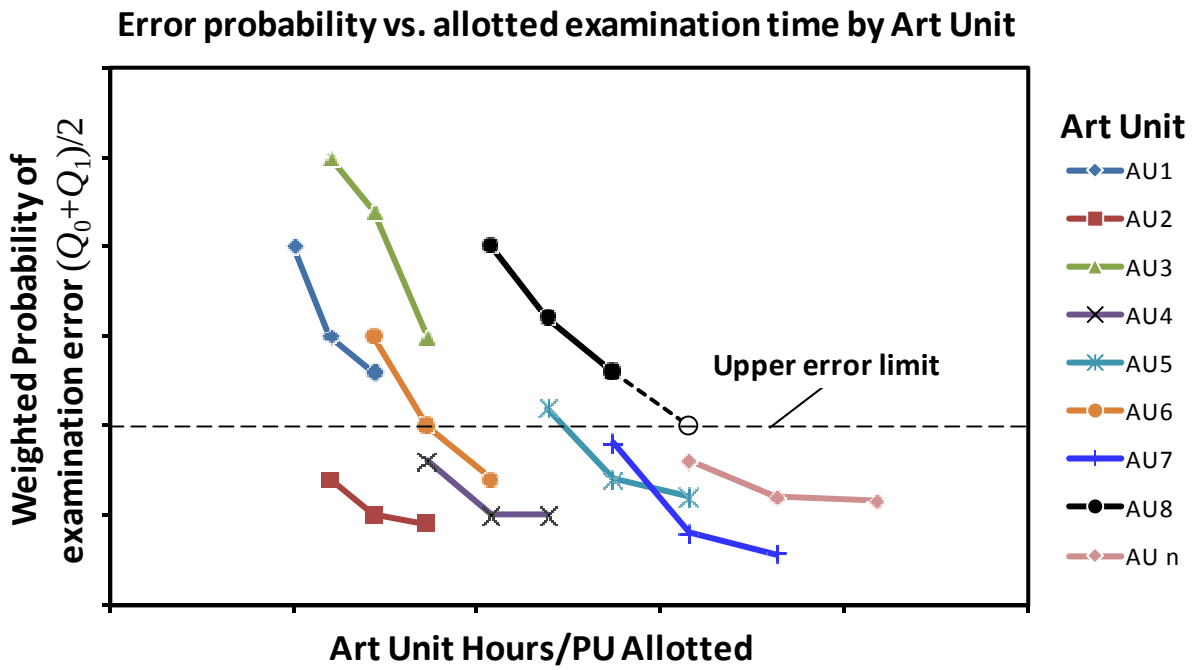


Figure 2 Adjusting art units' Hours/PU requirements

Two important features of this approach should be recognized. First, the results are expected to be robust and less erratic compared to current measurements of allowance errors because much of the fluctuations currently seen in allowance errors under constrained fixed examination-times are due to exchanges between allowance errors and invisible rejection errors. A metric involving the sum of both types of errors removes dependencies on differing examiner tendency shifts or on fundamental effective incentive asymmetry shifts as a function of allotted time shown in Figure 1. Thus, curves as shown in Figure 2 would provide more faithful indications of the true time allotments required for achieving satisfactory examination quality goals. Second, to minimize external collateral effects of the experiment, 100% sampling of participating art units during the experiments would likely be necessary to collect sufficient amount of statistically significant data. To the extent that certain art units would exhibit excessive error probabilities during the period of the T_j - d_j, allotment regime, corrective workload should be expected and planned for.

Figure 2 clearly illustrates how new art-unit targets for Hours/PU can be objectively set. The Office would set an upper limit for an acceptable probability of error, shown by the horizontal broken line. Art units that are found to have an error curve that crosses the limit would be allotted such time as necessary for compliance based on interpolation within their respective error curve. Art units that are found to exceed the line in all three allotment regimes (such as AU1, AU3 and AU8 in Figure 2), would be allotted additional Hours/PU based on an appropriate extrapolation, as shown for example, for AU8. The new targets would be verified by a forth experiment.

II.A.5. Regression analysis establishing dependence on application attributes relevant to examination workload

Whereas the experiments described above would constrain the average time examiners in any given participating art-unit spend on applications through the examiner production incentive system, it would not explicitly do so for individual applications. At that phase of the study, examiners would still be operating under the basic counts-per-disposal system and would therefore apportion the time they spend on each application based on their own judgment of the optimal allocation of time that maximizes their merit awards, by attempting to minimize their average examination error probability across an evaluation period.

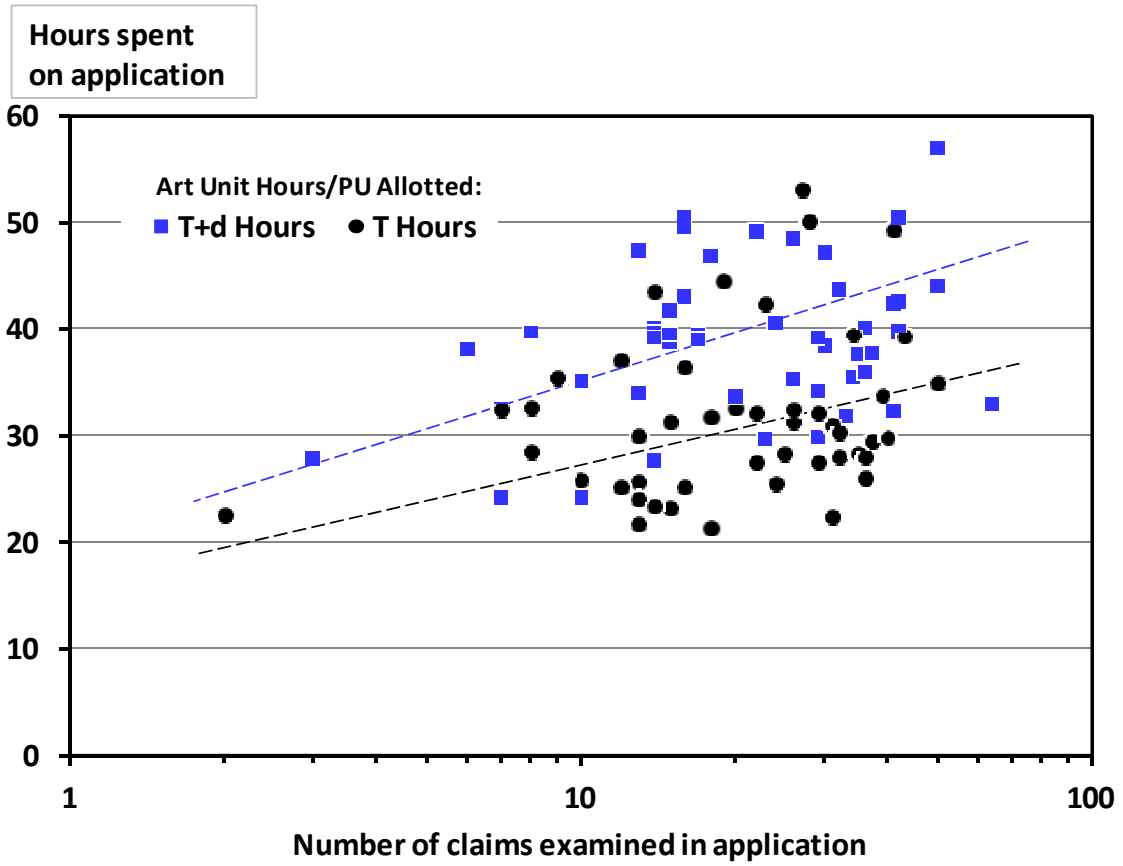


Figure 3 Number of hours spent on examining individual applications vs. one application attribute - (number of claims in this case), in two average time allotment regimes.

For a given participating art unit, the individual applications would have a scatter of time spent on each application as shown in the example of Figure 3. However, the average "Hours spent on application" of the scattered points for each allotted-time regime is expected to vary based on the values of $T_j - d_j$, T_j, and $T_j + d_j$. For clarity, Figure 3 shows only an example for the two regimes T and $T + d$. The actual number of hours spent will normally depend on various factors and a model having a reasonable explanatory predictive power across the observables is sought both as a tool for constructing a cost-based examiner count system and a realistic user fee structure.

Consider the overdetermined multivariate regression model with n parameters and m applications, $m > n$, wherein the number of hours h_i spent on application i is given by

(1) $h_i = \sum_{k=1}^{n} a_{ik} x_k + e_i$, where x_k are the parameters to be estimated, a_{ik} are the application attribute data of the problem and wherein e_i are the residuals. The vector (a_{i1}, a_{i2}, ..., a_{in}) represents the attributes of application i such as (# of independent claims, #dependent claims, # references cited in IDS, etc...). Other entries can be included such as the number of pages in an application, number of figures, number of figure designators appearing in the disclosure, etc. For model improvements, alternatives for a_{ik} can be functions of these variables as entries, such as log(# of claims). The problem is to find the estimates for the cost coefficients x_k that minimize the residuals e_i in some sense, optimizing the predictive power of the model.

For example, suppose one seeks a model for the number of hours spent on applications that depend only on the number of independent claims, total number of claims and the number of references cited by the applicant as follows:

(2) $h = x_1 + x_2 \cdot (ind\_claims) + x_3 \cdot \log(total\_claims) + x_4 (refs)$

The input data for the corresponding regression problem would be the vector h_i, i = 1,2, …, m, having entries equal to the number of hours spent on application i, and the application attribute data matrix a_{ik} given by

(3) $[1, ind\_claims_i, \log(total\_claims_i), refs_i]$, i = 1,2, …, m.

An optimal model that is geared for accurate accounting of hours spent (cost recovery) by the Office on the one hand, and for fair assessment of user fees across a wide range of applicants and application attributes on the other hand, requires that total hours (equivalent to dollars) of deviation from actual costs be minimized. Because incurred cost differentials are measured in absolute dollars and not by the square of the residual dollars, the popular regression methods based on least-squares fit that minimize $\sum_{i=1}^{m} e_i^2$ are inappropriate here, as they minimize an irrelevant objective function. The relevant objective function is based on ***absolute cost deviations***, such that the following objective is minimized by the estimates x_k:

(4) $\text{find } \{x_k\} \text{ to minimize } \sum_{i=1}^{m} |e_i| = \sum_{i=1}^{m} \left| h_i - \sum_{k=1}^{n} a_{ik} x_k \right|$

This problem is known as an L_1-norm estimation problem, for which efficient computer algorithms have been developed in the 1970's.[10] An important aspect of L_1 estimation is its insensitivity to extreme outlier data points, that otherwise skew the results of least-square estimation methods due to an excessive quadratic penalty from outlier points.

[10] *See* G.A. Watson, *Approximation theory and Numerical Methods.* John Wiley & Sons, (1980) (See Chapter 6).

Using various forms of application attribute data matrix a_{ik}, one can explore how many attributes or functions thereof should be beneficially included in the model and a determination of the most important attributes can be made in order to include only a small subset of these in the actual model.

II.A.6. Design of a new examination count system

Following completion of the studies for determining the average examination Hours/PU allotments for each art-unit as described in II.A.4, the regression results under the correct average allotment can form a "count correction factor" based on an appropriately scaled version of the regression model. For example, if a model in accordance with Equation 2 is adopted and the coefficients $x_1, \ldots, x_4$ for the art unit are established, the adjustment of the count credit that an examiner receives would be based on multiplying the standard count by a "count correction factor" given by

$$\text{(5)} \qquad \text{Count Correction Factor} = \frac{x_1 + x_2 \cdot (ind\_claims) + x_3 \cdot \log(total\_claims) + x_4 (refs)}{< h >}$$

where $< h >$ is the allotted average number of Hours/PU for the art unit and wherein the attributes of the application for which the count is calculated are inserted in the numerator.

By employing this count system, examiners will receive count credit per application that better reflects their actual workload burdens. With appropriate selection of the number of variables and their respective coefficients x_k, this count system can be made neutral in the aggregate, as the total counts received by all examiners in an art unit will be unchanged.

Note that the regression example herein is based only on the spread in the number of hours spent on applications and does not factor-in the likely spread in error probabilities. When examiners receive credit based on application complexity, they are likely to increase the spread of actual time spent on applications, thereby reducing the spread in error probabilities. This is expected to result in the desirable effect of more uniform examination quality at the mild expense of larger variability in the rate of disposals.

Of course, this proposal is only an oversimplified illustration of the possible approaches for updating the examiner count system. Many more details would have to be explored and worked out. Practical considerations and administrative constraints would likely complicate further any potential implementation. Moreover, details for dealing with partial credits after abandonments or RCEs must be developed. It is hoped that this outline will foster more work at the USPTO to further explore improvements in the examiner count system.

Appendix A

Patent Examination Policy and the Social Costs of Examiner Allowance and Rejection Errors

Ron D. Katznelson

Presented at
The Stanford Technology Law Review Symposium on PTO Reform
February 26, 2010

Abstract

A framework of Statistical Hypothesis Testing is used to describe and quantify the decision-making process of patent examiners. The examiner must choose among two hypotheses: $\boldsymbol{H}_1$ - application is allowable (grant a patent); and $\boldsymbol{H}_0$ - application should be rejected (deny a patent). With only finite examination resources allotted, examiners make two types of errors when choosing wrong hypotheses. The probability of choosing $\boldsymbol{H}_1$ when $\boldsymbol{H}_0$ is true (allowance error probability) is denoted by Q_0 and the probability of choosing $\boldsymbol{H}_o$ when $\boldsymbol{H}_1$ is true (rejection error probability) is denoted by Q_1. Subject to examination time constraints, the examiner implicitly controls the tradeoff between Q_0 and Q_1, based on Patent Office policies and incentives. There are social costs associated with each type of error. Average social costs of these two examination error types are defined, from which an average total social cost denoted by C is formed. A Bayesian method of maximizing consumer welfare by minimizing the average total social cost C is shown to be equivalent to minimizing the weighted average of the two types of error probabilities, $C = W_0Q_0+W_1Q_1$, where W_0 and W_1 are the respective weights. While definitive social cost estimation methods that admit evaluation of the specific weights W_0 and W_1 are unlikely to be found, the important social costs bound $W_1 > W_0$ is nevertheless derived based on well-established historical patent policy facts. This bound shows that the average social costs of making a rejection error are ***higher*** than that of making an allowance error. Finally, in view of this finding, it is recommended that the Patent Office augment its allowance error rate measures with rejection error rate measures and adopt an examiner incentive system that matches the true social costs of these errors. This will align examiners' implicit examination error tradeoff with that corresponding to the optimal tradeoff of social costs. Under such a system, Patent Office policies must ensure that the consequences to examiners for making allowance errors should be no more adverse than making rejection errors.

Costs of errors in USPTO allowance and rejection

- For our purposes, we define Social Costs to mean the consumer welfare losses due to errors.
- Examination errors cause social costs for
  - applicants
  - the USPTO
  - third parties and
  - society as a whole

Costs of erroneous allowances

- To applicants
  - who pursue licensing/litigation on invalid patents
- To USPTO
  - Reissues, Reexaminations
  - Public ridicule
- To third parties
  - Unnecessary R&D to design around invalid claims
  - Deterring downstream innovations erroneously deemed infringing
  - Unwarranted litigation and other legal costs.
- To society – harm to the public's perception of
  - the value of patents and
  - the merits of investing in patented inventions.

Costs of erroneous rejections

- To Applicants
  - Need to file RCEs and/or Appeals
  - Delay in obtaining patents
  - Statutory rights denied (if rejection succeeds)
- To USPTO
  - RCEs and Appeals workload increases.
- To third parties
  - Delay in public notice of issued claims
- To Society (if rejection succeeds)
  - Deny private investments and development of inventions
  - Reduce inventors' incentives to disclose inventions - less disclosure and teaching of new knowledge and discoveries.

