



# WORKING PAPERS

RESEARCH DEPARTMENT

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**BUSINESS METHOD PATENTS FOR**  
**U.S. FINANCIAL SERVICES**

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Federal Reserve Bank of Philadelphia

First Draft: March 2007  
This Draft: September 2007

RESEARCH DEPARTMENT, FEDERAL RESERVE BANK OF PHILADELPHIA

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# BUSINESS METHOD PATENTS FOR U.S. FINANCIAL SERVICES

Robert M. Hunt

## Abstract

Nearly a decade after the Federal Circuit decision in *State Street*, patents on computer-implemented methods of doing business have become commonplace. To date, there is little evidence of any effect on the rate of innovation or R&D among firms in financial services. Indeed, measuring such effects presents difficult problems for researchers. We do know that some of these patents are successfully licensed and others are the subject of ongoing litigation. Looking ahead, a number of recent Supreme Court decisions are likely to have a significant effect on how business method patents are enforced. Congress is also considering significant reforms to U.S. patent law.

JEL Codes: O31, O34, G20

Keywords: Business method patents, financial innovation, payment systems, financial exchanges, *KSR International v. Teleflex*, *Ebay v. MercExchange*, *in re Seagate*

## 1. Introduction

Almost a decade after the *State Street* and *AT&T* decisions, it is fair to say that the American financial services sector is reaching the end of the beginning in its adaptation to business method patents. Many financial services firms have added in-house patent counsel, developed internal processes for documenting their innovations, and are regularly filing for patents. Some firms, typically those outside the industry, have aggressively asserted their patents and have had some notable successes in obtaining licensing revenues.

At this point, can we say this policy experiment has been a success? There is simply no basis for reaching such a conclusion at this time. While there has been a steady increase in the traditional R&D inputs employed in financial and related services, this trend predates the significant court decisions that changed the industry's view of the efficacy of business method patents.

At present, the U.S. patent system is in a state of flux. Both the Supreme Court and the U.S. Congress have begun to reassert their authority in this area. A number of recent cases will influence how business method patents are used and their effects. In addition, there is a good chance that a number of procedural reforms will be enacted during 2007-8.

The remainder of the paper is organized as follows. Section 2 briefly reviews how business methods became patentable in the U.S. and the trends in patenting that have resulted. Section 3 presents the limited data available on the economic effects of these patents in financial services. Section 4 reviews several significant instances of litigation involving financial institutions, financial exchanges, or their vendors. Section 5 examines a number of recent federal court precedents (including several Supreme Court cases) that are likely to influence how business method patents are used in the U.S. Section 6 reviews the major elements of the patent reform legislation currently advancing in the U.S. Congress. Section 7 concludes.

## 2. The Patentability of Computer-Implemented Business Methods

The change in views about the patentability of methods of doing business was sudden, arising from the Federal Circuit decisions *State Street v. Signature Financial Group* and *AT&T v. Excel Communications* in 1998 and 1999.<sup>1</sup> While there are a number of examples of patents on methods of doing business that predate this decision (see USPTO 2000), such examples certainly did not influence the prevailing view that this was subject matter outside the scope of the Patent Act.

An important antecedent to the business method decisions was the more gradual change in views about the patentability of computer programs, since the inventions described in most business method patents are implemented via computer. This evolution spanned the years from the 1972 Supreme Court decision *Gottschalk v. Benson* to the 1994 Federal Circuit decision *in re Alappat* (Hunt 2001, Bessen and Hunt 2007).<sup>2</sup>

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<sup>1</sup> See 149 F.3d 1368 and 172 F.3d 1352, respectively. For a critical examination of the *State Street* decision, see Menell (2006).

<sup>2</sup> 409 U.S. 63 and 33 F.3d 1526, respectively. In the U.S., patent cases are first tried in a federal district

## A. Business Method Patents Become Mainstream

The effect of *State Street* is clearly evident in U.S. patent data. Figure 1 presents counts of issued patents contained in patent classification 705: *Data Processing: Financial, Business Practice, Management, or Cost/Price Determination* and for the sub-categories most closely associated with patenting by financial services firms or their vendors.<sup>3</sup> It appears there were many applications of this sort in the pipeline, and many more were granted once the patent office absorbed the lessons of *State Street*. The subsequent plateau in grants was due in part to procedures the patent office adopted after being criticized for issuing some business method patents (see below for a discussion of these procedures). As Figure 2 shows, however, new patent applications in these fields remain high so that any deceleration in patent grants is likely to be temporary.

Examination of the actual patents reveals that the majority are obtained by technology vendors. Still many of the largest financial institutions, including commercial banks, investment banks, insurance companies, and financial exchanges are also assembling patent portfolios. In the early stages of adaptation to *State Street* (around 2000), the business method patent portfolios of financial institutions varied from just a few patents to several dozen. The portfolios are undoubtedly larger today.<sup>4</sup>

One of the interesting developments is the proliferation of patents on tax avoidance strategies (Herman 2007, April 2006). In the past, these had often been protected as trade secrets, but new regulations substantially reduced the efficacy of this form of protection (Squires and Biemer 2006). At least 60 tax shelter patents have been issued since the early 1990s, and another 86 pending applications have been published (Coggins 2007). There is at least one ongoing infringement suit involving a tax shelter patent.<sup>5</sup>

Since 1998, many of the larger firms have added in-house patent counsel and formalized procedures for documenting and patenting inventions. Employee contracts are being re-drawn to ensure that any intellectual property that is developed is the property of the firm. In addition, a number of firms have put in place reward systems to provide incentives to their R&D workers (DePardo 2006). At industry conferences, presenters often describe these processes in the same way one would expect to find in a manufacturing firm. There is the inevitable discussion of the rationale for obtaining patents—which are typically defensive in nature. But given the costs of patent prosecution, there are also discussions about management’s desire to offset these costs with licensing income.

