AIPLA QUARTERLY JOURNAL

Volume 46, Number 2 Page 161 Spring 2018

DO HEIGHTENED QUALITY INCENTIVES IMPROVE THE QUALITY OF PATENTABILITY DECISIONS?

AN ANALYSIS OF TREND DIVERGENCES DURING THE SIGNATORY AUTHORITY REVIEW PROGRAM

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I. INTRODUCTION

Scholars and policymakers have expressed broad agreement that the quality of patentability determinations must be improved. Low-quality patents that fail to meet statutory requirements encourage wasteful litigation,[1] discourage new market entrants,[2] chill follow-on innovation,[3] and permit patent owners to extract undeserved monopoly profits.[4] Low-quality patent examination practices may also produce inconsistent and unjust results, such that the outcome of a patent application may depend in large part on the examiner to whom it is assigned.[5] These concerns have led Congress to introduce new administrative procedures to challenge low-quality patents,[6] fueled a surge in Supreme Court decisions addressing substantive patent law,[7] and spurred the U.S. Patent and Trademark Office (USPTO) to introduce an *Enhanced Patent Quality Initiative*.[8] Pursuant to this

1 *See* James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 397 (2014) (estimating that the socially wasteful litigation-related-expenditures was $29 billion).

2 Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 MINN. L. REV. 101, 113–14 (2006).

3 Alberto Galasso & Mark Shankerman, *Patents and Cumulative Innovation: Causal Evidence from the Courts*, 130 Q.J. ECON. 317, 321–22 (2015).

4 *See generally* Mark A. Lemley & Bhaven Sampat, *Examiner Characteristics and Patent Office Outcomes*, 94 REV. ECON. & STAT. 817, 817 (2012) (granting patents that cover inventions already known to the public creates social harm).

5 *Id.*

6 *See generally* Leahy–Smith America Invents Act, Pub. L. No. 112-29, §§ 311, 321, 298, 125 Stat. 284, 299–331 (2011) (codified at scattered sections of 35 U.S.C. (2012)) (establishing inter partes review, post-grant review, and covered business method proceedings).

7 Mark A. Lemley & Bhaven Sampat, *Is the Patent Office A Rubber Stamp?*, 58 EMORY L.J. 101, 105 (2008) (modern Supreme Court is interested in patent cases when "[b]oth the PTO grant rate and the use of continuation applications are at the heart of raging controversies over patent reform").

8 *Patent Quality*, USPTO, http://www.uspto.gov/patent/initiatives/enhanced-patent-quality-initiative [https://perma.cc/7RM5-G4UA] (last visited Apr. 4, 2018).

initiative, the USPTO actively solicits public input regarding methods to improve patent quality.[9]

While there is widespread agreement as to the need for quality improvement, there is no consensus for how this objective should be pursued. One factor complicating this decision is the possibility that initiatives to improve quality may increase patent pendency.[10] The USPTO has a dual mandate: first, patent applications must be processed and reviewed in a timely manner; second, the quality of patentability decisions must be maintained so that each patent application is allowed or rejected in accordance with its merits. Examiners have limited time to review patent applications, so it stands to reason that directing too much effort toward improving quality could hinder quantitative productivity and thereby increase the backlog of unexamined applications.[11]

The balance of these dual objectives, as well as their respective feasibility, has led to wildly divergent policy recommendations. For example, Frakes and Wasserman submit that patent quality could be improved by increasing examination time.[12] Conversely, Lemley has argued that such increases would be highly inefficient because examiners cannot effectively sort the wheat from the chaff and that it would be more prudent to allow the courts to adjudicate the merits of the small fraction of patents that are asserted in litigation.[13] Because basic questions—such as whether examiners are capable of meaningfully improving the quality of patentability decisions—have not yet been resolved, policymakers are

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9 *Patent Quality*, *supra* note 8.

10 *See* Michael D. Frakes & Melissa F. Wasserman, *Is the Time Allocated to Review Patent Applications Inducing Examiners to Grant Invalid Patents?: Evidence from Micro-Level Application Data*, 99 REV. ECON. & STAT., 550, 561–62 (2017) ("The agency's choice over how many hours to extend to examiners implicates a possible trade-off between the benefits of improved patent quality and the harms of reduced examination capacity.").

11 U.S. GOV'T ACCOUNTABILITY OFF., GAO-16-883T, PATENT OFFICE HAS OPPORTUNITIES TO FURTHER IMPROVE APPLICATION REVIEW AND PATENT QUALITY 18–19 (2016).

12 *See* Frakes & Wasserman, *supra* note 10, at 600–01; *see also* U.S. GOV'T ACCOUNTABILITY OFF., GAO-16-490, PATENT OFFICE SHOULD DEFINE QUALITY, REASSESS INCENTIVES, AND IMPROVE CLARITY 26 (2016) (estimating that 70% of the population of examiners say they do not have enough time to complete a thorough examination given a typical workload).

13 Mark A. Lemley, *Rational Ignorance at the Patent Office*, 95 NW. U. L. REV. 1495, 1508–11 (2001).

left with little guidance even as they attempt to navigate between diametrically opposed recommendations. Thus, there is a pressing need for greater understanding as to whether and how the quality of patentability determinations can be improved.

Human resource policies are a natural focal point for efforts to improve patent quality. The USPTO uses a complex system of production and quality incentives to encourage examiners to review applications efficiently and with high quality standards.[14] However, these incentives raise considerable questions as to their combined effects on patent quality. Under existing USPTO policies, quantitative production is readily measured and highly incentivized, whereas patent quality is difficult to measure and is subject to much weaker incentives.[15] In such an environment, workers may tend to sacrifice quality in order to increase quantitative production.[16] Unless considerable effort is directed toward measuring and incentivizing quality, therefore, it may be difficult to maintain high-quality standards.[17]

A key question is thus whether and how examiners respond to USPTO production and quality incentive policies. Prior studies have investigated the effects of production incentives,[18] but there has not yet been a systematic review of the effects of quality incentive policies on patentability decisions. Reviewing the production system, Frakes and Wasserman find that decreasing examination-time allotments as examiners are promoted may induce examiners to increase allowance rates and thereby grant relatively more low-quality patents.[19] The image painted by this finding is one of an examiner bound by draconian time constraints and forced to sacrifice quality to keep pace. But the finding could also be read to suggest that as examiners gain seniority, they become increasingly aware of the minimal quality standards attached to the examination function and increasingly

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14 *See infra* Section II.B.

15 *Id.*

16 *See* Bengt Holmstrom & Paul Milgrom, *Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design*, 7 J.L. ECON. & ORG. 24, 35 (1991) (finding that when a worker is evaluated based on the number of assignments finished, the worker tends to sacrifice the quality of the individual assignments to finish more assignments).

17 *See id* ("[I]f quality were poorly measured, it would be expensive or impossible to maintain good quality while using a piece-rate scheme.").

18 *See generally* Frakes & Wasserman, *supra* note 10.

19 *Id.*

able to exploit these low standards due to their greater autonomy. This latter view paints the examiner as a rational actor who responds to the system of incentives by shirking quality to maximize production or to simply go home early.

These two views would render sharply different policy recommendations. Under the first view, examiners are willing and able to increase the quality of their decisions—the system need only to give them more time to complete their work. Under the second view, increasing time allotments would have no effect on patent quality because examiners would use increased time allotments to further maximize their production ratings or spend even fewer hours working. The second view would instead recommend applying stronger quality incentives under the theory that examiners are capable of making better patentability decisions—they need only be given a reason to do so. In this respect, the second view is substantially more optimistic about the potential for improvements to patent quality. The first view, which envisions examiners stretched to their limits, necessarily implies a trade-off between patent quality and patent pendency. The second view, if true, would imply that there is significant slack in the system, and that examiners might be capable of increasing the quality of their decisions without reducing the rate at which they process applications.

The truth may lie between these two extremes, with examiners alternately choosing to and feeling compelled to sacrifice quality at various times during their careers. Yet from a policymaking perspective, the possibility that examiners might be rationally reducing the quality of their decisions in response to applied incentives represents a valuable opportunity to improve patent quality at relatively low cost. Before endeavoring to capture these gains, it is important to confirm that these quality improvements are available. This Article seeks to provide such evidentiary confirmation by answering three key questions:

1) Are examiners capable of improving quality while maintaining productivity?
2) Are heightened quality incentives an effective lever by which to promote quality improvements?
3) If so, how do patentability decisions rendered under heightened quality incentives statistically differ from those rendered under the current system of incentives?

To answer these questions, this Article analyzes divergences in decision-making trends while examiners undergo the Signatory Authority Review Program (the "Program"). The Program is the process by which examiners are promoted to the position of Primary Examiner; it represents a unique period in an examiner's

career during which she is subject to substantially heightened quality incentives.[20] This analysis suggests that examiners may respond to heightened quality incentives by increasing the quality of their patentability decisions, even as they must simultaneously increase quantitative production due to reduced time allotments.

Specifically, the authors find that examiners on the Program tend to reduce the rate at which they issue allowances. Whereas previous studies have shown that production incentives tend to bias patentability decisions in favor of allowance,[21] this Article finds that heightened quality incentives may tend to mitigate this bias. This analysis further finds that examiners on the Program issue relatively more second action non-final rejections (SANR) and that they provoke fewer applicant appeals. These findings are important insofar as they demonstrate, for the first time, that heightened quality incentives may induce examiners to measurably increase the quality of patentability decisions, even as quantitative productivity requirements are simultaneously increased.

The remainder of this Article is organized as follows. Part II details the incentive policies under which patent examiners operate and theorizes why these policies may influence patentability decisions. Part III describes the dataset and methodology underlying the present analysis. Part IV presents the results of this analysis and contextualizes these results within the relevant incentive structure. Part V discusses the policy implications of the present findings, and Part VI concludes by summarizing these findings and their context in the academic landscape.

