

**PROBLEMS TO BE EXPECTED FROM EXPANDED
ADMINISTRATIVE CHALLENGES TO U.S. PATENTS**

Scott Shane, Ph.D.
Professor of Economics
Case Western Reserve University
July 20, 2009

Prepared for
The Manufacturing Alliance for Patent Policy
www.mfgpatentpolicy.org

PROBLEMS TO BE EXPECTED FROM EXPANDED ADMINISTRATIVE CHALLENGES TO U.S. PATENTS

Executive Summary

Recently, critics of the U.S. patent system have called for a system of expanded administrative challenges to patents, modeled on the post grant opposition system used in Europe. The proposed changes to U.S. law would create a litigation-like mechanism for third party-initiated **post grant review** and expand the existing *inter partes reexamination* process. These challenges would occur at the United States Patent and Trademark Office (USPTO)

In the last Congress, both the House and Senate considered legislation to create a post grant review process lasting the life of the patent as part of the Patent Reform Act of 2007. A revised version was passed by the House of Representatives in September 2007. In April 2009, the Senate Judiciary Committee reported the Patent Reform Act of 2009, which contained identical language on post grant review to that contained in the House-passed bill of 2007. **The language in the Senate Patent Reform Act of 2009 would create a 12-month post grant review period and expand the existing *inter partes reexamination* in a fashion that, together, would be similar to the European system of post grant opposition.**¹

The purpose of this report is to outline the likely effects of the 2009 Senate legislative proposal. Contrary to the arguments made by proponents of the legislation, this expansion of administrative processes for challenging patent validity would likely have several adverse effects, including the following:

1. Increasing the length of patent pendency;
2. Creating uncertainty about patent validity;
3. Decreasing the disclosure of knowledge necessary for innovation;
4. Increasing the costs of achieving patent validation;
5. Reducing investment in R&D;
6. Hindering efforts of U.S. universities to transfer their inventions to the private sector; and
7. Increasing strategic patenting behavior by large, established firms.

Moreover, the proposed legislation will **not** have many of the beneficial effects the proponents of the legislation claim it will have. In particular, the proposed legislation:

1. Will not improve patent quality;
2. Will not reduce the cost of patent litigation; and
3. Will not speed the determination of patent validity.

The following paper provides a detailed explanation of the analyses underlying these conclusions.

PROBLEMS TO BE EXPECTED FROM EXPANDED ADMINISTRATIVE CHALLENGES TO U.S. PATENTS

Scott Shane, Ph.D.
Professor of Economics
Case Western Reserve University

Introduction

Recently, critics of the U.S. patent system have called for a system of expanded administrative challenges to patents, modeled on the post grant opposition system used in Europe. The proposed changes to U.S. law would create a litigation-like mechanism for third party-initiated **post grant review** and expand the existing *inter partes* **reexamination** process. These challenges would occur at the United States Patent and Trademark Office (USPTO).

In the 110th Congress, both chambers of Congress saw introduction of legislation to create a post grant review process, lasting the life of the patent as part of the Patent Reform Act of 2007. A revised version was passed by the House of Representatives in September 2007² and has now been adopted by the Senate in the 111th Congress as part of the Patent Reform Act of 2009.³ **The revised version would create a 12-month period of post grant review and expand the existing *inter partes* reexamination in a fashion that, together, would be similar to the European system of post grant opposition.**

This paper uses the term “**expanded administrative challenges**” to refer to the combination of the proposed 12-month post grant review period and expansion of *inter partes* reexamination.

The proponents of expanded administrative challenges have argued that the current patent system is flawed and hampers innovation, and that greater opportunity to challenge patents administratively is needed to remedy those flaws. Unfortunately, in all of the rhetoric about the “inadequacy” of the U.S patent system, the resulting “problems” faced by innovators in this country, and the need to adopt a system facilitating more administrative challenges to solve those problems, careful examination of the likely effects of these changes has been lost.

The purpose of this report is to outline some of the effects that the proposed system of administrative challenges would have on U.S. innovation so that policy makers can consider the likely impact of the proposed legislation. Contrary to the arguments made by proponents of this legislation, the adoption of expanded administrative challenges in the United States will likely have several adverse effects, including:

1. Increasing the length of patent pendency;
2. Creating uncertainty about patent validity;
3. Decreasing the disclosure of knowledge necessary for innovation;
4. Increasing the costs of achieving patent validation;

5. Reducing investment in R&D;
6. Hindering efforts of U.S. universities to transfer their inventions to the private sector; and
7. Increasing strategic patenting behavior by large, established firms.

Moreover, the proposed legislation will **not** have many of the beneficial effects the proponents of the legislation claim it will have. In particular, the proposed legislation:

1. Will not improve patent quality;
2. Will not reduce the cost of patent litigation;
3. Will not speed the determination of patent validity.

The next two sections of this report describe the evidence for these effects. The final section offers several conclusions for patent policy.

The Expected Effects of Expanded Administrative Challenges

- 1. The adoption of expanded administrative challenges would increase the length of patent pendency.** A new post grant review process and expanded *inter partes* reexamination process collectively mimicking Europe's post grant opposition system will take significant time and resources away from the USPTO's efforts to process patent applications, further lengthening patent pendency (the time between patent application and patent issuance).

To estimate how much the expanded administrative challenges would increase U.S. patent pendency, we first need to estimate the number of patent applications examined annually under the current system. In 2008, 6,099 patent examiners evaluated 396,228 of the 496,762 applications the USPTO received in that year.⁴ Thus, in 2008, the average examiner conducted 64.97 patent examinations.

According to estimates made by the USPTO and the National Academy of Public Administration, the average amount of time spent by patent examiners is 18 hours per patent application.⁵ At the current rate of application and the current level of USPTO's staffing, this amount of examination time results in a patent pendency rate of 32.2 months.⁶

Recent research reports that approximately eight percent of European patents are opposed in post grant proceedings.⁷ If the United States experienced a comparable patent review rate, it would have experienced 14,818 patent challenges in 2008.

Administrative patent challenges are a time consuming process. Absent significant additional funding for the USPTO, the proposed system of expanded administrative challenges will reduce the number of patent applications examined, either by reducing the number of examiners or by distracting examiners from their primary duties.