Public perception of the costs

- Scholarship and Media Attention
  - Focus on erroneous ***allowance*** more than erroneous rejection
  - Has ignored the ***relative*** costs of allowance errors compared to rejection errors.
- The fundamental asymmetry in resulting impact
  - Assertion of an alleged "bad patent" can result in public outcry from ***entire*** industries.
  - In contrast, erroneous rejection is not widely published and can outrage only one party – the applicant.
- Social costs of rejection errors are largely invisible
  - Inventions not exploited
  - Startups go belly-up and no one left to tell the story
  - Underinvestment in innovative research and disruptive advances
  - Overinvestment in incremental developments

Vocabulary alone shows the bias!

- Most commonly used term: "***Patent Quality***"
  - Rejected applications are not patents.
  - A **patent** must have been issued for its **quality** to be evaluated. - strictly a measure of ***allowance*** errors.
- Term should be "***Examination Quality"***
  - Unbiased between Allowance and Rejection
  - Correctly identifies the problem:

    EXAMINATION (not patents)

The USPTO's asymmetry

- Sampling
  - Reviews more than 5,000 allowances per year to estimate ***allowance*** error rate.
  - Does no ***final rejection*** error rate analysis
  - "***You cannot manage what you do not measure***"
- Review: "Second pair of eyes" program
  - Applies only to ***allowances***
  - Never to ***final rejections***
- Examiners' Merit Review
  - Allowance errors - supervisor may take adverse action
  - Final rejection errors – virtually no adverse action

Academics' asymmetry

- Suggested remedies for the "patent quality" problem:
  - Proposals to remove the **clear and convincing** evidence standard for the presumption of validity under 35 U.S.C. § 282.[1]
  - However, these proposals would leave intact the presumption of correct rejections with the **strong deference** the agency receives under the **substantial evidence** review standard of administrative law.
- ***If examination is not robust enough to warrant the presumption of validity, what makes its factfinding more reliable to warrant a presumption of correct rejection***?
  - Note also that many alleged examiner errors do not raise factfinding questions but are rather due to failure to follow agency procedures or the law, which receive no deference under administrative law.

1. D. Lichtman and & M. A. Lemley, Rethinking Patent Law's Presumption of Validity, 60 *Stanford Law Review,* 45 (2007); A. J. Devlin, Revisiting the Presumption of Patent Validity, 37 *Southwestern University Law Review*, pp. 323-369, (2008). ; Fed. Trade Comm'n, *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy* 8-10 (2003) (calling the presumption "unjustified" and saying that the "burden can undermine the ability of the court system to weed out questionable patents"); Matthew Sag & Kurt Rohde, Patent Reform and Differential Impact, 8 *Minn. J.L. Sci. & Tech.* 1, 63 (2007) (recommending the preponderance of the evidence standard for initially granted patents but a higher standard for patents surviving post-grant opposition proceedings).

Qualitative acknowledgement of rejection errors' importance is insufficient

- Provides no guidance
  - How should USPTO examination policy, procedures and review change?
  - How much change?
- No consensus appears in informal survey of opinions as to the relative costs of allowance and rejection errors
  - This perpetuates the status quo at the USPTO
- This study provides a definitive ***quantitative*** answer: ***Rejection errors are more harmful than allowance errors***

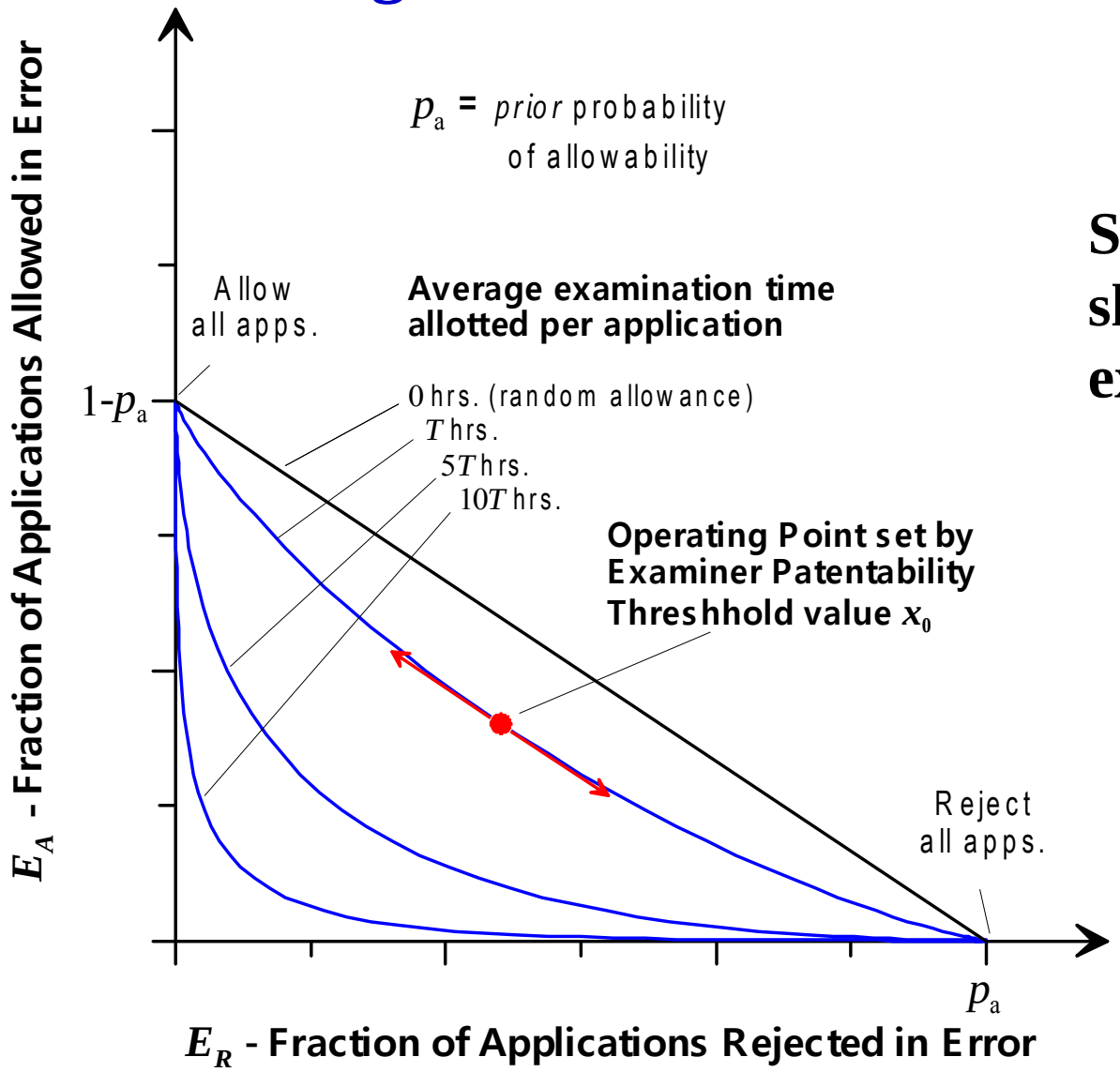
Main Results

- Consider a model wherein C, the social cost of examination errors, is proportional to Q_0 and Q_1, the allowance and rejection error probabilities respectively:

$$C = W_0Q_0+W_1Q_1$$

- W_0 and W_1 are the respective weights. Definitive social cost estimation methods that admit evaluation of the specific weights W_0 and W_1 are unavailable. However, a bound can be obtained as explained below.
- Important data point: societies that employ no resources to examine patents, prefer a patent registration system over a system with no patents at all. This means that among these two options only, social costs of abolishing patents exceed social costs of registering patents, wherein validity is determined in court with no prior presumption.
- This non-examination system data point on social costs is used in a simple method to obtain the social costs bound $\boxed{W_1 > W_0}$ for the examination case. This means that the average social costs of making a rejection error are ***higher*** than that of making an allowance error.

Trading off allowance errors with rejection errors under average examination time constraints



See following slides for explanation

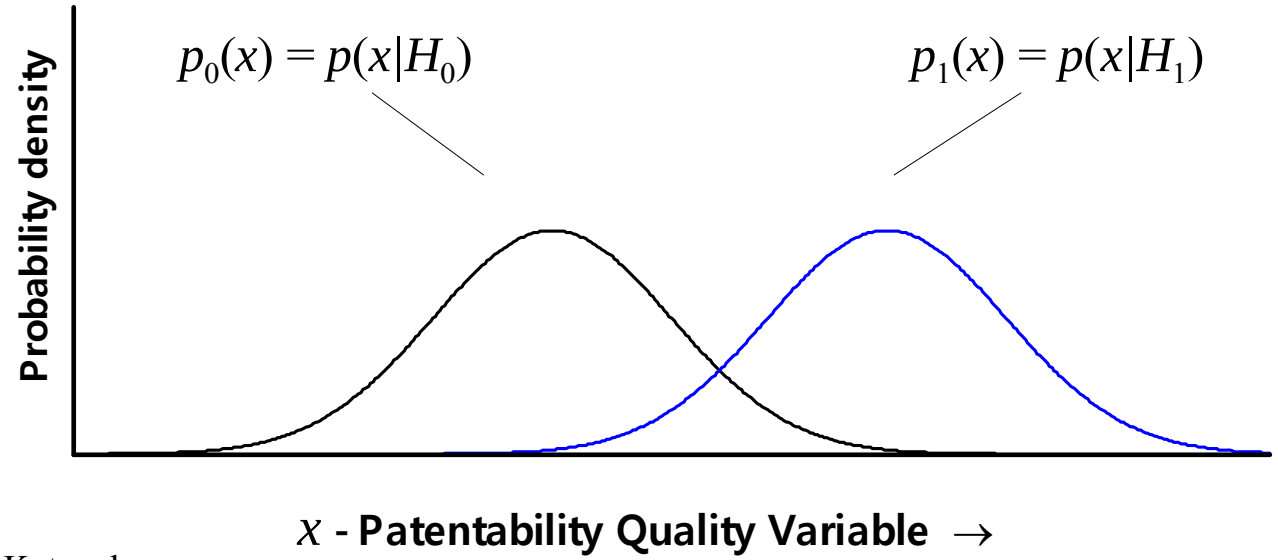
Patent Examination Styled as Hypothesis Testing

- Consider an ensemble of patent applications received by the Patent Office
- For each application, patent examination decisions are made based on a prosecution process with ***remaining uncertainty*** as to patentability**.** The examiner must ultimately make a decision as to which of the two hypotheses $\boldsymbol{H}_0$ and $\boldsymbol{H}_1$ are "true":
  - $\boldsymbol{H}_1$: Application is allowable (grant a patent)
  - $\boldsymbol{H}_0$: Application's subject matter is unpatentable (reject)
- For each application drawn from the ensemble, the examiner derives after examination a ***perceived*** observable value x - the "patentability quality variable". x is a conceptual construct representing a single variable in the mind of the examiner that embodies all characteristics relevant to patentability quality

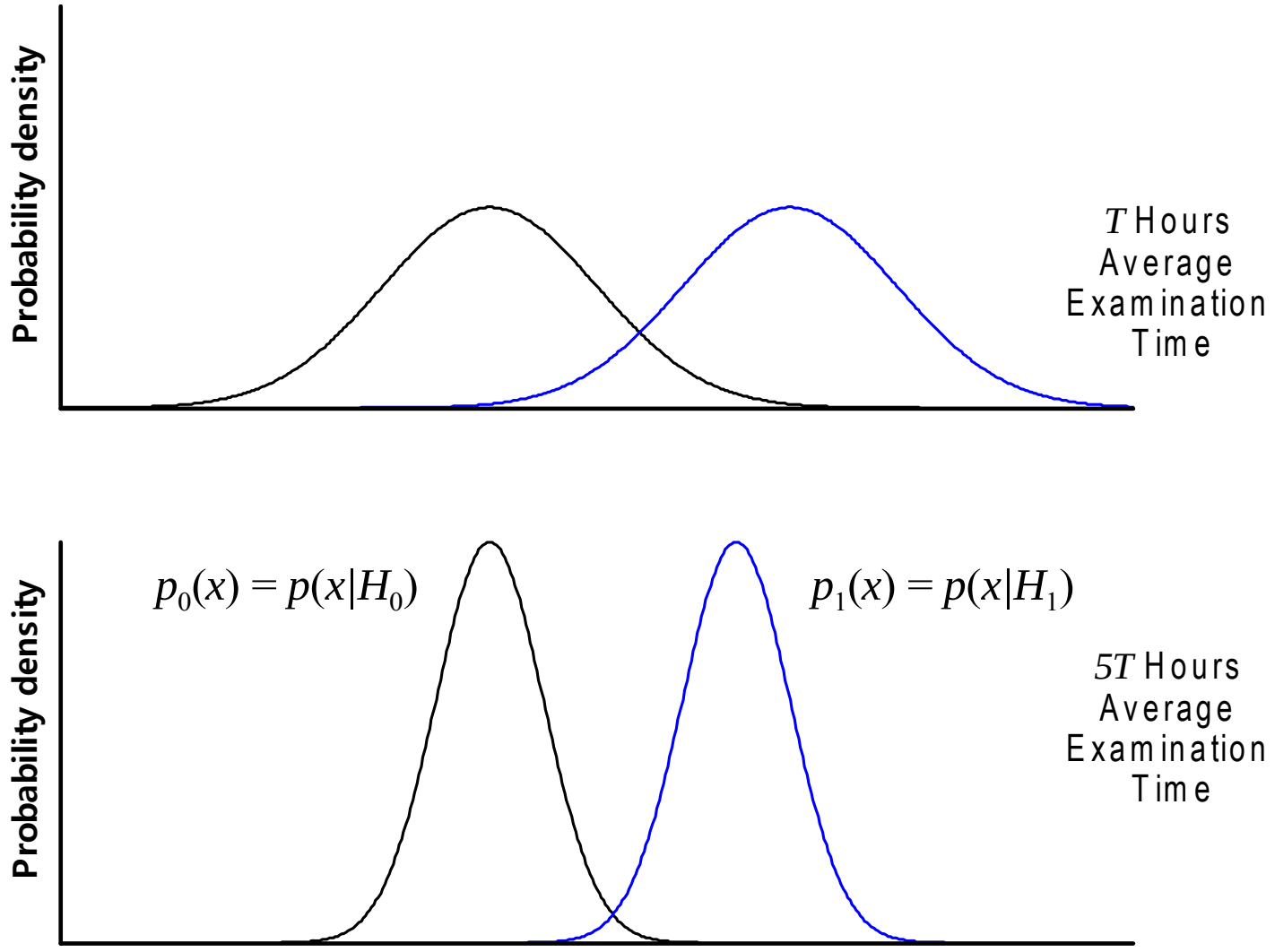
Patent Examination as Hypothesis Testing

Because remaining uncertainty after examination of applications in the ensemble results in a range of observable quality variable values, x can be thought of as a ***random variable*** drawn in accordance with an overall probability density $p(x)$.