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court. Appeals of patent cases from these courts were centralized in the Court of Appeals for the Federal Circuit in 1982. From there, patent cases are appealed to the Supreme Court.

<sup>3</sup> The U.S. Patent and Trademark Office (USPTO) maintains a system of patent classifications to assist in patent searches and examination. The most recent version of the classification system can be found at <http://www.uspto.gov/go/classification/>

<sup>4</sup> Scott and Schreiner (2007) report the following counts: American Express (65), Visa (45), MasterCard (33), First Data (24), Schwab (23), and Capital One (20). American Express has 150 published applications pending; Capital One has 45.

<sup>5</sup> For examples of these patents, see Joint Committee on Taxation (2006).

Financial institutions are not the only ones developing their expertise. The patent office has slowly been developing staff with qualifications to examine financial patents. This is not easy, since, in addition to any familiarity with financial services, the staff is currently required to have advanced training in other technical fields. In mid 2007, the patent office had 68 examiners dedicated to reviewing applications for financial patents. Of these, 32 have either an MBA or master's degree in finance or economics. The USPTO hopes to have 100 examiners in these sections by the end of the 2007 fiscal year (Coggins 2007). The patent office had a total of about 4,800 examiners at the end of the 2006 fiscal year.

Even financial regulators are becoming aware of the significance of intellectual property issues. For example, in 2004 the federal agencies responsible for oversight of banks, thrifts, and credit unions published guidance on the topic of "Risk Management of Free and Open Source Software," which, among other things, included a discussion of strategies for minimizing the potential for inadvertent infringement of patents that might result from using an open source program that includes proprietary code (FFIEC 2004).

#### B. Why the Lull in Business Method Patenting?

Two factors may explain the deceleration in business method patenting observed in Figure 1. The first are the procedural reforms instituted by the patent office in 2001. As part of this process, applications falling into Class 705 were examined by a second, experienced examiner—the so-called "second pair of eyes." This significantly lengthened the pendency period for these applications and may have reduced the allowance rate. But such delays will likely have only a temporary effect on the growth rate of business method patents. Indeed the number of these patents granted increased significantly in 2005 and 2006.

In 2007, the average time between first application and a final action was 54 months. This compares to an average pendency of 31 months for patents as a whole in 2006.<sup>6</sup> In 2001, 45 percent of patent applications in Class 705 were granted. This allowance rate fell to a low of 11 percent in 2005 and then recovered slightly to 19 percent in 2006. The overall allowance rate for patent applications in 2006 was 54 percent.<sup>7</sup>

One other explanation for the lull in business method patenting during the years 2001-5 is that the patent office imposed an additional requirement for patents on business methods—the claimed invention must fall into the "technological arts."<sup>8</sup> In principle, this meant that a system (e.g. a computer) implementing a business method was likely patentable, while the method itself might not be (Squires and Biemer 2006). Such a standard has the flavor of the "technical effect" requirement for patentable inventions

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<sup>6</sup> It is interesting to compare this pendency to the rate for two other categories of applications noted for long delays: computers and software—42 months, and communications—44 months (USPTO 2007).

<sup>7</sup> The statistics for business method patents reported here are from Coggins (2007). The statistics for patents as a whole in 2006 are from USPTO (2007).

<sup>8</sup> The reasoning seems to follow from Article 1 § 8 of the U.S. Constitution, which authorizes the creation of a patent system to promote the "useful arts." A number of court cases use the terms "technological arts" and "useful arts" interchangeably.

under the European Patent Convention, but it would seem to conflict with the Federal Circuit’s reasoning in the *AT&T* decision. But the October 2005 decision *ex parte Lundgren* rejected such a test.<sup>9</sup> This led the patent office to issue proposed guidelines on subject matter patentability that explicitly instruct examiners not to use a “technological arts” test when assessing subject matter patentability (USPTO 2005).

But it appears that the exact boundaries of patentable subject matter for business methods are still being explored, in particular when the claimed invention does not make any reference to a computer. In a number of recent decisions appealed to the Federal Circuit, the USPTO has argued that, in addition to the requirements set out in *State Street* and *AT&T*, the claimed invention must somehow *transform* something that is either tangible or intangible, such as data or signals (Toupin et al. 2007). This reasoning follows from a line of cases in the 1980s and early 1990s evaluating the patentability of computer programs (Bessen and Hunt 2007). In one of the appeals, *in re Comiskey*, the claimed invention is a process for implementing mandatory arbitration. In another appeal, *ex parte Bilski*, the claimed invention is a method for hedging risk in commodity prices.<sup>10</sup>

### 3. What Are the Economic Effects of Business Method Patents?

What can we say about the effect of business method patents on financial services? This is a difficult question, since this is an industry whose research inputs and outputs have not been accurately measured. This is beginning to change, but unfortunately, the existing measures are relatively crude and are clearly inadequate for identifying cause-and-effect relationships.

But a preliminary question to ask is why we might think patents would be important for protecting innovations in the financial sector. We explore this general question using a few examples. Our primary example is financial exchanges, because these markets have characteristics that may distinguish financial services from other sectors of the economy.