In Europe, post grant opposition utilizes patent examiners, who spend approximately six times as much time on an opposition proceeding as they do on a patent

examination.⁸ If we take the 14,818 reviews of newly-issued patents that are estimated to occur in the United States under a system of expanded administrative challenges and multiply it by the 108 hours that a patent examiner is estimated to spend on a typical patent challenge, and then divide that by the 18 hours spent by U.S. patent examiners to examine a typical patent, we find that a European-style opposition process like the one proposed would reduce the number of patents that the USPTO could examine each year by 88,908.

If the expanded U.S. administrative challenges were to involve only administrative law judges, then, absent additional funding, the agency would be forced to shift resources from examination to review. The result would be the same reduction in patents examined as described in the paragraph above.

Therefore, unless Congress appropriates significantly more resources with which to hire additional examiners, patent pendency will increase.

We can look at USPTO statistics on the number of patent applications and patent disposals in 2003 and 2007 to estimate the change in the patent pendency rate as a function of the change in the number of patent applications. Every 10,237 applications that are not disposed of add one month to patent pendency. Therefore, the proposed expansion of administrative challenges would increase the patent pendency by 8.7 months. That is, the current 32.2 month patent pendency rate would increase to 40.9 months if post grant review were made law.

Moreover, this estimate likely understates the probable increase in patent pendency because the amount of time an examiner spends on a typical patent review would likely be higher in the United States than in Europe.⁹ As a result, the number of unexamined applications that would result from expanded administrative challenges would be higher than that estimated above, and the patent pendency rate would rise by more than the amount estimated.

The resource cost of opposition proceedings may account for the decision of some countries to drop their opposition systems. As Dale Carlson and Robert Migliorini explain, “*The lessons learned in Japan, China and Taiwan indicate that multiple systems for challenging a patent have the potential to complicate matters by ... duplicating valuable patent office resources in the administration of parallel systems.*”¹⁰

- 2. Expanded administrative challenges would increase uncertainty about patent validity.** Under the current system, patents are “born valid.” However, their validity is made uncertain if they are administratively challenged in a reexamination or post-grant review proceeding -- uncertainty which remains until those proceedings are completed.

We can measure the amount of uncertainty that would be created by the proposed expansion of U.S. administrative challenges by looking at the difference between the

rate of post-grant opposition in Europe and the current rate of reexamination in the United States (to see how many additional patents would be made uncertain) and the length of time it takes to determine patent validity in post grant opposition cases (to see how long the validity of these patents would remain uncertain).

Economist Bronwyn Hall and her colleagues found that 7.8 percent more patents would be opposed than are currently reexamined if the opposition rate in the U.S. were the same as the European rate.¹¹ And, in work with Professor Dietmar Harhoff, she found that the average length of time it takes from patent issue to the outcome of an opposition is approximately 6 years.¹²

The value of the 7.8 percent of patents whose validity would be made uncertain for an average of 6 years is substantial. Academic estimates of the value of the average U.S. patent ranges from \$93,463 to \$118,988 in 2008 dollars. In 2008, 185,224 U.S. patents were issued. Therefore, the dollar value of U.S. patents issued in 2008 was between \$17.3 and \$22.0 billion. That means that the adoption of expanded administrative challenges would make uncertain the validity of approximately \$1.4 to \$1.7 billion of patents issued annually, totaling \$8.1 to \$10.3 billion of patents over the six years it takes to get an outcome of the average review case.¹³

3. **Expanded administrative challenges would hinder knowledge disclosure.** The proposed post grant review and expanded *inter partes* reexamination processes would increase the incentive for innovators to preserve their inventions as trade secrets, thereby reducing information sharing that facilitates innovation, increasing duplicative investment in research and development (R&D), and decreasing competition.¹⁴ If inventors face possible invalidation of their patents through administrative challenges that may last for many years, then they will be better off keeping their technology secret, and so will be more inclined to do so.¹⁵

One of the purposes of the patent system is to encourage inventors to disclose new technical knowledge so that others can build upon it. By providing inventors with the right to prevent others from making, using, or selling their invention for a period of time, in return for disclosure of how their inventions work, the patent system encourages inventors to disclose their inventions rather than keeping their developments secret.¹⁶ Because others can build more easily on disclosed inventions than undisclosed ones, patents facilitate technical advance through the diffusion of technical knowledge.¹⁷

By encouraging knowledge disclosure, the patent system also reduces the waste that comes from duplicative R&D efforts.¹⁸ When inventions are patented, a second inventor can look at a patented invention to learn the inventive step made by the first inventor. In the absence of patents, the second inventor needs to duplicate the first inventor's R&D because the inventive step on which he or she is building has not been disclosed.

Furthermore, the disclosure provided by patents enhances competition by helping companies to invent around others' inventions. By reading patents, companies can figure out ways to achieve the same goal as the patented invention without infringing its patent. As a result, the companies inventing around the innovators' patents introduce more competition into the economic system.¹⁹

Research shows the importance of strong patent protection in enhancing knowledge disclosure. Researchers estimate that patent documents include 70 percent of all technical knowledge accumulated – information that is not published elsewhere, or is only published elsewhere at a later date.²⁰ Moreover, the use of patent disclosures as a source of innovation information increases with the strength of patent protection.²¹

- 4. Expanded administrative challenges would increase the cost of achieving patent validation.** The proposed post grant review and expanded *inter partes* reexamination processes would add \$2.1 billion annually in direct costs to the process of ensuring patent validity. Post-grant opposition proceedings are estimated to cost \$150,000 in direct legal costs per case.²² Based on data from Europe, we can expect oppositions to occur in 7.8 percent more cases than currently occur with the current U.S. *inter partes* reexamination. Multiplied by the 185,224 patents issued in 2008, the \$150,000 per opposition proceeding applied to 7.8 percent of patents results in \$2.2 billion of additional cost of achieving patent validity.²³

It is important to note that these costs would be incurred in addition to the costs of patent litigation, and not substitute for those costs as some have argued. In a study that compared litigated U.S. patents to corresponding European patents, economists Stuart Graham and Dietmar Harhoff found that only 20 percent of litigated U.S. patents would be candidates for post grant opposition. Moreover, only for those patents whose reviews end in revocation not subsequently appealed can we assume there will not be subsequent patent litigation. If the revocation is appealed to higher levels of the patent office, one can expect the parties to continue their appeals to the courts if the outcome is not satisfactory to them. Professors Graham and Harhoff found that only one third of European post grant oppositions result in revocations, and only half of those revocations are not subsequently appealed. Thus, only one sixth of oppositions result in unappealed revocations. Given that only 20 percent of litigated U.S. patents are appropriate for review, the one-sixth of reviews that result in unappealed revocations accounts for 3.3 percent of litigated patents. Thus 96.7 percent of the costs of achieving patent validity through the proposed expansion of administrative challenges will be incurred in addition to the cost of patent litigation, not in place of it. That is, 96.7 percent of the \$2.2 billion legal cost of the proposed post grant review and expanded *inter partes* reexamination processes will be incurred in addition to the cost of patent litigation.