II. THEORY OF EXAMINER INCENTIVE EFFECTS

This Section examines why the USPTO's incentive policies may have an effect on the quantity of patentability determinations that examiners render. It begins by providing support for the propositions that incentives may shift employee behavior to maximize incentivized performance objectives and that these gains may come at a corresponding offset to other aspects of performance. Next, this Section turns to exploring the system of production and quality incentives under which examiners operate and how those incentives may influence the quality of patentability determinations.

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[20] *See infra* Section II.B.3.

[21] GAO-16-490T, *supra* note 12, at 27 (observing that "when pressed for time, examiners tend toward granting patents").

A. INCENTIVE POLICIES & THEIR EFFECTS ON EMPLOYEE PERFORMANCE

Employees operate with some discretion as to the level of effort and time given to their work, as well as to the specific tasks to which that effort is allocated.[22] To the extent that employees are rational actors, they will devote time to the tasks that provide the most marginal reward until the reward no longer exceeds the marginal cost of continuing to pursue that task.[23] Thus, by implementing policies that reward or punish selected behaviors and outcomes, a firm may influence its employees' performance.[24]

Prior studies offer empirical evidence that incentive systems do, in fact, cause employees to shift their behavior to increase productivity. In a leading study, Lazear examined the replacement of a flat-rate hourly compensation scheme with a piece-rate pay system for windshield installers at the Safelite Glass Corporation.[25] Reviewing a 19-month period, Lazear found that the policy change increased employee productivity by 44%, and that approximately half of these gains were attributable to changes in employee behavior.[26] Conversely, Freeman and Kleiner determined that removing a productivity incentive may reduce employee productivity.[27] Examining the elimination of a piece-rate pay system in favor of a flat-hourly rate at a U.S. shoe manufacturer, Freeman and Kleiner found that productivity dropped following the removal of the individual incentive pay system.[28]

While incentivizing productivity has been demonstrated to increase productivity, these gains may come at a corresponding offset to quality. Incentivizing measurable output may cause employees to increase effort directed toward the *measured* output while reducing effort toward *unmeasured* outputs.[29] In cases where quantitative production is more readily measured than work product

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22 *See* Holmstrom & Milgrom, *supra* note 16, at 33–35.

23 *See id.*

24 *See id.*

25 Edward P. Lazear, *Performance Pay and Productivity*, 90 AM. ECON. REV. 1346, 1346–47 (2000).

26 *Id.*

27 *See* Richard B. Freeman & Morris M. Kleiner, *The Last American Shoe Manufacturers: Decreasing Productivity and Increasing Profits in the Shift from Piece Rates to Continuous Flow Production*, 44 INDUS. REL. 307, 307 (2005).

28 *Id.*

29 *See* Holmstrom & Milgrom, *supra* note 16, at 35.

quality, a compensation system that rewards employees per work unit completed may tend to reduce work quality.[30] For example, Freeman and Kleiner found that eliminating the piece-rate pay scheme in favor of flat hourly pay increased product quality, thereby increasing profits even as productivity declined.[31]

There is reason to expect that USPTO examiners may be responsive to incentives. As explained in Section II.B below, the USPTO uses a complex system of metrics to track examiner performance, and these metrics focus predominantly on quantitative production with little regard for work quality.[32] Examiner promotions, bonus awards, and overtime payments are determined largely on the basis of quantitative performance metrics.[33] Meanwhile, examiners spend a substantial portion of their time performing a narrow set of repetitive tasks: reviewing claims, searching prior art, and preparing written patentability determinations.[34] Given the strong emphasis on performance metrics, examiners have reason to become intimately familiar with the metrics by which they are evaluated. With experience, they may learn techniques to maximize their performance in terms of those metrics. Furthermore, examiners have substantial discretion regarding patentability decisions and the level of detail and care applied to their written work products.[35] Due to this combination of strong incentives attached to well-understood metrics, examiners may utilize the broad latitude they are afforded to maximize measured performance objectives while reducing effort directed toward aspects of performance that are not so incentivized.

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30 *Id*.

31 *See* Freeman & Kleiner, *supra* note 27, at 328–29.

32 GAO-16-883T, *supra* note 11, at 12.

33 *See Awards*, PAT. OFF. PROF. ASS'N, http://popa.org/about/advocacy/awards/ [https://perma.cc/4JEA-MMC7] (last visited Mar. 27, 2018); *see also* Memorandum from the Acting Assistant Comm'r for Patents regarding Overtime Policies for Prof'l and Clerical Employees Under the Assistant Comm'r for Patents 3 (Mar. 26, 1990), *available at* http://www.popa.org/static/media/uploads/uploads/dennyotmemo1990.pdf [https://perma.cc/8T7Q-VWW7]; *see Promotions*, PAT. OFF. PROF. ASS'N, http://www.popa.org/about/advocacy/promotions/ [https://perma.cc/C7UW-JRXH] (last visited Apr. 4, 2018).

34 *See* Frakes & Wasserman, *supra* note 10, at 552.

35 *See* Lemley & Sampat, *supra* note 4, at 818–19 (although junior examiners' work is "subject to review from more senior examiners," senior examiners can "sign off on an application independently"); *see also infra* Section II.B.

B. UNITED STATES PATENT & TRADEMARK OFFICE INCENTIVE POLICIES

1. Production & Overtime

The USPTO uses a complex system of metrics to measure and reward examiner performance.[36] From an examiner's perspective, the most important metric is the *production rating*, which roughly tracks the number of patent applications that an examiner reviews per unit time.[37] An examiner's production rating is critical to career development.[38] Examiners must maintain a 95% production rating in order to be considered "fully successful" in quarterly reviews.[39] Examiners who repeatedly fail to meet this threshold may face disciplinary measures and may ultimately be fired.[40] Meanwhile, cash bonuses are awarded to examiners who achieve progressively higher production ratings.[41]

The production metric is also used to determine examiner promotions. To earn a promotion, an examiner must maintain a production level halfway between the production expectancy for her General Schedule (GS) level[42] and the GS-level

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36 GAO-16-883T, *supra* note 11, at 12.

37 *Patent Examiner Count System*, USPTO, https://www.uspto.gov/patent/initiatives/patent-examiner-count-system [https://perma.cc/Q92A-CR9Q] (last visited Mar. 28, 2018).

38 *See* PATENT EXAMINER PERFORMANCE APPRAISAL PLAN (PAP) GUIDELINES 3, 6 (2012), *available at* http://www.popa.org/static/media/uploads/uploads/examiner-pap-guidelines-04_19_12-508.pdf [https://perma.cc/B8Z9-XPNM].

39 *Id.* (defining production exceeding 110% as "outstanding," production between 103% and 109% as "commendable," production between 95% and 102% as "fully successful," production between 88% and 94% as "marginal," and production below 88% as "unacceptable").

40 *See* Memorandum from the Deputy Comm'r for Patents Regarding Application of Oral and Written Warnings and Statutory Performance Improvement and Maintenance Periods (Oct. 27, 2010), *available at* http://www.popa.org/static/media/uploads/uploads/Application_of_Oral_and_Written_Warnings_and_Statutory_Performance_Improvement_and_Maintenance_Periods_10_27_10.pdf [https://perma.cc/QT26-FCG2].

41 *Awards*, *supra* note 33.

42 Patent examiners are federal employees whose salaries are based on an adjusted version of the General Schedule for civil service personnel. *See* OFF. PERSONNEL MGMT., SPECIAL RATE TABLE, NO. 0567,

to which she seeks to be promoted.[43] Depending on the examiner's current GS-level, the production threshold to earn a promotion varies from approximately 104% to 113%.[44]

Given the importance of the production metric, examiners have reason to pay careful attention to the manner in which it is calculated. Broadly speaking, examiners receive work credits (referred to as "counts") when they complete certain stages of the patent-review process.[45] Every two weeks, examiners log the number of hours they spent reviewing applications over the past billing period (referred to as "biweeks"),[46] and the number of counts the examiner earned is divided by the number of hours the examiner reported.[47] The examiner's production is then calculated from this ratio by applying adjustments for the examiner's GS-level and the complexity of the technology in which the examiner works.[48]

The details of the production metric have substantial potential to influence examiner behavior. Most notably, the production metric rewards examiners for making patentability decisions that efficiently generate counts, potentially diluting the examiner's focus on the legal merits of a given patent application. Certain patentability decisions require the examiner to complete more time-consuming tasks, and the number of counts assigned to a task will not always correspond to the time required to complete it.

To explain how counts are allocated, it is useful to first review the ordinary cycle of patent prosecution from the examiner's perspective. An examiner will have any number of new applications awaiting review on her docket.[49] The

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https://apps.opm.gov/SpecialRates/2018/Table057601012018.aspx [https://perma.cc/3QRX-X4DT] (last visited Mar. 28, 2018).

43 *Awards*, *supra* note 33.

44 Authors' calculation based on production requirements for each GS-level.

45 PATENT OFFICE PROF'L ASS'N, *supra* note 33, at 3–5.

46 OFF. OF INSPECTOR GEN., U.S. DEP'T COMMERCE, REP. NO. 15-0076, TIME AND ATTENDANCE ABUSE BY PATENT EXAMINER A 1, 5 (2015), *available at* https://www.oig.doc.gov/OIGPublications/OIG-15-0076-I.pdf [https://perma.cc/FL3F-WXCN].

47 PATENT OFFICE PROF'L ASS'N, *supra* note 33, at 4.

48 Frakes & Wasserman, *supra* note 10, at 552.

49 *Id*. (explaining that before an application enters examination, the Art Unit Supervisory Patent Examiner randomly assigns the application to an examiner).

examiner selects a new application to work on, performs a search, and drafts a patentability decision rejecting or allowing the claims in the application.[50] This first office action is referred to as a "first action on the merits," or a FAOM.[51] If the examiner rejects the application, the applicant may file a response amending the claims or arguing that the examiner's rejection was improper.[52] If the examiner determines that the application is still not in condition for allowance, the examiner may issue a final rejection.[53] In the event that the applicant persuasively argues that first rejection was erroneous, however, the examiner should withdraw the original rejection.

