Ten Years After:
What Are the Effects of Business Method Patents in Financial Services?*

BY ROBERT M. HUNT

In recent years, the courts have determined that business methods can be patented and the United States Patent and Trademark Office has granted some 12,000 patents of this sort. Has the availability of patents for business methods increased the rate of innovation in the U.S. financial sector? The available evidence suggests that there has been no significant change in the aggregate trend of R&D investments made by financial firms. In this article, Bob Hunt discusses how recent court decisions and proposed federal legislation may change how firms enforce their patents. In addition, he outlines some of the remaining challenges that business method patents pose for financial companies.

A decade has passed since American courts made clear that methods of doing business could be patented. Since then, the U.S. Patent and Trademark Office (USPTO) has granted more than 12,000 of these patents, of which only a small share has been obtained by financial firms. A number of lawsuits have been filed, and a number of financial settlements, some involving significant sums of money, have occurred.

Has the availability of patents for business methods increased the rate of innovation in the U.S. financial sector? This is a difficult question to answer, in part because our official measures are not well suited for estimating research activity in financial services. Nevertheless, the available evidence suggests that there has been no significant change in the aggregate trend of R&D investments made by financial firms.

Business method patents are probably here to stay. But recent court decisions and proposed federal legislation are likely to change how firms enforce their patents. These changes should mitigate some of the concerns raised about business method patents: that the claimed inventions are not new, are not sufficiently novel to justify the award of a patent, and are being enforced in ways that increase business risk to financial firms. Nevertheless, significant challenges remain. In particular, the boundaries of the rights being granted in at least some business method patents are not sufficiently clear. Ambiguity over these boundaries creates uncertainty for both the owners of these patents and their competitors.

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*The views expressed here are those of the author and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

BACKGROUND

A patent is a grant of the legal right to exclude others from making, using, or selling the patented invention for a limited period of time. If the patent is infringed, the patent owner may sue the infringer to recover lost profits. Sometimes the patent owner is able to obtain an injunction — a court order that prevents the alleged infringer from continuing to make, use, or sell the patented invention. For reasons described below, an injunction is a very powerful legal weapon in patent litigation.

But not all inventions qualify for patent protection. To qualify, an invention must satisfy a number of statutory requirements, including what the law describes as *nonobviousness*. This prevents the grant of a patent for an invention that would have been obvious to a practitioner in the relevant field at the time the invention was made. In other words, a patentable invention must be more than a trivial extension of what is already known (the prior art).

As an example, consider one of the patents examined in the Supreme Court decision in *Graham v. Deere*.[1] The claimed invention was a combined sprayer and cap used on bottles of household chemicals. The essential elements of the sprayer had been developed by others, but they had never been assembled in this particular way, which made possible the use of automated bottling equipment. As a result, the product was highly successful. While the Supreme Court acknowledged that long-felt need and commercial success might suggest the invention was nonobvious, in the end it decided otherwise because the differences between the product's design and that of pre-existing products were minimal.

Patentable Subject Matter. In the U.S., assuming the criteria just described are also satisfied, any process, machine, manufacture, or composition of matter, or any improvement of those things can be patented. But the courts have also identified certain categories of subject matter that cannot be patented, for example, laws of nature and abstract ideas.

For at least 80 years, it was commonly believed that these limitations precluded patenting methods of doing business. This view was suddenly upended by the Federal Circuit's *State Street* decision in 1998.[2] That case involved a patent on a data processing system that made possible the pooling of assets in several mutual funds into a single portfolio, reducing overhead costs while maintaining the transaction information necessary for allocating gains, losses, and tax liabilities to the original funds. The district court determined that the invention in question was a business method and was therefore unpatentable. But the Federal Circuit concluded that, under U.S. law, there was no such thing as a subject matter exception for business methods.

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Business Method Patenting Grows Rapidly. The *State Street* decision had an almost immediate effect in terms of patenting behavior. About 1,000 patents for *computer-implemented* business methods were granted in each year after 1999 (Figure 1). Some examples are found in *10 Business Method Patents Granted in 2008.* An inspection of random business method patents reveals that many are not directly related to the financial industry (there are many patents on postage-metering systems, for example). Nevertheless, half or more of all the patents depicted in Figure 1 fall into categories of technology directly related to the provision of financial services. In addition, the vast majority of business method patents (roughly four in five) would also qualify as software patents.[3]

Classifying the industrial mix of the owners of business method patents can be difficult. Nevertheless, it is clear that when compared with firms in the information and communications technology sector (for example, computers, software, and communications equipment), financial institutions are relatively minor players. Very roughly speaking, manufacturers of electronics, computers, instruments, and software account for at least a third, and likely much more, of business method patents granted in the last five years.[4] In contrast, and again speaking very roughly, financial firms and providers of consumer payment services account for less than one-tenth of the total. Nevertheless, a number of financial institutions have accumulated a dozen or more these patents.[5]

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[1] The Supreme Court wrote a combined decision for three patent cases. The patent I describe here was at issue in *Calmar, Inc. v. Cook Chemical Co.*

[2] See also the Federal Circuit opinion in *AT&T v. Excel Communications.* The Federal Circuit is the sole court of appeals from federal district courts for patent cases. Federal Circuit decisions can be appealed to the Supreme Court.

[3] See the data appendix for definitions and additional information.

[4] The leading recipients include IBM, Sony, Hewlett-Packard, Fujitsu, Hitachi, NCR, and Microsoft.

[5] Among others, these include American Express, Citibank, JPMorgan Chase, Capital One, and Goldman Sachs.