- 5. Expanded administrative challenges would reduce investment in R&D.** The proposed expansion in administrative challenges would reduce patent effectiveness, and many studies show a positive relationship between patent effectiveness and R&D investment.²⁴ These studies show that patents add value over and above the value of

the innovations that they protect. In fact, the study that the National Academies says has the best design for measuring the patent premium finds it to be 50 percent of the value of the invention.²⁵

The patent premium means that anything that reduces the value of patents would reduce R&D significantly in all manufacturing industries. Specifically, a 10 percent decrease in the patent premium corresponds to a 7 percent decline in R&D.²⁶

The information on the patent premium allows us to estimate the effect of instituting expanded administrative challenges on R&D expenditures. If administrative challenges were used as frequently in the United States as opposition proceedings are used in Europe, 7.8 percent more patents would be challenged under the proposed system of post grant review and expanded *inter partes* reexamination than under the current reexamination procedure. If revocation rates of opposed patents were the same in the United States as in Europe (33 percent), then 2.6 percent of the value of U.S. patents would be eliminated through the adoption of expanded administrative challenges. Because a 10 percent decline in the patent premium leads to a 7 percent drop in R&D, the proposed post grant review and expanded *inter partes* reexamination processes would reduce U.S. R&D expenditures by 1.8 percent.²⁷ According to the National Science Foundation, in 2006, U.S. R&D amounted to \$342.9 billion, of which \$241.8 billion was paid for by industry.²⁸ Therefore, expanded administrative challenges would lead to a reduction of approximately \$4.4 billion in industrial R&D annually.

- 6. Expanded administrative challenges would hinder efforts of U.S. universities to transfer their inventions to the private sector.** Because universities do not produce products or services from their technologies directly, they can only derive commercial value from them through licensing.²⁹ This licensing activity generates a sizeable amount of money for universities. In 2004, universities earned \$1.2 billion in licensing revenue.³⁰ However, licensing revenues do not include the value of the equity that universities earn from investments in start-ups based on their intellectual property. Researchers estimate that universities earn approximately eleven times their licensing revenue from the equity that they hold in spinoff companies.³¹ If we combine university licensing revenue and the value of the equity that they earn from spinoffs based on their intellectual property, we find that U.S. universities earn approximately \$13.1 billion per year from their patented inventions.

Strong patent rights enhance technology transfer from universities to the private sector.³² Patents reduce the disclosure problem and make it more difficult for others to invent around a technology, facilitating technology licensing.³³ Therefore, universities would earn less than \$13.1 billion per year from their patented inventions if patent protection were weaker than it is today.

The proposed post grant review and expanded *inter partes* reexamination processes would weaken patents by increasing the opportunity for infringers to challenge patents.³⁴ If the patent protection of their inventions were weakened, universities

would find it more difficult to license their technologies, and would have to reduce the price of their inventions to attract buyers.

Moreover, the expansion of administrative challenges would make uncertain the validity of university patents, which would also adversely affect markets for university technology. The proposed system of post grant review and expanded *inter partes* reexamination would make the validity of an additional 7.8 percent of patents uncertain for an average of six years after patent issue. This means that, assuming that university patents are no more likely than other patents to be subject to post grant review or *inter partes* reexamination, approximately \$1.02 billion dollars of university earnings from licensing (royalties plus equity holdings in spinoff companies) will be made uncertain annually. Over the six years that it takes to reach a determination of the validity of the average patent through administrative review, approximately \$6.12 billion of university licensing earnings would be at risk of disappearing. Because those patents that are declared invalid cannot be licensed, this greater uncertainty about the value of university inventions would cause the amount of university licensing to decline.

How much this uncertainty will affect the willingness of universities to license their inventions to the private sector is unknown. But the size of the effect would be large enough to influence behavior. Reduced patent protection results in less effort to commercialize research. It also would change academics' willingness to conduct applied research. As the OECD reports in a review of the patent system, "*Quantitative studies tend to show that patenting has led universities to conduct more applied research.*"³⁵ And scholars studying this issue have found that university licensing has led to a tendency for faculty to orient their research more toward the needs of industry.³⁶ In short, expanded administrative challenges would reduce the amount of university technology commercialized by industry.

- 7. Expanded administrative challenges would increase strategic patenting behavior by some large, established firms.** Even Professors Joseph Farrell and Robert Merges, advocates of changing the patent system, concede, "*Post-grant patent revocations could be misused by firms who simply want to slow down or injure a patentee-firm.*"³⁷ Strategic efforts to hinder the performance of competitors by forcing them to defend their patents against multiple challenges, beginning with reexamination and review proceedings and ending with litigation, are a likely outcome of the adoption of expanded administrative challenges.³⁸ Moreover, some large, established firms might collude to avoid challenging the patents of their major competitors, focusing their attention on challenging the efforts of new entrants seeking to upset the industry status quo. Big companies might even fund third parties to challenge competitors' patents as a way to get around estoppel provisions in post-grant review proceedings.³⁹

The evidence from Europe indicates that many large companies use post-grant opposition strategically rather than to weed out bad patents. Professor Dietmar Harhoff and his colleagues found that patent opposition activity in the electronics

sector does not follow the expected pattern “*if opposition is used to stop questionable patents and if the increases in patent applications have reduced the quality of the average application.*” Rather, patent opposition activity follows the pattern expected if companies use oppositions to gain strategic advantage.⁴⁰ For instance, in one study, Professors Harhoff and Hall find that firms systematically oppose the patents of competitor companies in order to derive competitive advantage over them.⁴¹

Perhaps more insidious, the European evidence also indicates that post grant opposition involves tacit agreements by large, established firms not to challenge each others’ patents, but, instead, to focus their review, on the patents of other firms. As Professor Harhoff explains, “*some screening of cases and settlement prior to the filing of cases might be going on [in post grant opposition proceedings] – in such negotiations, players with large patent portfolios would be able to license patents from their portfolio to achieve some kind of agreement.*”⁴² As a result, Professor Harhoff explains in another paper, “*There seems to be a tacit understanding which leads to lower opposition rates in some concentrated technology areas.*”⁴³ Professor Hall and her colleagues conclude that “*there might be an increase in collusive settlements based on the threat of opposition.*”⁴⁴