If the examiner determines that the grounds of rejection set forth in the first office action were erroneous but believes that the application can be properly rejected on other grounds, the examiner should issue a second action non-final rejection (SANR) detailing the new grounds of rejection.[54] This action's non-final status means that the applicant will have a second opportunity to argue or submit claim amendments before the examiner can issue a final rejection. Following a final rejection, the applicant may abandon the application,[55] file a "request for continued examination" (RCE),[56] or appeal the rejection,[57] but claim amendments

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50 Frakes & Wasserman, *supra* note 10, at 551 (explaining that the patent examiner links their rejection decision to criteria outlined in the Patent Act).

51 MPEP § 1705 (9th ed. Rev. 08.2017, Jan. 2018)

52 37 C.F.R. § 1.111 (2017).

53 37 C.F.R. § 1.113 (2017).

54 *See* MPEP § 706.07 (9th ed. Rev. 08.2017, Jan. 2018) (explaining that an examiner may not make final a rejection that contains a new ground of rejection, unless the new ground is necessitated by the applicant's claim amendments or, in certain cases, if the new ground is based on information submitted in the applicant's information disclosure statement).

55 37 C.F.R. § 1.135 (2017) ("If an applicant of a patent application fails to reply within the [statutory] time period . . . the application will become abandoned unless an Office action indicates otherwise."); 37 C.F.R. § 1.138 (2017) ("An application may be expressly abandoned by filing a written declaration of abandonment.").

56 37 C.F.R § 1.114 (2017) (indicating that an applicant may request continued examination if an application is closed).

57 35 U.S.C. § 134 (2012) (stating that an applicant may appeal a claim that has been twice rejected).

are generally not permitted absent an allowance or the filing of an RCE.[58] For purposes of the count system, abandonments and RCEs are both considered "disposals."[59] If the applicant appeals, the examiner must write an answer to the appeal brief, and the issuance of an examiner's answer is likewise considered a disposal.[60] Often, the applicant will file an RCE, after which the application is restored to the examiner's docket, and the examiner may begin the cycle anew by issuing another FAOM.[61]

Each stage in this process is assigned a count value. The count values assigned to certain actions were modified when the USPTO reformed its count system in 2010.[62] Prior to these reforms, examiners received one count for issuing a FAOM and one count when a disposal was processed.[63] Notably, examiners received no credit for issuing final rejections.[64] Moreover, examiners received the same number of counts for a FAOM regardless of how many cycles of rejections and RCEs the application had undergone.[65] Naturally, reviewing an application that an examiner has previously searched and rejected requires less time than

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58 MPEP § 714(II)(F)(D) (9th ed. Rev. 08.2017, Jan. 2018) (explaining, "An after-final amendment, the amendment will be forwarded in unentered status to the examiner. In addition to providing reasons for non-entry when the amendment is not in compliance with 37 CFR 1.116 (e.g., the proposed amendment raises new issues that would require further consideration and/or search), the examiner should also indicate in the advisory action any non-compliance in the after-final amendment.").

59 MPEP, *supra* note 51.

60 *Id.*

61 37 C.F.R § 1.114 (2017).

62 Press Release, USPTO, Recently Announced Changes to USPTO's Examiner Count System Go into Effect (Feb. 18, 2010), *available at* https://www.uspto.gov/about-us/news-updates/recently-announced-changes-usptos-examiner-count-system-go-effect [https://perma.cc/RRK9-BHD8]

63 USPTO JOINT LABOR AND MANAGEMENT COUNT SYSTEM TASK FORCE; OVERVIEW OF COUNT SYSTEM INITIATIVES AND CHANGES 3, 7 (U.S. Patent & Trademark Office PowerPoint, Mar. 8, 2010), *available at* http://www.uspto.gov/sites/default/files/patents/init_events/Count_System_changes-Overview_3-8-2010.ppt [https://perma.cc/M9Y2-P9Y3]

64 *Id*. at 7.

65 *Id*.

reviewing a brand new application. Repeatedly rejecting applications to cycle through RCEs and earn FAOM counts on familiar applications may therefore have been an efficient strategy to maximize production. Allowing an application on a FAOM may have been another efficient technique. Because allowances are considered disposals, issuing an allowance on a FAOM earned the examiner two counts—one for issuing an FAOM and one for processing a disposal—on a single action.[66]

Count allocations were revised in 2010 to better track the time required to perform tasks and, relatedly, to reduce the incentive for examiners to cycle through rejections seeking efficient RCE counts.[67] Under the new system, examiners earn 1.25 counts for the first FAOM they issue on a given application.[68] Final rejections receive 0.25 counts, and disposals receive 0.5 counts.[69] If an RCE is filed, the examiner's second FAOM will earn 1.0 count.[70] If additional RCEs are filed, any subsequent FAOMs receive only 0.75 counts.[71] Thus, the reduced effort required to review a familiar application is met with progressively lower reward.

Accordingly, it is less clear under the current system that rejections—and the resulting RCEs—are an efficient pathway to maximize production. Repeated rejections on a single application would allow more opportunities to earn counts on the same application, but the number of counts awarded per rejection would be reduced relative to the number of counts that could be earned by examining a new application. Instead, issuing allowances (particularly on a FAOM) may be a relatively more efficient course. Like the old system, the new count system allocates FAOM credit as well as disposal credit to allowances on FAOMs. From the examiner's perspective, allowances provide additional counts for a single action and also curtail the cycle of rejections and RCEs before the count value is fully reduced.

The production system may also influence an examiner's biweekly compensation if the examiner chooses to claim overtime. Examiners who are rated fully successful or above are generally permitted to collect additional pay by

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66 *USPTO Joint Labor and Management Count System Task Force*, *supra* note 63, at 7.

67 *Id*.

68 *Id*.

69 *Id*.

70 *Id.*

71 *USPTO Joint Labor and Management Count System Task Force*, *supra* note 63, at 7.

claiming overtime hours on their biweekly timesheets.[72] While examiners are not permitted to claim more hours than they actually worked, the USPTO has limited ability to directly monitor the amount of time that examiners spend working.[73] Overtime claims are likely checked, at least in part, by the production system. Overtime hours are included in the examiner's work time, which has the effect of increasing the denominator in the production calculation and reducing the examiner's production rating.[74] Thus, if an examiner wishes to maintain her production rating at fully successful or better, she should only claim overtime hours for the excess counts that she is able to produce. In effect, the overtime system provides an additional monetary incentive for maximizing count production.

2. Quality Incentives

Given the central importance of the production rating metric to the operation of the USPTO, it may seem incongruous that there is no comparable tool for measuring quality. In most cases, quality is only loosely regulated through four channels: signature reviews, performance appraisals, reviews by the Office of Patent Quality Assurance (OPQA), and applicant-initiated appeals.[75] For reasons explained below, none of these channels provides a strong incentive for examiners to sacrifice production to increase the quality of patentability determinations.

The signature review process is most apparent in the day-to-day life of many examiners. For a junior examiner (generally, examiners at GS-13 or below) to issue a patentability decision, the work must be reviewed and signed either by their supervisor or a primary examiner who has agreed to conduct reviews on behalf of the supervisor.[76] Given time constraints, however, it may be challenging for supervisors to review all of the work that they must sign, so work products may receive less scrutiny as examiners gain more experience and earn the trust of their supervisors. Additionally, supervisors are evaluated and awarded, in part,

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[72] Memorandum from the Acting Assistant Comm'r for Patents, *supra* note 33, at 1.

[73] OFFICE OF INSPECTOR GENERAL, *supra* note 46, at 2.

[74] PATENT OFFICE PROF'L ASS'N, *supra* note 33, at 6.

[75] OFF. OF INSPECTOR GEN., U.S. DEP'T COMMERCE, FIN. REP. NO. OIG-15-026-A, USPTO NEEDS TO STRENGTHEN PATENT QUALITY ASSURANCE PRACTICES 1 (2015); *see generally* MPEP § 1200 *et seq* (9th ed. Rev. 08.2017, Jan. 2018).

[76] Frakes & Wasserman, *supra* note 10, at 552.

on the aggregate production of the examiners they oversee.[77] Accordingly, supervisors have a vested interest in timely signing the work products that they review. Note also that this stage of review is confined only to examiners who lack signatory authority and does not occur when a primary examiner issues a patentability decision.

Both primary and junior examiners receive annual performance appraisals in which supervisors assess the quality of their work.[78] Technically, a low quality assessment *could* prevent an examiner from receiving production-based bonuses to which they would otherwise be entitled, but this rarely occurs.[79] Supervisors are required to conduct a detailed review of at least four patentability decisions that the examiner issued over the review period, and any clear errors identified by the supervisor may be applied against the examiner's quality rating for that period.[80] When calculating the examiner's quality rating, however, the number of cases in which the supervisor has identified an error is divided by the total number of final determinations made by the examiner—not by the number of cases that were included in the review sample.[81] The result is that an examiner who commits errors in four out of four cases selected for review could nevertheless achieve an error rate under 5.5% and earn a "commendable" rating, so long as she produced at the average rate of 73 final determinations during the year.[82]

Supervisors are additionally incentivized to avoid assigning errors. If a supervisor records an error and refuses to withdraw the error upon the examiner's request, the examiner may challenge the error with the Technology Center Director[83] or raise a grievance with the Patent Office Professional Association.[84]

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77 U.S. GOV'T ACCOUNTABILITY OFF., GAO-10-946R, U.S. PATENT AND TRADEMARK OFF.: PERFORMANCE MANAGEMENT PROCESSES 4 (2015) [hereinafter PERFORMANCE MANAGEMENT PROCESSES].