TABLE

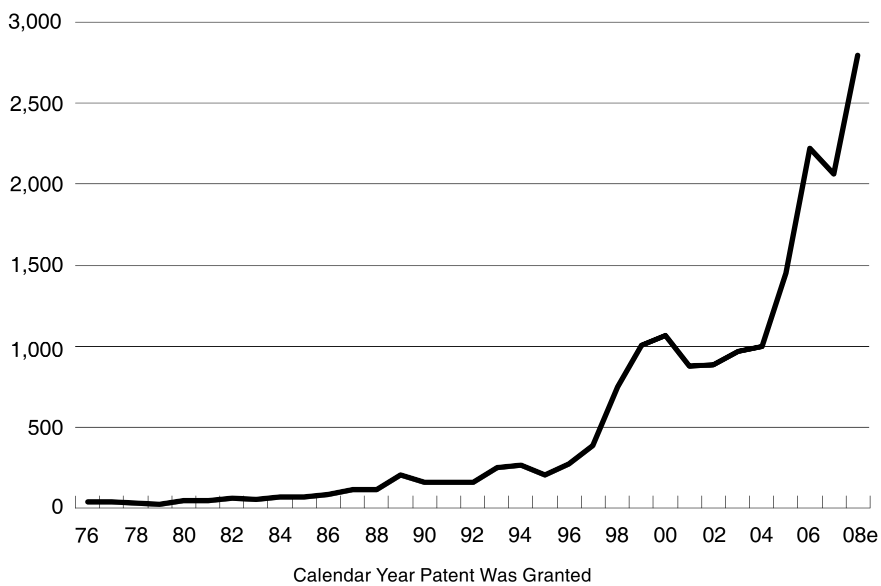
10 Business Method Patents Granted in 2008

Description*	Company**
A method and system for predicting changes in interest-rate sensitivity induced by changes in economic factors that affect the duration of assets and liabilities, including core deposits (no. 7,328,179).	McGuire Performance Solutions, Inc.
A method and system for calculating marginal cost curves for electricity generating plants (no. 7,333,861).	NeuCo, Inc.
A method of selecting sector weights and particular securities for a stock portfolio (no. 7,340,425).	First Trust Portfolios
A system and method of calculating prepayment and default risk, loss given default, and default correlations for the purpose of valuing a portfolio of assets (no. 7,340,431).	Freddie Mac
A machine and computer program that enables the pricing of auto insurance based on the risk associated with driving at particular locations and times (no. 7,343,309).	International Business Machines Corp.
A system and method for trading pollution emission allowances (no. 7,343,341).	Chicago Climate Exchange, Inc.
A computer-implemented method of computing price elasticities, choosing from one or more demand models based on goodness of fit (no. 7,343,355)	i2 Technologies US, Inc.
A method of assessing the capital adequacy of an automotive finance company (no. 7,346,566).	Ford Motor Company
A method of creating a customized payment card, based on a consumer's instructions/images, via a website (no. 7,360,692).	AT&T Delaware Intellectual Property, Inc.
A method of sharing the profits generated by a payment card program, in excess of some target, with users of the card (no. 7,360,693).	JPMorgan Chase Bank, N.A.

* The author's interpretation, based on the patent's claims or description of the invention
** Initial assignee on the patent document

FIGURE 1

Business Method Patents*



Source: U.S. Patent and Trademark Office and author's calculations

* These are patents in Class 705 (Data Processing: Financial, Business Practice, Management, or Cost/Price Determination) in the USPTO's patent classification system. The 2008 total is estimated from five months of data. See the appendix for details.

Between 1997 and 1999, new applications for business method patents tripled, and they have more than tripled since then. Today about 11,000 new applications for patents on business methods are filed each year, which suggests that there will be significant future growth in the number of patents granted. Over 40,000 of these applications are currently pending.

ARE FINANCIAL SERVICES SPECIAL?

An important question to ask is whether there are characteristics of the financial services sector that might make us think differently about how intellectual property influences decisions and outcomes among financial firms. For example, how do these firms protect their innovations in the absence of patents? Are there special interactions between *network effects*, which are important in many areas of finance, and intellectual property? What challenges does intellectual property pose for standard-setting, which is essential for coordinating the interactions of hundreds, if not thousands, of financial institutions acting on behalf of millions of clients?

Protecting Innovations in the Financial Sector. In many theoretical papers, patents are considered essential for protecting the fruits of innovation. Without them, inventions might be quickly copied by imitators, leaving the inventor without a means of recovering her costs. This would reduce the incentive to do R&D in the first place and hence the rate of innovation.

In practice, however, firms employ other means of protecting their innovations. Surveys of manufacturing companies in the 1980s and 1990s report that only a few industries (chemicals and pharmaceuticals) view patents as the primary means of protecting the profits generated by an invention.[6] Other factors, such as lead time or proprietary knowledge maintained as a trade secret, were typically ranked as more important than patents.[7] In addition, firms in most industries viewed their investments in specific manufacturing capabilities, reputation, brand names, and distribution networks as more important mechanisms than patents for protecting their innovations. Such investments are sometimes described as *complementary assets*. Consider the example of the semiconductor firm Intel. While the firm invests heavily in patents, much of Intel's success is derived from its ability to design and build new factories (which produce only the latest CPU chips)

[6] See the working paper by Wesley Cohen, Richard Nelson, and John Walsh. Evidence from earlier surveys is found in Edwin Mansfield's article and the article by Richard Levin and his co-authors.

[7] A trade secret is certain confidential information, such as a formula or a production technique, that a firm tries to keep from being disclosed. The firm can sue a person (or another company) for stealing or disclosing this information, but it cannot prevent others from independently discovering and using such knowledge.

[8] These are described in William Silber's article, Peter Tufano's 1989 article, and John Caskey's working paper. For a recent review of the literature on financial innovation, see Tufano's 2003 book chapter.

more rapidly than its competitors.

While those surveys focused on manufacturing firms, other researchers have documented similar lessons for innovations in financial services. For example, despite rapid imitation there appears to be persistent first-mover advantages (reflected primarily in market share) among firms developing new securities or option contracts.[8] Some studies find that larger investment banks and mutual fund companies tend to innovate more frequently than smaller ones. This pattern is consistent with the idea that financial firms are able to leverage complementary assets to protect their innovations.[9]

In conclusion, it appears that financial firms typically protect their innovations in much the same way as do manufacturing firms. Historically, patents have not been a significant part of the story for financial firms, and yet their absence has not prevented them from investing in new products (financial instruments) or the processes required to offer them. The question is then whether the addition of financial patents to the mix can improve on the existing incentives and thus increase the rate of innovation in this sector.

Network Effects and Standards. Many financial markets are subject to network effects: Users find the services provided are more valuable when there are many other users of the service. Two obvious examples include payment systems and financial exchanges. Consumers are more willing to carry a payment card when they know it will be accepted by most of the merchants they frequent. Merchants are more willing to incur costs to accept a payment card if they know there are many potential customers who want to use them. In the case of financial exchanges, efficiency is often determined by the number of active buyers and sellers of a security. This creates a tendency to concentrate trading of an instrument on just a few (or even one) exchanges. As these examples suggest, networks are difficult to start, but once they attain a critical mass, they often enjoy a large market share and generate considerable income.