This strategic use of post grant opposition works to the benefit of large, established companies at the expense of small, new ones. In a study of European patent oppositions in the telecommunications sector, Professors Mario Calderini and Giuseppe Scellato find that large firms act collusively to oppose the patents of small firms rather than those of each other.⁴⁵ They explain, “*The risk of retaliation through countersuits represents a credible threat that can eventually favour the instauration of collusive behaviours. Our results confirm this hypothesis, since the occurrence of patent oppositions among large incumbents is significantly lower than industry average.*”⁴⁶

Other researchers have found that these patterns extend beyond the telecommunications sector to other industries. As Professor Harhoff and his colleagues explain, “*Small firms seem to be opposed too often in certain technology areas... Smaller applicants are likely to face more opposition from rivals in the technology areas that are more concentrated and in which patent portfolio races are taking place ...*”⁴⁷

Some observers fear that foreign companies could strategically use expanded administrative challenges to attack domestic patent holders or create imitative products that challenge the patent holder’s goods and services in the world market.⁴⁸ Both a former chief judge of the Chinese patent court and the secretary general of the Indian Pharmaceutical Alliance pointed out that the adoption of this strategy by firms in their countries would be a likely outgrowth of the adoption of the proposed administrative challenges in the United States.⁴⁹

Some evidence from Europe supports this argument. A study by Professor Harhoff of post grant opposition in Germany found that patents issued to German (domestic)

companies were more likely to be subject to opposition proceedings than patents issued to non-German (foreign) companies and that German companies were less likely than non-German companies to succeed in defending them.⁵⁰ Professor Harhoff's explanations for why domestic patents are more likely to be attacked, and less likely to be successfully defended, are not specific to Germany, suggesting that one effect of the adoption of expanded administrative challenges in the U.S. would be the invalidation of a greater proportion of U.S. companies' patents than those of foreign competitors.

Were foreign countries also to institute new administrative challenges as a condition of U.S. adoption, this negative effect would be counterbalanced by corresponding benefits to U.S. companies overseas. However, this is not the case. Adoption of post grant review and expanded *inter partes* reexamination by the United States would be unilateral, creating no corresponding benefit to U.S. companies from efforts to invalidate foreign patents in other countries. That is, the net result of the proposed expansion of administrative challenges would be to favor foreign firms at the expense of U.S. firms.

The Flawed Arguments for the Benefits of Expanded Administrative Challenges

- 1. Expanding administrative challenge opportunities would not improve patent quality.** The Coalition for Patent Fairness, the primary proponent of the Patent Reform Act of 2007 and 2009, claims that "*improving the process for challenging questionable patents will lead to better patent quality.*"⁵¹ However, an examination of the evidence indicates that expanded administrative challenges would not improve patent quality, a view held by the European Patent Office.⁵² First, for a new system of administrative challenges to improve patent quality, companies would need to oppose poor quality patents. But, as law professors James Bessen and Michael Meurer explain, most companies are unlikely to challenge poor quality patents. As the professors explain, "*A potential infringer might see little to gain by appearing at an opposition hearing when its best defense is not invalidity but noninfringement.*"⁵³

In fact, companies have an incentive *not* to oppose other companies' poor quality patents. Challenging a patent signals the commercial interest of the challenger in invalidating the patent, and so makes it a target for patent prosecution by the patent holder.⁵⁴ Thus, as the Federal Trade Commission reports, few will risk identifying themselves as targets by opposing competitors' poor quality patents, no matter how attractive the process is made.⁵⁵ Because companies identify themselves as likely infringers when they oppose patents, they are only willing to challenge patents that they are likely to infringe and are commercially valuable.⁵⁶ As a result, expanded administrative challenges would not weed out many poor quality patents.

Second, empirical evidence from other parts of the world fails to show a positive effect of post-grant opposition on patent quality. A study by Professor Harhoff and his colleagues showed that many decades of post-grant opposition has done nothing to stem a decline in patent quality, as measured by the number of references per patent that could potentially cause the claim to be deleted.⁵⁷ The pattern in Japan

suggests that opposition proceedings might even reduce patent quality. Japan eliminated its post grant opposition system in 1996, and then experienced a sharp decline in the number of references per patent that could potentially cause the claim to be deleted (Professor Harhoff's measure of decreasing patent quality).⁵⁸

- 2. Expanded administrative challenges would not reduce the cost of patent litigation.** Proponents of post grant review and expanded *inter partes* reexamination also erroneously argue that such changes would reduce the amount and cost of patent litigation.⁵⁹ As one writer argues, "*A second objective [of post grant opposition] is to provide a party threatened with a patent infringement suit an alternative, and less costly means, to challenge a patent compared to expensive litigation.*"

An examination of the evidence indicates that the proposed expansion of administrative challenges would do little to reduce the amount and cost of patent litigation. First, as professors Bessen and Meurer explain, patent validity is not the cause of most patent litigation.⁶⁰ Rather, patent litigation only occurs when patents are valuable enough to fight over and the quality of the patent is uncertain. If the quality is obviously poor then the patent holder will know that the patent will be declared invalid and will not defend it.⁶¹

In a study that compared litigated U.S. patents to their European counterparts, Professors Graham and Harhoff found that only 20 percent of litigated U.S. patents would be candidates for post-grant review. Moreover, only one third of reviewed patents would be revoked, and only half of the revoked patents would not subsequently be appealed. Thus, only about 3 percent of patents that are the subject of litigation in the United States could be kept from reaching litigation through the proposed expansion of administrative challenges.