78 FIN. REP. NO.OIG-15-026-A, *supra* note 75, at 4.

79 *Id.* (finding from 2009-2013, 99 percent of examiners had quality ratings making them eligible for bonuses).

80 *Id.* at 3–7.

81 *Id.* at 7.

82 *Id.* at 6–7.

83 FIN. REP. NO.OIG-15-026-A, *supra* note 75, at 6.

84 *Id.*

The supervisor may obviate this time-consuming rebuttal process by electing to coach the examiner rather than charging a formal error.[85]

Moreover, supervisors have a financial interest in the production ratings of their examiners.[86] In the event that a supervisor has failed to raise quality concerns over the course of the year, there may be little to gain by docking the examiner's performance in the year-end review. It is therefore unsurprising that between fiscal years 2009 and 2013, "99 percent of examiners received quality ratings that made them eligible for almost $145 million in" production-based bonuses.[87] In such a context, annual quality appraisals likely provide minimal incentive for the examiner to focus on quality at the expense of production.

OPQA reviews, which are intended to generate a statistically significant estimate of corps-wide examination quality,[88] do not provide meaningful incentives for individual examiners to maintain high quality standards. From fiscal year 2009 through fiscal year 2013, the OPQA performed between 6,000 and 8,000 reviews per year, which amounted to less than 1% of examiner decisions issued over the same period.[89] Beginning in fiscal year 2010, errors found by OPQA could not be used to calculate an examiner's error rate,[90] thereby eliminating any link between OPQA reviews and examiner performance appraisals. Even prior to 2010, errors identified by OPQA were not consistently charged to examiners because there were no uniform policies or procedures for doing so.[91] Moreover, given that less than 1% of examiner decisions were reviewed,[92] the threat of being charged an error by OPQA was low.

The threat of applicant-initiated appeals provides the most meaningful incentive for examiners to maintain quality standards. Unlike the quality levers discussed above, applicant-initiated appeals have the potential to directly impact

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85 *Id.* at 6–7.

86 *See, e.g.*, *id.* at 7 ("[T]here is an incentive to not charge errors in order to avoid the potential time-intensive error rebuttal process.").

87 *Id.* at 4.

88 *See id.* at 11 (describing the purpose and some processes of the OPQA).

89 *Id*. at 10–11.

90 FIN. REP. NO.OIG-15-026-A, *supra* note 75, at 8.

91 *See* OFF. INSPECTOR GEN., U.S. DEP'T COMMERCE, FIN. REP. NO. OIG-11-006-I, U.S. PATENT AND TRADEMARK OFF. PATENT QUALITY ASSURANCE PROCESS 4 (2010).

92 *See* FIN. REP. NO. OIG-15-026-A, *supra* note 75, at 22.

an examiner's production. If an examiner issues a non-final rejection that is clearly improper or fails to meet minimal quality standards, the applicant may respond by noting the errors and demanding that the examiner withdraw the rejection.[93] If the examiner concedes and withdraws the rejection, she must spend time to issue a new decision, thereby discarding her prior work and reducing her production efficiency.[94] If the examiner instead issues a final rejection that maintains the erroneous grounds, the applicant may appeal the examiner's rejection to the Patent Trial and Appeal Board.[95] Before the examiner is permitted to respond to the appeal, however, two additional senior examiners must approve the examiner's rejection.[96] If the examiner's rejection is clearly improper, the rejection likely will not be cleared, in which case the examiner must withdraw the prior rejections and issue a new decision for which the examiner will receive no counts.[97] Since low-quality rejections followed by effective applicant responses can reduce an examiner's production, examiners have an incentive to maintain quality standards sufficient to avoid provoking applicant appeals.

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93 37 C.F.R. § 1.111 (2017).

94 If the examiner decides to issue a new rejection, she must make the new rejection non-final, in which case she receives no counts for issuing the decision. *See* 37 C.F.R. §§ 1.112-1.113 (2017) (prescribing the processes for reconsideration); *USPTO Joint Labor and Management Count System Task Force*, *supra* note 63, at 7 (identifying the actions that generate counts) (If the examiner instead decides to issue an allowance, she will receive disposal counts for the case. *Id.* In the case of an allowance, however, the original non-final rejection is wasted effort since (1) the low-quality rejection failed to force the applicant to comply with patentability requirements, and (2) the examiner could have received the same number of counts by issuing an allowance on the first action.

95 35 U.S.C. § 134 (2012). Prior to September 16, 2012, the Patent Office's administrative appeal board was called the Board of Patent Appeals and Interferences. *See* MPEP § 1201 (9th ed. Rev. 08.2017, Jan. 2018). The process for appealing examiner rejections was otherwise unchanged. *See id*.

96 MPEP § 1207.01 (9th ed. Rev. 7, Oct. 2015) ("The participants of the appeal conference should include (1) the examiner charged with preparation of the examiner's answer, (2) a supervisory patent examiner (SPE), and (3) another examiner.").

97 *USPTO Joint Labor and Management Count System Task Force*, *supra* note 63, at *7* (showing that under both versions of the count system, examiners do not receive counts for SANR).

While the threat of applicant-initiated appeals provides a more meaningful check on work product quality than the other channels discussed above, this incentive is still quite limited. Applicants do not appeal allowances, so a substantial set of decisions are not subject to the appeal process. In fact, the uneven application of this review may actually bias patentability decisions in favor of allowance.[98] To the extent that an examiner wants to hurriedly issue a low-quality decision to maximize production, she has an incentive to issue an allowance rather than a rejection in order to avoid the possibility of an appeal exposing her low-quality work.

Even in the context of rejections, the quality incentive is incomplete. For applicants, an appeal represents a long and costly delay.[99] Accordingly, many practitioners may seek to avoid appeals, reserving the option for only the most clearly erroneous rejections. This may limit the reach of the quality incentive since an examiner need only maintain quality standards just high enough to discourage appeals. Moreover, maintaining a uniformly low quality standard that invites appeals on a small subset of cases may still be an efficient strategy if the time lost dealing with those appeals is less than the time saved by sacrificing quality on cases that applicants choose not to appeal.

In sum, the production rating metric provides a strong incentive for examiners to maximize the number of patentability decisions they issue. High quantitative production is rewarded with promotions, cash bonuses, and overtime compensation. Meanwhile, examiners with low production ratings face disciplinary measures and may eventually be fired. The USPTO has no equivalent tool to monitor the quality of patentability decisions. Quality is loosely regulated through signature reviews, performance appraisals, OPQA reviews, and applicant-initiated appeals. Each of these quality checks is limited in effect, and even in combination, they do not provide a strong incentive for examiners to sacrifice quantitative production to increase the quality of patentability decisions

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98 *See* Melissa F. Wasserman, *The PTO's Asymmetric Incentives: Pressure to Expand Substantive Patent Law*, 72 OHIO ST. L.J. 379, 404–05 (2011) (noting that at the agency-level, the Patent Office can avoid costly appeals by granting patents, and that this incentive may bias Patent Office officials toward policies and decisions that favor patent applicants); *see also* Jonathan Masur, *Patent Inflation*, 121 YALE L.J. 470, 503–05 (2011) (noting that only rejections are subject to appeals, and that this may encourage the Patent Office to err on the side of granting patents).

99 OFF. OF INSPECTOR GEN., U.S. DEP'T COMMERCE, FIN. REP. NO. OIG-12-032-A, USPTO'S OTHER BACKLOG: PAST PROBLEMS AND RISKS AHEAD FOR THE BOARD OF PATENT APPEALS AND INTERFERENCES 2 (2012) (finding that from 2005–2012, average appeal pendency increased from 6 months to 23 months).

and written work products. Given the presence of strong production incentives and the lack of meaningful quality incentives, there is reason to expect that examiners may direct greater effort toward maximizing quantitative production while reducing the effort they direct toward maintaining the quality of patentability decisions.

3. Signatory Authority Review Program

Ordinarily, examiners do not have strong incentives to expend effort toward increasing the quality of patentability decisions and written work products. The Signatory Authority Review Program (the "Program") represents a significant departure from this status quo. The Program is a nearly two-year process that involves sustained periods of intensive quality review.[100] Only by successfully completing the Program may examiners earn signatory authority, be promoted to GS-14 and receive an accompanying salary increase, and achieve the title of primary examiner.[101] Thus, the Program represents an isolated period in which an examiner's career advancement depends directly on the quality of her patentability decisions.

The structure of the Program is detailed in a 1992 policy memorandum circulated by the Office of the Assistant Commissioner for Patents.[102] In the first of two stages, the examiner may earn **partial signatory authority**, which allows her to sign non-final rejections.[103] After successful completion of this stage, the examiner may endeavor to earn **full signatory authority**, which allows her to sign allowances and final rejections.[104] To earn partial signatory authority, an examiner must first complete a 10-biweek eligibility period, which automatically begins when the examiner is promoted to GS-13.[105] During the eligibility period,

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100 Memorandum from Edward C. Kubasiewicz, Assistant Comm'r for Patents on Signatory Auth. Program to All Patent Examiners 2–3 (Dec. 1, 1992), *available at* http://www.popa.org/static/media/uploads/uploads/sig-main.pdf [https://perma.cc/YF44-KSKT] (detailing a four step process consisting of 46 pay periods).

101 *See id*. ("The eligibility period is the time between a promotion to GS-13 and entry onto the Partial Signatory Authority Program trial period . . . .").

102 Memorandum from Edward C. Kubasiewicz, *supra* note 100.

103 *Id.* at 2–3.

104 *Id.* at 1.