#### A. Should Patents Matter? The Example of Financial Exchanges

Financial exchanges are good examples of markets that exhibit strong network effects. There are a number of reasons for this, with implications for the use and value of intellectual property in these markets. First, the value of an exchange, and of particular instruments traded on an exchange, is increasing in market depth, or liquidity. In other words, the more buyers and sellers there are, the more rapid is the process of price discovery and, typically, the smaller is the spread between bid and ask prices. In addition, a deeper market is able to absorb large orders without generating price changes that work against the interests of the trader (Pagano 1989). Harris (2003) describes these as *order flow externalities*—a participant who offers to trade provides a valuable option to trade

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<sup>9</sup> See Appeal No. 2003-2088 (BPAI 2005). This was a 3-2 decision. The case involved an application for a patent, filed in 1993, on a method for compensating company managers to reduce collusion in oligopolistic industries. An economist might regard this as an application for a patent on a solution to an optimal contracting problem.

<sup>10</sup> See Appeal Nos. 2006-1286 and 2007-1130, respectively.

for other market participants, but he or she is not compensated directly for providing this benefit.

Second, there are increasing returns associated with using a common clearinghouse for trades. In addition to amortizing certain fixed costs, the practice of net settlement increases the efficiency of clearinghouses that serve more traders.<sup>11</sup> For exchanges that rely on a central counterparty, trading in a single, larger market also allows participants to better economize on the collateral they must pledge (Moser 1998). Finally, there are issues of interoperability in the systems used by network participants. This has become even more important as financial exchanges have come to rely increasingly upon electronic systems for execution, clearing, and settlement of trades. Interoperability is typically achieved via standard setting. This is accomplished either by technology vendors or by the exchange itself.

Financial exchanges have been an important source of new financial instruments, particularly in the area of derivatives (Caskey 2003, Harris 2003). Other important innovators include investment banks (Silber 1981, Bhattacharyya and Nanda 2000, Tufano 2004) who often act as issuers, brokers, dealers, or specialists in these new instruments.<sup>12</sup> The exchanges also make significant investments in improvements in trading technology, but they are not alone. Over the last 20 years other firms have introduced new automated trading platforms and account for a significant share of trading in some markets (McAndrews and Stefanadis 2000). These organizations are sometimes called electronic communication networks (ECNs).

Economic analysis of the interaction between network effects and intellectual property rights is a relatively new field.<sup>13</sup> Much more work, both theoretical and empirical, remains to be done. On the one hand, network effects in themselves may be the primary source of competitive advantage and this may reduce the importance of intellectual property in these markets. This would be similar to a finding from surveys of manufacturing firms, which often consider complementary assets (e.g., productive capacity, first mover advantages, marketing, or distribution networks) as more important than patents in protecting the value of their innovations (Cohen et al. 2000).

There is evidence that first mover advantages play an important role in generating sustained profits from the introduction of new financial instruments (Tufano 1989). Studies by Silber (1981) and Caskey (2003) present evidence that an established contract on one exchange enjoys an advantage in terms of liquidity that is often difficult to overcome when a similar contract is introduced on another exchange. Anderson and Harris (1986) argue that regulations that delay imitation by rival firms reinforce first

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<sup>11</sup> Settlement refers to the actual conveyance of cash to sellers and securities to buyers. These are typically performed by settlement agents, which are very often the clearinghouses. Net settlement refers to the practice of adding up each trader's transactions over a given period (usually a day) and making debits and credits on traders' accounts on the basis of these totals. In contrast, under gross settlement, each transaction results in separate debit or credit to the traders' accounts.

<sup>12</sup> For a detailed set of case studies of financial innovation, see Mason et al. (1995).

<sup>13</sup> For a thorough analysis of many of the relevant issues, see Farrell and Klemperer (2006).

mover advantages, increasing the rents associated with financial innovations.<sup>14</sup>

There are other financial sectors, for example certain areas of insurance, where at least some participants believe there is a first mover *disadvantage*. The argument here is that the innovating firm incurs the expense required to develop a new product and to obtain the necessary regulatory approvals. If successful, they are quickly imitated by their competitors (Cuypers 2004). This is precisely the intuition that motivates why governments establish patent systems. If, in the absence of patents, innovators are unable to recoup their risky investments in R&D, they will have no incentive to innovate in the first place. Alternatively, they will only invest in innovations (such as new processes) they think can be effectively protected as a trade secret. In such an environment, the availability of patents could lead to more R&D and more innovation. It might also influence *which* firms innovate—the availability of patents may enable entry by new firms that do not own the complementary assets enjoyed by established firms.<sup>15</sup>

There are other reasons to think that patents could have significant effects for financial firms. For example, it is possible there could be synergistic effects if a firm is able to use intellectual property rights to capture the benefits conferred by strong network externalities. For example, a firm that obtains a patent infringed by all firms participating in a financial exchange may enjoy a particularly strong bargaining position in licensing negotiations. Those firms will be willing to license to avoid losing the benefits of the fixed investments in technology they have already incurred (Shapiro 2006a). And if a firm obtains a patent on a popular financial instrument, it may be able to extract some of the value associated with its liquidity in subsequent licensing negotiations.

How could this happen? It is more likely to occur when a court finds it difficult to disentangle the incremental contribution of the infringed patent from the other attributes (including network effects) that make a financial product or service valuable. This is a more general concern for what are called combination inventions, which are common in the information and communications technologies (ICT) industries (see section 6C).