Network effects also arise from the requirements of interoperability, which is extremely important in financial services.

Network effects also arise from the requirements of interoperability, which is extremely important in financial services. Interoperability is accomplished via standard setting, where industry participants agree on technical features so that their systems can work together. Two examples are the specification of the layout and numbering systems of paper checks and the message formats used by automated clearinghouse (ACH) networks for direct deposit of paychecks and other transactions.

Network effects have two implications for thinking about patents. First, they are an example of complementary assets that may permit financial institutions (or networks) to protect their innovations even in the absence of strong intellectual property rights. Second, networks are vulnerable to hold-up by third parties who own patents allegedly infringed by members of the network. Hold-up means that a patent owner may obtain an injunction, effectively shutting down the network. This puts the patent owner in a strong bargaining position in licensing negotiations. It is possible, then, for the patent owner to obtain income in excess of the incremental value created by the underlying invention. The source of that additional income is the value created by the size of the established network.

Consider the case of Research in Motion (RIM), not only the developer of the BlackBerry but also the builder of the servers and software that make it work. RIM was sued by a patent-holding company, NTP, whose primary investment was its portfolio of patents. RIM, on the other hand, had invested about $1 billion in property, equipment, and R&D. NTP won the case and was eventually granted an injunction that would shut down the RIM network in the U.S. This induced RIM to settle the litigation for about $600 million. Ironically, while NTP was very successful in court, the U.S. patent office, on re-examination, rejected many of NTP's patent claims.[10]

A similar problem can arise with standard setting, since firms have limited options to make technical changes without sacrificing interoperability. Suppose a third party subsequently obtains a patent that is infringed by firms complying with the standard. The patent owner may enjoy considerable bargaining power. This is especially the case when implementing the standard requires significant up-front investments that firms will be hesitant to abandon simply to avoid infringing the patent.

A key concern here is the effect of such risks on dynamic incentives. Companies may not be aware of all

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[9] See Tufano's 1989 article and his 1993 book chapter with Erik Sirri.

[10] NTP appealed at least one of those decisions.

of the patents that may arise and who owns them, at the time they are required to make their investment decisions. The risk of potential hold-up may discourage firms from investing in the first place. Such lost investment would be particularly costly, since it would otherwise enhance the network and, in turn, reinforce the positive externalities that network effects convey. Alternatively, such risk may increase the barriers that must be overcome in order for a network to reach a critical mass. In other words, some networks might never form.[11]

HAS THE AVAILABILITY OF BUSINESS METHOD PATENTS INCREASED FINANCIAL INNOVATION?

It is always difficult to establish a cause-and-effect relationship between a policy change and subsequent economic outcomes. This is especially difficult in this case because there is no systematic data on the volume of these innovations over time. Ordinarily changes in the number of patents might be used. But in this case such changes might simply reflect the fact that obtaining business method patents became much easier after the decision in *State Street*.

Measuring R&D. If the outputs of financial innovation are difficult to measure, another approach is to examine changes in the inputs, specifically research and development (R&D). The first items to look at, then, are the measures of R&D spending obtained from the National Science Foundation's (NSF) regular survey of private firms. The NSF has published these data for most years since 1958. It began reporting R&D statistics for firms in finance, insurance, and real estate (FIRE) only in 1995. Its most recent estimate (2006) of R&D spending for this group of industries was only $2 billion, compared with more than $220 billion for all industries.

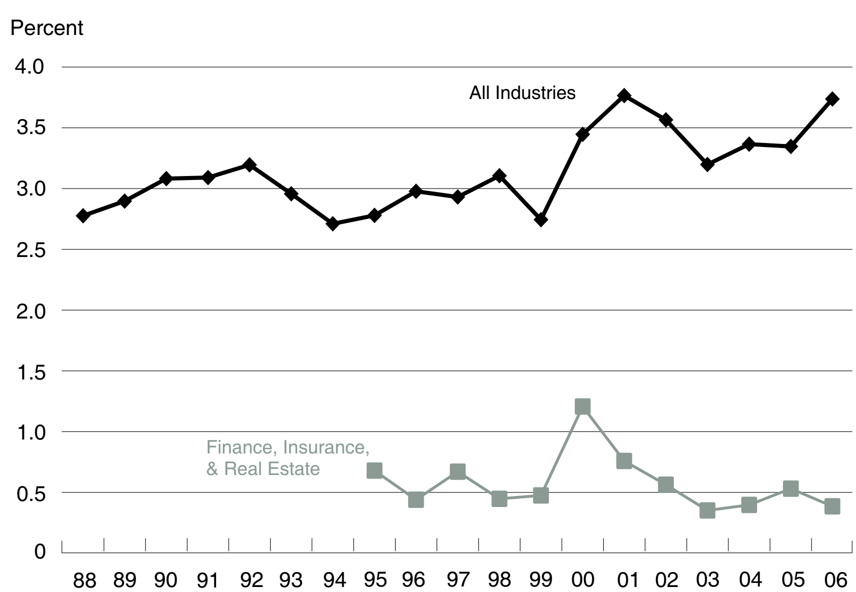
The NSF reports that the majority (58 percent) of R&D spending in FIRE in 2003 was for computer software. The financial sector's focus on software R&D is consistent with the mix of investment goods it purchases. In 1997, for example, companies in FIRE bought $30 billion in computers and software, making it the largest business customer of the information technology sector (accounting for 19 percent of sales). More than three-quarters of financial-sector investment, excluding structures, was devoted to the information, communication, and technology sector.[12]

Economists often examine R&D by comparing the size of these investments relative to sales or employment in the industry. According to the NSF data, financial services, including real estate, are significantly less R&D intensive than private industry as a whole (Figure 2). By these measures, the private economy as a whole enjoys a research intensity more than five times that of financial services. And while the R&D intensity of the U.S. economy has risen gradually over time, there has been no apparent change in the R&D intensity of financial services (the obvious spike in 2000 may reflect intense rewriting of computer code to address the century-date-change problem).

It is quite possible that the NSF's estimates for the financial sector do not reflect all of the R&D activity

FIGURE 2

Research Intensity (R&D/Sales)



Source: National Science Foundation and author's calculations

[11] For a more detailed discussion, see my working paper with Samuli Simojoki and Tuomas Takalo.