105 *Id.* at 2.

examiners are subject to ordinary production and quality incentives.[106] If the examiner maintains fully successful ratings throughout the eligibility period, she may enroll in a 13-biweek trial period during which she is temporarily granted authority to sign non-final rejections,[107] and her production expectancy is increased.[108] At the conclusion of the trial period, a sample of at least 17 patentability decisions is selected for intensive review to determine how many, if any, of the decisions contain clear errors.[109] The number of identified errors is then divided by the number of decisions the examiner issued during the sample period to arrive at an **error rate**.[110] If the calculated error rate and the examiner's production rating are each at or above the fully successful level, the examiner will be permanently awarded partial signatory authority.[111] If the examiner committed too many errors, however, she will fail the evaluation and must begin the process anew.[112]

An examiner who successfully achieves partial signatory authority may proceed to the second stage of the Program, beginning with a 10-biweek eligibility period during which production and quality are again tracked through ordinary procedures.[113] Upon successful completion of this eligibility period, the examiner may enroll in a second 13-biweek trial period,[114] during which she is temporarily granted authority to sign allowances and final rejections,[115] and her production

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106 *Id*. (explaining that an examiner will automatically proceed to the next stage of the Program "if the examiner has performed at least at the Fully Successful level in all the elements of the examiner's PAP during the eligibility period").

107 *Id.*

108 PATENT OFFICE PROF'L ASS'N, *supra* note 33 (indicating that the examiners position factor is increased from 1.15 to 1.25 when she receives partial signatory authority).

109 Memorandum from Edward C. Kubasiewicz, *supra* note 100.

110 *Id.* at 4–5.

111 *Id.* at 4–6.

112 *Id.* at 4.

113 *Id*. at 2.

114 Memorandum from Edward C. Kubasiewicz, *supra* note 100.

115 *Id.* at 4.

expectancy is increased yet again.[116] A sample of at least 17 decisions issued by the examiner during the second trial period is then selected for review, and an error rate for the second trial period is calculated.[117] Unlike the sample selected in the first trial period, this second review sample is weighted toward allowances and final rejections.[118] If the examiner's production and error rate are each at or above the fully successful level, the examiner is awarded full signatory authority and is promoted to the position of primary examiner.[119] Otherwise, she must attempt the second stage of the Program again.[120]

During the trial periods, examiners are uniquely incentivized to render only high-quality patentability decisions. Unlike the general population of examiners, the set of examiners who are in the midst of the trial periods likely conduct their work with the knowledge that a substantial percentage of their decisions will be subject to intensive quality review. Moreover, these examiners likely understand that committing errors on even a small number of their decisions may prevent them from being promoted to GS-14 and earning signatory authority. Due to this strong incentive to maintain high quality standards, there is reason to expect that patentability decisions issued by examiners on the Program will be of higher quality than the decisions that are issued before or after this period of intensive quality review.[121] The Program thus represents a unique opportunity to investigate the effects of heightened quality incentives on examiner decision-making, and it is the focus of the empirical analysis presented in the following sections of this Article.

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116 PATENT OFFICE PROF'L ASS'N, *supra* note 33, at 3 (indicating that the examiners position factor is increased from 1.25, for GS-13 (PSA), to 1.35, for GS-14, when she receives full signatory authority).

117 Memorandum from Edward C. Kubasiewicz, *supra* note 100, at 4–5.

118 *Id.* at 4.

119 *Id*.

120 *Id*.

121 *Cf.*, U.S. PAT. & TRADEMARK OFF., PATENT LITIGATION AND USPTO TRIALS: IMPLICATIONS FOR PATENT EXAMINATION QUALITY 3 (Jan. 2015), *available at* https://www.uspto.gov/sites/default/files/documents/Patent%20litigation%20and%20USPTO%20trials%2020150130.pdf [https://perma.cc/J5JU-3NVE] (finding that if the examiner who allowed the claims was a GS-13, the patent was less likely to have an IPR proceeding instituted than if the examiner was a GS-14, or a GS-12 or below).

III. DATA AND METHODOLOGY

A. DATA

To assess the impact of the Program—and its heightened quality incentives—on examiner decision-making, it is necessary to compile a robust dataset from which examiner patentability decisions may be linked to the dates during which they were on the Program. Frakes and Wasserman have previously compiled and published an extensive dataset that includes transaction histories and various quality-related indicators for every utility patent application that was filed on or after March 2001 and published by July 2012.[122] The published data also includes annual examiner roster data beginning in 1992, which Frakes and Wasserman use to match examiner characteristics to the application-level data.[123] Because the examiner roster data is available only on an annual basis, however, it is not possible to accurately predict the time period during which an examiner was on the Program and subject to heightened quality incentives.

This Article expands upon these datasets by contributing precise examiner promotion data and leveraging this information to determine whether a given patentability decision was issued while the examiner was on the Program. By filing a FOIA request with the USPTO, the authors obtained daily promotion data for every examiner promotion from January 2000 to September 2015. This data links examiner names and GS-levels to the dates of approximately 34,000 promotions, including approximately 4,250 promotions to GS-14.

Because the transaction history and promotion datasets each specify examiner names, it was possible to compile a merged file linking transaction data to the date on which the issuing examiner was promoted to GS-14. The merged dataset includes approximately 18.5 million transactions performed on 500,000 applications spanning the period March 2001 to July 2012.

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122 Frakes & Wasserman, *supra* note 10, at 553.

123 *Id*.

B. METHODOLOGY

This Article analyzes the set of patentability determinations rendered by examiners who were eventually promoted to GS-14 and seeks to identify changes in examiner decision-making before, during, and after examiners successfully complete the Program. As discussed in Section III, examiners are ordinarily subject to strong production incentives and weak quality incentives. The Program—in particular, the first and second trial periods—constitutes a unique period in an examiner's career during which she is subject to much stronger quality incentives. Thus, the design of the Program represents a discrete shock-event in which examiners are subject to treatment (heightened quality incentives) for a period of time and are then returned to the status quo.

To identify patentability decisions made while the issuing examiner was on the Program, we focus on the 37-biweek period (518 days) prior to the date on which the examiner was promoted to GS-14. Since an examiner cannot be promoted to GS-14 without successfully completing the Program, this 37-biweek selection should approximate the period during which the examiner was on the Program and subject to heightened quality incentives. Specifically, the 37-biweek selection is designed to cover the first trial period (13 biweeks), the second eligibility period (10 biweeks), the second trial period (13 biweeks), and one additional biweek to account for administrative time to review the examiner's work product and implement the promotion.

This method approximates the period of heightened quality incentives, but it will not produce a perfect match. First, the 37-biweek selection is designed to capture the minimum time required to complete the first and second trial periods. If an examiner repeats one of the trial periods or spends more than 10 biweeks in the second eligibility period, the 37-biweek selection will not capture the entire duration of the heightened quality incentives. That the heightened quality incentives may begin prior to this selection for some examiners may tend to under-report the observed effects when examiners begin the first trial period.

Second, the promotion to GS-14 must follow the successful completion of the second trial period.[124] To the extent that some examiners may cycle through multiple attempts before passing the second trial period, there is theoretical potential that the requirement for at least one successful trial may bias the sample. The magnitude of this bias may be mitigated, however, by the fact that an examiner who fails the second trial period on her first attempt but passes a subsequent attempt will have her examination data from a failed attempt at the second trial period replace the data from her successful completion of the first trial

[124] *See* Patent Office Prof'l Ass'n *supra* note 116.

period. Additionally, if this selection bias were statistically meaningful, it would likely inflate the quality of patentability determinations in the treatment pool since successful attempts at completing the Program will be included in the treatment pool, but some unsuccessful attempts may be excluded. Thus, the statistical markers for high-quality patentability decisions discussed in Section IV would not be undermined—and might in fact be strengthened—if this sample bias were statistically meaningful.

The primary mode of analysis used by the authors is to convert transaction-level data into time series that reference time relative to the associated examiner's promotion to GS-14. For each patentability decision, the analytical dataset specifies the patent application number, the type of transaction, the date on which it occurred, the name of the assigned examiner, and the date on which the examiner was promoted to GS-14. Other quality-related indicators are also provided, including whether the European Patent Office (EPO) and Japanese Patent Office (JPO) allowed patent applications in the same patent family. For each patentability decision, the authors subtract the transaction date from the date that the issuing examiner was promoted to GS-14 to generate a relative time variable that represents the timing of the decision relative to the examiner's promotion to GS-14. The authors then flag instances where the transaction or sequence of transactions suggests a quality-probative event and determine the frequency of such instances for each day within the relative time variable. The frequency data can then be expressed as a function of time relative to the issuing examiner's promotion to GS-14.

For example, to identify the number of allowances that were mailed on the day that the issuing examiner was promoted to GS-14, the authors determined the number of instances in which a notice of allowance was mailed on the day the issuing examiner was promoted to GS-14 (i.e., where the relative time variable is zero). This process is repeated for each day before the promotion, as well as for each day after the promotion. Next, the same process is used to measure the frequency of non-final and final rejections. Finally, an allowance rate is determined by dividing the number of allowances on a given day by the total number of patentability decisions (allowances, non-final rejections, and final rejections). Figure 1 charts the resulting allowance rate as a function of time relative to GS-14 promotion.[125]

This method is used to determine the frequency of other quality-probative indicators. The quality-probative indicators analyzed in this Article are: (1) allowance rate, (2) frequency of second action non-final rejections, (3) the rate at which rejections provoke the filing of a notice of appeal, and (4) the rate at which

[125] *See infra* Figure 1.

allowances are corroborated by patent family grants at either the EPO, JPO, or both. The reasons that these indicators are thought to be probative of examination quality are detailed in Section IV.