The policy implications of any synergistic effects will depend on many details of the particular cases, but they are likely to be important. For example, it is typical to observe damage awards in patent cases assessed in terms of percentage points of the revenues associated with the infringing product.<sup>16</sup> But the efficiency and liquidity of financial exchanges are often measured in terms of *basis points* of transaction value. A court-awarded royalty two orders of magnitude larger would likely create very large deadweight losses. A more sensible royalty might be specified in terms of a few pennies a trade. In markets where the annual number of transactions can be counted in millions, or

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<sup>14</sup> This intuition is formalized in a number of models of sequential innovation. See, for example, Cadot and Lippman (1997) and Chou and Haller (1995).

<sup>15</sup> This raises a more general point: To assess the effects of changes in the patent system we should examine both the R&D investments of existing firms and changes in patterns of firm entry or exit (Hunt 2007).

<sup>16</sup> Lemley and Shapiro (2007) report an average royalty rate of 13 percent, based on the small sample of damage awards that are sufficiently explicit (47 over the years 1982-2005). Unfortunately for economists, patent licensing terms are only rarely disclosed. But in every other example they point to in their paper, the royalty rate exceeds, by a large margin, 1 percent of sales.

even billions, such a royalty would still be quite lucrative. If the average value of a transaction was large enough, the associated deadweight loss would be more modest.

While these arguments have primarily used the example of financial exchanges, their application is much more general. For example, consumer payment systems, including debit and credit card networks, also exhibit strong network effects and rely extensively upon investments in ICT. They are also excellent examples of systems of technology that have benefited from continuous investment and innovation over several decades (Evans and Schmalensee 1999).

To date there are few economic studies of how and why consumer payment networks innovate. Verdier (2006) presents a model to study the role of pricing and network effects in determining the level of investment in quality and which network participants make those investments. This is one of the few examples of papers that explicitly examine the decision to *develop or improve* consumer payment technologies.<sup>17</sup> Instead, much of the literature on payment networks relies upon static models to examine a number of antitrust issues (Hunt 2003). In addition, the role of intellectual property (other than trademarks or brand names) in consumer payment networks is rarely, if ever, discussed in the literature.<sup>18</sup>

#### B. The Research Intensity of Financial Services

Figure 3 presents the only data we have on research and development spending (R&D) among the finance, investment, and real estate sectors (FIRE) of the U.S. economy. This data is from the National Science Foundation's Survey of Industrial R&D. Relative to the size of this part of the economy (\$425 billion in net sales for the R&D performers in 2003), the amounts shown are trivial. They almost certainly represent a vast underestimate of R&D performed in this part of the economy.

It is unclear what to make of the trends depicted in the figure. On the one hand, aggregate R&D appeared to be rising before *State Street*, and falling afterwards. But any trend in these data is quite likely an artifact of sampling and measurement problems in this part of the NSF survey.

We can compare these measures to other data that reflect the financial sector's investment in new technology. For example, in 1997, this sector accounted for the largest share of all investment in computers and software of any industry other than information technology itself (\$30 billion, or 19 percent of the total). More than three-quarters of the financial sector's investment, excluding structures, was devoted to ICT (Meade et al. 2003). This concentration is also evident in the limited data we have on the composition of R&D performed by the financial sector—the NSF reports that the majority of R&D performed by firms in FIRE is for software.

Figures 4 and 5 present additional measures of the industry's research input—its

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<sup>17</sup> To be clear; there are many studies of the *diffusion* of new payment technologies once they are developed, but very few that focus on the actual development decision and its processes.

<sup>18</sup> One exception is Hunt, Simojoki and Takalo (2007), which examines the likely role of intellectual property in the development of new electronic consumer payment systems in Europe.

employment of scientists and engineers.<sup>19</sup> These numbers are rising over time, both in absolute measures and relative to total employment in the sector. In absolute terms, the leading sub-sectors include commercial banks and insurance companies. In terms of intensities, the greatest concentration of scientists and engineers occurs among insurance companies, financial exchanges, and somewhat surprisingly, the Federal Reserve System. But once again, the rising trend in resources typically associated with R&D predates the *State Street* decision.

#### C. Effects on the Value of Financial Institutions

In terms of private benefits, Boscaljon, Filbeck, and Smaby (2006) find a positive stock price effect of the announcement of a successfully prosecuted business method patent (Class 705) among firms in the manufacturing or financial sector. They do not test for the effect of these announcements on the stock market prices of competing firms.

By itself, we cannot determine from such an analysis why the value of these firms increased. Such an increase in value may give financial firms an incentive to file for patents, but not necessarily to do more R&D. There are at least theoretical grounds for concern about the likely effects of granting many marginal patents in highly innovative industries (Hunt 2006).

Based on these limited data, one might conclude that the U.S. financial sector is likely to become more innovative in the future. Nevertheless, at present there is little basis for determining what role, if any, business method patents have played in this general trend.

#### 4. Litigation and Licensing of Patents Affecting Financial Services

Business method patents in financial services are no longer intellectual curiosities. Demand letters are regularly sent, and dozens of financial institutions, including several Federal Reserve Banks, have been sued (Decker and Matthews 2007). A number of institutions have reached settlements, with significant licensing payments changing hands.

A recent study by Lerner (2006) finds that financial patents are litigated at a rate 27 times higher than for patents as a whole. Litigated patents tend to be ones granted to individuals or small firms. But these owners are often not the plaintiffs in these cases; instead the suits tend to be initiated by patent holding companies. Financial patents acquired by foreigners are much less likely to be litigated. The defendants in these suits are typically large financial firms or exchanges.