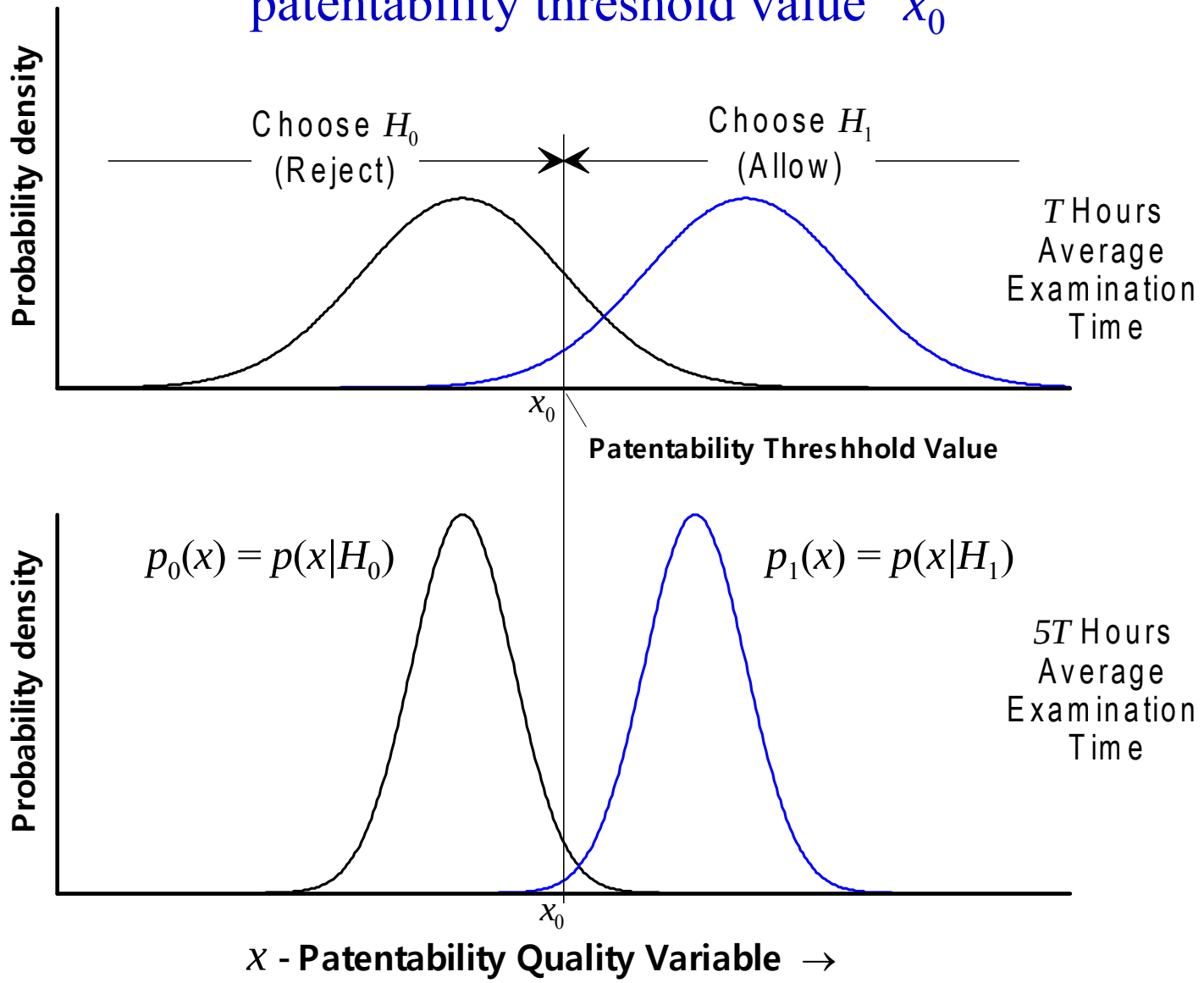
The uncertainty of x under each hypothesis:
The probability density $p_0(x)$ corresponds to the distribution of the values of x given that $\boldsymbol{H}_0$ is true, and $p_1(x)$ corresponds to that in which $\boldsymbol{H}_1$ is assumed to be true.



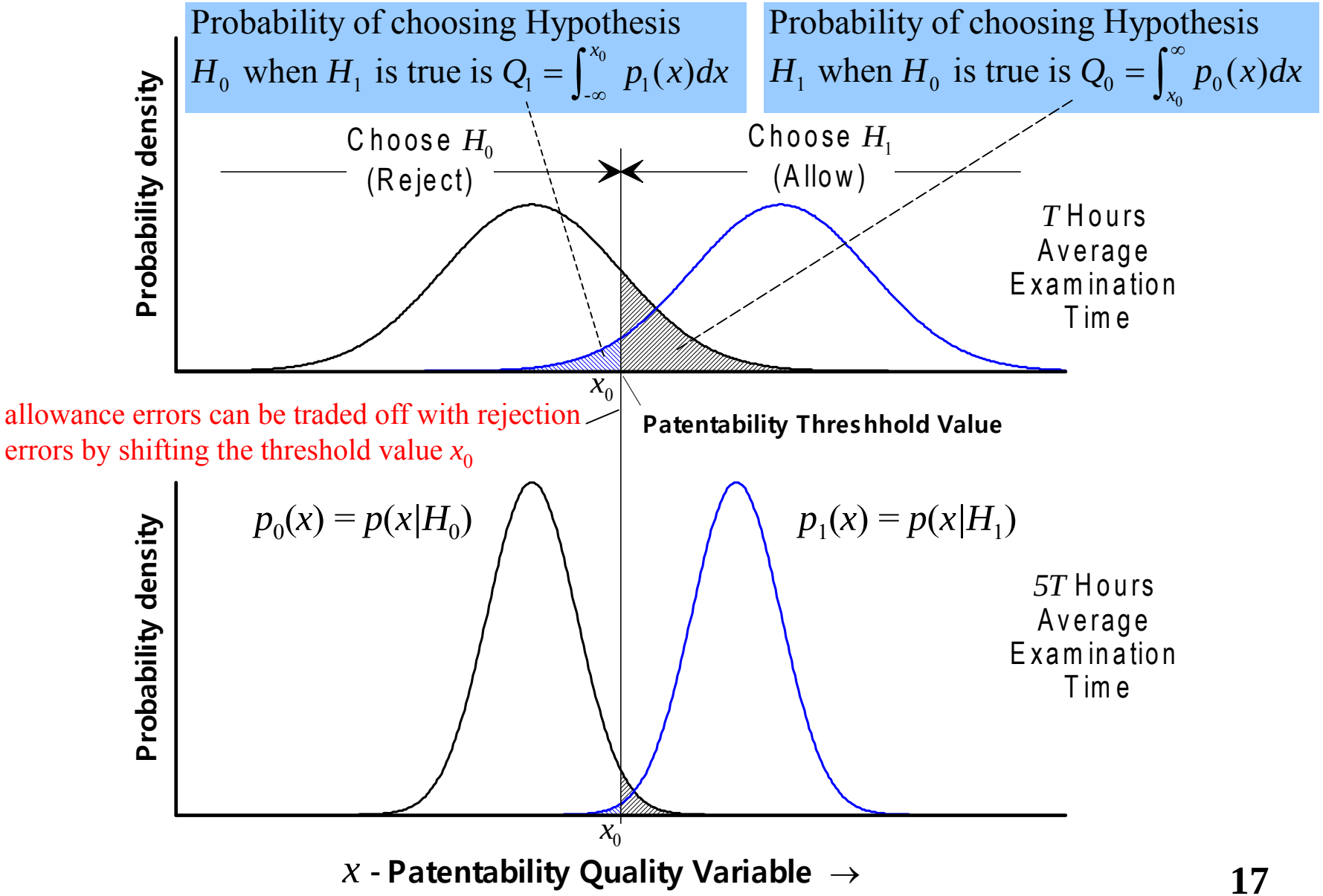
Uncertainty can be reduced by investing more time in examination



Examiner decision between $\boldsymbol{H}_0$ and $\boldsymbol{H}_1$ is made based on a comparison of the quality value observable x and an examiner-set "patentability threshold value" x_0



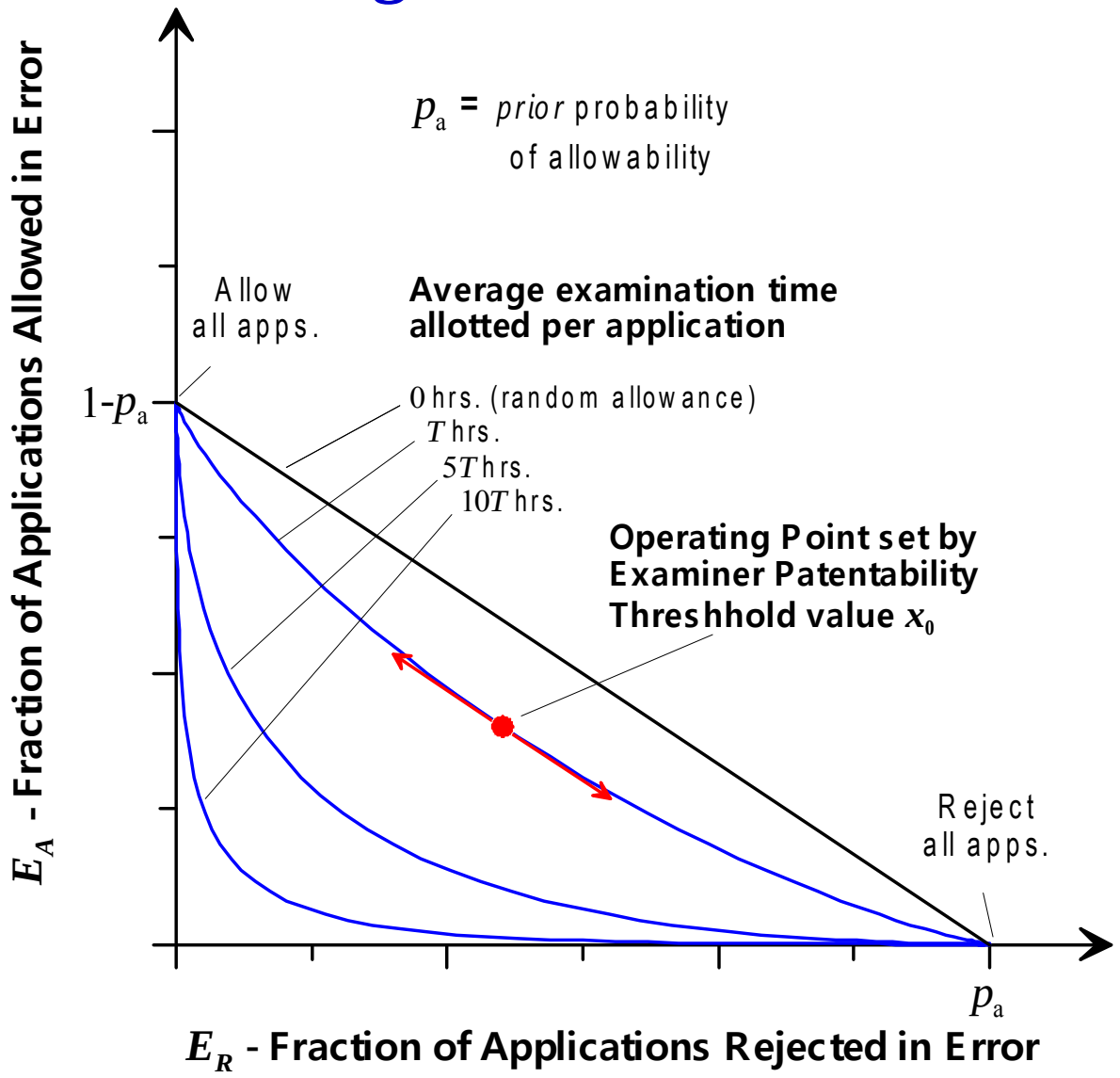
Decision errors in choosing between hypotheses H_0 and H_1



Effects of examination errors

- Assume that the ***prior probability*** that a patent application is allowable is given by p_a. This applies to the whole ensemble, i.e:
  - the probability that $\boldsymbol{H}_1$ is true is $\Pr(\boldsymbol{H}_1) = p_a$
  - the probability that $\boldsymbol{H}_o$ is true is $\Pr(\boldsymbol{H}_o) = 1 - p_a$
- As examiner decisions are applied over the ensemble,
  - the number of applications that are rejected in error as a fraction of ***all*** applications (- **the erroneous rejection total probability**) is given by
    $E_R = \Pr(\boldsymbol{H}_1)\ \Pr(\text{choosing } \boldsymbol{H}_o \text{ when } \boldsymbol{H}_1 \text{ is true}) = p_a\ Q_1(x_0)$
  - the number of applications that are allowed in error as a fraction of ***all*** applications (- **the erroneous allowance total probability**) is given by
    $E_A = \Pr(\boldsymbol{H}_0)\ \Pr(\text{choosing } \boldsymbol{H}_1 \text{ when } \boldsymbol{H}_0 \text{ is true}) = (1-p_a)\ Q_0(x_0)$
- Given the constraints on average examination time, examiners implicitly adopt an internal patentability threshold value x_0 to trade off $Q_1(x_0)$ and $Q_0(x_0)$ (thereby E_R and E_A) based on their incentive structure as set by the Patent Office's policy choice

Trading off allowance errors with rejection errors under average examination time constraints



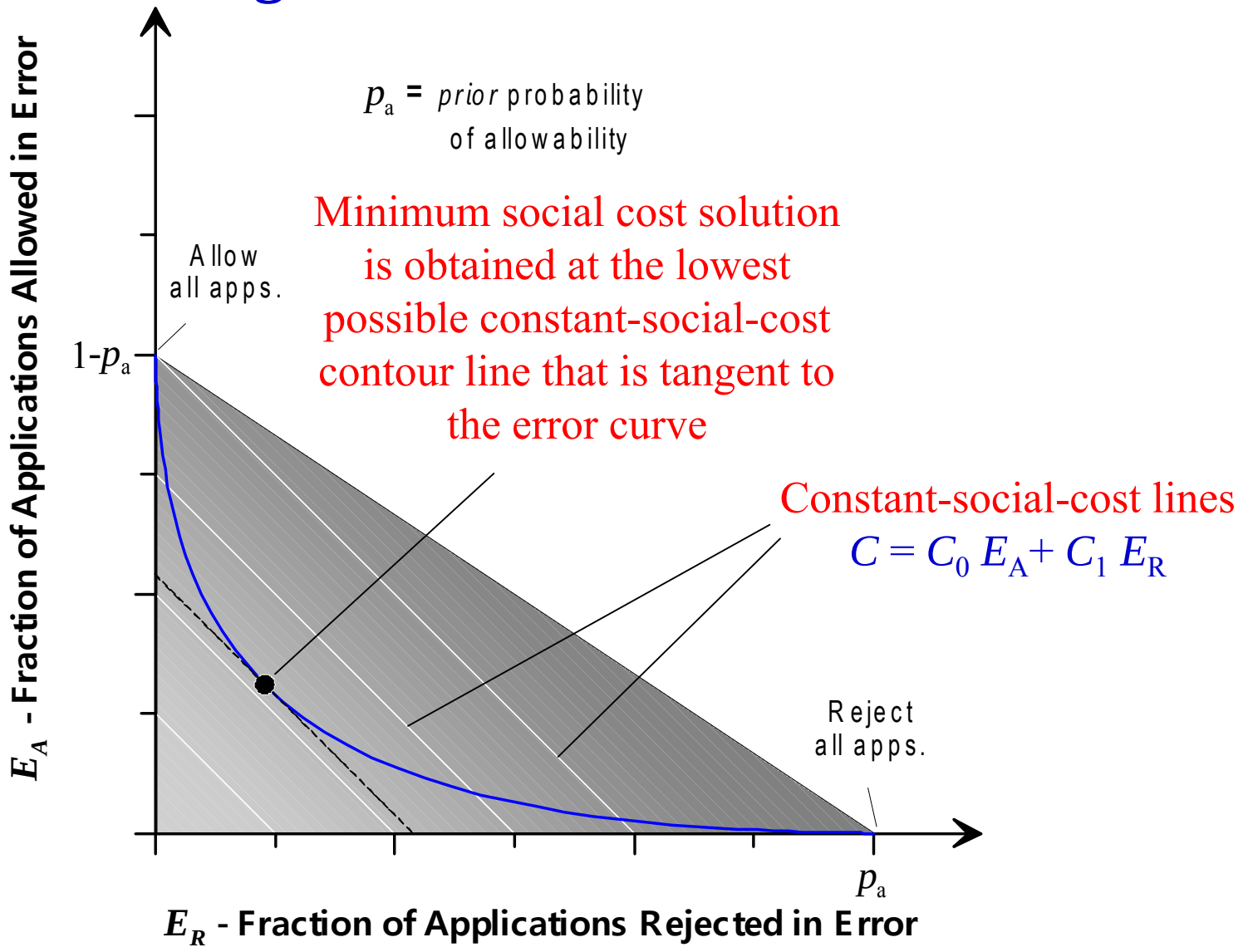
Optimal patent examination policy by minimizing national social costs of examination errors