Examiner characteristics such as experience and start date are not controlled for in the charts provided herein. Such controls were found to be unnecessary due to the design of the study and the strong effects that clearly overlap with the treatment period. Figure 4, which charts the rate at which rejections provoke the filing of a notice of appeal, represents the sole exception.[126] In this case, it was helpful to isolate the effect of being on the Program from the strong relationship between examiner experience and the rate at which examiners provoke appeals. This control variable, charted in Figure 5,[127] is determined according to the same methodology described above except that the time variable is days of examiner experience. Most of the variables charted in this Article are smoothed by applying a centered moving average filter of width 200 observations.[128] Figure 5 is instead smoothed by applying a centered moving average filter of width 600 observations.[129]

IV. RESULTS AND DISCUSSION

This Section discusses divergences in examiner decision-making that occur while examiners are on the Program and subject to heightened quality incentives. Four theoretical indicators for work product quality are addressed: (1) allowance rate, (2) frequency of SANRs, (3) the rate at which rejections provoke the filing of a notice of appeal, and (4) the rate at which allowances are corroborated by patent family grants at either the EPO, JPO, or both.

A. ALLOWANCE RATE

The academic literature has often associated high allowance rates with low-quality examination practices.[130] While it is not yet possible to directly

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126 *See infra* Figure 4.

127 *See infra* Figure 5.

128 *See id*. This filter receives an input of 200 data points (x,y) and outputs the arithmetic mean thereof ($\bar{x}$,$\bar{y}$).

129 *See id*.

130 *See* Frakes & Wasserman, *supra* note 10, at 560 ("Our analysis finds that as examiners are given less time to review applications upon certain types of promotions, the less prior art they cite, the less likely they are to make time-consuming obviousness rejections, and the more likely they are to grant

measure patent quality, it is certainly true that from the examiner's perspective, granting an allowance will often represent the path of least resistance.[131] On a first action on the merits (FAOM), an allowance produces almost twice as many counts as a rejection.[132] On the second action, an allowance will produce an immediate disposal count, whereas a final rejection typically will not produce a disposal count for months.[133] Additionally, rejecting an application forces the examiner to prepare a detailed report of the reasons for her rejection and a response to each of the applicant's arguments.[134] Issuing an allowance requires no equivalent written work product.[135] Moreover, rejecting invites the risk that the applicant will demonstrate the applied rejections to be improper, which would necessitate additional work that would not be rewarded with counts.[136] Thus, if the

patents. Moreover, our evidence suggests that these marginally issued patents are of weaker-than-average quality.").

131 *See* Memorandum from Peggy Focarino, Deputy Commissioner for Patents, United States Patent and Trademark Office, *FY 2011 Examiner Production Credits and Revisions to Examiner Expectancies* 2 (Aug. 31, 2010), http://popa.org/static/media/uploads/Agreements/counts-counts-31aug2010.pdf [https://perma.cc/SLM6-W9CT] (noting that a first action allowance is worth more counts than any other first actions).

132 *See id.* (noting specifically that a first action allowance is worth 2.0 counts, while a first action rejection is worth 1.25 counts).

133 *See id.* (noting that a third action is required to dispose of an application after a second action rejection).

134 *See* 37 C.F.R. § 1.104(a)(2) (2017) ("The applicant . . . will be notified of the examiner's action. The reasons for any adverse action or any objection or requirement will be stated in an Office action and such information or references will be given as may be useful in aiding the applicant."); MPEP § 707.07(f) (9th ed. Rev. 08.2017, Jan. 2018) ("Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it.").

135 *See* 37 C.F.R. § 1.104(e) (2017) ("If the examiner believes that the record of the prosecution as a whole does not make clear his or her reasons for allowing a claim or claims, the examiner *may* set forth such reasoning.") (emphasis added).

136 *See* MPEP § 706.07(a) (9th ed. Rev. 08.2017, Jan. 2018) ("Second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims, nor based on information submitted in an information disclosure statement."); Memorandum from Peggy Focarino,

patentability of an application is marginal, the production incentives favor allowance.[137]

If production incentives ordinarily bias examiner decision-making in favor of allowance, there is reason to expect that strong quality incentives would tend to mitigate this bias and thereby reduce allowance rate. This theory offers a specific prediction for how examiner behavior should change during the Program. Namely, one should expect the allowance rate to dip as heightened quality incentives are applied and then snap back to status quo as heightened quality incentives are removed. Indeed, this pattern is clearly demonstrated in Figure 1, which shows a pronounced drop in allowance rate that coincides with the timing of the Program.[138]

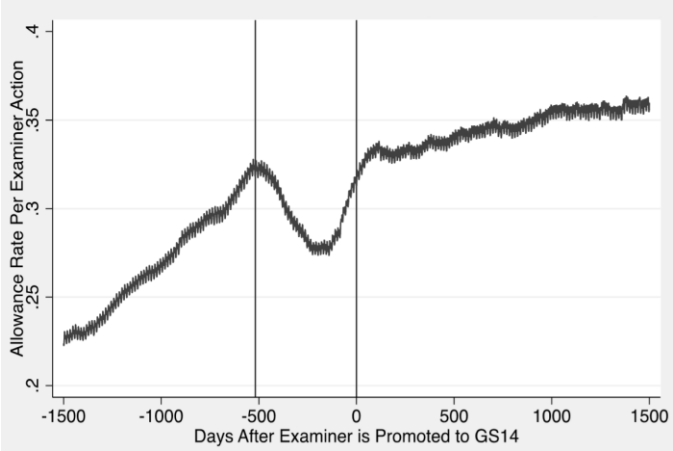

Figure 1. Examiners on Program Issue Fewer Allowances
Allowances as Fraction of Examiner Actions (Allowances and Rejections)

Figure 1 charts the ratio of allowances over total patentability decisions as a function of time relative to GS-14 promotion.[139] Thus, just prior to the beginning of the first review period (estimated at t = -518 days), allowances constitute

supra note 131 (noting that no credit is awarded for a second action non-final rejection).

137 *See* Memorandum from Peggy Focarino, *supra* note 131 (noting that a first action allowance is worth more counts than any other first actions).

138 *See infra* Figure 1.

139 *See supra* Figure 1.

approximately 32.8% of examiner patentability decisions.[140] During the Program, this ratio falls to 27.4%, before snapping back to 32.6% within four weeks of the promotion to GS-14.[141] Graphically, the rebound in allowance begins somewhat before and settles somewhat after the conclusion of the Program.[142] This is likely a product of the smoothing filter, which causes each charted output point to include data from 100 days prior and 100 days after the given point. Because the charted data for up to 100 days before or after the treatment window includes some treatment data, we should expect the charted data near the treatment window to partially reflect the treatment effect. To the extent that a lag exists in the unsmoothed data, it may be partially attributable to the fact Figure 1 charts the time that a notice of allowance is mailed, which follows the date that the examiner renders the decision to allow. Additionally, it may take some time for habits formed during the Program to fully revert to status quo.

The observed drop in allowance rate is quite significant as it represents a 16.5% decrease in the number of allowances issued. Moreover, the timing of the drop, which begins when heightened quality incentives are applied and snaps back to the status quo when the incentives are removed, provides strong support for an inference that being on the Program causes examiners to reduce the rate at which they issue allowances.

B. Frequency of Second Action Non-Final Rejections

SANRs have not been previously studied as a quality-probative event. USPTO officials may be inclined to regard a SANR as an indicator for low-quality examination since an examiner who issues a SANR effectively concedes that she made an error.[143] As explained herein, however, the relationship between work product quality and SANRs is quite complex. In fact, the data better supports a conclusion that high-quality examination actually increases the incidence of SANRs.

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140 *See id.*

141 *See id.*

142 *See id.*

143 *See* MPEP § 706.07(a) (9th ed. Rev. 7, Oct. 2015) ("Second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims, nor based on information submitted in an information disclosure statement.").

As defined for purposes of this Article, a SANR occurs where an examiner issues a non-final rejection, the applicant files a response, and the examiner issues a second non-final rejection without an intervening final rejection or RCE. This pattern of transactions is thought to be probative of examination quality for several reasons. First, production incentives disfavor SANRs.[144] An examiner receives no counts for issuing a SANR,[145] and issuing a SANR permits the applicant to file an additional response, thereby delaying receipt of the eventual disposal count. Since quality incentives are shown in Section IV.A to mitigate biasing effects of the production system, one might initially expect examiners on the Program to issue relatively more SANR.

There are, however, countervailing quality-related considerations at issue. Given that SANRs produce no counts,[146] an examiner should rationally issue a SANR only when the circumstances of the application require them to do so. An examiner must issue a SANR where the applicant has persuasively argued that the previously applied rejection was improper, but where the application is still not allowable over the prior art.[147] In other words, the issuance of a SANR indicates that the examiner has considered the applicant's arguments and decided to concede that her previous rejection contained an error.[148]

The effects of quality incentives surrounding this decision are difficult to unpack because these incentives will plausibly influence both the initial rejection and the SANR. In isolation, the decision to issue a SANR suggests high-quality examination since it indicates that the examiner has carefully considered the applicant's arguments and has decided to sacrifice production efficiency to make the correct decision on the merits of the application. However, a SANR will only be necessary if the applicant is able to persuasively argue that the preceding

144 *See* Memorandum from Peggy Focarino, *supra* note 131 (noting that no credit is awarded for a SANR).

145 *See id.*

146 *See id*.

147 *See* MPEP § 706.07(a) (9th ed. Rev. 08.2017, Jan. 2018) ("Second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims, nor based on information submitted in an information disclosure statement.").

148 *See id.* ("Second or any subsequent actions on the merits shall be final, except where the examiner introduces a new ground of rejection that is neither necessitated by applicant's amendment of the claims, nor based on information submitted in an information disclosure statement.").

rejection contained an error. That an error was identified in the preceding rejection might on first glance suggest low-quality examination. On the other hand, a high-quality rejection may tend to be substantially more detailed and specific than a low-quality rejection. In the absence of strong quality incentives, experienced examiners may devote detailed attention to only the limitations in the first independent claim, making, at most, brief reference to the remaining claim terms or declining to address them at all. Another strategy is a "shotgun" approach in which examiners apply multiple rejections with little detail,[149] hoping that the applicant will fail to effectively poke holes in each of the rejections. To the extent that it is easier for applicants to identify inconsistencies in more detailed rejections, high-quality rejections may actually be more likely to necessitate subsequent SANRs.