There are some notable examples of patent litigation and successful licensing campaigns that involve plaintiffs from outside the industry. For example, Ronald A. Katz Technology Licensing owns, among other things, a portfolio of patents on the technology used by telephone call centers. To date, Katz has struck approximately 150 licensing agreements. These include many large financial institutions and their processors, including American Express, Bank of America, Capital One, Equifax, First Data

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<sup>19</sup> This is a relatively good measure of R&D inputs for this sector. According to NSF (2007) salaries and benefits account for nearly three-quarters of R&D costs in FIRE.

Corporation, Merrill Lynch, Nationwide, OppenheimerFunds, Prudential Financial, T. Rowe Price, Vanguard Group, Wachovia Corporation, and Wells Fargo.

Other patents have been litigated. 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, which was increased by 50 percent in subsequent proceedings in the district court.<sup>20</sup>

#### A. Litigation Involving Financial Exchanges

There has been a significant amount of patent litigation involving the American futures exchanges. For example, in 2001, the company Electronic Trading Systems sued the Chicago Mercantile Exchange, the Chicago Board of Trade, and the New York Mercantile Exchange. The ECN eSpeed, a developer and operator of electronic trading systems, was also a defendant but it eventually acquired the patent in dispute and continued the case against the exchanges. All three exchanges eventually settled the case. Licensing revenues have been estimated to be \$50 million (Young and Corbett 2005).<sup>21</sup>

In another case, the company Mopex threatened to sue the American Stock Exchange (AMEX), arguing that certain exchange-traded funds offered on the exchange infringed its patent on an open-end mutual fund securitization process. In 2000, AMEX sued to invalidate the patent. The patent was eventually declared invalid because of prior art contained in a 1994 Morgan Stanley SEC filing, slightly more than a year before Mopex applied for its patent.<sup>22</sup>

ECNs sometimes sue each other. In 2003 eSpeed sued BrokerTec Global, arguing that the latter's online ordering system for trading U.S. Treasury securities infringed its system and method patent for auction-based trading of fixed-income instruments. These two firms are the dominant platforms for electronic trading of Treasury securities in the secondary market (Mizrach and Neely 2006). A district court rejected eSpeed's petition for a preliminary injunction in the case. Prior to that hearing, the U.S. government filed a statement of interest, arguing that a preliminary injunction might disrupt the secondary market for Treasury securities (Kellner 2006). eSpeed's patent was subsequently invalidated due to inequitable conduct in its prosecution of the patent application before the patent office.<sup>23</sup>

More recently, the firm Trading Technologies International sued eSpeed, arguing that eSpeed's futures market trading software infringes two patents on a graphical user

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<sup>20</sup> See 469 F. Supp. 2d 203 (2007)

<sup>21</sup> The patent in question (4,903,201) for an automated futures trading exchange was applied for in 1983 but only issued in 1990. It expired in February 2007. The patent was initially assigned to World Energy Exchange; later it was acquired by Electronic Trading Systems and finally by eSpeed.

<sup>22</sup> *American Stock Exchange, L.L.C. v. Mopex, Inc.*, No. 00-cv-05943 (S.D.N.Y, Feb. 4, 2003). An invention does not satisfy patent law's requirement of novelty if it is described in print a year or more prior to the application date of a patent. See 35 U.S.C. § 102(b).

<sup>23</sup> See *eSpeed, Inc. v. BrokerTec USA, L.L.C.* 417 F. Supp. 2d 580 (D. Del. 2006). The decision was upheld by the Federal Circuit in 2007.

interface for displaying the market depth of orders for futures contracts (Young and Corbett 2005). Trading Technologies has offered to license its patents to the futures exchanges for a *perpetual* royalty of 2.5 cents per trade (Acworth and Burns 2005).

### B. Litigation Involving Consumer Payment Technologies

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. Banks are in the process of eliminating the physical transportation of paper checks, which is generally required under the traditional law for these financial instruments. The Check Clearing for the 21st Century Act of 2003 permits banks to process check transactions without physically presenting the original check to the issuing bank, so long as certain standards are satisfied.<sup>24</sup> Financial institutions are currently making very large information technology investments in order to take advantage of the efficiencies afforded by this reform.

In January 2006, the company DataTreasury sued 57 banks and other companies that participate in the check-image clearing process.<sup>25</sup> 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 JP Morgan 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 (Bills 2007a).

But the DataTreasury patents are not without controversy. In December 2006, the patent office invalidated 43 patent claims in a re-examination requested by a defendant firm—First Data Corporation. This is only the first step in a process that can take several years, but it is reminiscent of the patent dispute between Research in Motion (RIM), developer of the BlackBerry, and NTP, a patent holding company. In that case, RIM agreed to a \$600 million settlement under threat of a court injunction after being found to infringe several NTP patents. And yet, prior to the announcement of this settlement, a patent office re-examination requested by RIM resulted in the preliminary rejection of every NTP patent relevant to the case.

In another case involving the migration away from paper checks, LML Payment Systems sued First Data, U.S. Bancorp subsidiary Nova, and the Electronic Clearing House for infringing its patent on a process for converting checks into ACH transactions at the point of sale. The firms reached a settlement in 2006 (Bills 2006).<sup>26</sup>

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<sup>24</sup> Public Law 108-100, 12 U.S.C. 5001. If the issuing bank desires, it may insist on presentment of a “substitute” check, an image of the original carrying certain information and satisfying certain standards set by the Board of Governors of the Federal Reserve System. Substitute checks can be sent electronically and then printed. Substitute checks are the legal equivalent of the original check.