- Assume that the total national average social costs of patent examination errors are given:
  - C_0 = average cost per application of choosing $\boldsymbol{H}_1$ when $\boldsymbol{H}_0$ is true (cost of allowance error)
  - C_1 = average cost per application of choosing $\boldsymbol{H}_0$ when $\boldsymbol{H}_1$ is true (cost of a rejection error)
- The average national social cost due to errors per application is given by

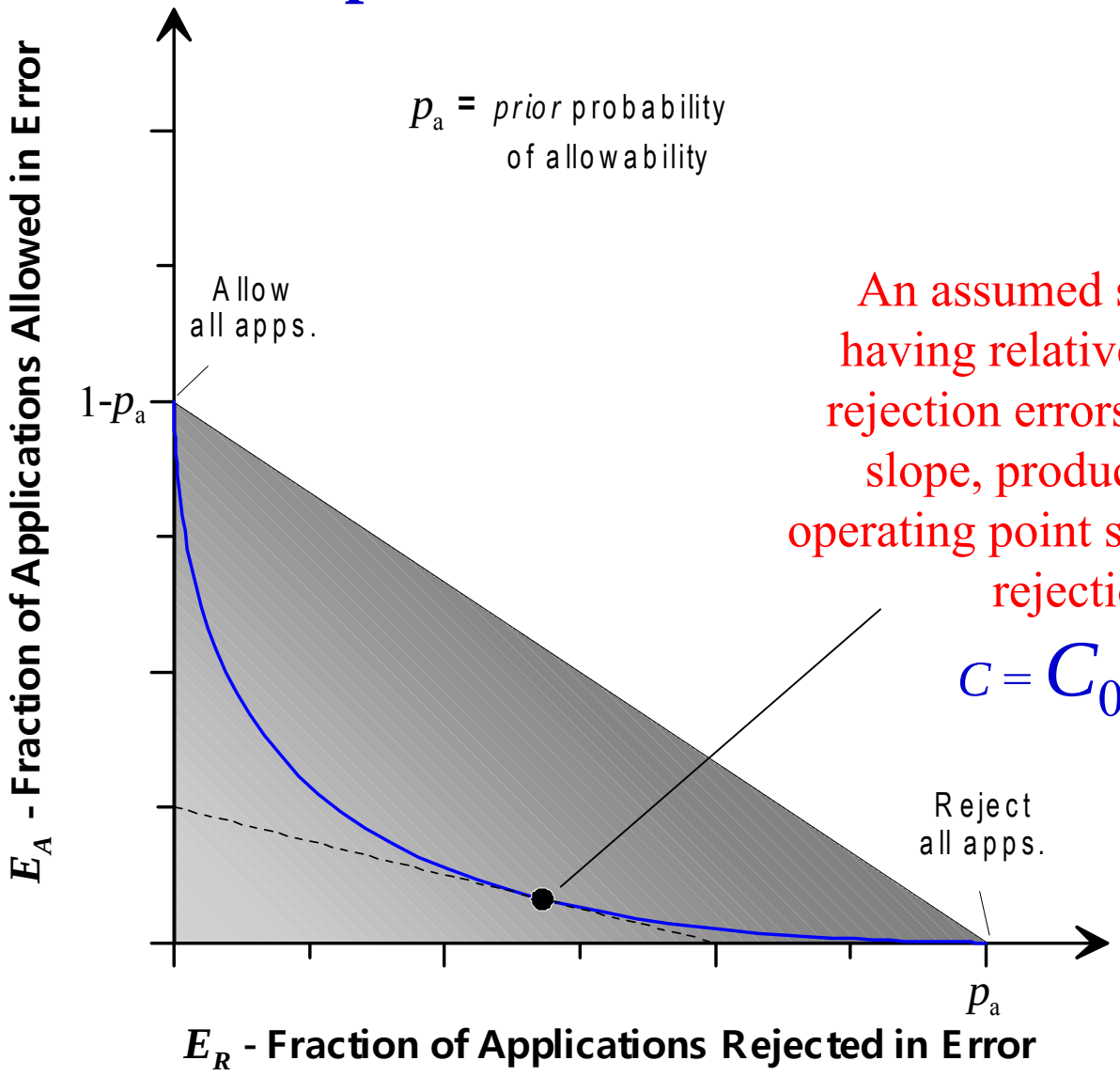
$$C(x_0) = C_0\,(1\text{-}p_a)\,Q_0(x_0) + C_1\,p_a\,Q_1(x_0) = C_0\,E_A + C_1\,E_R$$

- Note that $C(x_0) = W_0 Q_0(x_0) + W_1 Q_1(x_0)$, defining the weights by $W_0 = C_0\,(1\text{-}p_a)$ and $W_1 = C_1\,p_a$
- The *Bayes* solution is obtained by setting a threshold value x_0 that minimizes the total average cost $C(x_0)$

Minimal average social cost solution under a fixed average examination time constraint



Skewing examination errors under different assumptions of their relative costs



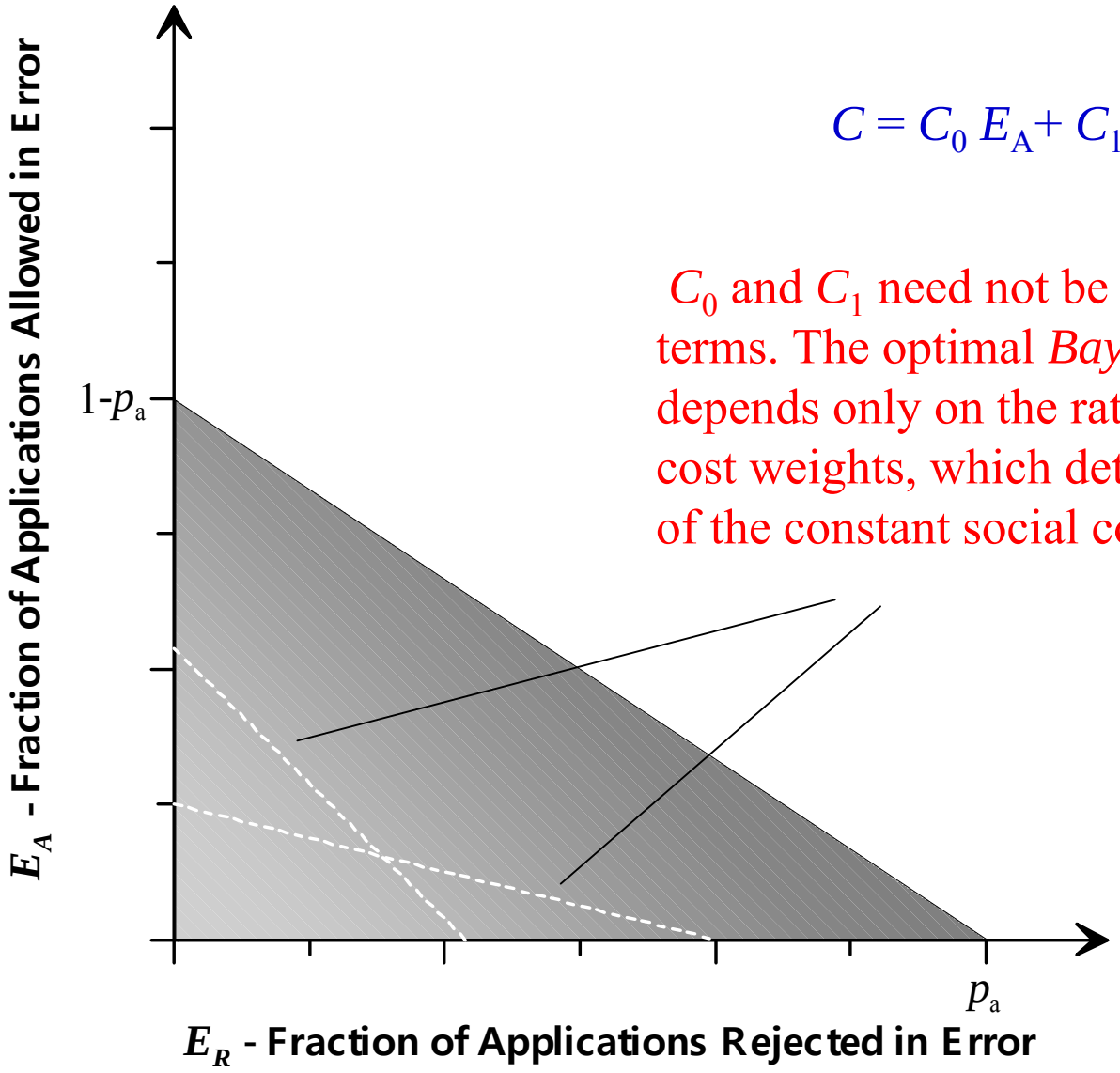
An assumed social cost lines having relatively low costs for rejection errors are shallower in slope, producing an optimal operating point solutions with more rejection errors

$$C = C_0 E_A + C_1 E_R$$

Implicitly setting Examiner Patentability Threshold value

- The underlying densities $p_0(x)$ and $p_1(x)$ and the desired patentability threshold value x_0 are conceptual descriptive constructs that cannot be communicated numerically to examiners
- However, *economically rational* examiners can be influenced to internally adopt the "optimal" implicit patentability threshold value if they are personally presented with incentives that mimic the desired social cost weights related to C_0 and C_1 for making allowance and rejection errors
- **But how do we know what the correct relative social costs of making allowance and rejection errors are?**

What is the correct slope of the social cost lines?



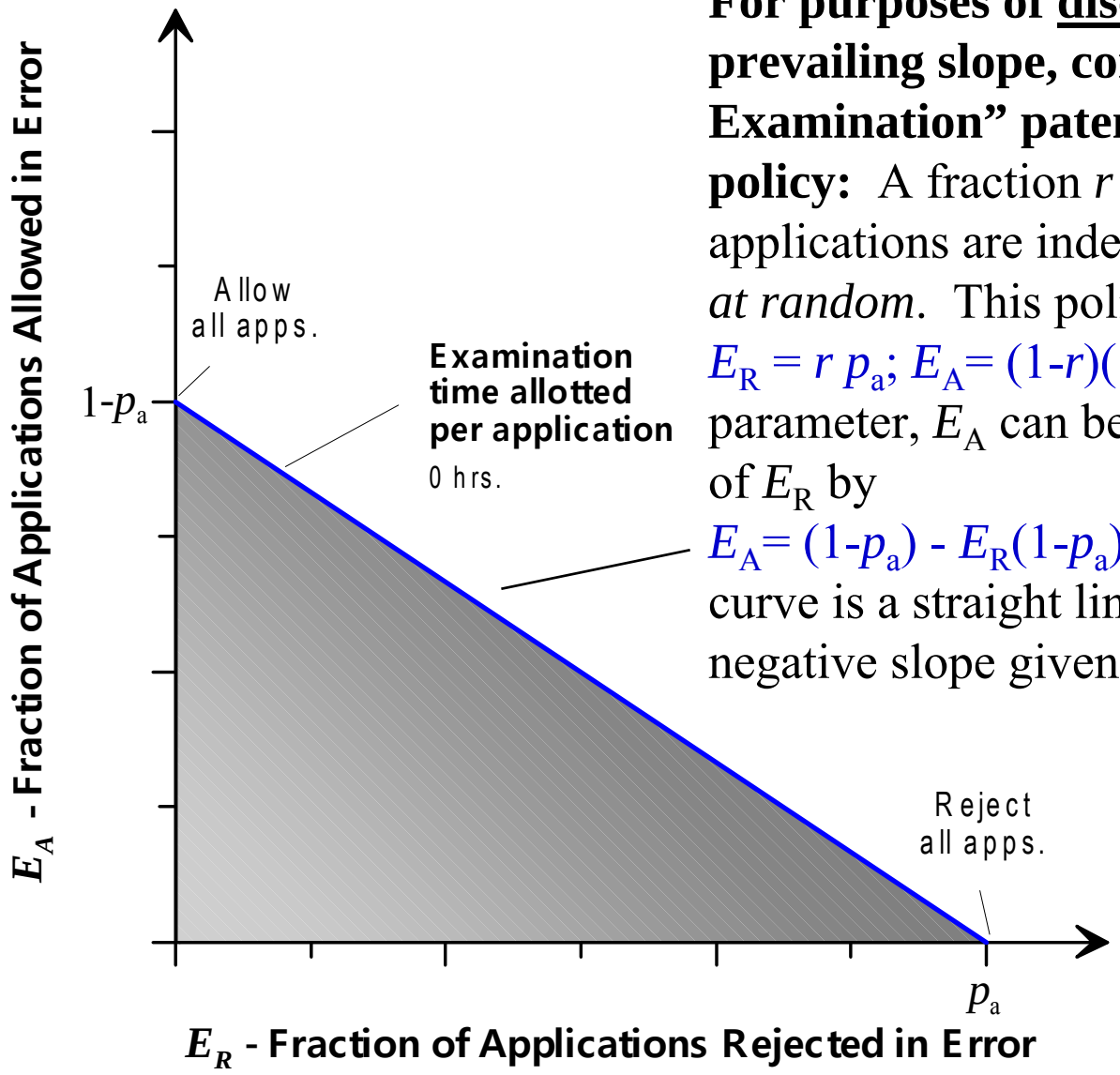
$$C = C_0 E_A + C_1 E_R$$

C_0 and C_1 need not be known in absolute terms. The optimal *Bayes* solution depends only on the ratio between these cost weights, which determines the ***slope*** of the constant social cost lines

Relative social costs of patent allowance and rejection errors

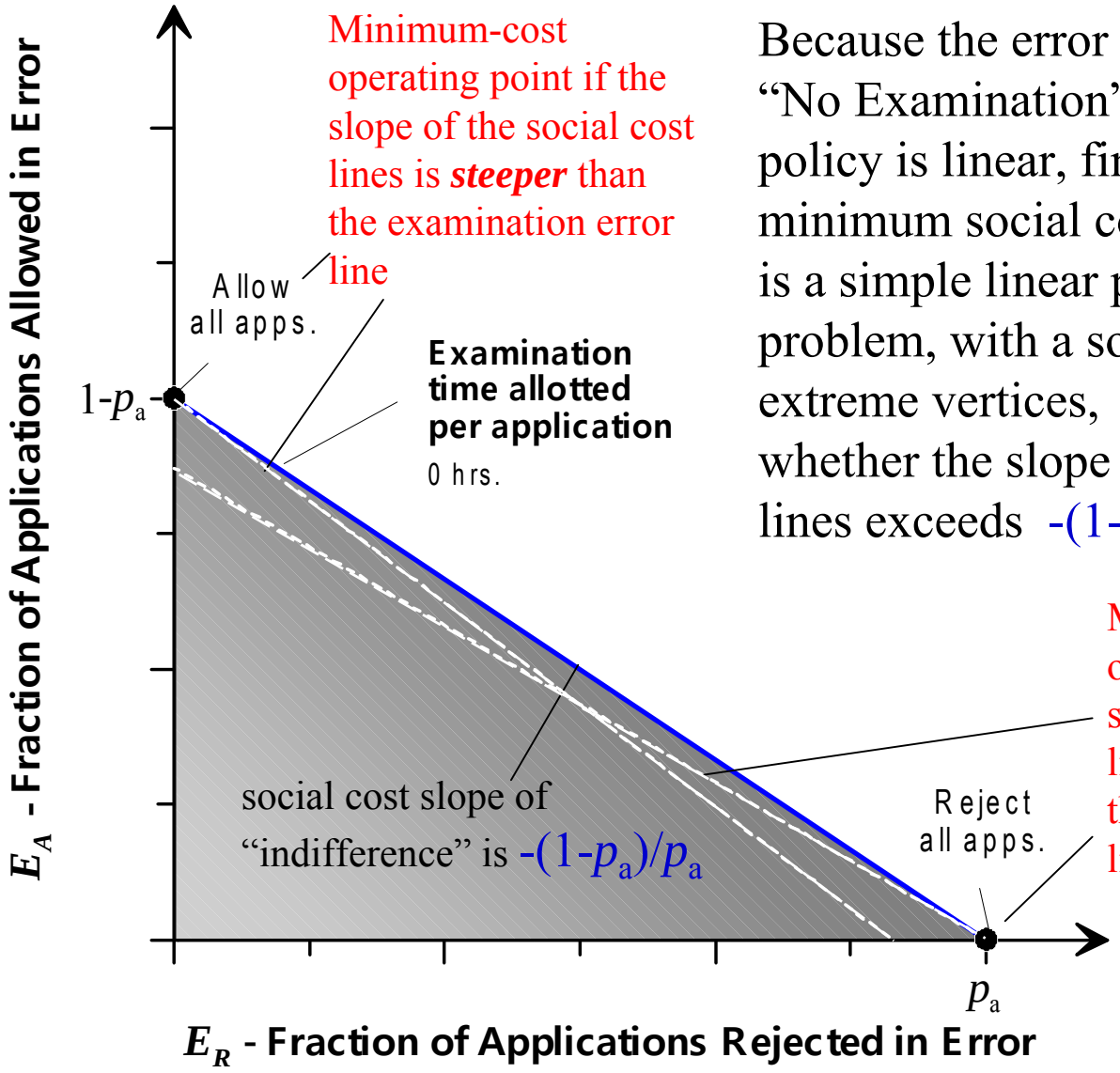
- There is no shortage of scholarship and enunciation of the harm associated with the first type of examination errors – allowance errors. However, quantitative reliable assessments of the ***relative*** social costs of both error types are unavailable.
- Nevertheless, a derivation of a ***lower bound*** for the relative costs ***can be obtained*** based on simple known patent policy facts, as shown below

Finding a bound for the *slope* of the social cost lines



For purposes of <u>discovering</u> the prevailing slope, consider the "No Examination" patent allowance policy: A fraction r ($0 \le r \le 1$) of applications are independently rejected *at random*. This policy yields $E_R = r\,p_a$; $E_A = (1-r)(1-p_a)$. Using r as a parameter, E_A can be expressed in terms of E_R by $E_A = (1-p_a) - E_R(1-p_a)/p_a$. This error curve is a straight line as shown, with a negative slope given by $-(1-p_a)/p_a$.

