WHAT'S WRONG WITH THE ARGUMENTS FOR PATENT REFORM

Scott Shane
Department of Economics
Weatherhead School of Management
Case Western Reserve University
11119 Bellflower Road
Cleveland, OH 44106
Tel: 216-368-5538
Email: scott.shane@case.edu

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Introduction

Innovation is central to U.S. economic growth. Economists have long shown that more than one third of all the gains in per capita incomes and productivity are the result of technological innovation. Moreover, the United States has long been and remains a world leader at this activity.

Economic theory and empirical evidence show that an effective system of intellectual property protection is an important part of what makes the U.S. successful at generating technological innovation. The importance of an effective system of intellectual property protection to U.S, success at technological innovation means that policy makers should very carefully evaluate any changes to our nation's intellectual property system.

The last two U.S. Congresses have considered legislation to change several aspects of the U.S. patent system. Two of these provisions are highly controversial: reducing damages for patent infringement and subjecting patents to unlimited post-grant 3rd party challenges. The former would change the way that damages are calculated in patent infringement lawsuits.[1] The latter would create a low cost, challenger-friendly mechanism for third parties to institute administrative oppositions to invalidate patents in the United States Patent and Trademark Office (USPTO).[2]

Proponents of changing the patent system have made a number of arguments for why Congress should change it. Because of the importance of our patent system to technological innovation in this country, the accuracy of these arguments is of great importance to policy makers considering whether or not to make these changes. This study examines these arguments in light of empirical evidence on the patent system.

The main finding of this study is that the arguments for changing the patent system are based on flawed logic and a poor reading of the existing empirical evidence on the performance of the patent system. Specifically:

1. The growth in patent applications has **not** led to a decline in patent quality.
2. The United States is **not** bogged down in patent disputes.
3. Patent damage awards are **not** excessive.
4. Patent litigation has **little** adverse impact on innovation and job creation.
5. Patent trolls are **not** hijacking the U.S. patent system.
6. The proposed changes to the patent system will **not** greatly improve patent quality, substantially reduce the cost of patent litigation, or speed determination of patent validity. [3]

The remainder of this paper is divided into three sections. The next section provides a brief primer on the role of patents and changes that have occurred in the U.S. patent system in recent years. The third section evaluates the arguments made for the post grant opposition and "apportionment" of damages proposals. The fourth section explains why the proposed changes to the patent system will not have the beneficial effects they are argued to have. The final section concludes.

A Brief Primer on the U.S. Patent System

A patent is a government-granted monopoly that precludes others from using an invention from the date of patent issuance until 20 years from the date of patent application (for utility patents) in return for the inventor's disclosure of how the invention operates. That is, patents are based on a fundamental trade-off. In return for investing in the creation of an invention, for disclosing it to the public and for showing others how it works, thereby advancing the level of technical knowledge in a country, inventors receive the right to prevent others from making, using, or selling their invention for a period of time.

Not everything is patentable. You cannot patent laws of nature or substances that appear naturally,[4] such as chemical elements, because the government thinks of Nature, not the person discovering them, as the inventor. You **can** get a utility patent, which is given for new or improved products and processes, for one of four things: a process (such as a chemical reaction), a machine (such as a laser), an article of manufacture (such as a diskette), or a composition of matter (such as a genetically-altered bacterium).[5]

Patents are only granted for inventions that the patent office determines are novel, non-obvious, and useful. The USPTO defines an invention as "novel" if it has not been previously invented.[6] The patent office deems an invention to be "obvious" if it is a clear next step in technological development to a person of ordinary skill in the field of the purported invention (for example, an electrical engineer would be considered to have ordinary skill and knowledge with respect to electrical circuits) or if the elements of the invention all were present in existing patents and it would be obvious to combine those elements.[7] For the USPTO to view an invention as "useful", it has to work, have a use, and be functional.[8]

Patents provide several benefits to an economy. First, they provide people with an incentive to innovate. In the absence of the monopoly right provided by patents, many inventors often would be unable to capture the value coming from their inventions, and therefore be unwilling to develop or exploit them. Second, patents provide disclosure of an innovation that makes it possible for other parties to learn from inventions and make further advances, which would not be possible if the inventors kept the inventions secret. Third, patents facilitate the operations of markets for technology, allowing inventions to be transferred effectively from inventors to other parties better able to exploit them, as occurs when universities license the inventions of their faculty and staff to private sector firms that can turn those inventions into marketable products. Fourth, they provide incentive to invest in the development and implementation of new ideas, particularly in industries with high development costs and/or capital-intensive manufacturing requirements.

Some perceive that the benefits of patents come at a potential cost. Patents are sometimes criticized as deterring technological innovation on the basis that they make it difficult for other parties to reap commercial value from undertaking further developments in an area. In practice, however, patent holders of an original invention will most often license (or

cross-license) such improvements, as they expand, providing ample incremental profits to be shared between the original inventor and the improver during the original patent's remaining term. In addition, once the original patent expires, the improver remains in control of his improvement through the expiration of his later-issued patent.

The U.S. patent system has changed significantly since 1980. Since that time, the U.S. Supreme Court has determined that certain new technologies may qualify for patent protection. Since 1980, patents may now be obtained on genetically engineered organisms, like mice; genetically altered substances, like cotton and soybeans; and human genetic sequences that enable life saving diagnostics. [9] (Patents on genetically modified plants are the business anchor for a global agricultural revolution that is dramatically improving the life for previously-subsistence farmers who now produce more food, feed, fiber and biofuels with less pesticide and fuel input.) In addition, while mathematical formulas are considered to be natural phenomena and cannot be patented,[10] those formulas that are applied to a structure or process, as occurs in software, have been patentable since 1981.[11] In addition, new legislation established a new court of appeals, known as the Federal Circuit Court of Appeals, to hear all patent appeals.

The number of applications for utility patents has grown dramatically since the early 1980s, reaching 456,154 in 2007.[12] The number of issued patents has also grown, though not as fast as patent applications. In addition, patent applications are thought to be becoming increasingly complex.[13]

Pointing to the growth in the number of patents, critics have raised questions about their quality.[14] A belief that patents have declined in quality and have become more complex, combined with a belief that patents have become the subject of greater litigation, particularly by "non-practicing entities" – those who obtain patents with no intent to commercialize but rather to extract licensing fees from others who would infringe their patents – have led to a belief among some that problems in the patent system are discouraging innovation.[15]

This issue is non-trivial because it has arisen at the same time intellectual property has become much more important to U.S. corporations than it was in the past. Studies show that for public companies, intellectual property now accounts for as much as 70 percent of the value of the business.[16]

The belief among some that there are problems with the patent system has led the U.S. Congress to consider two major changes to the patent system: the method for calculating damages in the event of patent infringement, and the creation of a post-grant opposition process similar to that used in Europe.