Second, there is no evidence elsewhere in the world that opposition proceedings have led to a decline in patent litigation. In fact, in Europe there isn't even a positive correlation between industry rates of patent opposition and industry rates of patent litigation.⁶² As professors Bessen and Meurer explain using the example of semiconductors and chemicals, "*Opposition rates for EPO patents are three times higher for chemical patents than they are for semiconductor/software patents...just the reverse of litigation rates.*"⁶³

Post-grant opposition has done nothing to reduce patent litigation in other countries that have such a system. In Germany, which has had an opposition system for decades, and participates in the European patent system, which also has an opposition system, the rate of patent litigation doubled from 1996 to 2006.⁶⁴ During the same time period, the rate of patent litigation did not increase in United States, where administrative challenges are currently limited to reexaminations. As a result, Germany now has a higher rate of patent litigation than the U.S, with approximately one litigation case for every 300 patents, as compared to one in every 525 patents in the United States.⁶⁵

Not only does the post grant opposition experience of other countries suggest that oppositions do little to reduce patent litigation, but policy makers in some countries believe that oppositions actually lead to more patent litigation. The Japanese government, for instance, dropped its system of post grant opposition because it found that the policy increased patent litigation.⁶⁶

Third, the proposed post grant review and expanded *inter partes* reexamination processes would reduce the amount and cost of patent litigation only if companies substituted them for litigation. Economists Wes Cohen and Steve Merrill explain that there is no evidence this substitution will occur, writing, “*Graham and colleagues are unable to confirm the ... prediction that the use of opposition should substitute for subsequent litigation over validity....*”⁶⁷

This is supported by the empirical evidence from Europe indicating that post grant opposition is followed by patent litigation in a large proportion of cases.⁶⁸ A defendant who has lost an opposition proceeding can always find something that the patent examiner failed to consider, which will justify further efforts to maintain the validity of a financially valuable patent.⁶⁹ About half of all patents that are revoked or amended in European opposition proceedings are subsequently appealed to higher administrative levels of the patent office, making the opposition proceeding far from the last step in the legal wrangling.⁷⁰ Moreover, one study in Germany found that patents that were not revoked in opposition had a higher probability than other patents of subsequently being litigated.⁷¹

The proposed expansion of U.S. administrative challenges would do little to reduce the costs of American patent litigation. Researchers estimate that 14 patents are litigated per thousand issued. This means that of the 185,224 patents issued in the United States in 2008, approximately 2,593 will be litigated. For only three percent of these patents, or 78 patents per year, would an administrative challenge result in revocation without appeal, making administrative challenge a substitute for litigation as a way to invalidate a patent in only a small percentage of cases. The total savings in legal costs for these 78 patents per year is not much. Weighting scholarly estimates of the legal costs from patent litigation by the proportion of cases that go to trial yields average legal costs per patent case for both sides combined of \$1.61 million.⁷² Thus, the total amount of legal costs from patent litigation that would be foregone because of expanded administrative challenges is \$125 million per year, which would amount to only 0.004% of U.S. corporate revenues.

3. **Expanded administrative challenges would not speed determination of patent validity.** Proponents of post grant review and expanded *inter partes* reexamination incorrectly argue that these changes would provide “*a fast, inexpensive method for increasing the certainty as to the enforceability and scope of patents.*”⁷³

The available evidence indicates otherwise. Researchers examining the time required to determine patent validity through the European post-grant opposition process find it is no shorter than that required to determine patent validity through the current U.S.

reexamination process. Economist Stuart Graham and his colleagues found that the typical amount of time from application to outcome of an opposition process in Europe was 7 years.⁷⁴ And economists Hall and Harhoff found that the average length of time from application to the outcome of a post-grant opposition in Europe was 8.3 years.⁷⁵ In contrast, Steve Merrill, Richard Levin and Mark Myers put the median length of time it takes to determine validity through the U.S. reexamination system at 7.5 years.⁷⁶

While some portion of the duration of either a European opposition or a U.S. reexamination is accounted for by the interval between patent application and patent issuance, the time spent on post grant opposition and appeal in Europe is, nonetheless, substantial. The initial opposition typically lasts two years, but half of patents revoked or modified in the proceedings are appealed, with a typical appeal adding 2.1 years to the evaluation period.⁷⁷ Thus, the median duration of post grant opposition and appeal of European patents is 3.1 years,⁷⁸ and the average is 4.0 years.⁷⁹

Moreover, the duration can be much longer.⁸⁰ Professors Hall and Harhoff found that “*opposition and appeal last longer than 6.2 years for one quarter of all cases.*”⁸¹

Because it takes a long time to establish patent validity under the European opposition system, patent litigation in the U.S. is sometimes resolved well before the completion of a challenge of a corresponding European patent. For instance, Economist Stuart Graham and his colleagues describe one lawsuit in the United States that was settled five years before the post grant opposition of the corresponding European patent was resolved.⁸²

The length of time it takes to complete post-grant opposition proceedings in Europe has led many European courts to move forward with patent litigation before the resolution of opposition proceedings to ensure rapid resolution of patent validity. As one observer explains, “*It has been noted that the five year delays in EPO opposition proceedings are way too long to provide value and achieve the original goals, and some of the European courts now feel compelled to move with the trials in order to provide a fair forum for patent holders.*”⁸³

In sum, the experts believe that post grant challenges do not speed the establishment of patent validity. Professor Graham and his colleagues write, “*The EPO opposition system does not reach a conclusion much more rapidly than the U.S. reexamination procedure when this procedural duration is estimated as the length of time from patent application date to final resolution.*”⁸⁴ They continue, “*Indeed, opposition proceedings in some cases (and almost certainly, in important, complex cases with numerous opponents, appeals, etc.) may well take as much time to be resolved as litigation in the U.S. system.*”⁸⁵ Similarly, the National Academies’ report on the patent system concluded, “*In fact, the average length of time between patent issuance and the conclusion of opposition is approximately the same as the average time between issuance and the conclusion of litigation in the United States.*”⁸⁶

Conclusions

Critics of the U.S. patent system have called for the adoption of expanded opportunities to challenge patents administratively at the United States Patent and Trademark Office (USPTO).⁸⁷ They argue that a new post grant review system and an expansion of the existing *inter partes* reexamination system is needed to remedy flaws in the system. However, their advocacy suggests benefits that are unlikely to occur and overlooks likely adverse effects on the patent and innovation systems of the United States.

This report outlined several adverse effects likely to result from the expansion of administrative patent challenges. It showed that the changes would increase the length of patent pendency, create uncertainty about patent validity, decrease the knowledge disclosure necessary for innovation, increase the costs of achieving patent validation, reduce investment in R&D, hinder efforts of U.S. universities to transfer their inventions to the private sector, and increase strategic patenting behavior by large, established firms.

Moreover, the proposed changes would **not** improve patent quality, speed the determination of patent validity or substantially reduce patent litigation costs, as the proponents claim.

The U.S. Congress should make its decisions on patent policy informed by the evidence. The likely adverse effects of the proposed post grant review process and expanded *inter partes* reexamination process are substantial, and policymakers should take these effects into consideration when making decisions about the pending legislation.

¹ The House version of the Patent Reform Act of 2009 has one additional problematic provision that expands the definition of prior art that can be used in patent challenges. That language is not the focus of this report.