Finding a bound for the *slope* of the social cost lines



Because the error curve under the "No Examination" patent allowance policy is linear, finding the minimum social cost operating point is a simple linear programming problem, with a solution only at the extreme vertices, determined by whether the slope of the social cost lines exceeds $-(1-p_a)/p_a$.

Given zero examination resources, patent registration is preferred over patent abolition

Countries' use of patent registration systems

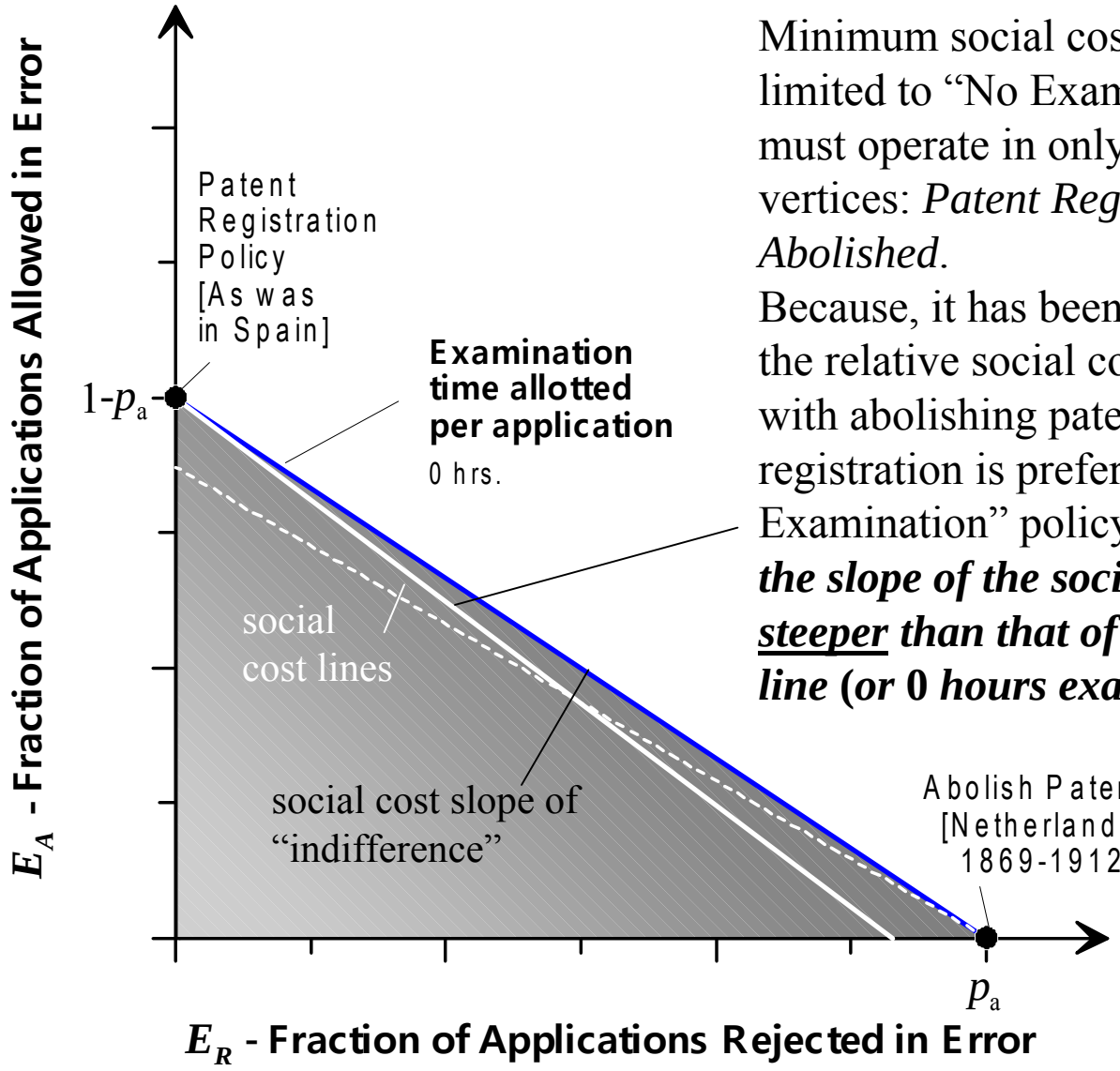
Country	Patent registration since patent act of the year:	Established national examination practice in the year:	Alternative EPO examination route available in the year:	Comment
Belgium	1817	1977		(a)
Egypt	1949	2002		
France	1791	1977		(a)
Great Britain	1852	1905	1977	
Greece	1924	1986		(a)
Iceland	1923		2004	
Italy	1859	1978		(a)
Latvia	1920	1995		(a); Part of the USSR patent system during 1940-1991.
Lebanon	1924			
Lithuania	1994		2004	(a)
Luxemburg	1880		1977	(a)
Lybia	1959			
Macedonia	1993		2009	(a)
Malta	1899	2007		(a)
Monaco	1955	1991		(a)
Morocco	1916			
Netherlands	1817	1912	1977	**Patents abolished during 1869 - 1912**
Portugal	1837		1992	(a)
Romania	1906		2003	(a)
South-Africa	1910			
Spain	1820		1986	(a)
Switzerland	1888		1977	(a)
Syria	1924			
Tangier Zone	1938			Practice continued after 1956 unification with Morocco
Tunis	1888			
Turkey	1880		2000	(a)
Turkmenistan	1993			
United States	1793	1836		Upon enactment of the 1836 Patent Act

Notes: (a) Present national examination exclusively via EPO.

Sources:

1. P.J. Federico, Historical Patent Statistics 1791-1961, *Journal of the Patent Office Society*, Vol. 46, pp. 89-171, (1964)
2. William Martin, "The English patent system", p.53, (1904).
3. Fritz Machlup & Edith Penrose, The Patent Controversy in the Nineteenth Century, *The Journal of Economic History*, Vol. 10, (May, 1950), pp. 1-29
4. World Intellectual Property Organization (WIPO) at: http://www.wipo.int/pct/guide/en/index.html, http://www.wipo.int/ipstats/en/resources/patent_systems.html, http://www.wipo.int/members/en/index.jsp .

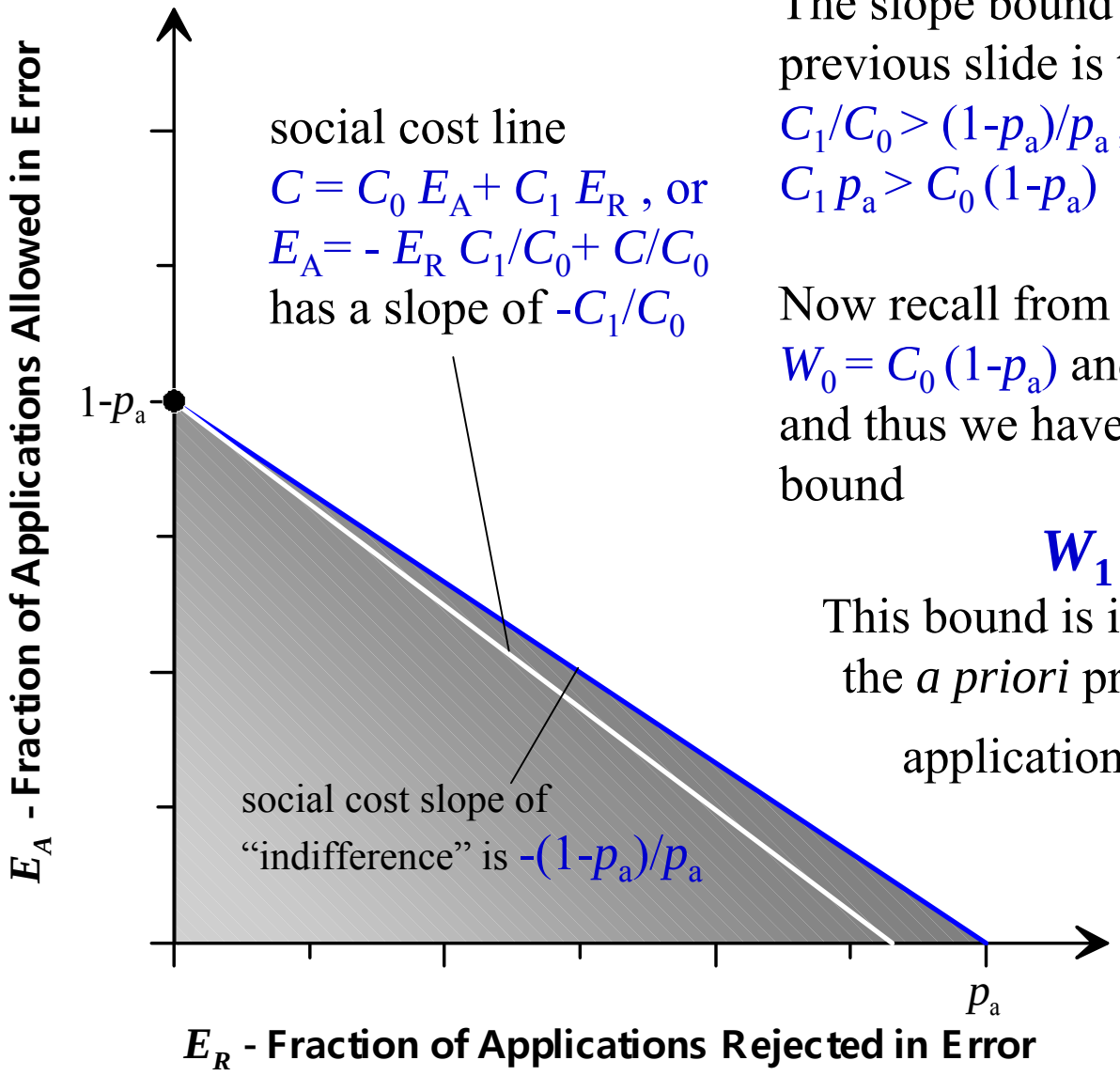
Finding a bound for the *slope* of the social cost lines



Minimum social cost in patent systems limited to "No Examination" methods must operate in only one of two possible vertices: *Patent Registration* or *Patents Abolished*.

Because, it has been well established that the relative social costs are inconsistent with abolishing patents and that patent registration is preferred under "No Examination" policy, ***we conclude that the slope of the social cost line must be steeper than that of the "indifference" line (or 0 hours examination error line)***.

Finding a bound for the *slope* of the social cost lines



The slope bound discovered in the previous slide is therefore
$C_1/C_0 > (1-p_a)/p_a$, or
$C_1 p_a > C_0 (1-p_a)$

Now recall from Slide 17 that
$W_0 = C_0 (1-p_a)$ and $W_1 = C_1 p_a$,
and thus we have obtained the bound

$$W_1 > W_0$$

This bound is independent of p_a, the *a priori* probability that an application is allowable.

The importance of the relative social cost bound

- The previous slide shows that **the social costs of making a rejection error are higher than those of making an allowance error ($W_1 > W_0$)**
- This bound is independent of the *a priori* probability p_a that an application is allowable.
- Examiners must be provided with incentives that reflect these established social cost weights.
- However, the USPTO only tracks and publishes allowance error rate relating to Q_0 but appears to ignore Q_1.[1] It implements a biased policy through its management and examiner incentive plan under which $W_1 << W_0$, in contradiction with national social cost interests. ***This must change!***

1. USPTO's *In-Procees Error Review* includes tracking rejection errors among other error types but there is no sampling of ***final rejections only*** cases to form ***and publish*** formal and reliable estimates relating to Q_1. The Office's historic use of the all-encompassing term "error rate" to mean only allowance error rate is evidence for its fundamentally biased metric and incentives.

Thank You

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Appendix B

My 2010 wishes for the U.S. Patent Examiner

By Ron D. Katznelson

When asked what wishes pertaining to patents I have for the New Year, I began thinking about the large number of problem areas for which I wish fundamental change, improvements and solutions. The problem list grew longer but all have a single common underlying cause. All of the problems would likely not have developed had the U.S. patent office been functional and timely in granting quality patents. For the most part, past actual and perceived USPTO dysfunction stem from long-term failure to invest in our Nation's patent examiner corps. This is the reason that for this New Year, I make my wishes for the USPTO *Patent Examiner*.

I wish that 2010 became the year during which we have a new and different conversation on the role, status and skill level we should expect from USPTO examiners. I wish that this conversation would lead to the national realization that we have severely under-funded, under-resourced and under appreciated the role and status of the patent examiner profession. Although the implications of my wish may appear radical and expensive to some, I believe the conversation should focus on three fundamental elements. The first is the recognition that proper examination of patent applications for inventions in leading areas of technology requires professional knowledge and expertise in the art comparable to, if not exceeding, that of inventors in the field. The second is the recognition that basic changes in examiners' working conditions, production goals and incentives are required to ensure that examiners have adequate time for examination and for acquiring technical knowledge, and that they are easier to recruit and retain. The third component is the proper alignment of examiner quality measures and incentives with the societal costs of patent examination errors. In addressing these issues, I cite historical facts and policy practices of previous USPTO administrations in order to highlight what I believe to have been mistakes that should have been avoided, and I wish would be avoided in the future.

(1) Examiners as knowledgeable scientific and technical professionals

Patent applicants respect their examiners. I believe that examiners should be able to earn our elevated respect and recognition as peers. When prosecuting my patent application, I expect an examiner who is well versed with the latest developments in my field and one who comprehends the problems my invention solves. A way to achieve this goal is to attract top technical experts to become patent examiners, an area in which the USPTO has had limited success. In order to develop and retain the expertise in the examining corps, it is essential to provide examiners with more time to specialize in their fields, the same way that their peers do: reading the technical literature, participating in conferences and attending technical trade shows. In my view, the examining corps expertise should rest on two "pillars:" examiners should first be scientists, engineers or technical experts in their art area, and second be specialists in patent examination procedures. While many examiners currently fit both of these "pillars," the USPTO today lacks the resources to ensure and foster the former. U.S. patent examiners' expertise, proficiency and professionalism should be regarded as a national asset worthy of investment to no lesser degree than recent national infrastructure investments under the stimulus package, as I elaborate below.