The Arguments Justifying Changes to the Patent System Are Flawed

Proponents of apportionment of damages and post-grant opposition have made five primary arguments for changing the patent system. First, the growth in the number of patent applications has led to a decline in average patent quality. Second, the U.S. is increasingly bogged down in legal disputes over patents. Third, damage awards in patent

infringement lawsuits are out of control and are causing harm to our national innovation system. Fourth, patent litigation is adversely impacting R&D investment, innovation, and job growth in this country. Fifth, "non-practicing entities" are hijacking the country's patent system, causing harm to legitimate innovators. While the rhetoric behind these arguments is passionate, the evidence in support of them is lacking.

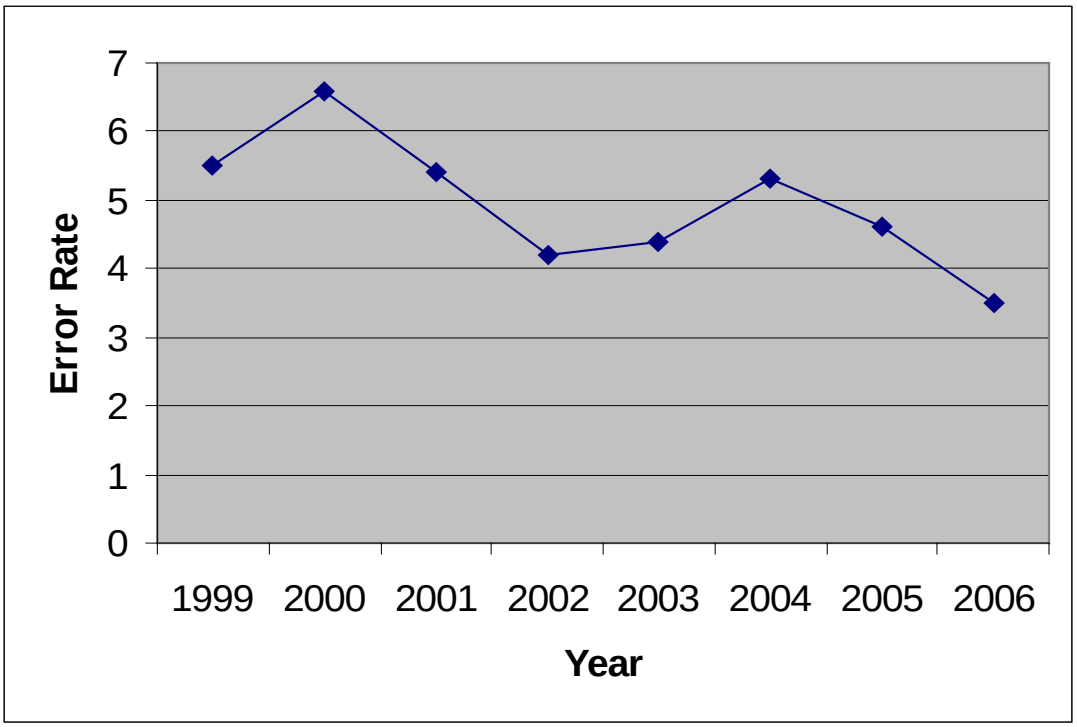
1. The first argument is that growth in the number of patent applications,[17] combined with an increased number of claims per patent, has caused a decline in the quality of issued patents.[18] As economists Adam Jaffe and Josh Lerner write in their book, Innovation and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress and What to do About It, "*The rationale for a patent opposition system lies in the many examples … where patentees have received patents that appear to be illegitimate.*"[19]

   The argument that apportionment of damages and a post-grant opposition system are necessary to redress a problem of declining patent quality, is predicated on the assumption that patent quality has, indeed, **declined**. However, this argument is currently unproven,[20] perhaps because, as the National Academy of Science explains in its report on the patent system, "*the claim that quality has deteriorated in a broad and systematic way has not been empirically tested.*'"[21]

   Moreover, examination of the available data on patent quality does not point to a decline. Two measures of patent quality are the USPTO error rate – the rate at which an annual sampling by the USPTO of its recently issued patents reveals problematic patents – and the Board of Appeals affirmance rate – the rate at which the USPTO Board of Appeals affirms examiner decisions on patent applications.

   If patent quality were declining because of examiner errors, then, over time, the USPTO should be identifying a **greater** proportion of errors in the sample of patents that it checks. However, as Figure 1 shows, from 1999-2006, the USPTO error rate has **declined**.

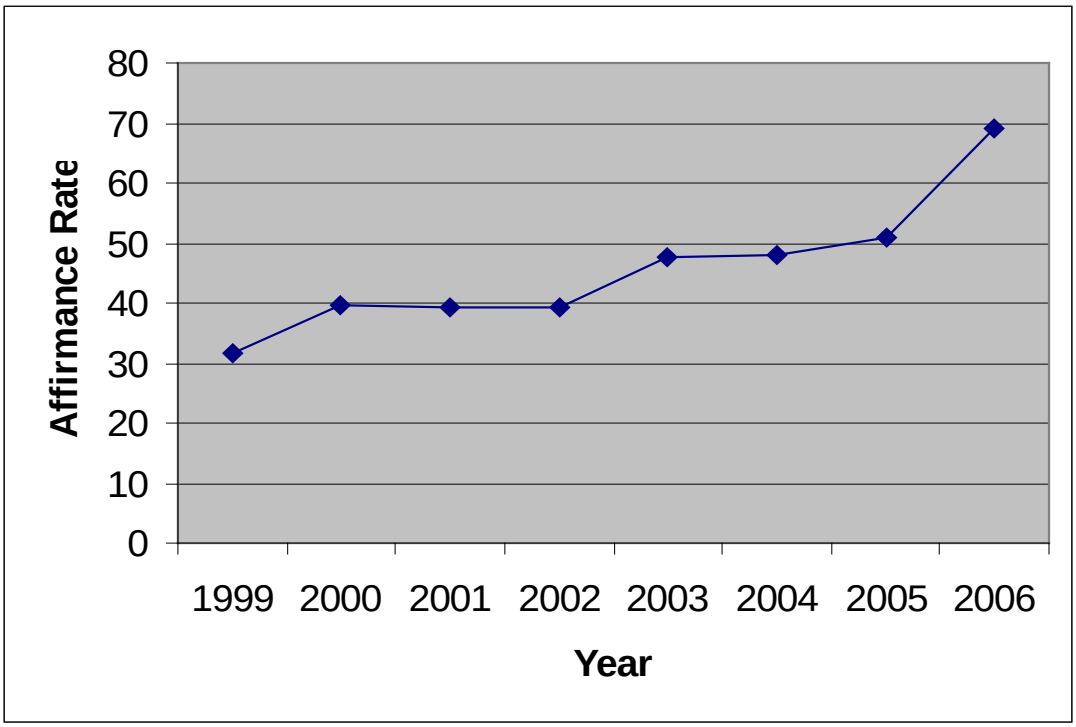
Figure 1. The USPTO Error Rate from 1999-2006.



Source: Various issues of the Annual Performance and Accountability Report, USPTO http://www.uspto.gov

Moreover, if patent quality were declining due to examiner errors, then the Board of Appeals should be affirming the a **smaller** proportion of examiners' decisions on patent applications over time. However, as Figure 2 demonstrates, the Board of Appeals is affirming an **increasing** portion of these decisions.