² S. 1145, the Patent Reform Act of 2007, 110th Cong., 1st Sess. (introduced April 18, 2007); H.R. 1908, the Patent Reform Act of 2007, 110th Cong., 1st Sess. (introduced April 18, 2007). As passed by the House of Representatives, H.R. 1908 limited the post-grant review provision to twelve months and made the existing *inter partes* reexamination process more favorable to challengers by loosening the estoppel requirement. Because *inter partes* reexamination is available for the life of the patent, the effect of loosening estoppel, along with a 12-month post grant review, would be similar to the post grant opposition process used in Europe

³ S. 515, The Patent Reform Act of 2009, introduced March 3, 2009, reported favorably by the Senate Judiciary Committee, April 2, 2009. The House companion legislation is H.R. 1260, The Patent Reform Act of 2009, introduced March 3, 2009

⁴ <http://www.uspto.gov/web/offices/com/annual/2008/2008annualreport.pdf>. The number of patent applications reported is from preliminary data.

⁵ Lemley, M. 2001. Rational ignorance at the patent office. *Northwestern University Law Review*, 95 (4): 1495-1532.

⁶ <http://www.uspto.gov/web/offices/com/annual/2008/2008annualreport.pdf>

⁷ Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for Improving U.S. Patent Quality via Post-Grant Opposition, *NBER Working Paper*, Number 9731.

⁸ Personal correspondence with patent examiners in the European Patent Office and researchers who have studied European patent oppositions.

⁹ National Academy of Public Administration. 2006. *U.S. Patent and Trademark Office: Transforming to meet the Challenges of the 21st Century*, Washington, DC: National Academy of Public Administration, p. 77.

-
- ¹⁰ Carlson, D., and Migliorini, R. 2006. Patent reform at the crossroads: Experience in the Far East with oppositions suggests an alternative approach for the United States. North Carolina Journal of Law and Technology, 7(2): 261-319, p.308-9.
- ¹¹ Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for Improving U.S. Patent Quality via Post-Grant Opposition, NBER Working Paper, Number 9731.
- ¹² Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact. Berkeley Technology Law Journal, 19(989): 1001-1114, p.1003-4. Because the U.S. is more litigious than most of Europe, the length of time it takes to get through the post grant review process in the U.S. could very well be longer than that in Europe, making the estimates here conservative.
- ¹³ This estimate is conservative because research on post-grant review shows that more valuable patents are more likely to be opposed.
- ¹⁴ Letter from the Innovation Alliance to Senator Patrick Leahy, March 6, 2008, p. 2.
- ¹⁵ Pammolli, F., and Rossi, M. 2005. Intellectual Property, Technological Regimes and Market Dynamics, Working Paper, University of Florence downloaded from <https://www.who.int/intellectualproperty/submissions/IP-tech-reg-final.pdf> p. 3-4.
- ¹⁶ Gallini, N. 2002. The economics of patents: Lessons from recent U.S. patent reform. Journal of Economic Perspectives, 16(2): 131–154.
- ¹⁷ Letter from the Innovation Alliance to Senator Patrick Leahy, March 6, 2008, p. 2.
- ¹⁸ Burrone, E., and Jaiya, G. 2003. Intellectual property (IP) rights and innovation in small and medium-sized enterprises. Prepared for the Second OECD Ministerial Conference for Small and Medium-sized Enterprises, World Intellectual Property Organization, downloaded from http://www.wipo.int/export/sites/www/sme/en/documents/pdf/iprs_innovation.pdf, p.3
- ¹⁹ Davidson, K. Retooling patents: current problems, proposed solutions, and economic implications for patent reform, Houston Business And Tax Law Journal, 8: 425-461, p.457
- ²⁰ Burrone, E., and Jaiya, G. 2003. Intellectual property (IP) rights and innovation in small and medium-sized enterprises. Prepared for the Second OECD Ministerial Conference for Small and Medium-sized Enterprises, World Intellectual Property Organization, downloaded from http://www.wipo.int/export/sites/www/sme/en/documents/pdf/iprs_innovation.pdf, p.3
- ²¹ Pammolli, F., and Rossi, M. 2005. Intellectual Property, Technological Regimes and Market Dynamics, Working Paper, University of Florence downloaded from <https://www.who.int/intellectualproperty/submissions/IP-tech-reg-final.pdf> p. 3-4.
- ²² Shapiro, R., and Mathur, A. 2008. The Economic Implications of Patent Reform: The Deficiencies and Costs of Proposals Regarding the Apportionment of Damages, Post-Grant Opposition, and Inequitable Conduct. Washington, DC: Sonecon, downloaded from http://www.bio.org/reg/media/patent_reform_study.pdf, p. 10.
- ²³ Shapiro, R., and Mathur, A. 2008. The Economic Implications of Patent Reform: The Deficiencies and Costs of Proposals Regarding the Apportionment of Damages, Post-Grant Opposition, and Inequitable Conduct. Washington, DC: Sonecon, downloaded from http://www.bio.org/reg/media/patent_reform_study.pdf, p. 10. This legal cost does not include the cost to the USPTO of the additional examiner time necessary to conduct the patent examinations.
- ²⁴ Hahn, R. 2003. The economics of patent protection. AEI-Brookings Joint Center for Regulatory Studies, SSRN Working Paper, Number 467489; Kanwar, S., and Evenson, R. 2003. Does intellectual property protection spur technological change? Oxford Economic Papers, 55(2): 235-264; Standing Committee on the Law of Patents. 2008. Report on the International Patent System, Geneva: World Intellectual Property Organization.
- ²⁵ Merill, S., Levin, R., and Myers, M. 2004. A Patent System for the 21st Century, Washington, D.C.: National Academies Press, p. 48.
- ²⁶ Arora, A., Ceccagnoli, M., and Cohen, W. 2003. R&D and the patent premium. NBER Working Paper, Number 9431.
- ²⁷ Arora, A., Ceccagnoli, M., and Cohen, W. 2003. R&D and the patent premium. NBER Working Paper, Number 9431.
- ²⁸ http://www.nsf.gov/statistics/nsf07331/content.cfm?pub_id=3829&id=2
- ²⁹ Bessen, J., and Meurer, M. 2005. Lessons for patent policy from empirical research on patent litigation. Lewis & Clark Law Review, 9(1): 1-27.