A good indicator of resource allocation by an agency for the first "pillar" is manifested by technical and scientific publications. Although there is no question that USPTO personnel are "well published" in terms of office actions, patentability opinions and legal briefs, these publications relate primarily to the second "pillar" of their job – not to the first scientific and

technical "pillar". Note that the USPTO is not the only government agency that employs scientists and technical experts to implement and exercise the agencies' authority to issue permits, award rights, regulate, or grant licenses to individuals or corporations. Agencies such as the EPA, FDA, NIH and USDA come to mind in that respect. Most relevant publication types for our comparison purposes are review articles rather than original contribution articles because patent examiners are not hired to perform basic research in their field. Analyzing citations of scientific and technical papers, I counted only the number of ***review*** papers published in the last 10 years by authors affiliated with the U.S. government agencies mentioned above. The numbers are tabulated below.

Number of technical/scientific review articles published during the last ten years having a US Government agency author

	Author/co-author affiliation
559	Environmental Protection Agency (EPA)
479	Food And Drug Administration (FDA)
679	National institute of health (NIH)
890	US Department of Agriculture (USDA)
1	US Patent and Trademark Office (USPTO)

Source: *ISI Web of Science* search result as of Dec-18-2009. Limited to 1999-2009 articles of a *"Review"* type and to "OG=" agency name variants selection of each agency listed above.

Only one review paper by an author affiliated with the USPTO was found. To be sure, because patent examiners are not hired to perform basic research in their field, we should not expect examiners or their line managers to publish hundreds or even tens of review papers in a decade. Moreover, I stipulate that my analysis is non-scientific and is rather sweeping, as it contains no normalization of agency staff or budgets directed at solely issuing permits, awarding rights, or granting licenses. For example, I acknowledge that my approach for comparing the FDA to the USPTO under this criterion is arguably like comparing "apples to oranges." I maintain, however, that these are still "two pieces of fruit" worthy of juxtaposition. First, I do not count articles for original research. I only count published review articles, although the article count likely includes papers published by FDA authors who may be engaged exclusively in research. Second, it is safe to conclude that a substantial number of published FDA authors are scientists from the centers directly responsible for processing, examining, rejecting or approving applications filed by commercial entities seeking FDA approval for their products.

I do not suggest or expect that USPTO examiners and their line managers spend a substantial amount of the aggregate corps time on writing and publishing papers. However, I do believe that more resources and non-examination time should be made available for professional career development that fosters specialization within the Office's technology art workgroups. This will permit and encourage expert examiners' compilation and occasional publication of "state of the art" reviews in peer-reviewed technical and scientific journals. I envision such publications to include all sources and particularly review new technical knowledge that became public through patent disclosures and through the unique USPTO repository of millions of commercial technical documents found in applicants' Information Disclosure Statement (IDS) filings.

This published "state of the art" research, compilation and publication activity should review the art in conjunction with the description of the pertinent patent ***subclasses*** and perhaps the rationale for their establishment at the Office. These published works would inform researchers, inventors and examiners alike. This composite documentation activity can help restore the

patent classification system to its important rightful place, after years of cuts in the Office's patent classification resources. Figure 1 shows the decline of classification establishment activity from an average of about 4,000 new subclasses per year, to one third of that in the last decade, despite the unabated continued exponential growth in new original patent applications in that period.

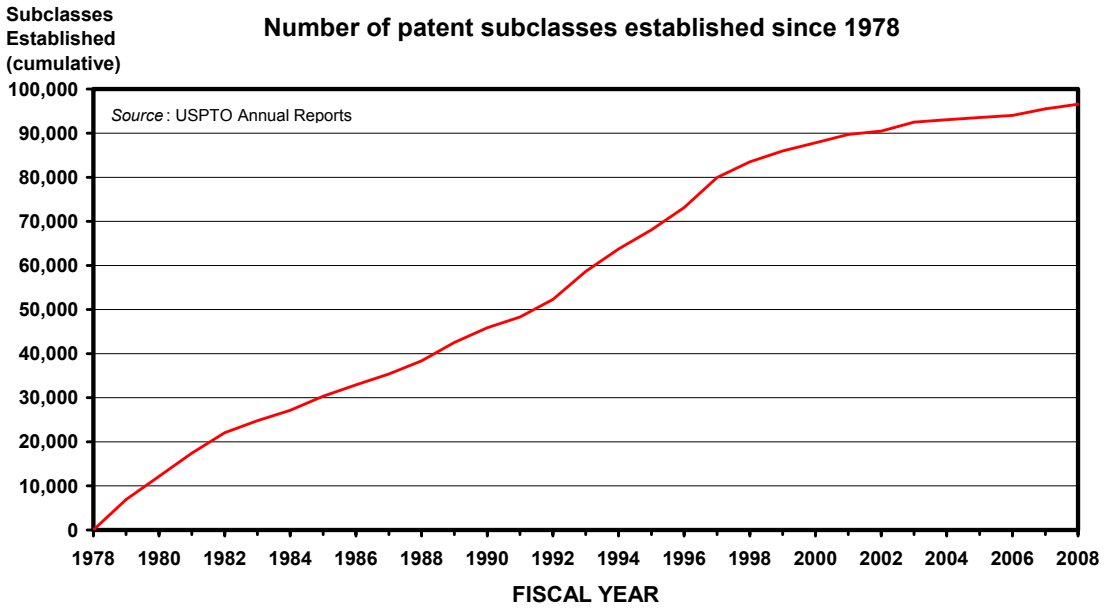

Figure 1 USPTO patent classification activity had slowed down significantly in the last decade.

The USPTO's apparent under-investment in the classification infrastructure of our national knowledge repository system is troubling. The classification system is an important patent quality tool, as it facilitates efficient search and identification of the most relevant prior-art, which often cannot be accomplished by keyword search tools alone. Permitting the speciation of the subclass system to deteriorate into effectively coarser subclasses detracts from its value and utility in supporting applicants' and examiners' search and the examination process. In addition, such degradation that weakens examination tools also weakens the proficiency of examiners.

Figure 2 shows one possible indicator of applicants' concerns about USPTO examiners' professional knowledge and search proficiency compared to their European colleagues. Such concern is likely a significant factor in the USPTO's low 'market share' (less than 17%) as the applicant-selected International Search Authority (ISA) among the Trilateral Patent Offices. This is a troubling fact, given that the USPTO receives about half of the PCT applications filed with these three offices. PCT International search fees are uniform, mandatory and somewhat duplicative of national phase search fees. As a U.S. applicant, I have often selected the EPO as the ISA for my PCT applications in order to get additional search results as a "second opinion," knowing that I also receive the USPTO examiner's search results for my counterpart national U.S. application. Similarly, because foreign PCT applicants (virtually all of whom designate the U.S in their PCT applications) originate about half of the Trilateral Offices PCT applications, I would expect them to appoint the USPTO as their ISA in order to obtain an opinion second to that of their Offices. Thus, under ***equally perceived examiner proficiencies and diligence***, I would not have expected the EPO's PCT search 'market share' to exceed that of the USPTO. The fact that it does so by more than a factor of four, is telling.

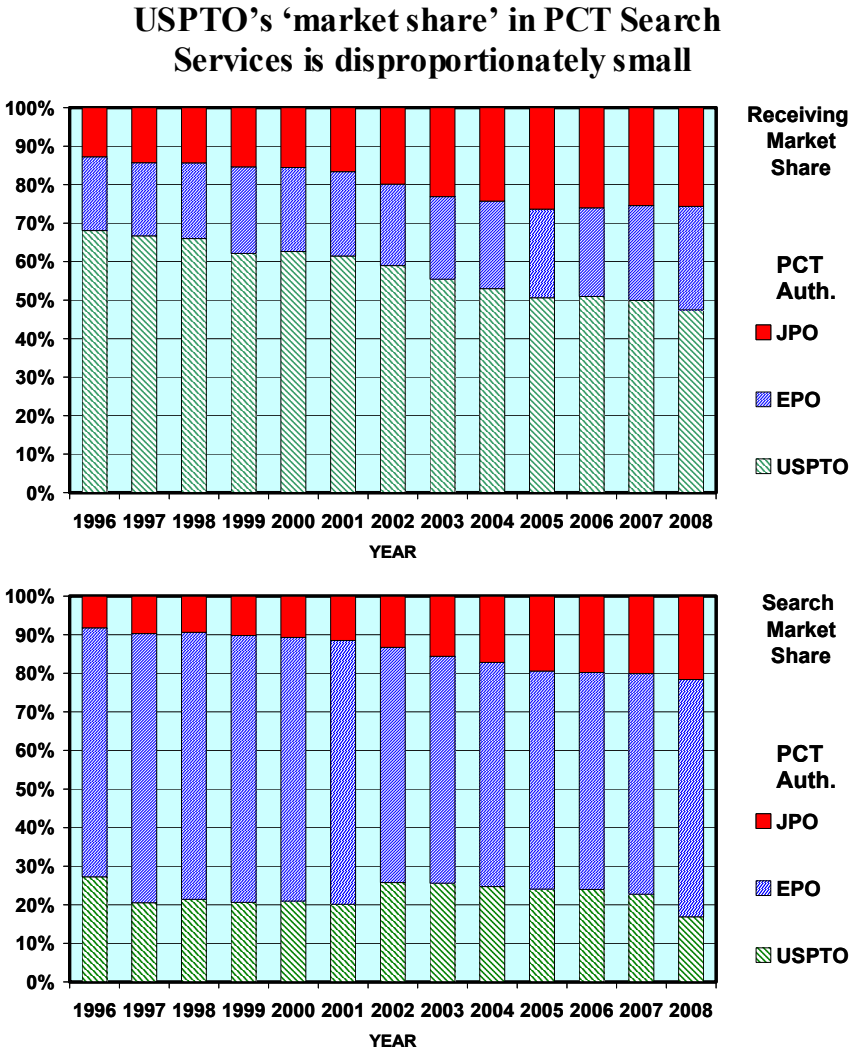

Figure 2 Relative share of PCT applications received and searched by the three major patent office *Source*: Trilateral Patent Offices Statistical Reports. At http://www.trilateral.net/statistics/tsr.html.

The EPO's disproportionately high PCT search 'market share' has a salutary effect of exposing EPO examiners to a growing number of sources and published art. It enhances the EPO's examiner corps' technical proficiency, thereby increasing even further its PCT search 'market share.' According to a 2005 EPO report, EPO examiners perform about three times more searches per claim than examinations per claim - a ratio that is substantially higher than that of their USPTO colleagues. As a result, EPO examiners spend more time in studying the art and less time in examining and writing office actions. Moreover, their time is well paid for by PCT search fees - an important revenue stream for the EPO, helping in attracting more examiners and retaining them. For every PCT International search ***not*** performed by a USPTO examiner, the USPTO loses $2,080 in PCT search fees. A substantial fraction of these PCT cases move to the U.S. national phase, whereupon a USPTO examiner must perform a search anyway, fetching only $540 in U.S. national search fees. In contrast, every national phase PCT application, for which the USPTO is selected as the ISA, fetches a total of $2,620 in search fees for search work that is not much different.

Therefore, investments in USPTO examiners' ability to elevate applicants' confidence in their work and seize search-services 'market share' from their European colleagues can not only

improve overall USPTO patent quality, but also bring large returns that would help pay for these investments. Unfortunately, this change appears to require major shifts in USPTO's management's approach: just as EPO's success in gaining search services share caused a self-propelling ability to gain even larger share, the USPTO's declining share denies its examiner corps' the resources and personnel to spend more time on these PCT searches, as the growing USPTO examination backlog takes precedence. This has caused a spiral of self-propelling deterioration.

In conclusion, a modest but sufficient increase in USPTO investments in its workgroups' ***non-examination*** time in areas described above is required for elevating USPTO examiners' proficiencies and status, for advancing their professional development and for increasing their retention and the respect they deserve. This investment will also enable the USPTO to gain market share in PCT search services, with all the concomitant benefits entailed, including revenue support for a larger examining corps.

(2) Examiners' workload and production goals

I wish that in 2010 the USPTO would commence a thorough review and conduct serious statistical performance studies and measurements in order to design a better examiner production-goal system. The following historical facts are worth mentioning. Recent USPTO annual reports and GAO studies attribute the current examiner production goal system to a 1976 agreement with the Examiners' Union. The goals were set after a "study" that apparently had been kept unpublished. However, the 1976 USPTO Annual Report mentions that the '76 production goal system had provided for a 6% increase in the average time for a disposal, setting the corps' new average goal at 19.5 GS-12 equivalent hours. I could find no evidence that the workgroup quotas set then were based on any measurements or objective performance facts. These objective performance facts might be examination error rates under different time allotments, choosing the shortest periods that yield acceptable examination error rates.

It appears that the ***relative*** quotas of examiner workgroups were not changed much in 1976 and that those had been determined earlier. To be more specific, they were determined in 1965, when the Office reorganized its patent examination Groups and created 108 Art Units in the Groups. The Office's 1965 Annual Report explains:

> In connection with program management, each Group Manager had been assigned ***a standard cost per disposal*** for his Group taking into account complexity of art and experience level of the examiner staff. This standard was developed through the joint efforts of the Superintendent, the Directors, and the Group Managers." (Emphasis added).

Thus, it appears that no objective measurements had been made of the number of hours required (the cost) to achieve acceptable error rates in relation to application attributes in order to "take into account complexity of art and experience level of the examiner staff." The reorganization of the corps was completed in 1966 and it is safe to conclude that the USPTO has been operating under this ad-hoc examiner production quota since then.

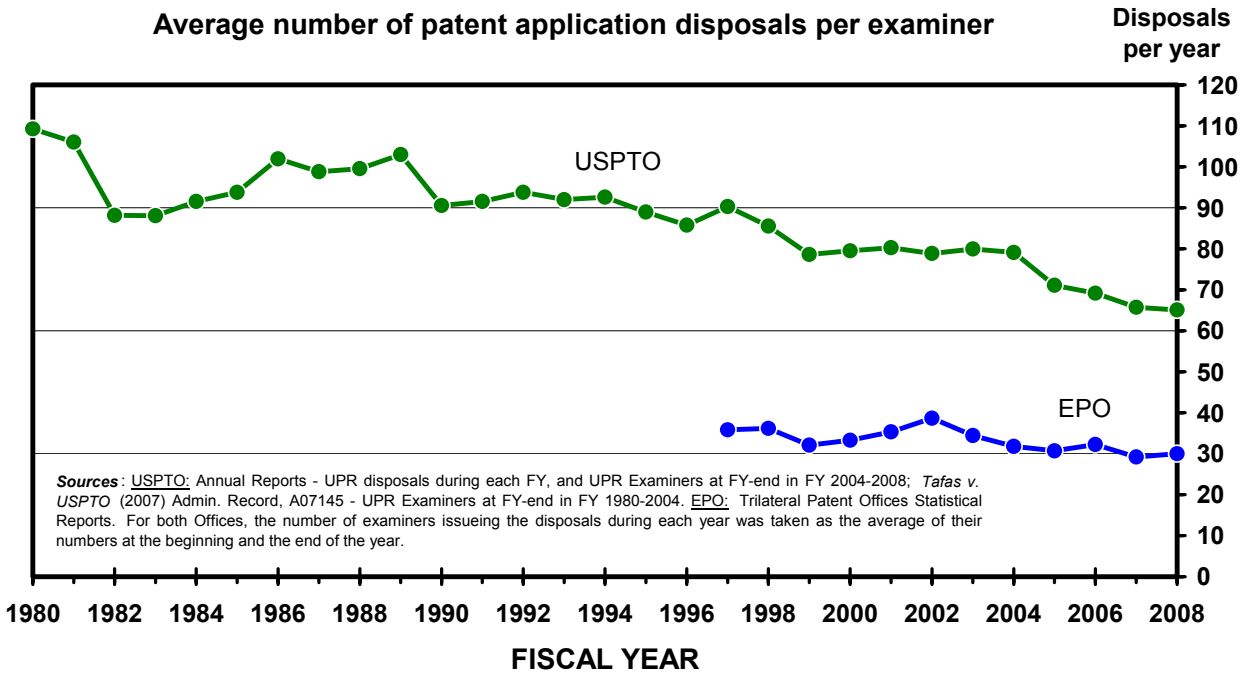

Figure 3 Average patent examination production rates at the USPTO and the EPO

At year-ends 1975 and 1976, the USPTO had 1,118 and 1,047 examiners respectively, corresponding to an average of 1083 examiners during 1976. They disposed of 113,312 patent applications during that year – an average of 105 disposals per year per examiner.[1] As the UPR statistics in Figure 3 show, this production rate had not changed much during the 1980's, although it had gradually declined in the last two decades. Note that USPTO examiners have examined more than twice the number of applications than their EPO colleagues. There are several contributing factors to this difference. In part, this is due to EPO's performing many more searches than examinations, as discussed above. Furthermore, evidence discussed below suggests that USPTO examiners are not given enough time per application, which adversely affects their work product's quality.