Figure 2. The Board of Appeals Affirmance Rate, 1999-2006.



Source: Various issues of the Annual Performance and Accountability Report, USPTO http://www.uspto.gov

Another source of evidence on patent quality is the number of patents declared to be invalid as the result of patent litigation. If patents were really getting worse over time, then we would observe an upward trend in the proportion of patents being declared invalid by the courts. However, in a roundtable of the American Intellectual Property Association, Court of Appeals of the Federal Circuit (CACF) Judge Randall Rader explained that the Federal Circuit court decisions do **not** support the argument that the USPTO is issuing a large numbers of poor quality patents.[22]

Nor do the decisions of other courts support the argument of declining patent quality. Law professors James Bessen and Michael Meurer examined patent invalidity as a result of litigation since the beginning of the 1990s and explain that *"invalidity… did not increase during the 1990s….If patent search quality declined during the 1990s **and** the patents with missed prior art were litigated to a final decision, then there should have been an increase in cases finding patents invalid."* [23] If anything, the results of litigation show that patent quality is **improving** over time. Researchers that have looked at the rate at which Federal district courts upheld the validity of issued patents found that only about one third of patents were upheld by district courts from 1953 to 1978, but from 1989 to 1996, this rate had increased to 55 percent.[24]

Finally, experts on patent quality argue that if the patent office were granting lower quality patents – patents with claims too broad to be upheld by the courts – then average patent claims should be getting broader. However, research on patent claims

shows that they are narrower today than they were in 2003. [25] In short, the data do **not** provide evidence that patent quality is declining.

There also does not appear to be any evidence of the causal mechanisms that the proponents of changing the patent system argue account for the alleged decline in patent quality. The proponents of changing the system argue that patent quality has declined because patent examiners are overworked. However, the only empirical effort to examine the effect of examiner workload on the likelihood that an invalid patent will be issued – a study by economists Iain Cockburn, Sam Kortum, and Scott Stern – shows **no support** for this argument. As the authors explain, "*there is no evidence in our data set that examiner… workload at the time a patent is issued affects the probability that the CACF will find a patent invalid.*"[26] In fact, contrary to the argument that patent examiners are issuing bad patents because they are not spending enough time examining them, Professors Cockburn, Kortum and Stern find that the examiners spend **more** time on those patents that are subsequently declared invalid than on the ones that are later found to be valid.

Another causal mechanism that is argued to have led to a decline in patent quality is patent examiner inexperience with new technologies. Because patent examiners aren't knowledgeable about many of the new areas in which patents have been issued in recent years, the argument goes; they have issued more poor quality patents.[27]

Software patents are often cited as the exemplar of poor quality patents that are issued because of examiner inexperience. Because examiners aren't familiar with software, the argument goes; they have issued poor quality patents with overly broad claims that do not hold up in litigation. However, the data do not support this argument. If examiner inexperience were responsible for the issuance of poor quality software patents, then we should observe the problem declining as patent examiners become more experienced with software. But Professors James Bessen and Michael Meurer explain that there has been no change in court findings of software patent validity as patent examiners become more experienced. [28]

Moreover, economists Iain Cockburn, Sam Kortum and Scott Stern examined directly whether patent examiner inexperience has led to a decline in patent quality. Looking at the relationship between examiner experience at the time of patent examination and later CACF decisions on the validity of patents, they find that examiner experience has **no** effect on the probability that the CACF will later find the patent not invalid. In fact, they find that, if anything, examiners with **more** experience are more likely to issue patents that the CACF invalidates.[29]

2. A second argument for changing the patent system is that "*the U.S. economy is increasingly bogged down in patent disputes*"[30] that, if not stopped, will drive innovation out of the economy. However, this argument is flawed. There has been no increase in patent litigation in recent years.[31] In fact, several sources of data show just the opposite; rates of patent litigation are, in fact, declining.

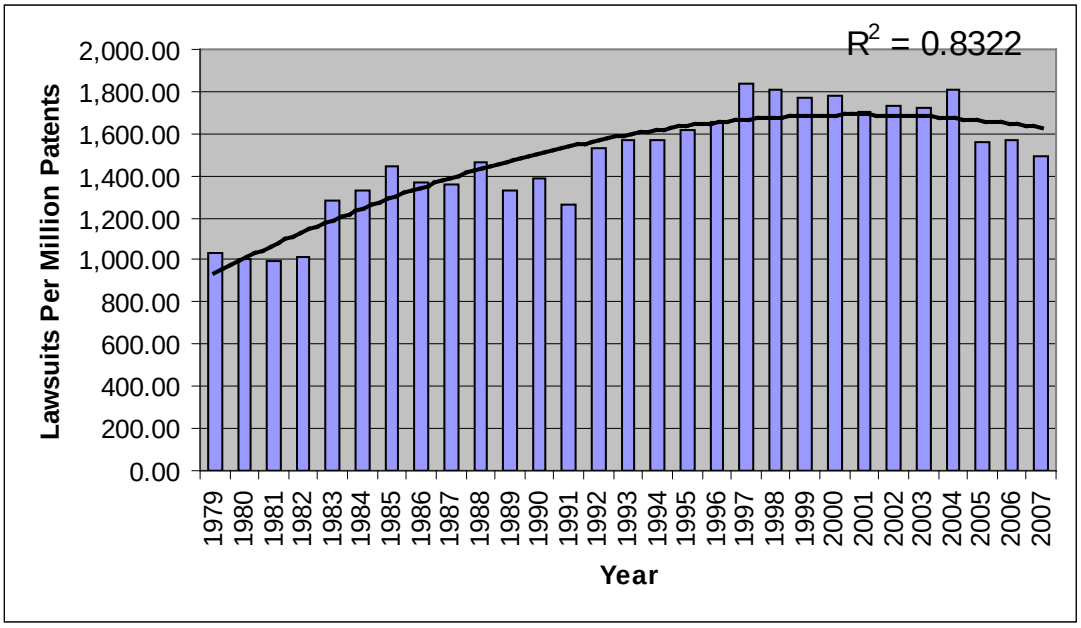
While the absolute number of patent suits filed has increased in recent years, this number is not a meaningful statistic. As economists Adam Jaffe and Josh Lerner point out, we **should** have more patent disagreements if we have more patents. As Professors they clearly explain, "*The escalation of patent litigation…is … partly due to the escalation in patenting; the more patents there are, the more there are to fight over."* [32]

In their book, Patents in a Knowledge-Based Economy, economists Wes Cohen and Steve Merrill explain that the correct measure of patent litigation is the **litigation rate**, which is "*defined as decisions to file a suit normalized by numbers of patents."* [33] If we look at the number of patent suits divided by the number of patents issued annually, we find that "*litigation rates have **not changed** over the two decades of rapid growth in patent law suits."* [34] (Emphasis added.)

However, this figure **overestimates** the rate of litigation when the stock of patents is growing, as it is currently. Because all patents in force are at risk of litigation – not just those issued in the current year – a better estimate of the rate of litigation is the number of lawsuits divided by the number of active patents (a measure consistent with Cohen and Merrill's definition).