<sup>25</sup> *DataTreasury Corporation v. Wells Fargo & Co.*, E.D. Texas, No. No. 2:06-cv-00072-DF,

<sup>26</sup> There are at least 54 issued U.S. patents and 89 pending patent applications that contain one or more

### C. Other Litigation

Some other recent cases have resulted in spectacular misfires for the plaintiffs. Eon-Net, L.P. sued 26 companies, including Flagstar Bancorp, for allegedly infringing its patent for extracting data from computer scans of paper documents. In the Flagstar case the alleged infringement arose from its use of purchased software in its e-mortgage business, but the developer of that software had already licensed the patent in dispute. After a year of delay, Eon-Net conceded there was no infringement. The court sanctioned the company (under Rule 11 of Federal Civil Procedure) for failing to undertake the minimum investigation required before filing suit.<sup>27</sup>

In another case, the court sanctioned a law firm for filing a frivolous infringement suit against Hypercom, a leading manufacturer of point-of-sale transaction terminals. The law firm, Verve LLC, had obtained nearly \$1 million in licensing income from settlements resulting from suits filed against at least 10 other companies. But Hypercom refused to settle. At trial, the district court concluded that Verve had engaged in an abuse of process and malicious prosecution, in part because Verve had failed to investigate whether there was evidence of infringement prior to filing suit. It awarded Hypercom \$700 thousand in damages (Young 2007).<sup>28</sup> Verve's suit before the International Trade Commission was also dismissed on similar grounds.

### 5. Recent Developments in the Courts

The last year or so of court decisions may represent a sea change in the interpretation and application of patent law in the United States. Many of the new precedents will be especially relevant for business method patents. Indeed, some of these cases were inspired by those patents.

#### A. The Supreme Court Asserts Itself

During the first quarter century of the Federal Circuit, the Supreme Court has only rarely taken up patent cases, but there are signs this deference appears to be fading. Three recent cases, in particular, will have important implications for business method patents.

##### 1. Injunctions

The first case (*eBay vs. MercExchange*) is about when the remedies for patent infringement should include an injunction against the defendant, prohibiting further use of the patented invention without the consent of the patent owner. In the original district court decision in 2003, eBay's "Buy it Now" feature was found to infringe two MercExchange patents that allowed shoppers to purchase items without first participating in an auction. The court awarded damages, but no injunction. When MercExchange

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references to the phrase "Check 21" (based on the author's keyword search of the USPTO website in September 2007).

<sup>27</sup> The court ordered the plaintiff to pay the defendant's reasonable attorney's fees and costs. See *Eon-Net, L.P. v. Flagstar Bancorp, Inc.*, 2006 U.S. Dist. LEXIS 91735 (W.D. Wash. 2006)

<sup>28</sup> *Verve LLC v. Hypercom Corporation*, 2006 05-CV-0365-PHX-FJM (United States District Court for the District of Arizona). The patents involved in these cases were owned by a Japanese company, Omron Corp. In a separate settlement, Omron agreed to pay \$1.5 million to Hypercom (Young 2007).

appealed, the Federal Circuit decided that an injunction was also warranted.<sup>29</sup> The Federal Circuit opinion argued that injunctions should be denied in patent cases only under exceptional circumstances.

The Supreme Court reversed this decision, remanding the case to the district court to determine the appropriateness of an injunction on the basis of the court's traditional four-factor test: (1) A plaintiff must demonstrate irreparable injury, (2) Monetary damages are an insufficient remedy for this injury, (3) The balance of hardships favor an injunction, and (4) The public interest would not be disserved by an injunction.<sup>30</sup> In addition, the court concluded that a district court's decision to impose an injunction (or not) may be reviewed on appeal only on the grounds of an abuse of discretion.

Thus, relative to the Federal Circuit's position, injunctions will be somewhat harder to come by. In addition, in a concurring opinion four justices linked the public interest part of its test to concerns about the vagueness and suspect validity of some business method patents.

## 2. Can a Licensee Seek Declaratory Judgments?

The second important case is *MedImmune v. Genentech*.<sup>31</sup> MedImmune licensed Genentech's Cabilly II patent in 1997, but it also sought a declaratory judgment, arguing it did not infringe any *valid* claims of the patent in question. In the lower courts, Genentech sought dismissal of the case, arguing that MedImmune lacked standing to sue, since it was paying royalties and thus did not face a risk of being sued. This argument is sometimes called "the reasonable apprehension of suit" test.<sup>32</sup>

This doctrine poses a tradeoff for any firm contemplating a license of a suspect patent: On the one hand, the firm may want to protect itself from additional and substantial liability if the patent is upheld. On the other hand, it may not want to give up the option to seek invalidation of the patent. But ordinarily, it cannot accomplish both. It must either seek a license and forgo the opportunity to litigate, or decline a license and risk an even larger damage award if it is subsequently found to infringe a valid patent. Those damages could be potentially very large if the firm is found to willfully infringe the patent (see section 5B).

But in an 8-1 decision, the Supreme Court overturned the lower court decisions, citing a similar case before the Supreme Court in 1943.<sup>33</sup> In that decision the court concluded that the firms' rights to sue for declaratory judgment were not precluded by the fact they continued to pay royalties to the owner of the disputed patent.