-
- ³⁰ Thursby, J., and Thursby, M. 2007. University licensing. Oxford Review of Economic Policy, 23(4): 620–639.
- ³¹ Shane, S. 2004. Academic Entrepreneurship: University Spinoffs and Wealth Creation. Aldershot, UK: Edward Elgar.
- ³² Standing Committee on the Law of Patents. 2008. Report on the International Patent System, Geneva: World Intellectual Property Organization; Hahn, R. 2003. The economics of patent protection. AEI-Brookings Joint Center for Regulatory Studies, SSRN Working Paper, Number 467489.
- ³³ Gambardella, A., Giuri, P., Luzzi, A. 2007. The market for patents in Europe, SSRN Working Paper, 899539.
- ³⁴ Patent reform debate moves to the senate. Downloaded from http://www.autm.net/about/AboutAUTM_patentReformSenate.cfm.
- ³⁵ OECD. 2004. Patents and Innovation: Trends and Policy Challenges, Paris, France: OECD, p.21.
- ³⁶ Thursby, J., and Thursby, M. 2007. University licensing. Oxford Review of Economic Policy, 23(4): 620–639.
- ³⁷ Farrel, J., and Merges, R. 2004. Incentives to challenge and defend patents: Why litigation won't reliably fix patent office errors and why administrative review might help. Boalt Working Papers in Public Policy Law, University of California at Berkeley, Number 131, p.25.
- ³⁸ Zandy, K. 2006. Too much, too little, or just right? A goldilocks approach to patent reexamination reform. NYU Annual Survey of American Law, 61: 865-905, p. 889.
- ³⁹ Zandy, K. 2006. Too much, too little, or just right? A goldilocks approach to patent reexamination reform. NYU Annual Survey of American Law, 61: 865-905, p. 889. In the NYU Annual Survey of American Law, Ms. Zandy writes, "*It is unlikely that patent-holders who are forced to defend against multiple reexamination challenges would be able to carefully scrutinize the identities of their accusers, which would facilitate inequitable use of reexamination by competitors who secretly fund other groups' challenges.*" (See Zandy, K. 2006. Too much, too little, or just right? A goldilocks approach to patent reexamination reform. NYU Annual Survey of American Law, 61: 865-905, p. 892.)
- ⁴⁰ Harhoff, D., Hall, B., von Graevenitz, G., Hoisl, K., Wagner, S., Gambardella, A., and Giuri, P. 2007. The strategic use of patents and its implications for enterprise and competition policies, Report for the European Commission, July 8, p. 156.
- ⁴¹ Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact and expected impact. Berkeley Technology Law Journal, 99: 989-1015.
- ⁴² Harhoff, D. Forthcoming. The battle for patent rights. In de Meyer, A. and van Pottelsberghe, B (eds.), Economics and Management Perspectives on Intellectual Property Rights. London: Palgrave-McMillan.
- ⁴³ Harhoff, D., Hall, B., von Graevenitz, G., Hoisl, K., Wagner, S., Gambardella, A., and Giuri, P. 2007. The strategic use of patents and its implications for enterprise and competition policies, Report for the European Commission, July 8, p. 252.
- ⁴⁴ Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for Improving U.S. Patent Quality via Post-Grant Opposition, NBER Working Paper, Number 9731, p.13.
- ⁴⁵ Calderini, M., and Sellato, G. 2004. Intellectual property rights as strategic assets: the case of European patent opposition in the telecommunications industry, Working Paper, CESPRI, Number 158, downloaded from <ftp://ftp.unibocconi.it/pub/RePEc/cri/papers/WP158CalderiniScellato.pdf>
- ⁴⁶ Calderini, M., and Sellato, G. 2004. Intellectual property rights as strategic assets: the case of European patent opposition in the telecommunications industry, Working Paper, CESPRI, Number 158, downloaded from <ftp://ftp.unibocconi.it/pub/RePEc/cri/papers/WP158CalderiniScellato.pdf>, p.1.
- ⁴⁷ Harhoff, D., Hall, B., von Graevenitz, G., Hoisl, K., Wagner, S., Gambardella, A., and Giuri, P. 2007. The strategic use of patents and its implications for enterprise and competition policies, Report for the European Commission, July 8, p. 252-3.
- ⁴⁸ The Coalition for 21st Century Patent Reform statement, March 6, 2008.
- ⁴⁹ Cheng, Y., and Lin, L. 2007. The greatest changes of the U.S. patent system of the last 50 years. China Intellectual Property News, November 11. Downloaded from [Cheng_Lin_ChinaIPNews_GreatestChanges_USPatentSystem_withClarifications.pdf](#) and Prasad, G. 2007. Local cos can eye patents in the U.S. The Economic Times, July 23. Downloaded from http://economictimes.indiatimes.com/News/News_By_Industry/Healthcare__Biotech/Local_cos_can_eye_patents_in_US/articleshow/2225676.cms