[12] These statistics are from the article by Douglas Meade and his co-authors.

that is actually occurring. The NSF's methodology and the definition of R&D employed are derived from a long tradition of surveying R&D managers at manufacturing firms. In that sector, R&D facilities are relatively easy to identify, and members of senior management know who their R&D managers are. These factors make it relatively easy to conduct a survey of R&D patterns among manufacturing firms. For most financial institutions, the terms R&D, R&D lab, and R&D manager are largely foreign concepts.[13] For example, in 2006 only six publicly traded financial firms reported any R&D in their financial statements, and the total amount they reported was only $65 million.[14] No publicly held bank or insurance company reported doing any R&D in that year.

The activities associated with developing new financial products, or better ways of delivering them, often fall outside the definition of R&D applied by official agencies. For example, a number of tax-court decisions conclude that research carried out by financial firms does not satisfy the IRS's definition of R&D. The NSF excludes from its definition of R&D "other nontechnological activities… and research in the social sciences."[15] The development of a better credit scoring model or a new derivative contract would likely fall outside this definition.

Measuring Research Workers. Other data may shed additional light on both the level and the trend in R&D being performed in this sector. To do that, I compare the composition of the workforce in financial services with that of the private economy as a whole. This may be a particularly informative measure for financial services, since 80 percent of R&D costs in this sector consist of wages and fringe benefits.[16] The strategy is to identify those occupations that are most likely to be used for research and to count the number of these workers among financial services firms.

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To do that, I rely on the *Occupational Employment Statistics* produced by the Bureau of Labor Statistics. I defined a set of occupations I'll call *research occupations.* This set includes all types of engineers and computer programmers and all scientists (including social scientists) and research managers.[17] Physicians, teachers, and technicians in any of the above fields were excluded. Of course, not all workers in these occupations and employed by financial firms are actually engaged in R&D; in fact, most are probably not. But I expect that this is also true of other industries. As long as the ratio of actual R&D workers to my broader measure remains constant over time, the broader measure should accurately capture any trend.

For 2005, my occupational data identify about 3.2 million *potential research workers*. In that year, the NSF identified 1.1 million *R&D workers* in all industries (see the first column of Figure 3).[18] In other words, for every three workers in these research occupations there was an R&D worker in the NSF counts. In financial services, my occupational measure identifies about 147,100 potential research workers in 2005, which is roughly five times the number of R&D workers (30,200) found by the NSF (see the second column of Figure 3).

In the financial sector, about two-thirds of potential research workers were either computer programmers or software engineers. The other third were actuaries, operations researchers, market researchers, or social scientists — occupations less likely to be reflected in the NSF counts, since work in these fields is not counted as R&D. In contrast, in all industries, 85 percent of potential research workers were engineers, programmers, or non-social scientists.

The NSF count of R&D workers in the financial sector is likely to understate the actual number. As described in the previous section,

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[13] For additional discussion of the issues in measuring R&D in finance and other service industries, see the 2005 National Research Council report and the report by Michael Gallaher, Albert Link, and Jeffrey Petrusa.

[14] These data are from Standard & Poor's *Compustat*.

[15] The instructions for the survey forms used in the NSF survey of industrial R&D explicitly exclude the following listed categories: economics, expert systems, market research, actuarial and demographic research, and R&D in law.

[16] That statistic is derived from NSF data for 2002. The comparable share for all private firms is 53 percent.

[17] See the appendix for a more complete list of occupations included in this definition.

[18] By R&D worker, I mean the count of (full-time equivalent) scientists and engineers engaged in R&D as reported in the NSF survey of industrial R&D. The survey instructions indicate that the count should include "all persons engaged in scientific or engineering work at a level that requires knowledge of physical or life sciences or engineering or mathematics."

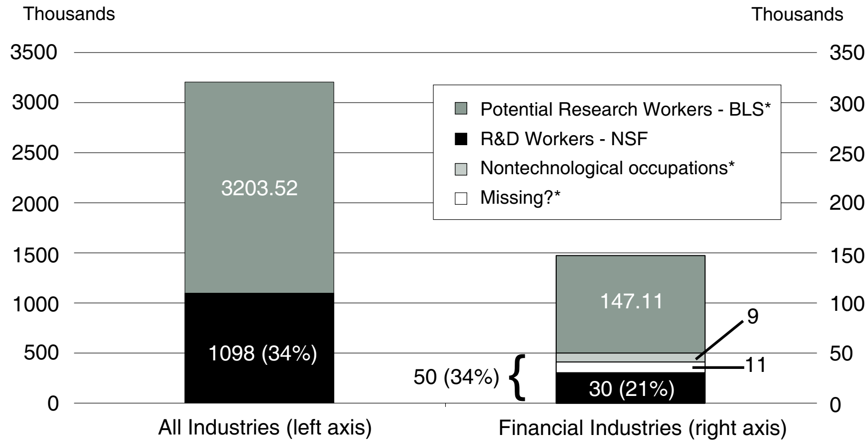
this may result from the definition of R&D used and the greater difficulty in identifying where R&D is performed in financial organizations. A very crude estimate of the number of additional R&D workers in finance can be constructed using the relationships between my data and the NSF data for all industries. If those relationships also hold true in finance, there might have been another 20,000 R&D workers in that sector in 2005 (see the second column of Figure 3).[19] About half of this amount may be attributable to the higher share of nontechnological occupations among workers who may be involved in developing new products or processes.