To calculate the number of active patents, we need to look at the number of patents issued in years in which patents could still be in force, adjusted by the rate of non-renewal of patents of different ages. If one does this and calculates the **number of patent suits per active patent** since 1979 we see that patent litigation rates appear to have peaked (see Figure 3). In fact, a curvilinear trend line fits the data well with an R-squared of 0.83.

Figure 3. Number of patent lawsuits per active patent 1979-2007.



Source: U.S. patent statistics chart, calendar years 1963-2007, downloaded from www. uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm and patent suits and other civil actions over time, downloaded from http://www.patstats.org/editors_page.rev6.html.[35]

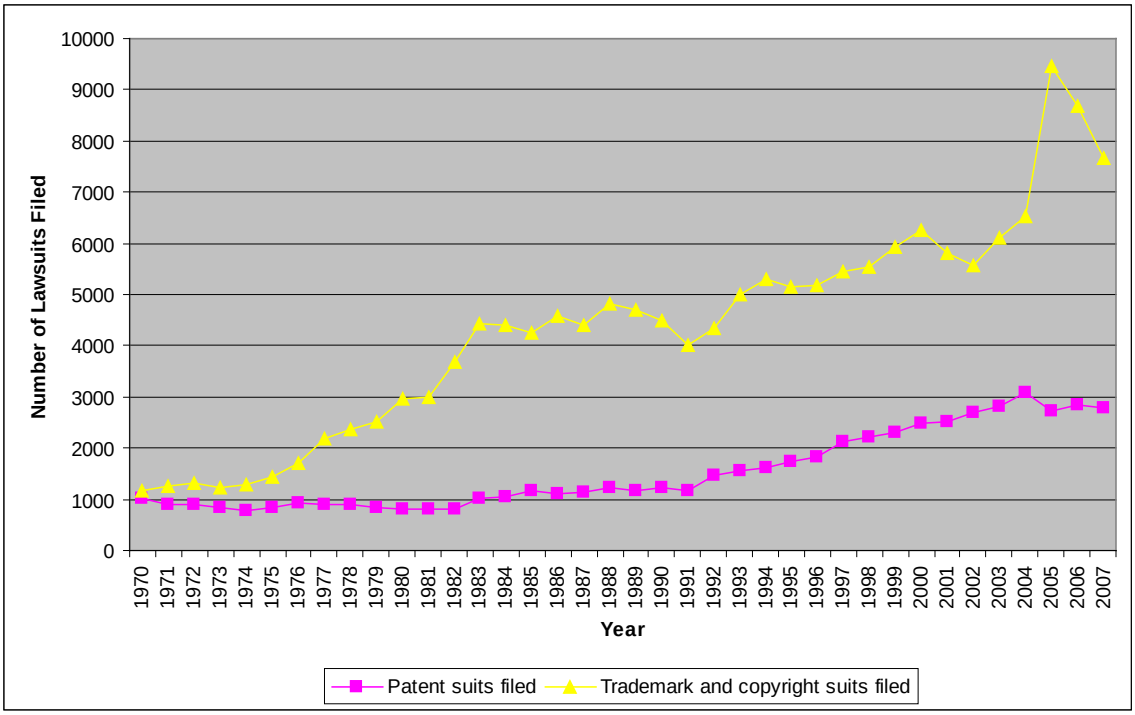
Another explanation for the rise in the number of patent lawsuits in recent years is a general trend toward increased litigation. If all civil litigation is rising in the United States, then patent litigation, which is a subset of this total, should be rising too. As Professors Adam Jaffe and Josh Lerner write, "*The escalation of patent litigation that has occurred over the last two decades may be due in part to a general trend towards a more litigious society*"[36]

It is also possible that the rise in the number of patent lawsuits represents growth in the importance of intellectual property. As patents, copyrights, trademarks, and trade secrets become more and more a source of the value created by businesses, it is natural that companies would be fighting about them more often. Because the growth in the number of patent lawsuits might merely reflect growth in the use of the legal system to protect intellectual property rights, an important measure of whether patent litigation is "out of control" is how its growth compares to the growth in other types of intellectual property litigation. If patent litigation is "out of control," then the number of patent lawsuits should be growing faster than the number of copyright and trademark suits.

Once again, the data do not support the claim that patent litigation is "out of control." As Figure 4 shows, **trademark and copyright** litigation has been growing much faster than patent litigation over the past 37 years, suggesting that, if anything,

lawsuits over these types of intellectual property, not patent litigation, is what is "out of control."

Figure 4. The growth of patent litigation versus trademark and copyright litigation from 1970-2007.



Source: http://www.patstats.org/Patstats3.html

3. A third argument for changing the patent system is that patent litigation often results in costly and unfair patent damages,[37] causing harm to the national innovation system.[38] As Senator Patrick Leahy argued, "*As products have become more complex, often involving hundreds or thousands of patented aspects, litigation has not reliably produced damages awards in infringement cases that correspond to the value of the infringed patent.*"[39]

However, once again the data do not support the argument; patent damage awards have **not** become "excessive." As law professor David Opderbeck explains, "*Empirical studies of damages in patent cases do not reveal a systemic problem of the sort trumpeted by reform advocates. There are, to be sure, occasional enormous outlier verdicts, but there is no indication that these result from inflated royalty calculations, as the reformers suggest.*"[40] Analysis of patent damage awards by Professor Paul Janicke of the University of Houston law school shows that, for 2005 and 2006, the median (typical) damage award in a patent infringement case was only **$4,167,936.**[41] Moreover, the consulting firm PricewaterhouseCoopers has found that, since 1995, the **real dollar** value of the median damages award in a patent litigation case has stayed constant.[42]

When compared to the R&D expenditures and sales of U.S. corporations, the amount of patent damages paid by U.S. companies is miniscule. According to the National Science Foundation, from 1983-2006, U.S. business invested $3.4 trillion in R&D.[43] Over the same period, the American Bar Association reports that the total amount of patent damages awarded and sustained upon appeal totaled $4.5 billion.[44] That is, patent damages accounted for 0.13 percent of R&D expenditures of American businesses over from 1983-2006.

Patent damage awards are even **smaller** in comparison to the revenues of U.S. businesses. A comparison of the total amount of patent damages from all patent suits reported by the American Bar Association in 2005 with the revenue information on U.S. corporations that conduct R&D reported by the National Science Foundation[45] indicates that, for businesses that conducted any R&D at all, patent damages accounted for 0.0066 percent (less than one-one hundredth of one percent) of revenues.

The numbers are not that much higher if we consider settlements in patent infringement cases rather than damages. According to Patentstats.org, a patent litigation tracking organization at the University of Houston law school, 85 percent of patent cases in 2005-2007 settled, and only 10 percent were adjudicated to a disposition.[46] Even if we assume that settlements in patent infringement cases are of the same magnitude as the damages awarded by the courts, (a conservative assumption since infringers have an incentive not to settle cases if settling requires them to pay as much as they would pay if they were to lose an infringement case because they have some probability of winning the case), the magnitude of settlements is low in comparison to the R&D expenditures and revenues of R&D-conducting businesses. Settlements plus damages in patent infringement cases account for only 1.2 percent of R&D expenditures and 0.6 percent of revenues of R&D-conducting U.S. corporations.