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<sup>29</sup> At the same time the court invalidated one of MercExchange patents on obviousness grounds. Shortly thereafter, in March 2005, a USPTO reexamination reached a preliminary finding rejecting the other patent also for obviousness. That decision is under appeal.

<sup>30</sup> See 126 S. Ct. 1837 (2006).

<sup>31</sup> See 127 S. Ct. 764 (2007).

<sup>32</sup> See, for example, the Federal Circuit decision in *Gen-Probe Inc. v. Vysis, Inc.*, 359 F.3d 1376 (2004).

<sup>33</sup> *Altwater v. Freeman*, 319 U. S. 359.

### 3. Nonobviousness and Combination Inventions

The third decision, in *KSR International v. Teleflex*, is likely the most important Supreme Court opinion on patent cases in more than a decade.<sup>34</sup> While the suit involves a mechanical invention (an adjustable gas pedal with an electronic sensor), the real issue at question was how a court should determine that an invention is obvious and therefore unpatentable.

Courts traditionally assess obviousness from the perspective of a hypothetical person having ordinary skill in the art (the so-called PHOSITA). Especially in recent years, this inquiry relies on information contained in the (written) prior art that might “suggest” an invention that largely consists of a novel combination of pre-existing elements. To avoid the problem of hindsight bias (inventions seem more obvious once we know how they work), beginning in 1982 the Federal Circuit placed limitations on how the prior art could be interpreted to suggest the invention. Unless a piece of prior art actually suggests the combination of ideas from other parts of the prior art, the Federal Circuit has tended to assume that a person of ordinary skill in this field would not find the invention obvious. At the extreme, all the relevant aspects of an invention must then be contained in a single piece of prior art.

Critics argue that this approach implicitly reduces the standard of non-obviousness (or the inventive step as it is called in Europe), since it presumes that a person of ordinary skill in the art has little ability or creativity. Some scholars have argued that the capability of PHOSITA ought to be reasonably related to the observed 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 (Barton 2001, and Hunt 2004, 2007).

A unanimous Supreme Court seemed to agree with this reasoning, reversing the Federal Circuit. The opinion concludes:

“...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....”

This decision could represent the first substantive tightening of the nonobviousness requirement in U.S. patent law in over 20 years. The decision will have implications for patents in all fields, but its effects could be especially pronounced for business method patents that would not have been issued on novelty grounds had the prior art been more accessible to examiners (Lerner 2003). For this reason alone, the *KSR* decision may significantly influence the way financial patents are used in the U.S.

#### B. Decisions in the Lower Courts

The first important observation is that the federal courts are already incorporating the

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<sup>34</sup> See 127 S. Ct. 1727 (2007).

new precedents established by the Supreme Court in their decisions. For example, on remand, the original district court in the *eBay* case (the Eastern District of Virginia) applied the Supreme Court's four-factor test and upheld its original decision not to impose an injunction.<sup>35</sup> That does not mean, however, that injunctions are no longer available. In the 15 months after the *eBay* decision, there were at least 22 district court decisions that awarded a permanent injunction after a finding of infringement (Slenkovich 2007).

Several recent decisions reflect the Supreme Court's reasoning in *KSR*, and a number of patents have been invalidated on obviousness grounds.<sup>36</sup> In one case, the Federal Circuit upheld the patent office's rejection, on re-examination, of two patents that claimed a system of inflation-adjusted deposit and loan accounts.<sup>37</sup> The rejection was based on 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 (Mukherjee and Orlans 1975). The second was a patent granted in 1983 that described how to use a data processor (e.g., a computer) to manage a set of accounts. The combination, then, was deemed to obvious.

In a separate case, 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 in existence well more than a year before the application date. This prior art was not considered by the patent office when it decided to grant the patent.<sup>38</sup>

The Federal Circuit recently overturned its own precedent regarding the determination of willful infringement. This is an important decision because when a firm is found to willfully infringe a patent, it is likely a court will award *treble* damages to the plaintiff.<sup>39</sup>

Nearly 25 years ago, the Federal Circuit articulated its definition of willful infringement: when a potential infringer has notice of another's patent rights, he or she has a duty to exercise care to avoid infringing. One way to discharge that duty would be to obtain competent legal advice before engaging in activities that might infringe the patent.<sup>40</sup> This precedent, and subsequent cases, resulted in two complexities. The first is that it put defendants in the position of disclosing a legal opinion, in order to avoid an allegation of willful infringement, but at the risk of implicitly waiving attorney client

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<sup>35</sup> See 2007 U.S. Dist. LEXIS 54642 (Civil Action No. 2:01cv736).

<sup>36</sup> See, for example, *Leapfrog Enterprises v. Fisher-Price, Inc.*, No. 06-1402 (Fed. Cir. 2007).

<sup>37</sup> See *in re Trans Texas Holdings Corp.* (2006-1599, -1600). These patents were the subject of a 1999 infringement case against *Pimco Advisors, L.P.*, which resulted in a settlement.

<sup>38</sup> See *Advanceme Inc v. Rapidpay, LLC, et al.*, Case No. 6:05 CV 424 (E.D. Texas 2007).

<sup>39</sup> Under U.S. patent law, a court is permitted to award damages up to three times the actual harm to the patent owner. See 35 U.S.C. § 284. But the law itself does not specify the circumstances where such an award is appropriate.

<sup>40</sup> See *Underwater Devices Inc. v. Morrison-Knudsen Co.*, 717 F.2d 1380 (1983).

privilege. The second is that the investigation often became one of determining the intent of the defendant.