Just as with R&D spending, we can create a measure of research intensity by calculating the share of an industry's workforce that falls into the occupations included in my definition of potential research workers (Figure 4). There are several striking patterns. First, the potential research share of the financial workforce is about the same as for private industry as a whole. Second, after 1999, there is a rising trend for the entire economy. The pattern is more mixed in financial services, with increases in some years offset by declines in other years.[20]

The occupation-based measure of research intensity can be broken down to examine patterns within different segments of the financial services sector (Figure 5). Again, there does not appear to be a consistent trend for any of these five industries, but there are persistent differences across them. Using somewhat older data, we can examine even finer industry counts. In 2001, for example, insurance firms

FIGURE 3

Research Workers, 2005

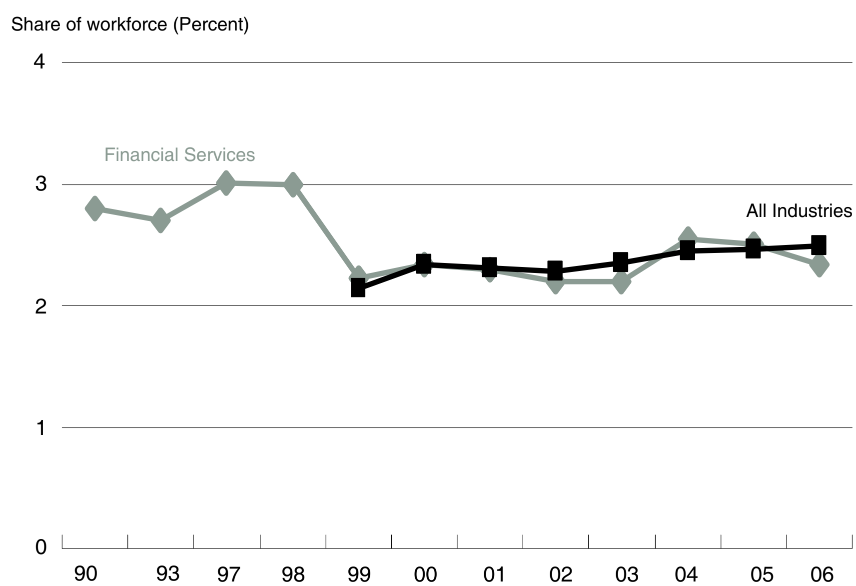


Source: Author's calculations using data from the Bureau of Labor Statistics and National Science Foundation

* Potential research workers include programmers, software engineers, actuaries, mathematicians, operations researchers, statisticians, architects, cartographers, surveyors, all engineers, and all life, physical, or social scientists. Estimates of additional financial R&D workers assume that the true ratio of NSF R&D workers to potential research workers in financial services is identical to the ratio for all private industries (34 percent). About half of this amount may result from undercounting R&D workers who are actuaries, operations or market researchers, or social scientists. The remainder is categorized as potentially missing. See the appendix for additional information.

FIGURE 4

Potential Research Workers*



Source: Bureau of Labor Statistics and author's calculations

* Potential research workers include programmers, software engineers, actuaries, mathematicians, operations researchers, statisticians, architects, cartographers, surveyors, all engineers, and all life, physical, or social scientists.

[19] Details on these calculations are found in the data appendix.

[20] The BLS introduced a new occupational taxonomy in 1999, so we should be cautious about interpreting the decline from the level of the late 1990s.

accounted for nearly half (48 percent) of potential research workers, followed by commercial banks (20 percent) and investment banks (12 percent).

Do these data suggest that the financial services sector enjoys the same research intensity as other parts of the economy? Probably not. We know from NSF data that, compared with all private industries, financial firms spend significantly less on R&D per research worker.[21] Adjusting for this difference, it would appear that financial services has a research intensity (roughly 1.3 percent) that is about 40 percent of that found in private industry as a whole. Still, this would be 2.5 times higher than reported in the NSF statistics.

What can we conclude? First, the financial services sector is likely more research intensive than is reflected in the more traditional measures. Second, there is no clear trend in the research intensity of this industry. If financial patenting is having an effect, it is not easily discerned in any of the R&D measures presented. Finally, NSF data and my occupation-based measures show that ICT (especially software) are important technologies developed and employed in financial services.

PATENT LITIGATION

While there is little evidence of a change in R&D patterns in the industry, patent litigation involving financial firms has increased. In perhaps the first systematic study of suits involving financial business method patents, Josh Lerner found that they are litigated at a rate 27 times higher than patents in general.[22] Defendants in these suits were typically large financial services firms or one of the financial exchanges. Plaintiffs were typically not financial companies. In several instances, they were patent-holding companies. In other words, they were not actively engaged in providing goods or services. Instead, they specialized in asserting, and sometimes litigating, patents. It also means they couldn't be countersued for infringing someone else's patents.

Litigious plaintiffs have obtained significant damage awards and licensing revenues. These are usually paid by very large financial institutions or the technology companies that serve them. For example, in January 2006, the Lending Tree Exchange was found to infringe a patent on a method and system for making loan applications and placing them up for bid by potential lenders. The jury awarded $5.8 million in damages to the plaintiff, IMX, an award that was increased 50 percent in subsequent proceedings in the district court. In an unrelated case, the three American futures exchanges settled infringement suits, each involving the same patent, collectively paying about $50 million in licensing fees.[23]

Litigation Affecting Consumer Payments. Another important example of patent litigation involves the application of new technologies to an old payment instrument — the paper check. Check imaging and exchange technologies are especially important in the U.S. at this time. The Check Clearing for the 21st Century Act of

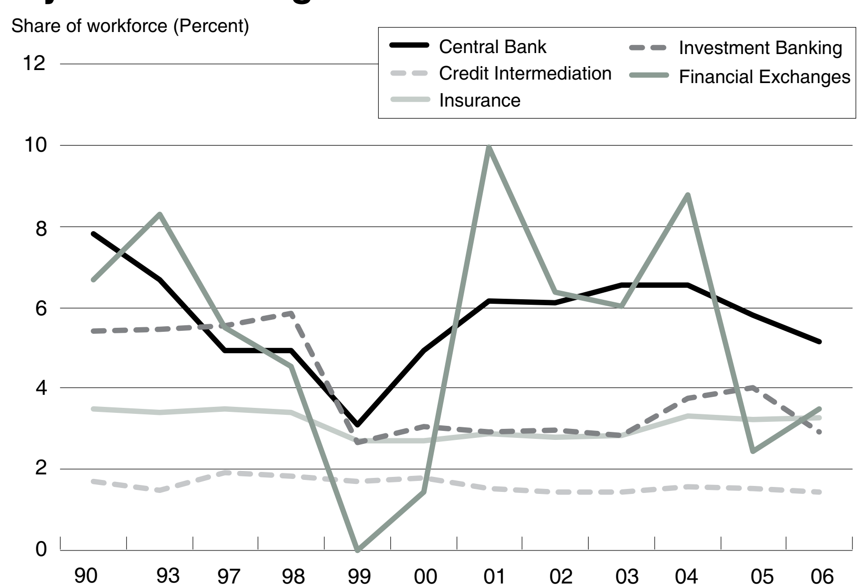
[21] NSF data for 2003 show that for every dollar of R&D spent per full-time researcher in all industries, financial firms spent less than 40 cents. While some of this disparity may be due to the definitional issues described earlier, it's unlikely they explain the entire difference.