Although critics charge that "runaway" juries are responsible for very large patent awards, the data do not support this proposition either. An analysis of jury damage awards in patent infringement cases between 2005 and 2007 by Professor Paul Janicke indicates that there were no "runaway jury verdicts" and that judges regularly set aside verdicts that are unsupported by the facts of the case. [47]

Proponents of changing the patent system also claim that the total costs of patent litigation are enormous. For instance, The Coalition for Patent Fairness writes, "*These complex cases cost millions in legal bills that can coerce large settlements that cost upwards of $100 million or much more ….*"[48] However, a careful look at the evidence shows that patent litigation is not very costly. If we weight estimates of the legal costs from patent litigation by the proportion of cases that go to trial and by the amount in dispute, we find that the average legal bill per patent case **for both sides combined** is $1.61 million.[49] Because there were 2,772 lawsuits initiated in 2007, the total cost of patent litigation in that year was $4.47 billion. In 2006, the total amount of patent damages awarded and that stood upon appeal was $350 million.[50] If

we combine the amount of damages that stood on appeal with the cost of lawsuits to both sides, the total cost of patent litigation was approximately $4.82 billion in 2007. Estimates of the total value of U.S. patents in that year were between $180.1 and $228.3 billion, depending on the estimate.[51] The cost of litigation on these patents was between 2.1 and 2.7 percent of the value of patents in force.

4. A fourth argument for changing the patent system is that patent litigation hinders innovation and job creation.[52] As the Coalition for Patent Fairness argues, "*The U.S. economy is increasingly bogged down in patent disputes that drain billions of dollars that otherwise would be invested in creating jobs… [and] developing new innovations.*"[53]

   However, this argument, too, is inconsistent with the data. We have **no evidence** that the number of patent suits is associated with a decline in employment or R&D expenditures over time or across industries.

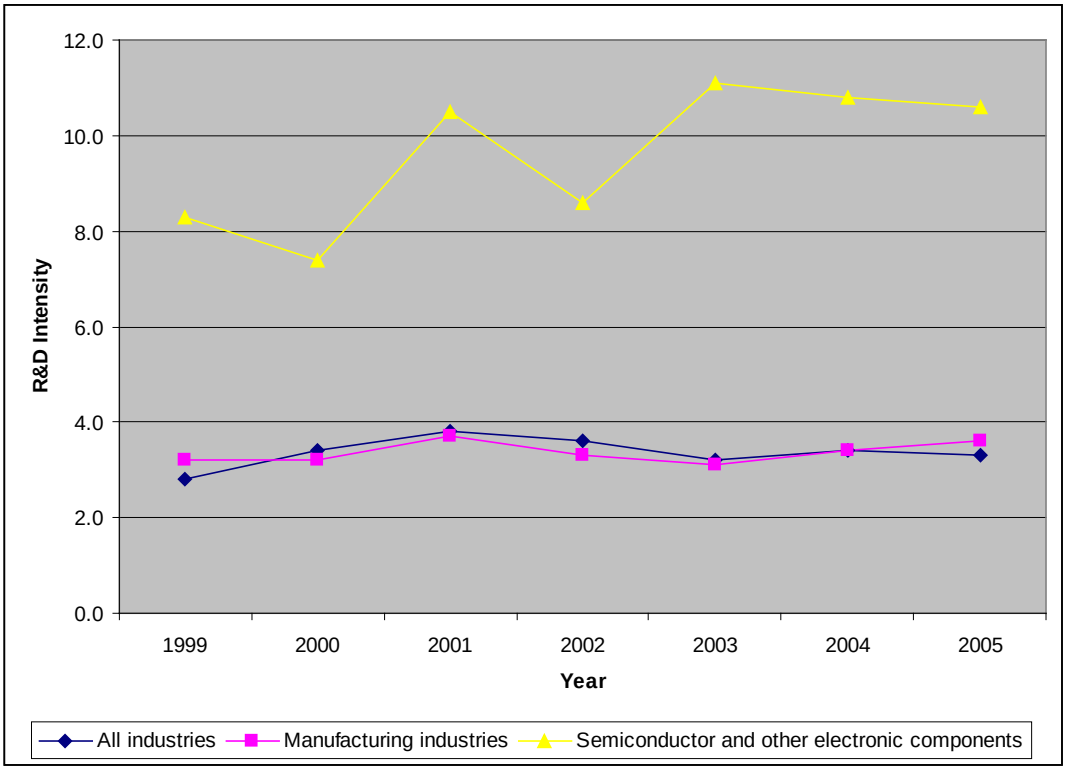
   Take, for example, the software industry. Many critics have charged that patent litigation has adversely affected investment in R&D is this industry. However, law professor Ronald Mann examined the effect of patent litigation on R&D expenditures in software and found that "*direct evidence of high R&D spending in the software industry **undermines claims** that software patents cause firms to reduce R&D spending.*"[54]

   Despite the rise in software-related patent litigation, Professor Mann explains, industry R&D has remained high. From 1997 to 2000, software industry R&D intensity remained far above the average of 3.6 percent for all industries that conduct R&D, coming in at 19.3 percent, 20.0 percent, 16.8 percent, and 20.5 percent, respectively, for each of the years 1997, 1998, 1999 and 2000. This level of R&D intensity is so much higher than any industry (other than scientific R&D services) that Professor Mann says it is "*hard to credit the argument that R&D spending in the industry is systemically depressed.* "[55]

   Proponents of changing the patent system also argue that innovation has been slowed in certain industries because of the formation of "patent thickets" which choke efforts to innovate. Because these observers argue that "patent thickets" have been growing over time, companies in these industries should be reducing their R&D investments.

   However, we have no evidence that R&D investments are decreasing in industries that are subject to patent thickets. For instance, in the semiconductor industry, argued to be the prototypical example of an industry tangled in a patent thicket, R&D intensity has actually **increased** since 1999 when compared to all industries or all manufacturing industries (see Figure 5).

Figure 5. R&D intensity in semiconductors, all manufacturing, and all industries, 1999-2005.



Source: National Science Foundation, Science and Engineering Indicators, various years.

5 A fifth argument for changing the patent system is that "non-practicing entities" have hijacked it,[56] forcing innovative producers to pay damages for patent infringement to those who obtain patents with no intent to commercialize but rather to extract licensing fees from others who would infringe their patents.[57]

However, the evidence does not support this argument. The entities most likely to acquire ownership of patents for the purpose of seeking royalties rather than producing products are not patent trolls, but, rather, are universities. In 2006, U.S. universities managed 12,672 licenses, and applied for 15,908 patents on the inventions of their faculty, staff, and students with the purpose of licensing those inventions to others.[58]

Moreover, companies that purchase patents account for a very small portion of the companies that file patent infringement lawsuits every year. [59] One study showed that "non-practicing entities" account for only 3 percent of all patent infringement lawsuits filed in the United States.[60]

The Arguments about the Benefits of Changes to the Patent System are Flawed

Proponents of changing the patent system have made primary arguments in favor of altering the system: the changes would improve patent quality, reduce the cost and amount of patent litigation and speed determination of patent validity. However, careful examination of the available evidence indicates that these changes would **not** have the beneficial effects that proponents argue they would have.