In sum, this theory predicts that, all else equal, heightened quality incentives will render examiners more likely to issue SANR. In the context of the Program, however, all else may not be equal because many of the rejections preceding SANRs will also have been issued under heightened quality incentives. The theory is ambiguous as to the effect of quality incentives on rejections preceding SANRs—applying heightened quality incentives for non-final rejections could plausibly increase or decrease the rate at which applicants are able to effectively demonstrate errors in those rejections. Figure 2 lends support to the prediction that heightened quality incentives will produce more SANRs.

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149 *See* Michael Frakes & Melissa F. Wasserman, *Procrastination in the Workplace: Evidence from the U.S. Patent Office* 14 n.17 (Duke Law Sch. Pub. Law & Legal Theory, Paper No. 2017-15), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2888061 [https://perma.cc/F53J-ZYZD] ("The term [shotgun rejection] refers to patent examiners rejecting claims for questionable reasons in part because of time pressures of work.") (internal citations and internal quotations omitted).

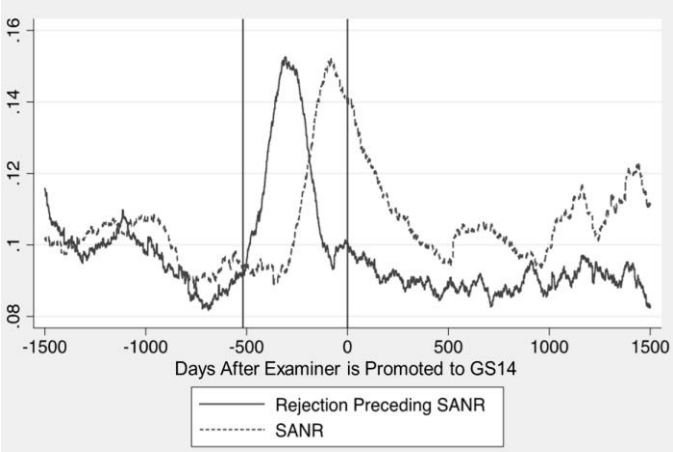

Figure 2. SANRs are More Frequent When Examiners are on the Program
Fraction of Non-Final Rejections that Are or Precede SANR

Figure 2 shows a spike in rejections that precede SANRs during the first half of the Program and a spike in SANRs beginning in the second half of the Program. These results indicate that the incidence of SANRs is more frequent when examiners are on the Program, but the reasons behind this increase are less clear. One possibility is that rejections issued during the first half of the program are more detailed, with the result that applicants are better able to identify errors in these rejections. A second possibility is that examiners more carefully consider applicant responses and are less likely to issue a final rejection that maintains a questionable rejection during the second half of the program. A third possibility is that examiners on the Program reject applications that are nearer to the threshold for patentability, and these questionable rejections provide more fertile grounds for effective applicant responses. Note that these hypotheses are not mutually exclusive, and Figure 2 may reflect two or more of these effects operating in combination.[150]

When evaluating these potential causes, it is helpful to bear in mind two key facts. First, the Program consists of two distinct trial periods that apply slightly different incentives. Quality reviews following the first trial period are weighted toward non-final rejections, while quality reviews following the second trial period are weighted toward final rejections and allowances.[151] Second, the median time between a first rejection and a SANR in the sample is 182 days, which

[150] *See supra* Figure 2.

[151] Memorandum from Edward C. Kubasiewicz, *supra* note 100, at 4.

represents the time required for the applicant to file a response and for the examiner to consider and respond to the applicant's arguments.[152] Meanwhile, the first and second trial periods are separated by a 10 biweek (140 day) eligibility period.[153] Thus, a SANR issued during the second trial period will often follow a non-final rejection issued during the first trial period. The result is that both decisions in this chain will be issued during the portion of the Program that most emphasizes quality for the respective category of decision, and the incentive effects in one trial period will likely influence the observed results in the other.

That SANRs and non-final rejections preceding SANRs appear to peak during the second and first trial periods respectively matches what one might expect, given that quality incentives will be most pronounced for these types of patentability decisions during the respective trial periods. Due to the close relation between a SANR and the preceding rejection, however, it is difficult to disentangle incentive effects applied to the two patentability decisions. Under any causal hypothesis, however, it is clear that the Program and its heightened quality incentives tend to produce more SANRs—not less. This result is important insofar as it counsels against policies that might otherwise treat SANRs as an indicator for low-quality examination.

C. The Rate at Which Examiners Provoke The Filing of a Notice of Appeal

The frequency with which examiners provoke applicant appeals is another quality-probative indicator first described in this Article. As discussed in Section III.B, applicants may appeal examiner rejections to the Patent Trial and Appeal Board. Filing an appeal represents a long and costly delay, however, so applicants may tend to appeal only the subset of rejections that they believe are most clearly erroneous. Indeed, applicants filed a notice of appeal in response to only 3% of the rejections included in the sample data. Since an applicant performs a detailed evaluation of the legal merits of an examiner's rejection, the results of this evaluation, as reflected by the applicant's decision to appeal, offers a unique statistical window into quality of the rejection.

To the extent that an applicant's decision to file a notice of appeal indicates that the preceding rejection may have been of low quality, one should expect rejections issued by examiners on the Program to provoke appeals relatively less often. And indeed, this is precisely the pattern observed in Figures 3 and 4, which

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[152] *See supra* Figure 2.

[153] Memorandum from Edward C. Kubasiewicz, *supra* note 100, at 3.

chart the frequency with which rejections provoke appeals as a function of time relative to GS-14 promotion.[154] Figure 3 presents the raw data without controls,[155] and Figure 4 shows the same indicator controlled for examiner experience.[156]

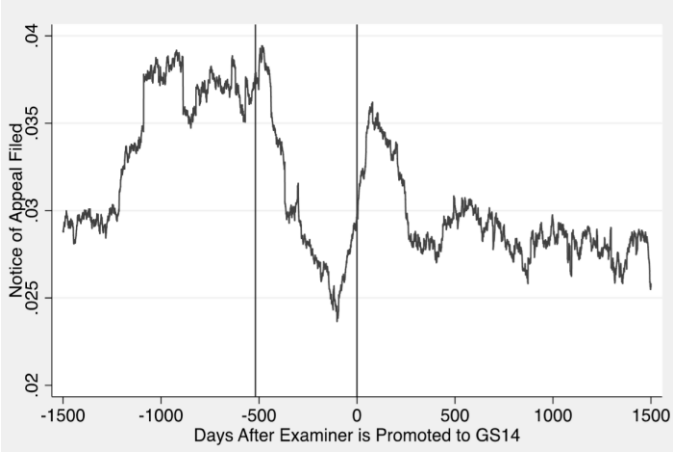

Figure 3. Examiners on Program Provoke Fewer Appeals
Fraction of Rejections Followed by Notice of Appeal

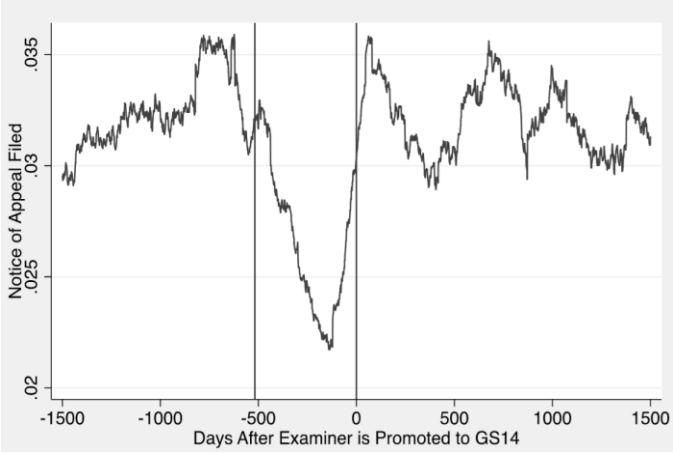

Figure 4. Examiners on Program Provoke Fewer Appeals
Fraction of Rejections Followed by Notice of Appeal (Controlling for Experience)

154 *See infra* Figures 3–4.

155 *See infra* Figure 3.

156 *See infra* Figure 4.

As illustrated in Figures 3 and 4, there is a pronounced dip in the rate at which rejections provoke applicant appeals when examiners are on the Program. Figure 4 shows this rate dropping nearly a full percentage point from the time that examiners begin the first trial period, and the appeal rate quickly snaps back to the status quo when heightened quality incentives are removed. This percentage-point drop is quite significant given that only 3% of rejections are appealed—the drop represents a one-third reduction in appeal frequency. This result lends support to the hypothesis that strong quality incentives will tend to reduce the rate at which examiners produce erroneous rejections that invite appeals.

This ability to reduce appeals is particularly impressive because examiners reject relatively more applications while they are on the Program. An increased rejection rate will presumably involve rejecting more applications that are near the threshold for patentability, which could arguably increase the rate at which applicants appeal. The data nevertheless indicates that examiners are able to more than offset any such effect by increasing the quality of their rejections.

Figure 5 illustrates the relationship between examiner experience and the rate at which they provoke appeals. This relationship serves as the control variable that is used to produce the chart in Figure 4. The upward trend in appeal rate as an examiner begins their career likely reflects the fact that an application cannot be appealed until a rejection has been applied at least twice. As rejections are repeatedly applied over time, appealing becomes an increasingly attractive option for applicants. The downward trend in appeal rate as examiners gain experience may suggest any or all of the following: improvements to the quality of an examiner's rejections, an examiner's increasing willingness to allow marginal applications (and thereby obviate the need to appeal), or the development of other patent examination skills (such as the ability to dissuade appeals by more effectively conducting examiner interviews).