[22] See Lerner's working paper.

[23] See the article by Mark Young and Gregory Corbett.

FIGURE 5

Potential Research Workers* by Financial Segment



Source: Bureau of Labor Statistics and author's calculations

* Potential research workers include programmers, software engineers, actuaries, mathematicians, operations researchers, statisticians, architects, cartographers, surveyors, all engineers, and all life, physical, or social scientists.

2003 (Check 21) permits banks to process check transactions without physically presenting the original check to the issuing bank, so long as certain standards are satisfied.[24] Financial institutions are making very large investments in technology in order to take advantage of the efficiencies afforded by this law.

In January 2006, a company called DataTreasury sued Wells Fargo, 56 other banks, and a number of other firms that participate in the check-image clearing process. The company also sued the Clearing House Payments Co., which operates a check-image exchange network. DataTreasury owns at least six patents on processes for creating, processing, and storing digital images of paper checks. In earlier years it had sued a number of institutions and obtained licensing agreements with firms such as JPMorgan Chase, Merrill Lynch, and ATM manufacturer NCR Corporation. More recently, the ATM manufacturer Diebold struck a licensing agreement with DataTreasury in part to assuage bank customers who have grown increasingly concerned about their potential liability for patent infringement.[25]

SHIFTING SANDS?

While financial patents are likely here to stay in the United States, they will be affected by a number of recent Supreme Court decisions and, quite possibly, new federal legislation. For the most part, this activity is prompted by more general concerns about the efficacy of our patent system, but some proposals are specifically directed at business method patents. For example, a patent reform bill (H.R. 1908) passed by the House of Representatives in 2007 would make tax-planning methods unpatentable subject matter. In 2008, the Senate Judiciary Committee reported a bill (S. 1145) that included an amendment intended to preclude patent infringement claims against institutions processing checks in compliance with the requirements of Check 21.[26]

The Supreme Court Speaks. In 2006 the Supreme Court decided a case involving a patent owned by the company MercExchange that a federal district court determined was infringed by eBay's "Buy it Now" feature on its auction website. The question was whether, in addition to damages, MercExchange was also entitled to an injunction preventing eBay's ongoing use of this feature. On appeal, the Federal Circuit concluded that injunctions should be denied to a successful plaintiff in patent cases only under exceptional circumstances. The Supreme Court disagreed, pointing to its traditional balancing test for determining the appropriateness of a permanent injunction. On retrial, the original court concluded that an injunction was not warranted.[27]

In 2007 the Supreme Court decided what may become the most important patent case in at least a decade. In *KSR International v. Teleflex*, the court considered how to determine whether an invention consisting of a combination of pre-existing elements is obvious and therefore unpatentable. With inventions like this, courts worry about the problem of hindsight bias: A novel combination of the elements seems more obvious once it has been tried and proven to work. To prevent this, the Federal Circuit created limitations on how the prior art could be interpreted to suggest that an invention was obvious. Unless a piece of prior art actually suggested the combination of ideas, the Federal Circuit typically concluded the invention was not obvious. At the extreme, to demonstrate obviousness, all the relevant aspects of the new combination must be mentioned in a single piece of prior art.

Such an approach has been criticized for being too permissive, since it presumes that a person of ordinary skill in the art has little ability or creativity. Some legal scholars and economists have argued that the standard should be related to the rate of technical progress in the field. If the standard is too low, the result is less innovation in those industries that ought to be the most innovative.[28] Without specifically articulating a more appropriate standard, a unanimous Supreme Court concluded that the Federal Circuit had set the bar too low: "In many fields there may be little discussion of obvious techniques or combinations, and market demand, rather than scientific literature, may often drive design trends. Granting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, for patents combining previously known elements, deprive prior inventions of their value or utility."

Business method patents are already feeling the effects of this deci-

[24] Public Law 108-100, 12 U.S.C. 5001.

[25] See the article by Steve Bills. There are at least 63 issued U.S. patents and 123 published patent applications that contain one or more references to the phrase Check 21.

[26] A cost estimate for the bill, prepared by the Congressional Budget Office, suggests that the affected patent holders would likely sue the federal government for a taking of private property. If those suits were successful, CBO estimates that the resulting compensation payments could be as high as $1 billion.

[27] Permanent injunctions in patent cases have not disappeared. In his article, Keith Slenkovich identifies 22 district court decisions after eBay where an injunction was awarded.

[28] See, for example, the article by John Barton and my 2007 law review article.

sion. In one case (*in re Trans Texas Holdings*), several issued patents for a system of inflation-adjusted deposit and loan accounts were rejected on re-examination, and the Federal Circuit upheld the decision. The rejection was based on an allegedly obvious combination of two pieces of prior art. The first was a book chapter that described how, in the 1950s, Finnish banks would adjust their loan and deposit accounts for the actual inflation that had occurred. The second was a patent granted in 1983 that described how to use a data processor (for example, a computer) to manage a set of accounts. In a separate case (*Advanceme Inc v. Rapidpay*), a district court invalidated a patent on a computerized method for securing a loan using future credit card receivables, arguing that the claimed invention was a predictable variation of at least five card programs already in existence.

Congress Deliberates. For a number of years, there has been considerable debate over the efficacy of the patent system in facilitating innovation in high-technology industries that tend to innovate cumulatively.[29] This stands in contrast to the view that in other industries, such as chemicals and pharmaceuticals, where innovations tend to be more discrete, the patent system seems to be functioning reasonably well. From this debate a consensus is emerging in favor of some limited reforms. Other proposals are more controversial.

Two proposals are particularly relevant for business method patents. The first is designed to increase the quality of patents issued by increasing the information available to the patent office. That information is likely to come from interested third parties if they are afforded the opportunity to contest the issuance of a pending or recently granted patent (these are called *opposition* procedures).