Improving Patent Quality

The first argument that proponents of changing the patent system make is that these changes would improve patent quality. No one believes that apportionment of damages would improve patent quality. Changing the process for calculating damages would not improve patent quality because damages are determined *after* the patent is issued. Moreover, damages are only awarded in patent infringement cases in which the validity of patents is **upheld**. If a patent is deemed invalid, there cannot be infringement, and damages will not be awarded. Therefore, by definition, apportionment of damages could not cause the number of poor quality patents issued by the patent office to decline.

Regarding post-grant review, The Coalition for Patent Fairness claims that "*improving the process for challenging questionable patents will lead to better patent quality."* [61] However, an examination of the evidence indicates that post-grant opposition would not improve patent quality, a view held by the European Patent Office.[62] First, for post-grant opposition 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 oppose 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."* [63]

In fact, companies have an incentive **not** to oppose other companies' poor quality patents. Opposing a patent signals the commercial interest of the company in invalidating the patent and so makes it a target for patent prosecution by the patent holder.[64] Thus, as the Federal Trade Commission reports, few competitors would risk identifying themselves as targets by opposing competitors' patents no matter how attractive the process was made.[65] Because companies identify themselves as likely infringers by opposing patents, they would only be willing to challenge patents that they are likely to infringe **and** are commercially valuable.[66] As a result, post-grant opposition 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 Dietmar 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.[67] The pattern in Japan suggests that post-grant opposition might even reduce patent quality. Japan had a post grant opposition which it eliminated in 1996. After that country **eliminated** its post grant opposition system, it saw 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).[68]

Reducing the Cost of Patent Litigation

The second argument that proponents of changing the patent system make is that these changes would substantially reduce the cost of patent litigation. But how would apportionment of damages really reduce the cost of patent litigation?[69]

While the greater use of apportionment would reduce the damages portion of litigation costs for infringers, damages themselves account for a small portion of the cost of patent litigation. Most of the costs come from the expense of lawyers on both sides of the disputes. Therefore, apportionment of damages would only reduce the cost of litigation if it reduces the amount of patent litigation, something that the evidence does not support. However, a survey of 207 patent attorneys at independent law firms randomly selected from the USPTO list of registered attorneys and patent agents indicated that 57 percent expected the proposed legislation to have no effect on the number of patent lawsuits, making the typical expected effect on the number of lawsuits zero.[70]

Moreover, economists Jerry Hausman and Gregory Leonard explain that apportionment of damages would actually result in **more** patent litigation because the reduction in damages that comes from apportionment would increase the incentive for companies to infringe, making **patent holders** more likely to litigate to protect their patents against infringement.[71]

An apportionment-centric system of damages also would make the calculation of damages more complex. Under such a system, both sides to patent disputes would need to hire expensive valuation experts to calculate damages, and would incur the cost of additional attorneys' fees and court delays. [72] As appellate court judge Paul Michel explains, *"The present bills require a new kind of macroeconomic analysis that would be extremely costly and time consuming, far more so than current application of the well-settled apportionment law. Resulting additional court delays would be severe, as would additional attorneys' fees and costs."*[73] The survey of patent attorneys revealed that they expect the cost of setting damages to increase 21.4 percent if the proposed legislation were adopted.

Proponents also argue that a post-grant opposition system would reduce the amount and cost of patent litigation because companies would substitute a faster and cheaper post grant opposition system for patent litigation.[74] 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."*

However, an examination of the evidence indicates that post-grant opposition would do little to reduce the amount and cost of patent litigation. First, as professors James Bessen and Michael Meurer explain, patent **validity** is not the cause of most patent litigation.[75] Rather, patent litigation only occurs when patents are valuable enough to be worth fighting 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.[76])

In a study that compared litigated U.S. patents to their European counterparts, Professors Stuart Graham and Dietmar Harhoff found that only 20 percent of litigated U.S. patents would be candidates for post-grant opposition. Moreover, only one third of opposed patents would be revoked, and only half of the revoked patents would not be 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 a post-grant opposition procedure.

Second, there is no evidence elsewhere in the world that post-grant opposition has 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.[77] As law Professors James Bessen and Michael Meurer explain, giving 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."* [78]

Post-grant opposition has done nothing to reduce patent litigation in other countries that have such a system. In Germany, which has had a post-grant opposition system for decades, **and** participates in the European patent system, which also has a post-grant opposition system, the rate of patent litigation **doubled** from 1996 to 2006,[79] but did not increase in United States, which has no post-grant opposition system. 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 U.S.[80]

Not only does the experience of other countries with post-grant opposition suggest that it does little to reduce patent litigation, but policy makers in some countries believe that post-grant opposition actually leads to **more** patent litigation. The Japanese government, for instance, dropped post grant opposition because it found that the policy **increased** patent litigation.[81]

Third, post-grant opposition would only reduce the amount and cost of patent litigation if companies substitute post-grant opposition for litigation. Economists Wes Cohen and Steve Merrill explain that we have no evidence that this substitution would occur, writing, *"Graham and colleagues are unable to confirm the … prediction that the use of opposition should substitute for subsequent litigation over validity…."*[82]

This is supported by the empirical evidence from Europe indicates that post grant opposition is **followed by** patent litigation in a large proportion of cases. [83] A defendant who has lost a post-grant opposition proceeding can always find something that the patent examiner failed to look at or consider which will justify further efforts to maintain the validity of a financially valuable patent.[84] About half of all patents that are revoked or amended in opposition proceedings in Europe are subsequently appealed to higher

administrative levels of the patent office, making the opposition proceeding far from the last step in the legal wrangling over patents.[85] Moreover, one study in Germany found that patents that were not revoked in a post-grant opposition proceeding had a **higher** probability than other patents of subsequently being litigated.[86]

A post-grant opposition system would do little to reduce the costs of patent litigation in the United States. Researchers estimate that 14 patents are litigated per thousand issued. This means that of the 182,901 patents issued in the United States in 2008, approximately 2,560 will be litigated. For only three percent of these patents, or 77 patents per year, would post-grant opposition result in revocation without appeal, making post-grant opposition a substitute for litigation as a way to invalidate a patent. The total savings in legal savings for these 77 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.[87] Thus, the total amount of legal costs from patent litigation that would be foregone because of post-grant opposition is $124 million per year, which would amount to only 0.0044% of U.S. corporate revenues.

Speeding Determination of Patent Validity

The third argument that proponents of changing the patent system make is that these changes would speed the determination of patent validity.[88]

Proponents of changing the patent system suggest that apportionment of damages would speed the determination of patent validity.[89] However, there is **no** empirical evidence to support this assertion. In fact, logic suggests that apportionment of damages will **slow** the determination of patent validity. [Again, it is important to remember that damages are assessed only after infringement of a valid patent has been determined. Therefore, changing the way in which damages are calculated would do nothing to speed the determination of patent validity. If anything, the enactment of an apportionment-centric system of damages is likely to severely slow the resolution of all patent disputes as parties await the outcome of litigation to determine the meaning and extent of the new system. As Judge Michel explains, determining the contours of such a system would be complicated, costly and time-consuming.]