Although it may appear from Figure 3 that over the years, USPTO examiners progressively spend more time per application, this is not the case within each art area because the average production quota for USPTO workgroups have not changed since 1976. The disposal rates shown in the figure are an average over all examiners in ***all*** workgroups. It declined over the years because workgroups dealing with more complex applications (allotted with more time per application) have expanded and added more examiners in proportion to workgroups that deal with less complex and more mature technologies (allotted with fewer hours per application). Hence, the Office's examiner corps is now skewed towards groups dealing with more complex applications. The Office calls this phenomenon the "Complexity Creep."

The "complexity creep" relates only to changes in the ***mix*** of applications examined by the Office, but not to the increase over the years in complexity or the size parameters of applications received in a ***specific*** given art area. Indeed, there is evidence that the size parameters in the same art area do increase substantially over time. For example, the number of references cited in

[1] Note that the 1976 USPTO Annual Report lumps the number of Utility Plant and Reissue (UPR) examiners with Design patent examiners. Because of the very small numbers of design patent examiners and their relative number of disposals, the results above are approximately the same for UPR workloads.

liquid crystal patent applications had grown substantially over the last several decades. However, it does not appear that the USPTO has considered complexity growth ***within*** art areas since it has not adjusted the allotted examination hours per application. Therefore, the Office's term "complexity creep" is a misleading term that is better stated as "complexity mix creep." The fact remains that the USPTO had not dealt with patent applications' true "complexity Creep" since 1976.

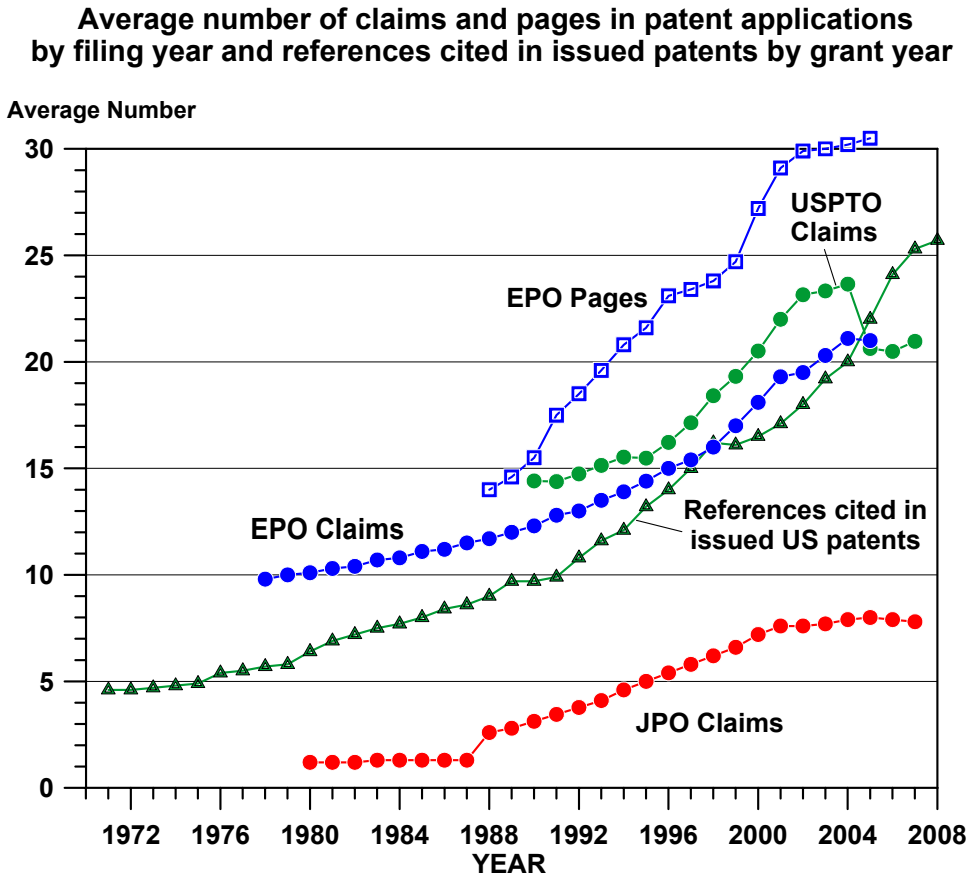

Figure 4 Patent application size parameters' growth trends. *Sources*: USPTO Claims: Sources detailed in R.D. Katznelson (2007) p. 13, at http://works.bepress.com/rkatznelson/16/. EPO Claims and Pages: N. van Zeebroeck et al. *World Patent Information*, **30**, pp. 43–52, (2008); E. Archontopoulos et al. *Information Economics And Policy,* **19**(2), pp. 103-132, (June 2007). JPO Claims: A. Goto and K. Motohashi, *Institute of Intellectual Property*, Tokyo, Japan (2006) at http://www.iip.or.jp/e/patentdb/paper.pdf. (The grand average was estimated by using the technology sector data of Figure 5 weighted by the number of applications for each technology sector shown in Figure 2). References cited in issued US patents: D. Crouch (2008) (sum of patent and non-patent references), at http://www.patentlyo.com/patent/2008/09/information-dis.html.

The composite of the "complexity mix creep" ***and*** the complexity growth within art areas over time is shown for several parameters in Figure 4. These include averages of the total number of claims in patent applications, the total number of pages in applications (including specification, drawings and claims) and the total number of references cited on the face of granted U.S. patents. More time is required for searching and examining an average patent application filed today in a given art area, compared to an average application filed in 1976 in that art area.

USPTO examiners operate under production goals set in 1976. They have very little choice but to meet these goals and in so doing, their actual average time spent per production unit (PU), which includes a first action and a disposal, is bound to be very close to the goals set by the

Office. This is shown in Figure 5, where actual allotted time per PU for each workgroup is presented for 2003 and 2004, with very little change between the years. Because the target goals had not changed since then, the hours spent per PU in these workgroups in subsequent years are expected to be substantially the same.

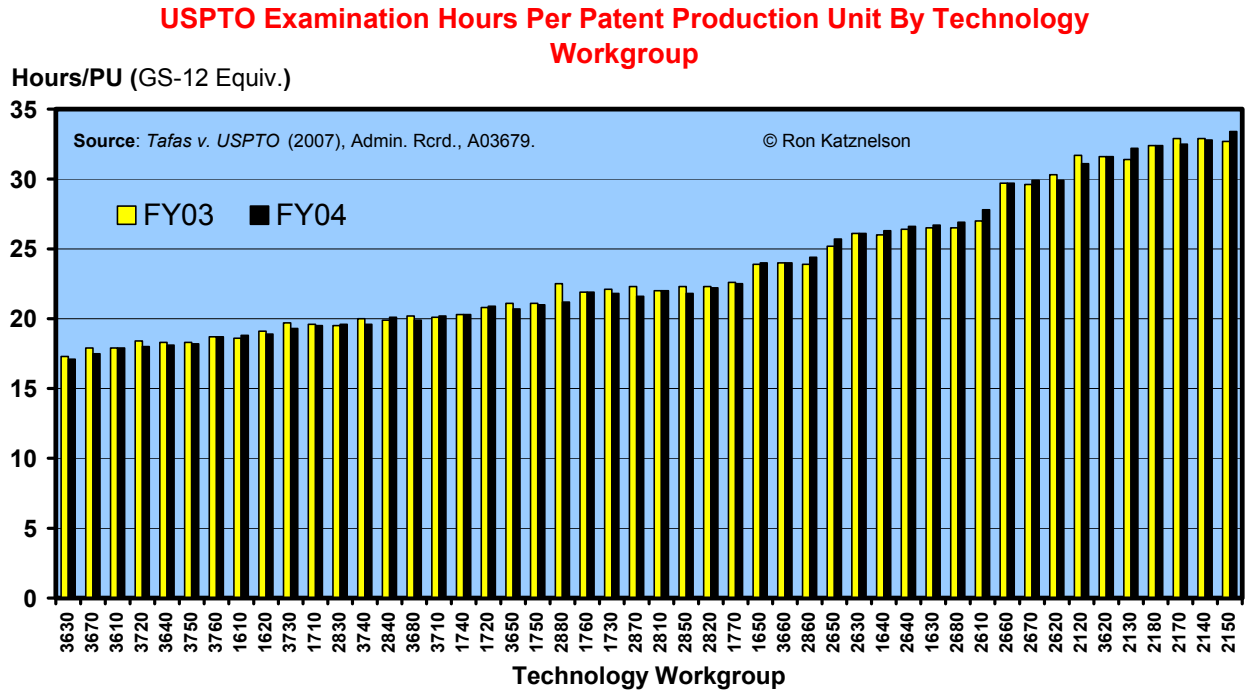

Figure 5 Examination time recorded per production unit in USPTO Technology Workgroups for Fiscal Years 2003 and 2004. Note that the year-to-year change is negligible, indicating performances near workgroup quotas.

Note that the range in the production time spent across workgroups covers nearly a factor of two, with about 17 hours per PU in Workgroup 3630 to about 33 hours per PU in Workgroup 2150. How was such a range for production goals arrived at? What basis does the Office have today to continue to believe that the growth since 1976 in the applications' number of pages, claims filed, references cited by applicants and those found by the examiner, has not changed materially the required time to review and consider the material and to examine the application? For example, is it likely that the more voluminous application material handled by examiners in Workgroup 1610 (Drugs, Bio-affecting and Body Treatment) today, could even be read and researched adequately, let alone examined, in about 18 hours on average?

GAO reports in 2005 and 2007 had identified the USPTO's archaic examiner production goal system as unrealistic, raising major concerns regarding examiner performance. In addressing calls for reevaluating these goals and their functional correctness, previous USPTO top management seemed to have adopted a circuitous and indirect indicator for the goals' adequacy and correctness: *examiner attrition statistics*. The previous USPTO Director responded in the following way to questions put to him in a February 27, 2008 congressional oversight hearing:

> *Mr. BERMAN:* Mr. Dudas, after the GAO report came out, the USPTO issued a press release in October stating that it will review assumptions the agency uses to establish production goals for patent examiners. What steps thus far has the agency taken to study these assumptions? When do you think we will have the results of your study? And will these results be made publicly available?

> *Mr. DUDAS*: Since that time, we have begun to look particularly at breaking down attrition and retention numbers not just across the board but specifically based on year. And we found that, as things are more focused, when you get more focus on things, you see patterns that begin to develop. [reporting on attrition statistical results].

Moreover, the previous Director had perceived no problem with the examiner production goals system:

> *Mr. CHABOT*: Mr. Undersecretary, I will begin with you… why did the USPTO wait until the 2007 GAO report to initiate a study on patent examiner production goals when a 2005 GAO report identified unrealistic production goals as a problem?
>
> *Mr. DUDAS*: Essentially, we are — we have not agreed with the conclusion that has come from GAO that it was intimated in 2005, and I think more directly said in 2007, the conclusion that what we need to do is adjust production goals and that that will somehow really increase production. And the reason being—and so, in 2004, I mentioned earlier, the inspector general did a report that said the opposite, essentially. It said we need to raise our production goals, not lower them. So I think what we are constantly looking at what should production goals be and how do they work. We are also looking in terms of what does it really mean in terms of attrition. What the GAO study did was gave a lot of good, raw data, but we have spent a lot of time doing—digging deeper under that data since earlier than 2005, really trying to find out what really is — what matters most for attrition and retention by year.

The previous Director appeared to conflate the production goal in hours per PU with the number of disposals an examiner completes per year. The USPTO had also followed up with written responses to the Subcommittee, showing that "Higher production requirements do not necessarily translate to higher attrition." The previous Director went further in denying any fault in the Office's production goal system:

> *Mr. DUDAS*: I think where I see attention is I think the conclusion that has come from the GAO study for many people is that what we need to do is lower standards across the board. And I would have to tell you, the USPTO disagrees that we need to lower standards for examiners. We are a performance-based organization with high achievers. And let me tell you what this means. It means that 60 percent of all of our folks work beyond the level they need, beyond 10 percent and beyond, to get higher bonuses. What we need to do is not lower standards. We need to increase opportunity. We need to increase flexibility. We need to let examiners have the opportunity to do what they do best from wherever they want, whenever they want, and however they want. [Providing more information on the Office's Tele-working program].

The Office's previous management's approach appears to have had the following logic: "The examiner production goals are just fine and are ***not*** set too high. ***We know*** this based on the fact that examiners are meeting, and indeed exceeding, their goals to get bonuses." This logic indicates a profound misapprehension of the examination process and of basic examiner personal economics: Examiners work to bring home a paycheck (which may include a bonus). They will ***always*** need to bring that check home, for which they ***will meet*** most any hour per PU goal the Office will set. The goals will always be met on average - see Figure 5. The only question is what kind of work product and examination errors will result in the process. Moreover, knowing some of these goals to be unrealistic, examiners may not feel responsible for the resulting work product and would not necessarily leave the corps in dissatisfaction. Thus, none of the attributes that the previous USPTO management had "studied for years" have much to do with the substantive merits or suitability of the examiner production goal system. For the most part, the GAO had also failed twice to identify the relevant facts that can help ascertain how realistic the

examiner production goals are. It interviewed examiners about the reasonableness of the goals but avoided asking the basic question: How do we know whether the production goals are realistic? As I show below, these are quality measurement facts that were staring in the face of USPTO's top management, who apparently ignored them.

As discussed below, the USPTO's own measure of examination errors is one-sided, as it reports final allowance error rates but does not report final rejection error rates. Nevertheless, even by this allowance-error measure alone, the fundamental deficiencies of the Office's production goals appear evident. This is shown in Figure 6 below, where the average allowance error rate for each workgroup is plotted against the average allotted time per PU in the respective workgroup. While not conclusive, these results are particularly suggestive: the broken trend lines show a definite indication that, on average, the examiner goal system fails to provide the minimum baseline time required in many workgroups ***regardless of technology***. Of course, other factors also affect examination error rates, as can be seen by the spread and fluctuating individual workgroups' results across these two observed years. However, the inadequate average time goals set for many groups allotted with less than 25 hours appears consistent. Examiner performance at lower time allottment levels appear unreliable, with wide spread in error rates. These results suggest a closer review of the goals set for workgroups in these low allotted-time categories. The conclusion is clear: examiners do meet their goals – but at the expense of quality.