Limited forms of these procedures exist under current law, but they are used infrequently. One proposal would reduce certain disadvantages that a third party might experience in any subsequent litigation involving the patent. Under the current post-grant procedure (*inter partes* re-examination), a third party is precluded from using *any* argument in subsequent litigation that it *could* have raised during the re-examination proceedings.[30] Under the proposal, the third party is precluded from using only the actual arguments it raised during the opposition.

Another proposal stipulates that when the patent in question involves a *combination* invention, damages for infringement should be based on the incremental contribution of the patented feature to the value of the final product. This proposal is intended to address the problem of royalty stacking in information, communication, and technology industries where products may embody dozens or even hundreds of patented inventions. Some researchers and industry participants suspect that, in such environments, there is a tendency for courts to overestimate damages from the infringement of individual patents.[31] They fear the resulting conflict over the division of profits may reduce the incentive to bring new products to market.

Concerns about royalty stacking may also arise in the financial sector, especially given its reliance on ICT and the emphasis on software in its R&D. In particular, innovations in the processes used to provide financial services are typically cumulative in nature. As noted earlier, financial markets and payment systems often exhibit network effects. These effects create value for network participants that may complicate the estimation of the incremental benefit attributable to one of many patented inventions employed by a network.

Patent Boundaries. Not all concerns about business method patents are likely to be resolved. One major concern about these patents, and software patents more generally, is that their abstractness makes it difficult to determine the actual boundaries of the property rights being granted. Using the jargon of patent law, these patents often suffer from ambiguous "claims."[32] This is problematic because if firms cannot determine what is protected and what is not, instances of inadvertent infringement are more likely to occur.

Consider the analogy to property rights to land. If the boundary lines between properties are consistently unclear or frequently reinterpreted over time, trespassing on another's property would be more difficult to avoid. Even worse, there may be instances in which a person makes significant improvements to his or her property only to find he or she has built partially on another's land. The result would be more litigation, and this additional risk might deter efficient investment in the first place.

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[29] See the report by the Federal Trade Commission, the book by Stephen Merrill, Richard C. Levin, and Mark Myers, and the book by Adam Jaffe and Josh Lerner.

[30] See 35 U.S.C. § 315(c). The purpose of this restriction is to prevent abuse of the opposition process.

[31] The issues are described in the article by Mark Lemley and Carl Shapiro and formally modeled in Shapiro's working paper. For some examples from actual cases, see the testimony by John Thomas.

[32] In their 2008 book, James Bessen and Mike Meurer point out that appeals over the definition of claims in a business method patent occur more than six times as frequently as for (litigated) patents in general.

CONCLUSION

There is, at present, very little evidence to argue that business method patents have had a significant effect on the R&D investments of financial institutions. It is possible that the availability of business method patents has encouraged more entry and R&D by start-up firms or more efficient trading of technologies. At present, however, these represent intriguing possibilities and not outcomes that have actually been measured. In short, we still cannot determine whether financial patents are creating value for the U.S. economy.

Nevertheless, business method patents are becoming commonplace. Compared with many other patents, they are litigated more often. Some of this litigation has resulted in very large settlements paid by established providers of financial services. These facts, in themselves, don't prove anything. But combined with the lack of evidence suggesting a positive effect on R&D investments, they do suggest that there is likely scope for improving on the current business method patent bargain.

From the standpoint of policy, it is important to ensure that patents are granted only for new and nonobvious business methods and that those standards are rigorous. In this light, the Supreme Court's decision in *KSR* and the debate over the adoption of enhanced opposition procedures appear to be positive developments. The characteristics of financial markets — in particular, network effects and the requirements of interoperability — should affect the choice of appropriate remedies for patent infringement. At least after the *eBay* decision, these factors may influence when a court is willing to grant an injunction or how it will determine the damages resulting from infringement. Each of these changes suggests that we may already be in the process of increasing the benefits and reducing the costs to society of financial patents. But there is likely more work to be done.

DATA APPENDIX

Counts of business method patents consist of all patents assigned to Class 705 (Data Processing: Financial, Business Practice, Management, or Cost/Price Determination) in the U.S. Patent Classification System. The United States Patent and Trademark Office (USPTO) describes Class 705 as a collection of financial and management data processing areas, including insurance, trading of financial instruments, health-care management, reservation systems, computerized postage metering, electronic shopping, auction systems, and business cryptography. For additional information, see http://www.uspto.gov/web/menu/busmethp/class705.htm.

The estimate of business method patents that are more financial in nature is based on counts of patents falling into subclasses of Class 705 based on analysis of patents performed by CHI research in 2001. These subclasses include 1, 4, 7, 10, 16, 26, 30, 33, 45, 53, and 64-80. These exclude many of the patents primarily dealing with cryptography, postage metering, and similar technologies less closely related to the provision of financial services.

The definition of software patents used to calculate the software share of business methods is the one specified in the article by Bessen and Hunt. It is based on the following search of the USPTO patent full-text database: "SPEC/software OR SPEC/computer AND program ANDNOT spec/antigen OR antigenic OR chromatography ANDNOT ttl/chip OR semiconductor OR bus OR circuit OR circuitry AND ISD/$/$/yyyy AND ccl/705/$."

The analysis of occupational data is based on the Occupational Employment Statistics compiled by the Bureau of Labor Statistics (BLS) (see http://www.bls.gov/oes/home.htm). The BLS has used different industrial and occupational taxonomies over the years. In particular, industries were defined using the Standard Industry Classification (SIC) system up to 2001, when the BLS switched to the North American Industry Classification (NAIC) System. The BLS used its own occupational definitions in these data until 1999, when it adopted definitions based on the Census Bureau's Standard Occupational Classification (SOC) system. In the end, I constructed two lists of industries and three lists of research occupations that were roughly comparable over time. Note that my definition of financial services excludes real estate and holding companies. Potential research occupations include computer scientists, programmers, software engineers, actuaries, mathematicians, operations researchers, statisticians, architects, cartographers, surveyors, all engineers, and all life, physical, and social scientists. Additional details are available upon request.

In the text, I suggested a potential undercounting of R&D workers in financial services of about 20,000. This was derived as follows. For all industries in 2005, the ratio of potential research workers to R&D workers identified by the NSF was 2.9:1. Dividing the 147,000 potential research workers in financial services by 2.9 yields about 50,400 jobs, about 20,200 more than found by the NSF. If, however, I exclude workers in all industries who were actuaries, operations researchers, market researchers, and social scientists, the ratio of potential research workers to NSF R&D workers falls to 2.5:1. Excluding jobs in those occupations in the financial sector leaves about 98,400 potential research workers in 2005. Dividing this number by 2.5 yields about 39,400 jobs, about 9,200 more than reported in the NSF data.