Proponents also argue that post-grant opposition would provide "*a fast, inexpensive method for increasing the certainty as to the enforceability and scope of patents.*"[90]

However, the available evidence indicates otherwise. Researchers that have examined the time it takes to determine patent validity through the post-grant opposition process in Europe find that it is no shorter than the length of time it takes to determine patent validity through the U.S. reexamination process. Economist Stuart Graham and his colleagues found that the **typical** amount of time from application to the outcome of a post-grant opposition in Europe was 7 years.[91] And economists Bronwyn Hall and Dietmar Harhoff found that the **average** length of time from application to the outcome of a post-grant opposition in Europe was 8.3 years.[92] In contrast, Steve Merrill, Richard

Levin and Mark Myers put the **median** length of time it takes to get to validity through the U.S. reexamination system at 7.5 years.[93]

While some portion of time in both locations is accounted for by the interval between patent application and patent issuance, the time spent on opposition and appeal in Europe is, nonetheless, substantial. The initial opposition typically lasts two years, but half of patents revoked or modified in opposition proceedings are appealed, with a typical appeal adding 2.1 years to the evaluation period. [94] Thus, the median duration of opposition **and** appeal on European patents is 3.1 years, [95] and the average is 4.0 years. [96]

Moreover, the duration can be much longer.[97] Professors Bronwyn Hall and Dietmar Harhoff found that "*opposition and appeal last longer than 6.2 years for one quarter of all cases.*"[98]

Because it takes a long time to establish patent validity under the post-grant opposition system, patent litigation in the U.S. is sometimes resolved well before post-grant opposition on corresponding European patent has been completed. For instance, Economist Stuart Graham and his colleagues describe one lawsuit in the United States that was settled **five years before** the opposition on the corresponding EPO patent was resolved. [99]

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 patent 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."*[100]

In sum, the experts believe that a post-grant opposition system would **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.*" [101] 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.*" [102] 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.*" [103]

Conclusions

Innovation is central to U.S. economic growth. Moreover, economic theory and empirical evidence show that effective intellectual property protection is an important part of the system that makes the U.S. effective at generating technological innovation. Therefore, policymakers should very carefully evaluate any potential changes to our patent system.

The U.S. Congress has recently considered legislation to change the way damages are calculated in patent infringement lawsuits, and to institute a system of post grant opposition. Proponents of these two changes to the patent system made a number of arguments for them. This study finds that those arguments are based on flawed logic and a poor reading of the existing evidence. Specifically, the growth in patent applications has **not** led to a decline in patent quality; the United States is **not** bogged down in patent disputes; patent damage awards are **not** excessive; patent litigation has **little** adverse impact on innovation and job creation; and "non-practicing entities" are **not** hijacking the U.S. patent system.

Proponents of changing the patent system have also argued that apportionment of damages and post-grant opposition would improve patent quality; reduce the cost of patent litigation; and speed determination of patent validity. However, the evidence indicates that these changes would have **none** of the effects that proponents argue they would have.

The U.S. patent system is central to our national success in technological innovation. For this reason, the U.S. Congress needs to carefully evaluate any potential changes that it makes to the system. Any reforms that Congress makes should be informed by the evidence about the likely effects of the changes. The justification for changing the patent system and the claimed benefits of apportionment of damages and post-grant opposition are not based on an accurate reading of the available evidence. Policy makers should take this information into consideration when making decisions about patent reform legislation.

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[1] 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).

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

[3] "Complex" technologies, like electronic devices, are made up of many components. "Discrete" technologies, like chemicals, are made up of few components.

[4] Kesan, J. 2000. Intellectual property protection and agricultural biotechnology. The American Behavioral Scientist, 44(3): 464-503.

[5] Yoffie, D. 2003. Intellectual Property and Strategy, Harvard Business School Note, Number 9-704-493.

[6] Schilling, M. 2005. Strategic Management of Technological Innovation, New York: McGraw Hill.

[7] Yoffie, D. 2003. Intellectual Property and Strategy, Harvard Business School Note, Number 9-704-493.

[8] Yoffie, D. 2003. Intellectual Property and Strategy, Harvard Business School Note, Number 9-704-493.

[9] Jaffe, A., and Lerner, J. 2004. Innovation and Its Discontents, Princeton, NJ: Princeton University Press.

[10] Kesan, J. 2000. Intellectual property protection and agricultural biotechnology. The American Behavioral Scientist, 44(3): 464-503.

[11] Jaffe, A., and Lerner, J. 2004. Innovation and Its Discontents, Princeton, NJ: Princeton University Press.

[12] http://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.htm

[13] Allison, J., and Lemley, M. 2002. The Growing Complexity of the United States Patent System, Boston University Law Review 82 (1): 77-144.

[14] Hall, B., Graham, S., Harhoff, D., and Mowery, D. 2003. Prospects for improving U.S. patent quality via post-grant opposition, NBER Working Paper 9731.

[15] Scotchmer, S. 1991. Standing on the shoulders of giants: cumulative research and the patent law, The Journal of Economic Perspectives 5(1): 29-41.

[16] McGavock, D. 2002. Intangible assets: A ticking time bomb. Chief Executive, 183 (November), downloaded from http://findarticles.com/p/articles/mi_m4070/is_2002_Nov/ai_94145235.

[17] Dinh, V., and Paxton, W. 2007. Patent reform: Protecting property rights and the marketplace of ideas. Prepared for the Coalition for Patent Fairness, December 3. It is important to note that increases in patent applications per se are not a bad thing. Applications could be going up because innovation is increasing. In fact, professors Sam Kortum and Josh Lerner explain that increases in the number of patents in the 1980s and 1990s represented just that – greater innovation and better R&D management not changes in the legal system. (See Kortum, S., and Lerner, J. 1999. What's behind the recent surge in patenting, Research Policy 28:1–22, p. 8.)

[18] Dinh, V., and Paxton, W. 2007. Patent reform: Protecting property rights and the marketplace of ideas. Prepared for the Coalition for Patent Fairness, December 3, A high quality patent has "*little uncertainty over the breadth of its claims…as well as whether these claims are likely to be upheld in legal proceedings following the issue of the patent." (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.3. Similarly, the National Academy of Public Administration says that *"a quality patent is one that can be enforced in court and … consistently survive[s] validity challenges."* (See National Academy of Public Administration. 2006. U.S. Patent and Trademark Office: Transforming to meet the Challenges of the 21st Century, August, p. 62.) In contrast, "*questionable patents or patents of poor quality are those patents which have been granted that might be deemed invalid if challenged either by litigation or reexamination because they fail to meet the statutory requirements of novelty, non-obviousness, or utility, or because they contain claims that are unclear, not enabled across their full scope, or suffer from an insufficient technical description…..*" (See Mills, A., and Tereskerz, P. 2008. Proposed Patent Reform Legislation: Limitations Of Empirical Data Used To Inform The Public Policy Debate A Report Prepared For The Biotechnology Industry Organization January 30: p.6.)