I expect that some observers would argue that the effects shown in Figure 6 do not exists in recent error rate results because average allowance error rates have declined by a couple of percent since 2004. That may be so, as a policy of 'reject, reject, and reject' does indeed reduce the allowance error rate. However, I have shown empirical evidence in my previous works that strongly suggests this must have been accompanied by an increase in the rejection error rates. As explained below, a proper measure of examination error rate should weigh both types of errors and I suspect that when such weighted error rate is considered, trends similar to those in Figure 6 remain today. I also expect some observers to speculate that the relatively lower error rates reported in Figure 6 for workgroups allotted more hours per PU in fact understate the true error rate. This, they may argue, is because the record only reflects lower incidences of ***detected*** errors in workgroups dealing with more complex and perhaps esoteric technologies, which the quality reviewers are less familiar with. If undetected errors indeed abound, then the Office's problems are far more fundamental - it would mean that, not only are examiners more prone to errors than reported (meaning that far more examiner time must be allotted), but that the quality review specialists themselves are not up to their task.

Under the new Director, Mr. David Kappos, the USPTO recently announced that it is adding to the examination quotas an additional two hours per PU across the board and that it will monitor the results of such a change. This is a first good step that will increase the corps average from 23 hours to 25 hours per PU in FY `10. However, this move must be followed by a more systematic fact-based study to determine the appropriate allocation of examiner hours.

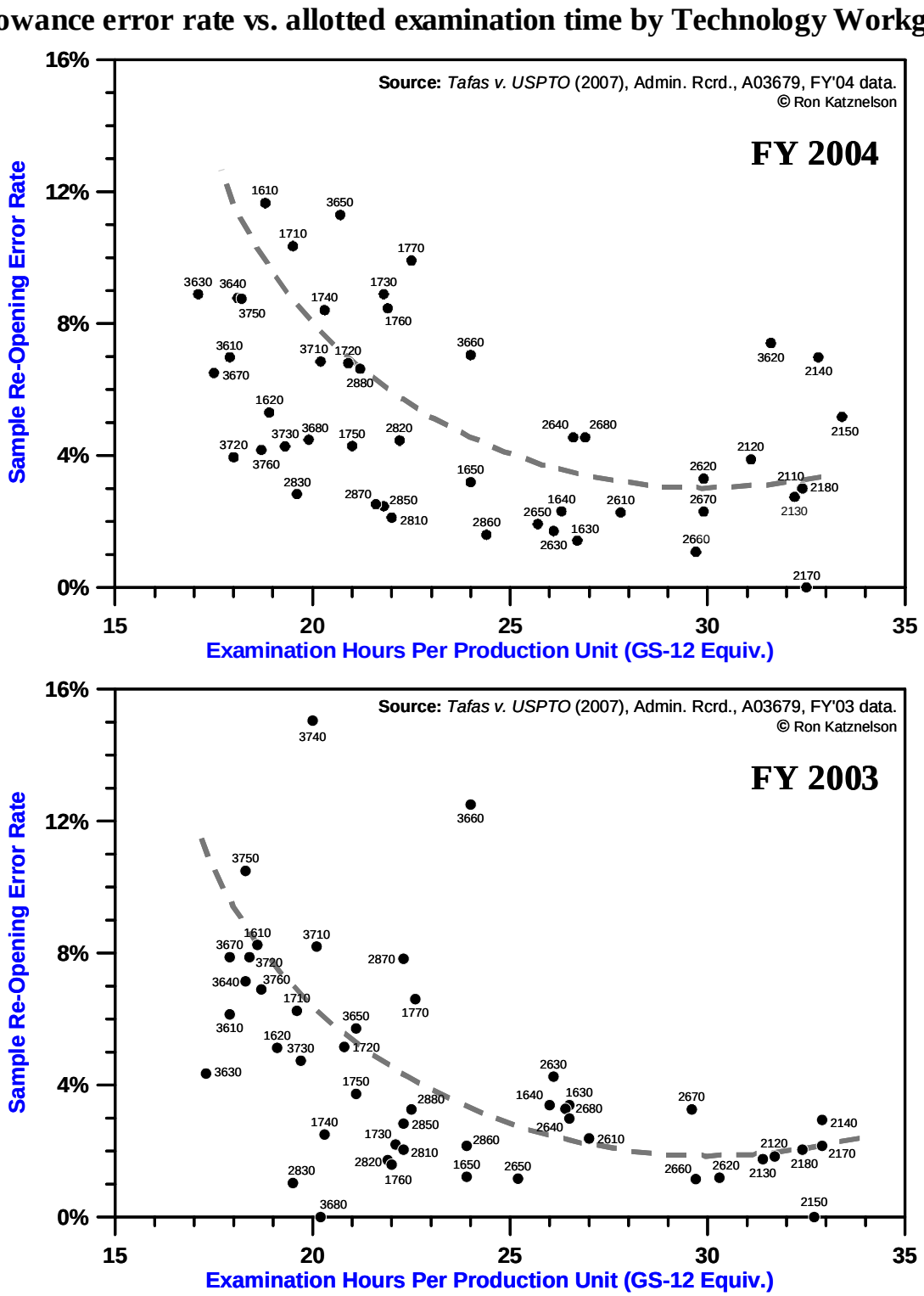

Figure 6 USPTO's Reported allowance error rate vs. allotted time per production unit by technology workgroup.

Figure 6 resolves only one dimension in this inquiry. Some of the variations in the error rates may well be due to unaccounted applications' size attributes such as the average numbers of claims, prior art references, drawing figures, drawing item reference designators, and pages in the disclosures - all of which are definite factors in the required examination time. A proper

assessment and redesign of the examiner production goal system would therefore require setting various experimental production goals, measuring the respective examination error rates and submitting the results to a multidimensional regression analysis of the variables listed above to discover the most influential of these variables. Adopting an acceptable error rate target can then form the basis for establishing the necessary number of hours in workgroup production goals on an application-by-application basis, depending on the most influential variables. I recognize that the Office cannot approach this task solely based on these considerations and that it is faced with the unenviable position of having to balance these goals with practical operational considerations and unintended consequences of such production goal changes. Nevertheless, I do envision proper production goals to be tiered not only by technology workgroup, but also by key application size attributes.

Recent welcome developments under Director Kappos include the Office's decision to expand non-examining time allotments for examiners. These involve examiner-initiated interviews and increased resources available for examiner certification. The Office has also begun reaching out to its former examiners in an effort to recruit them back. These important actions should be followed by an aggressive effort not only to increase the Office's force but also to build confidence in the Office's management's ability to project requirements and sustain the growth of the force.

No recent time stands out as more fateful in the current predicament in which the Office finds itself than the year 2003, when its *21st Century Strategic Plan* was introduced. The profound inability of the USPTO to project application loads and the deficiencies of its workforce planning were evident in the USPTO's grossly overoptimistic Strategic Plan published on February 3, 2003. Based on its projections at that time, the USPTO stated the following goals as achievable:

> Achieve first Office action patent pendency of 14.7 months in fiscal year 2008.
> Achieve an interim patent pendency goal of 27 months by fiscal year 2008. ….
> ***Reduce*** total patent examiner hires through fiscal year 2008 by ***2,400*** compared to the 2003 Business Plan projection." (Emphasis supplied).

As we have known for a while, the Office failed spectacularly with respect to the first two goals, as first Office action patent pendency was 25.6 months and total patent pendency was 32.2 months in FY 2008. Most remarkable, however, is the radical change during early 2003 in the USPTO's perceived need for examination resources. In a sweeping change of workload projections, the USPTO apparently believed it could achieve all these production goals ***and*** avoid hiring the 2,400 examiners that ***it projected*** it would need in its 2003 business plan only one year earlier. In view of USPTO management's failure at that time to explain its true needs as expressed in the original 2003 business plan, it is perhaps not surprising that Congress had diverted $100M in user fees in 2004. Unfortunately, the USPTO had not disclosed its application filing and pendency models' details and projections methodology to permit the public and Congress to assess the basis for its radical change in workload projections.

The history since 2003 in this regard manifests continuous failure of the Office to project and build its examiner corps. Blindsided by "unexpected" growth in applications, the USPTO in 2006 attributed its growing backlog to applicants' "abuse" of the continuation procedure and to applicants' propensity to file "excessive" number of claims. The Office had no basis for these assertions and, in fact, had data and evidence that it could have used in prior years, but had not used, to correctly project the growth in its workload. It had data showing that since 1980 the number of continuation applications had been consistently doubling every 6.5 years, as opposed

to original applications that had been doubling only every 14 years. Instead of using established scientific methods of modeling exponential growth of each application type at a distinct rate, the Office repeatedly underestimated the total filing rate because it used a trivial single component growth rate model, lumping all application types under one growth rate. The USPTO also had evidence that since 1990 the average number of claims in applications had been growing by 4.5% per year. This too, had not been taken into account as a trend to be reckoned with. None of these critical details were new and no surprise in workload increases would have been encountered had the USPTO taken these details into account.

The Office's pendency models' credibility is at an all-time low and it has done nothing to restore the credibility by refusing to release the model since the public's explicit requests to do so during and after the continuations and claims rulemaking proceedings in 2006. Indeed, a comparison of USPTO pendency projections in its FY-08 and FY-09 published budget plans suggests possible flaws in the Office's pendency model. As a change from the FY-08 budget plan, the FY 09 budget plan revised downwards the projected number of incoming applications for every year. It also revised upwards the rate of disposals for every year. If fewer applications enter the backlog pool and if the pool depletes at higher rates, one would normally expect this revision under these FY-09 assumptions to decrease pendency projections compared to the FY-08 projections. However the USPTO model of FY-09 produces higher projected pendencies than the FY-08 model for the years 2009-2011. Would a correct model produce this result?

The most recent Internet posting of USPTO's pendency model ***simulator*** supplies no answers and only raises questions as to its correctness and the analytics that the USPTO attempts to hide from the public. The Office deliberately omitted spreadsheet rows and cells that contain the key equations, logic and relationships among variables. It made available only the User Interface and hid the basic assumptions, equations and methodology by which results are obtained under this model. Is there any rational reason for the Office to continue to withhold its pendency model – a model that is so central to its operation? In keeping with the Administration's new commitment to open government, for the sake of the U.S. examiner and the U.S. patent system, I wish that 2010 marks the year during which the Office finally releases its pendency model.

To achieve pendency reduction, the USPTO must not only articulate that as a goal, it must also be able to avoid underestimating its long-term application load. Projection based on the best information available must be made with ***added margin for error*** in order to assure stability. A sound policy would be to build-in the margin ***required for unexpected surges*** in applications or examiner attrition so that during periods of lower incoming application traffic, examiners can spend extra non-examination time on improving knowledge and proficiency as explained above. One can never overstaff the USPTO examiner corps.

I wish that in 2010 the USPTO management would be able to plan correctly and educate Congress on the true needs of the Office. I hope we can all help prevent the 2003 under-investment fiasco from repeating. Diversion of fees by Congress since then was merely a symptom of a profound failure of the patent community (including previous USPTO managements) to educate the public and the Congress of the consequences of under-investment in our examiner corps and our patent system. An economic stimulus package restoring over $500M in diverted user fees to the Office would cover an immediate shortfall of more that $200M and another $300M that would be required for offsetting startup transient revenue losses of a Deferred Examination system that can reduce workload by up to 25%. These infusions are required in order to put the USPTO on a successful long term quality-enhancing and pendency-reducing trajectory and should not be held hostage to a patent reform bill.

(3) Alignment of examiner quality measures and incentives with the societal costs of patent examination errors

Societal costs of examination errors comprise of costs to applicants, to the Patent Office, to third parties and society as a whole. Erroneously allowing applications that do not meet the statutory patentability requirements or erroneously rejecting meritorious patent applications are both harmful to society.

Examiner rejection errors

(a) deny inventors their constitutionally directed statutory rights to their inventions;
(b) deny society the benefit of private investments in, and development of, otherwise patentable innovations; and
(c) deny society the benefit of disclosure and teaching of new knowledge and discoveries, thereby slowing innovation.

Examiner allowance errors adversely affect third parties subject to erroneously issued claims by

(a) inflicting unwarranted legal costs; and
(b) deterring downstream innovation that are erroneously deemed infringing.

There appears to be no shortage of scholarship and literature focused ***solely*** on the societal costs of examiner allowance errors. However, there is a glaring paucity of such sources on the societal harm of erroneous rejection of meritorious applications for patentable inventions. Furthermore, I am unaware of ***any*** quantitative assessments of the ***relative costs*** of these two types of errors so that a balance between the two can be considered.

The USPTO's focus on allowance errors appears exclusive. It compiles and reports an "end-of process" allowance error rate but does not do so for final rejection error rates. The Office's In-Process Review (IPR) included tracking rejection errors among other error types, however, it does not produce or report an "end-of-process" Rejection Error Rate. Moreover, the USPTO recently announced that it would no longer look at final office actions in its IPR estimates. As opposed to allowance errors, no one knows the answer to this simple question: What is the fraction of all final rejections that are erroneous? The Office's historic use of the all-encompassing term "error rate" to mean only allowance error rate is evidence for its fundamentally biased metric and incentive systems.

It is therefore not surprising that the allowance-error-centric quality measures appear as the exclusive source of examiner's error performance review. Examiner allowance errors ***rather than rejection errors*** appeared to be the sole, or nearly the sole, source for examiner supervision actions involving errors in final actions:

(a) Warnings based upon a single clear error in Patentability Determination
(b) Warnings based upon multiple clear errors in Patentability Determination over multiple consecutive quarters during a fiscal year
(c) Failure of written warning improvement period on the basis such warnings
(d) Rating of record of less than Fully Successful for a fiscal year based upon clear error in Patentability Determination.

There is no 'free lunch.' Examination under finite average time per application cannot be made error-free: Examiners must trade off rejection errors with allowance errors given a finite time

per application. Their operating point in patentability determinations will depend on the relative costs they must bear in making each type of error. If it occurred, I have yet to hear about examiners being disciplined for erroneously rejecting a meritorious patent application. Had the Office had an infrastructure that penalizes examiners for making final rejection errors, we would have seen a different allowance rate trajectory over the last few years. We would not have seen a free-fall of the allowance rate from the mid 70% to the low 40% at the same time that RCE and appeal brief filings skyrocketed.

This state of affairs is remarkable. It means that the USPTO deems societal costs for making rejection errors negligible compared to societal costs for making allowance errors. This implied underlying premise lacks any basis and is counterfactual. In an upcoming paper on the subject of trading off patent examination error types, I prove the following proposition:

> ***The societal costs for making patent examination rejection errors are higher than the societal costs for making allowance errors.***

The proof of this proposition relies on the ***same societal cost-benefit analyses*** that lead many nations who had not found resources to institute a patent examination system to adopt instead a patent registration system, rather than abolish patents altogether.

The USPTO's apparent presumption that allowance errors are far more important to control than rejection errors is contrary to fundamental economic principles of the patent system. The Office must augment its quality measures to include a second final action measure: ***Final Rejection Error Rate***. Examiners' incentive and supervisory programs should weigh this second metric with no lesser weight than that accorded allowance error metrics.

Director Kappos articulated what should have been the Office's policy before his arrival: "***Patent quality does not equal rejection***." The Office has recently started to move away from the excessive weight on allowance errors. This is a welcome move in the right direction, coming from a leader who had experienced in his prior position the draconian effects of previous USPTO policies. It is not enough, however, to merely attenuate examiner costs for making rejection errors. The Office should pursue a ***balance*** in weighing these errors with rejection errors. Thus, it is my hope that the recent changes would be followed by a fresh review of the Office's quality programs, and that measures of final rejection error rates would be instituted and that the Office will use them to balance its examiner incentive and performance appraisal system.

(4) Conclusion

My observations and recommendations above are all about empowering U.S. patent examiners by investing more resources in their operations and by allotting more time for professional development. Management is working hard on increasing the ranks of the corps. Actions should also facilitate examiner's quality work by balancing their incentives. Growing patent backlog damage had been done over the last decade and the Office's new management cannot be expected to fix it overnight. The overarching and laudable goal of reducing pendency should not translate into extreme diversion of USPTO resources narrowly for the sake of reducing pendency, regardless of collateral outcome adverse to the examiner corps. It will take years to rebuild the corps and overcome the backlog harm. My 2010 wish for the U.S. Patent Examiner is that we start this year.