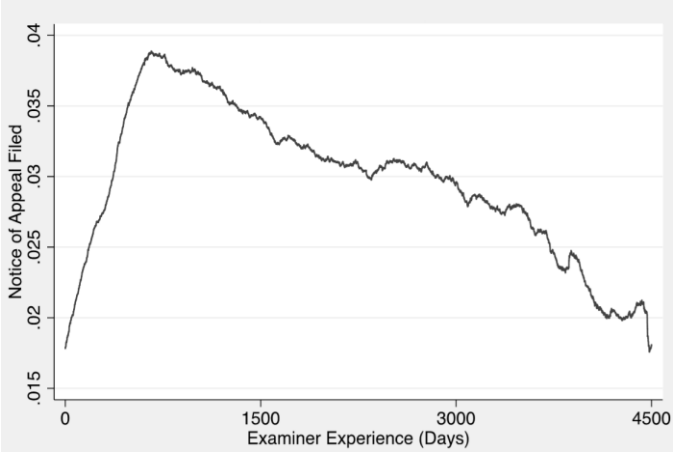

Figure 5. Appeal Frequency Depends on Examiner Experience
Fraction of Rejections Followed by Notice of Appeal

D. PATENT FAMILY GRANTS BY THE EUROPEAN PATENT OFFICE & JAPANESE PATENT OFFICE

Corroborating grants by the EPO and JPO have been proposed as an indicator for high patent quality.[157] Patent applications disclosing the same invention are often filed in multiple jurisdictions with each application in the patent family being linked together by a series of priority claims.[158] International patent families thus allow decisions made by U.S. patent examiners to be compared to decisions made by examiners at the EPO and JPO who are applying similar patentability standards to applications that disclose identical technologies.[159] Moreover, the EPO and JPO are known to invest greater resources per application in the examination process,[160] suggesting that patentability decisions made by the EPO and JPO may better reflect the merits of a given application.

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157 *See* Frakes & Wasserman, *supra* note 10, at 553, 560.

158 Antoine Dechezlepretre et al., *International Patent Families: From Application Strategies to Statistical Indicators*, 111 SCIENTOMETRICS 793, 797–98, 805 (2017).

159 Frakes & Wasserman, *supra* note 10, at 553, 560.

160 *Id*. at 560 (citing Pierre M. Picard & Bruno van Pottelsberghe de la Potterie, *Patent Office Governance and Patent System Quality*, CEPR Discussion Paper No. DP8338 (2011)).

Using patent family grants by the EPO and JPO as an indicator for the quality of U.S. patents may be questionable, however, because the claims issued in a U.S. patent may be materially different than the claims that are allowed in foreign jurisdictions. In the context of U.S. patent prosecution, the examiner's primary role is to determine whether the claim scope is too broad — not whether the technology disclosed in the specification is novel and non-obvious.[161] Even if the originally filed claims were similar in each jurisdiction, the back-and-forth process of rejections and amendments at the USPTO often substantially alters the claim scope. Given that a single word in the claims can make the difference between validity and invalidity, the grant of a related application with the same specification but different claims by the EPO or JPO may be of questionable relevance to the quality of the U.S. patent.

As shown in Figure 6, the Program does not appear to exert a meaningful influence on the likelihood that an allowance will be corroborated by a patent family grant at the EPO or JPO.[162] Indeed, the rate of corroboration appears surprisingly flat over time, suggesting that neither examiner experience nor the status of being on the program are meaningful predictors of corroboration rate.

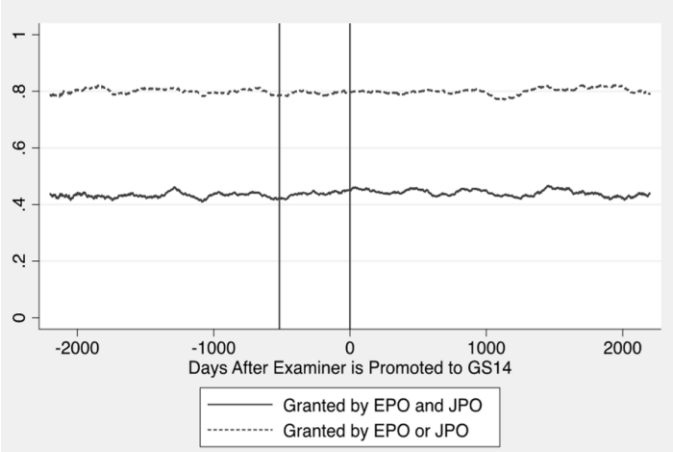

Figure 6. Program is Not a Meaningful Predictor of Grant by EPO or JPO
Fraction of Allowances Corroborated by EPO and/or JPO

The logic for why one might expect to see an increase in corroboration frequency during the Program rests upon two links: (1) examiners on the Program might produce higher quality patents, and (2) higher-quality patents might be

[161] MPEP § 706.02 (9th ed. Rev. 08.2017, Jan. 2018).

[162] *See infra* Figure 6.

corroborated by patent family grants at the EPO and JPO more frequently. Given that no increase in corroboration rate is observed, it seems likely that at least one of these links is weak or nonexistent. The observations discussed earlier in this Article—that examiners on the Program allow fewer applications, issue more SANRs, and provoke fewer appeals[163]—suggest that there is a meaningful link between examination quality and the status of being on the Program. This, in combination with likely divergences in claim scope between allowed U.S. patents and patents granted abroad, suggests that the link between patent quality and foreign corroboration rate may be questionable. A counter-argument can be raised that indicators discussed in this Article are not expressly tied to patent validity. As such, the ultimate question of whether foreign corroboration is an indicator for patent validity is beyond the reach of the present analysis.

V. IMPLICATIONS

This analysis suggests that examiners may meaningfully improve the quality of their patentability decisions while they are on the Program. In particular, examiners tend to reduce the rate at which they issue allowances, increase the rate at which they issue SANRs, and reduce the rate at which they provoke applicant appeals.

Moreover, the observed quality improvements appear to be tied to the heightened quality incentives that the Program applies. The Program involves three major structural shifts to the contextual backdrop in which examiners render patentability decisions. First, examiners are granted authority to sign their own decisions.[164] Second, examiners' hour allotments per count are reduced, thereby increasing the number of decisions that they are expected to render.[165] Third, examiners are subject to substantially heightened quality incentives insofar as their decisions receive intensive quality reviews, and their promotions are contingent upon the outcome of those reviews.[166] At the close of the Program, the grant of signatory authority and reduced hour allotments are made permanent, but the heightened quality incentives are removed.[167] Because the observed decision-making divergences begin when heightened quality incentives are

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163 *See supra* Figure 3 (analyzing data showing that examiners on the program issue fewer allowances, more SANRs, and provoke fewer appeals than examiners not on the program).

164 Memorandum from Edward C. Kubasiewicz, *supra* note 100, at 2.

165 *Id*.

166 *Id*.

167 *Id*. at 7.

applied and revert after they are removed, the results support an inference that the divergences are caused by the application of heightened quality incentives.

These results further suggest that examiners may be capable of improving the quality of their patentability decisions even as they must simultaneously increase the quantity of decisions rendered. This finding supports the idea that there is "slack" in the system, such that reforming the system of incentives could potentially produce quality gains without necessitating an offset to quantitative production and an increase in application pendency.

While these results are promising insofar as they suggest that incentives may be an effective lever by which to promote improved patent quality, important caveats do apply. First, the findings are confined to discrete periods of heightened incentives. The first and second trial periods last only 26 weeks each, and there is a 20-week eligibility period between the two trial periods.[168] It is possible that the heightened incentives associated with these trial periods induce examiners to work much harder in short bursts, and for at least some examiners, these quality improvements may not be sustainable over longer terms. On the other hand, two 26-week periods are not a trivial amount of time. Given the right incentives, many examiners may be willing and able to maintain a heightened level of performance.

Second, the particular incentives offered by the Program are unique in nature. Absent a revocation, signatory authority can only be granted once during an examiner's career. Likewise, promotions to a given GS-level are generally awarded only a single time. The quality incentives applied during the Program additionally do not come without cost. Quality must be measured before it can be incentivized. In the case of the Program, this is accomplished by performing intensive quality reviews,[169] but it is not clear whether this model could be cost-effectively expanded to a broader population of examiners and patentability decisions. Thus, if policymakers wish to reform quality incentives to promote improved patent quality, substantial attention will need to be paid to the design of the quality measurement system as well as the incentives offered. This Article's findings—heightened quality incentives reduce allowance and appeal rates and increase SANR rates—offer statistical characteristics that could be used in combination with expanded substantive reviews to track quality improvements.

VI. CONCLUSION

Despite widespread consensus that the quality of patentability determinations must be improved, there has been no agreement as to how this

[168] *Id.* at 2–3.

[169] *Id.* at 7.

objective should be pursued. A lack of understanding as to the effects of the USPTO's production and quality incentives may have presented a barrier to such an agreement. By detailing the system of production and quality incentives under which examiners operate, this Article aims to provide a common foundation upon which reforms may be proposed and advanced. Moreover, by analyzing divergences in examiner behavior when heightened quality incentives are applied, this Article contributes empirical evidence indicating how incentive policies influence patentability decisions and how examiners respond to changes in those policies.

A thorough review of USPTO incentive policies indicates that quantitative production is well-measured and highly incentivized, whereas work product quality is generally not well-measured nor subject to strong incentives. As discussed in Section IV, transaction data drawn from a discrete period during which examiners are on the Program and subject to heightened quality incentives indicates that examiners can improve the quality of their patentability decisions even as they must also increase quantitative production. This Article further characterizes statistical divergences in examiner decision-making when heightened quality incentives are applied, finding that examiners issue fewer allowances, provoke fewer appeals, and issue more SANRs. Taken together, these findings indicate that reforming USPTO incentive policies may represent a valuable opportunity to improve patent quality and that a degree of quality gains may be achievable without substantial sacrifices to quantitative productivity.