[19] 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, p.151.

[20] Sag, M., and Roede, K. 2006. A differential impact analysis of patent reform. Paper prepared for the Intellectual Property Scholars Conference, P.7

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[26] Cockburn, I., Kortum, S., and Stern S. 2003. Are all patent examiners equal? Examiners, patent characteristics and litigation outcomes. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 20.

[27] 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, p.151.

[28] Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p.19.

[29] Cockburn, I., Kortum, S., and Stern S. 2003. Are all patent examiners equal? Examiners, patent characteristics and litigation outcomes. In Cohen, W., and Merrill, S. (eds.) Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 20.

[30] "Who We Are", Coalition for Patent Fairness, http://www.patentfairness.org/about the coalition/who we are.cfm

[31] The absolute number of patent cases that go to court is very small. In 2006, only 102 patent lawsuits went to trial. (See Choate, P. 2007. The patent reform act of 2007: Responding to legitimate needs or special interests? Business Voice, 1- 29.)

[32] 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, p.56.

[33] Cohen, W., and Merrill, S. 2003. Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 8.

[34] Cohen, W., and Merrill, S. 2003. Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 8.

[35] The stock of active patents is calculated by taking the patents in force over the previous 17 years (because patents used to have 17 year life from the date of issue and now have a 20 year life from the date of application, but take almost three years to issue) multiplied by the estimates of the percentage of patents still in force by age provided by Lemley, M. 2001. Rational ignorance at the patent office. Northwestern University Law Review, 95(4): 1495-1532. The number of lawsuits comes from www.patstats.org.

[36] 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, p.56.

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[45] Science and Engineering Indicators 2008. Downloaded from http://www.nsf.gov/statistics/seind08/pdf_v2.htm

[46] http://www.patstats.org/Patstats2.html

[47] Janicke, P. 2007. Patent Litigation Remedies: Some Statistical Observations, Power Point Presentation. Downloaded from www.patentsmatter.com/issue/Patent_Litigation_Remedies-Janicke.ppt.

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

[49] 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.)

[50] McGrath, J., and Kedrowski, K. 2007. Trends in Patent Damages. Section of Litigation, American Bar Association, p. 1-13, downloaded from http://www.docs.piausa.org/ABA/07-06-01-ABA-Report-On-Patent-Damages.pdf.

[51] The estimate was created by taking the number of patents issued over the past 17 years, multiplying them by the estimates of the percentage of patents still in force by age provided by Lemley, M., 2001, Rational ignorance at the patent office. Northwestern University Law Review, 95(4): 1495-1532; and multiplying the resulting number by estimates of patent value reported in Barney, J., 2002, A study of patent mortality rates: Using statistical survival analysis to rate and value patent assets, *AIPLA Quarterly Journal*, 30(3): 317-352; Bessen, J., 2006, The value of U.S. patents by owner and patent characteristics, Boston University School of Law, Working Paper 06-46; and Putnam, J., 1996, *The Value of International Patent Protection.* PhD Dissertation, Yale University Press. The three studies reveal average patent values in 2008 dollars of between $97,177 and $123,716. In 2008, there were 2,578,918 U.S. patents in force.

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[53] Who we are, The Coalition for Patent Fairness. Downloaded from http://www.patentfairness.org/about the coalition/who we are.cfm..

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[55] Mann, R. 2005. Do Patents Facilitate Financing in the Software Industry? Texas Law Review (83) 4: 961-1030, p. 1002-3.

[56] McDonough, J. 2006. The myth of the patent troll: An alternative view of the function of patent dealers in an idea economy. Emory Law Journal, 56: 189-223.

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[58] http://www.autm.net/about/dsp.Detail.cfm?pid=215

[59] Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p.17.

[60] Akerley, S. 2006. Trolling for Patents, American Executive, August 1, downloaded from http://www.americanexecutive.com/content/view/5553/

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

[62] 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.

[63] 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

[64] Shapiro, C. 2004. Patent system reform: Economic analysis and critique. Berkeley Technology Law Journal, 19(3): 1017-1047, p. 1033

[65] Federal Trade Commission. 2003. To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy, Washington, DC: Federal Trade Commission, p.229.

[66] 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)

[67] 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.

[68] 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.

[69] Hedlund, J. 2007. Patents pending: Patent reform for the innovation economy. SSRN Working Paper, Number, 1004512, p.2.

[70] The methodology for the survey was as follows: A temporary employee with no background in the patent reform debate was engaged to select random entries from the USPTO list of registered attorneys/agents. We selected only attorneys from law firms because attorneys would have greater knowledge of patent litigation and attorneys at law firms would have a more objective view of the impact of patent law changes than corporate attorneys. Approximately 22 percent of the 949 attorneys surveyed responded. The respondents were asked to comment on the effect of the proposed legislation on patent damages, the cost of expert witnesses to set patent damages, and the amount of patent litigation. The proposed legislation was defined as follows: "The 110th Congress (2007-08) considered legislation to change the process for calculating damages in patent litigation from the common-law Georgia-Pacific 15-factor framework to a statutory framework in which the court selects a method of calculating a reasonable royalty from: (a) the economic value attributable to patent's specific contribution over the prior art; (b) the entire market value, if the claimed invention's specific contribution over the prior art is the predominant basis for market demand; or if neither (a) nor (b) is appropriate, then (c) the terms of any nonexclusive marketplace licensing of the invention, and other relevant factors."

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[72] O'Reilley, D. 2008. The latest trends in Europe and U.S. laws and regulations. Report on the International Patent Licensing Seminar, p.6.

[73] Letter from Paul Michel of the U.S. Court of Appeals for the Federal Circuit to Shanna Winters, Chief Counsel to the Subcommittee on The Courts, Internet and Intellectual Property, June 7, 2007. It is not clear this can be calculated. As the Coalition for 21st Century Patent Reform explains, *"At some level, essentially inventions are combinations of old elements…The value of a license to use an invention has nothing to do with its relative use of known components, but rather the overall value of the combination as opposed to commercially available, non-infringing alternatives."* (See Letter from The Coalition for 21st Century Patent Reform to Representatives John Conyers and Lamar Smith, May 24, 2007, p. 2)

[74] 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.

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[78] Bessen, J., and Meurer, M. 2008. Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton, NJ: Princeton University Press, p. 225.

[79] CJA Consultants. 2006. Patent Litigation Insurance, Report for the European Commission, June, p.22.

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[81] http://thehill.com/op-eds/electornics-industry-seeks-advantage-at-all-others expense-2008-03

[82] Cohen, W., and Merrill, S. 2003. Patents in the Knowledge Based Economy, Washington, DC: National Academies Press, p. 7-8.

[83] 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)

[84] Hosteny, J. Post-grant opposition: Building on sand. Intellectual Property Today, August: 8-12.

[85] 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

[86] 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.)

[87] 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.)

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