REFERENCES

Barton, John H. "Nonobviousness," mimeo, Stanford University (2001).

Bessen, James, and Robert M. Hunt. "An Empirical Look at Software Patents," *Journal of Economics and Management Strategy*, 16 (2007), pp. 157–89.

Bessen, James, and Michael J. Meurer. *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk*. Princeton, NJ: Princeton University Press, 2008.

Bills, Steve. "Diebold Bids to Lift Image ATMs with Patent Deal," *American Banker*, 172:16 (January 24, 2007).

Caskey, John P. "The Evolution of the Philadelphia Stock Exchange," Federal Reserve Bank of Philadelphia *Business Review* (Second Quarter 2004).

Cohen, Wesley M., Richard R. Nelson, and John P. Walsh. "Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)," NBER Working Paper 7552 (2000).

Congressional Budget Office. "Cost Estimate: S. 1145, Patent Reform Act of 2007 as reported by the Senate Committee on the Judiciary on January 24, 2008." (February 15, 2008) at http://www.cbo.gov/ftpdoc.cfm?index=8981

Federal Trade Commission. *To Promote Innovation: The Proper Balance of Competition and Patent Law and Policy.* Washington, DC: Federal Trade Commission (2003).

Gallaher, Michael, Albert Link, and Jeffrey Petrusa. "Measuring Service-Sector Research and Development," NIST Planning Report No. 05-01 (March 2005).

Hunt, Robert M. "Economics and the Design of Patent Systems," *Michigan Telecommunications and Technology Law Review*, 13 (2007), pp. 457-70.

Hunt, Robert M., Samuli Simojoki, and Tuomas Takalo. "Intellectual Property Rights and Standard Setting in Financial Services: The Case of the Single European Payments Area," Federal Reserve Bank of Philadelphia Working Paper 07-20 (2007).

Jaffe, Adam B., and Josh Lerner. *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, 2004.

Lemley, Mark A., and Carl Shapiro. "Patent Hold-Up and Royalty Stacking," mimeo, University of California at Berkeley (2007).

Lerner, Josh. "Trolls on State Street? The Litigation of Financial Patents, 1976-2005," mimeo, Harvard Business School (2006).

Levin, Richard C., Alvin Klevorick, Richard Nelson, and Sidney Winter. "Appropriating the Returns From Industrial Research and Development," *Brookings Papers on Economic Activity* (1987), pp. 783-831.

Mansfield, Edwin. "Patents and Innovation: An Empirical Study," *Management Science*, 32 (1986), pp. 173-81.

Meade, Douglas S., Stanislaw J. Rzeznik, and Darlene C. Robinson-Smith. "Business Investment by Industry in the U.S. Economy for 1997," *Survey of Current Business*, 83:11 (2003), pp. 18-70.

Merrill, Stephen A., Richard C. Levin, and Mark B. Myers, eds. *A Patent System for the 21st Century*. Washington: National Academies Press, 2005.

National Research Council. *Measuring Research and Development Expenditures in the U.S. Economy*. Washington DC: National Academies Press, 2005.

National Science Foundation. *Survey of Industrial Research and Development.* Washington: NSF (various years).

National Science Foundation. *Survey of Industrial Research and Development Form RD-1 Instructions* (2005); available at http://www.nsf.gov/statistics/ srvyindustry/surveys/srvyindus_rd1i_2005.pdf

National Science Foundation. *U.S. Business R&D Expenditures Increase in 2006.* NSF Info Brief 08-313, 2008.

Shapiro, Carl. "Injunctions, Hold-Up, and Patent Royalties," mimeo, University of California at Berkeley (2006).

Silber, William L. "Innovation and New Contract Design in Futures Markets," *Journal of Futures Markets*, 1 (1981), pp. 123-55.

Sirri, Erik, and Peter Tufano. "Competition and Change in the Mutual Fund Industry," in Samuel L. Hayes, III, ed., *Financial Services: Perspectives and Challenges.* Boston: Harvard Business School Press, 1993.

REFERENCES

Slenkovich, Keith. "Triple Dose of Bad News to Non-Practicing Patent Holders," *IPFrontline* (August 29, 2007); from http://www.ipfrontline.com/depts/article.asp?id=15866&deptid=7.

Thomas, John R. Prepared statement for U.S. House of Representatives Hearing on H.R. 1908, The Patent Reform Act of 2007. Hearings before the Subcommittee on Courts, the Internet, and Intellectual Property of the Committee on the Judiciary (April 26, 2007).

Tufano, Peter. "Financial Innovation and First-Mover Advantages," *Journal of Financial Economics*, 25 (1989), pp. 213-40.

Tufano, Peter. "Financial Innovation," in G.M. Constantines, M. Harris, and R. Stulz, eds. *Handbook of the Economics of Finance, Vol. 1a: Corporate Finance*. Amsterdam: Elsevier, 2003.

Young, Mark, and Gregory Corbett. "Futures Patent Litigation: A new Competitive Force," *Futures Industry Magazine* (January/February 2005); from http://www.futuresindustry.org/fi-magazine-home.asp?a=979

Cases Cited

Advanceme Inc v. Rapidpay, LLC, et al., Case No. 6:05 CV 424 (E.D. Texas 2007).

AT&T v. Excel Communications 172 F.3d 1352 (Fed Cir 1999).

Calmar, Inc. v. Cook Chemical Co, 336 F.2d 110 (8th Cir. 1964)

DataTreasury Corporation v. Wells Fargo & Co. No. 2:06-cv-00072 (E.D. Texas 2006).

eBay Inc. et al. v. MercExchange, L. L. C. 126 S. Ct. 1837 (2006).

Graham v. Deere 383 U.S. 101 (1966).

IMX, Inc. v. Lendingtree, LLC 469 F. Supp. 2d 203 (D. Delaware 2007).

in re Trans Texas Holdings Corp. 498 F.3d 1290 (Fed Cir 2007).

KSR International Co. v. Teleflex Inc. 127 S. Ct. 1727(2007).

State Street v. Signature Financial Group 149 F.3d 1368 (Fed Cir 1998).