-
- ⁵⁰ Harhoff, D., Scherer, F., and Vopel, K. 2003. Citations, family size, opposition, and the value of patent rights. Research Policy, 32: 1343-1363.
- ⁵¹ The Coalition for Patent Fairness. The Case for Reform. Downloaded from http://www.patentfairness.org/case_for_reform/need_for_reform.cfm.
- ⁵² National Academy of Public Administration. 2006. U.S. Patent and Trademark Office: Transforming to meet the Challenges of the 21st Century, Washington, DC: National Academy of Public Administration, p. 246.
- ⁵³ Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p. 224-5
- ⁵⁴ Shapiro, C. 2004. Patent system reform: Economic analysis and critique. Berkeley Technology Law Journal, 19(3): 1017-1047, p. 1033
- ⁵⁵ Federal Trade Commission. 2003. To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, Washington, DC: Federal Trade Commission, p.229.
- ⁵⁶ Gambardella, A., Harhoff, D., and Verpagen, B. 2005. The value of patents. Working Paper, Bocconi University. Research on post-grant opposition in Europe confirms that the monetary value of patents increases the likelihood that they will be opposed. (See Harhoff, D., and Reitzig, M. 2004. Determinants of opposition against EPO patent grants – the case of biotechnology and pharmaceuticals. International Journal of Industrial Organization, 22:443-480; Gambardella, A., Harhoff, D., and Verpagen, B. 2005. The value of patents. Working Paper, Bocconi University, p.4)
- ⁵⁷ Harhoff, D., Hall, B., von Graevenitz, G., Hoisl, K., Wagner, S., Gambardella, A., and Giuri, P. 2007. The Strategic Use of Patents And Its Implications For Enterprise And Competition Policies, Report for the European Commission, July 8.
- ⁵⁸ Harhoff, D., Hall, B., von Graevenitz, G., Hoisl, K., Wagner, S., Gambardella, A., and Giuri, P. 2007. The Strategic Use Of Patents And Its Implications For Enterprise And Competition Policies. Report for the European Commission, July 8.
- ⁵⁹ Carlson, D., and Migliorini, R. 2006. Patent reform at the crossroads: Experience in the Far East with oppositions suggests an alternative approach for the United States. North Carolina Journal of Law and Technology, 7(2): 261-319, p.300; The Coalition for Patent Fairness. The Case for Reform. Downloaded from http://www.patentfairness.org/case_for_reform/need_for_reform.cfm.
- ⁶⁰ Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p. 300.
- ⁶¹ Shapiro, C. 2004. Patent system reform: Economic analysis and critique. Berkeley Technology Law Journal, 19(3): 1017-1047, p. 1033
- ⁶² Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p.19.
- ⁶³ Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p. 225.
- ⁶⁴ CJA Consultants. 2006. Patent Litigation Insurance, Report for the European Commission, June, p.22.
- ⁶⁵ CJA Consultants. 2006. Patent Litigation Insurance, Report for the European Commission, June, p.22.
- ⁶⁶ <http://thehill.com/op-eds/electornics-industry-seeks-advantage-at-all-others> expense-2008-03
- ⁶⁷ Cohen, W., and Merrill, S. 2003. Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 7-8.
- ⁶⁸ Graham, S., and Harhoff, S. 2005. Would the U.S. benefit from patent post-grant reviews? Evidence from a ‘twinning’ study. Working Paper, p.15-16; Sag, M., and Roede, K. 2006. A differential impact analysis of patent reform. Prepared for the Intellectual Property Scholars Conference, p.56. As the proponents of changing the patent system, Viet Dinh and William Paxton, explain, “*post-grant review merely provides a new option for parties to allow the USPTO a first look that will, in any case, ultimately be subject to judicial review.*” (See Dinh, V., and Paxton, W. 2007. Patent reform: Protecting property rights and the marketplace of ideas. Paper Prepared for the Coalition for Patent Fairness, December 3: 15)
- ⁶⁹ Hosteny, J. Post-grant opposition: Building on sand. Intellectual Property Today, August: 8-12.
- ⁷⁰ Harhoff, D. Forthcoming. The battle for patent rights. In de Meyer, A. and van Pottelsberghe, B (eds.), Economics and Management Perspectives on Intellectual Property Rights. London: Palgrave-McMillan
- ⁷¹ Cremers, K. 2004. Determinants of Patent Litigation in Germany. Working Paper, Centre for European Economic Research (ZEW), Mannheim, October 12, p. 3. In fact, as Bronwyn Hall and her colleagues

explain, “Unless barred by statute, successful opposition might also lead to later litigation on the part of the former patent holder.” (See Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for improving U.S. patent quality via post-grant opposition, Working Paper, p.13.)

⁷² Estimates based on scholarly research indicate that the average amount of legal expenses for both sides in patent cases decided at trial are \$3.5 million, while the average legal cost for both sides for cases decided before trial are \$1.52 million. (See Bessen, J., and Meurer, M. 2008. The private costs of patent litigation. Boston University School of Law Working Paper, 07-08. For large suits (\$25 million plus), the cost of defending is between \$2 and \$4.5 million dollars and for suits of less than \$1 million, the cost is between \$300,000 and \$750,000. (See Jaffe, A., and Lerner, J. 2004. Innovation and its Discontents: How Our Broken Patent System is Endangering Innovation and Progress and What to do About It, Princeton, NJ: Princeton University Press.) Approximately 4.6 percent of lawsuits reach trial. (See Kesan, Jay P. and Gwendolyn G. Ball. 2005. “How Are Patent Cases Resolved? An Empirical Examination of the Adjudication and Settlement of Patent Disputes,” U. Illinois Law & Economics Research Paper No. LE05-027.)

⁷³ Dinh, V., and Paxton, W. 2007. Patent reform: Protecting property rights and the marketplace of ideas. Paper prepared for the Coalition for Patent Fairness, December 3: 14.

⁷⁴ Graham, S., Hall, B., Harhoff, D., and Mowery, D. 2003. Patent quality control: A comparison of U.S. patent re-examinations and European patent oppositions. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 74-119.

⁷⁵ Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact. Berkeley Technology Law Journal, 19(989): 1001-1114, p.1003-4.

⁷⁶ Merrill, S., Levin, R., and Myers, M. 2004. A Patent System for the 21st Century, Washington, D.C.: National Academies Press, p. 48.

⁷⁷ Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact. Berkeley Technology Law Journal, 19(989): 1001-1114, p.1003-4.

⁷⁸ Graham, S., Hall, B., Harhoff, D., and Mowery, D. 2003. Patent quality control: A comparison of U.S. patent re-examinations and European patent oppositions. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 74-119.

⁷⁹ Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact. Berkeley Technology Law Journal, 19(989): 1001-1114, p.1003-4.

⁸⁰ Graham, S., Hall, B., Harhoff, D., and Mowery, D. 2003. Patent quality control: A comparison of U.S. patent re-examinations and European patent oppositions. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 74-119.

⁸¹ Hall, B., and Harhoff, D. 2004. Post grant reviews in the U.S. patent system – Design choices and expected impact. Berkeley Technology Law Journal, 19(989): 1001-1114, p.1003-4.

⁸² Graham, S., Hall, B., Harhoff, D., and Mowery, D. 2003. Patent quality control: A comparison of U.S. patent re-examinations and European patent oppositions. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, , p. 74-119.

⁸³ Innovation Alliance. 2007. Why Congress should carefully evaluate the impact of recent U.S. Supreme Court and CAFC decisions before enacting patent reform legislation. June, downloaded from http://www.innovationalliance.net/files/IA_Paper_Supreme_Court.pdf, p. 2.

⁸⁴ Graham, S., Hall, B., Harhoff, D., and Mowery, D. 2003. Patent quality control: A comparison of U.S. patent re-examinations and European patent oppositions. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 74-119, p.97.

⁸⁵ Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for improving U.S. patent quality via post-grant opposition, Working Paper, p.17.

⁸⁶ Merill, S., Levin, R., and Myers, M. 2004. A Patent System for the 21st Century, Washington, D.C.: National Academies Press, p. 102.

⁸⁷ The Coalition for Patent Fairness. The Case for Reform. Downloaded from http://www.patentfairness.org/case_for_reform/need_for_reform.cfm.