In an August 2007 decision, *in re Seagate Technology*, the Federal Circuit concluded that its earlier precedent on willfulness was the equivalent of imposing a standard of negligence on potential defendants when a standard more akin to *recklessness* would be more appropriate.<sup>41</sup> It reached this conclusion by analogy to precedents established in other cases. For example, federal courts will impose enhanced damages in copyright infringement cases when the defendant demonstrates reckless disregard for the plaintiff's rights.<sup>42</sup> The Federal Circuit concluded that

“Accordingly, to establish willful infringement, a patentee must show by clear and convincing evidence that the infringer acted despite an objectively high likelihood that its actions constituted infringement of a valid patent ... The state of mind of the accused infringer is not relevant to the objective inquiry... the patentee must also demonstrate that this objectively defined risk was either known or so obvious that it should have been known to the accused infringer.”

It would appear that establishing willful infringement of a patent, with the attendant prospect of treble damages, is now more difficult. In addition, the Federal Circuit reiterated that it was not necessary for potential infringers to obtain prior advice of counsel in order to avoid a charge of willful infringement and that any waiver of attorney client privilege did not apply to trial counsel.

## 6. Legislative Proposals

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.<sup>43</sup> Two recent reports, one by the Federal Trade Commission and another by the National Academies have provided additional weight to these concerns (FTC 2003, Merrill et al. 2004).<sup>44</sup> From this debate there is an emerging consensus in favor of some limited reforms. Other proposals are more controversial.

After several years of stalemate, it appears that the U.S. Congress is poised to enact the most significant changes in patent law since 1952. In July of 2007, the Judiciary committees of the House and Senate voted out patent reform bills, but they are not identical. The bills contain many provisions, and the ones most relevant to the topic of

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<sup>41</sup> See Miscellaneous Docket 830 (Fed. Cir. 2007).

<sup>42</sup> The opinion also mentions the recent Supreme Court decision in *Safeco Insurance Co. v Burr*, 127 S. Ct. 2201 (2007), which involved a case under the Fair Credit Reporting Act. Under that law, consumers can recover actual damages resulting from negligent violations and punitive damages if the violations were found to be willful. In this case, the Supreme Court defined willful as reckless behavior.

<sup>43</sup> 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. For empirical evidence of this distinction, see Cohen et al. (2000)

<sup>44</sup> See also Jaffe and Lerner (2004).

this paper are described briefly here.<sup>45</sup>

#### A. Publication of Patent Applications

A 1999 law specified that patent applications, in their original form, would be made public 18 months after the date of application. Prior to 1999, pending applications were not disclosed by the patent office. But that law included an exception to the publication requirement for an applicant who stipulates he or she does not intend to file for a patent to protect the same invention in countries that also require that pending applications be published.<sup>46</sup> Both bills would remove this exception. Publication of pending applications is important because it is often the first notice to market participants that an applicant may obtain property rights that could affect their businesses.

#### B. Prior User Rights

Similarly, the 1999 law imposed a limitation on the enforcement of business method patents for firms that had been practicing, as a trade secret, what became the patented invention a year or more before the date of the patent application.<sup>47</sup> Traditional trade secret law does not offer such protection and for deliberate reasons—it is a way of encouraging individuals and firms to file for patents, and thus disclose their inventions.

By creating a prior user right for business method patents, prior users could not be held liable for infringement, nor would they be required to obtain a license from the patent owner in order to continue practicing the invention. One of the reform bills would expand the availability of prior user rights for all patents and not just for patents on business methods. Although prior user rights do exist in some other industrialized countries, this would represent a very significant change in U.S. patent law.<sup>48</sup>

#### C. Calculating Damages for Patent Infringement

The bills contain a number of provisions that might affect how damages for patent infringement are determined. First, the criteria used to determine *willful* infringement would be modified. These proposals have likely been superseded by the recent decision in *Seagate* (see section 5B).

Second, the bills contain language on how damages should be calculated for *combination* inventions. These are products (or services) that embody many inventions, which can complicate the determination of the contribution of a particular patented invention to their total value.

This is a contentious issue in policy circles. On the one hand, in ICT industries such as computers, electronics, and software, there are concerns about royalty stacking. Products in these fields may embody dozens or even hundreds of patented inventions.

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<sup>45</sup> The description of legislation presented here is based on Thomas and Schacht (2007). The House of Representatives passed its version of the bill (HR 1908) on September 7, 2007.

<sup>46</sup> *The American Inventors Protection Act*, P.L.106-113, 113 Stat. 1537-44. The particular section referenced here is found at 35 U.S.C. § 122(b).

<sup>47</sup> See 35 U.S.C. § 122(b). Currently, a prior user right applies only to a patent on a “method of doing or conducting business,” but this phrase is not defined in the act.

<sup>48</sup> See Shapiro (2006b) and Moschini and Yerokhin (2006) for economic analyses of prior user rights.

Some researchers and industry participants suspect that, in such environments, there is a tendency for courts to overestimate the marginal contribution of each invention to the value of the whole (Lemley and Shapiro 2007).<sup>49</sup> But expected trial outcomes may also influence the terms of licensing negotiations. The resulting conflict over the division of profits may reduce the incentive to bring new products to market. Others worry that rules devised to address a problem in ICT industries may have unintended effects for industries such as chemicals and pharmaceuticals, where inventions and the resulting products tend to be more discrete.

The process of innovation in financial services is probably closer to what is observed in ICT industries than in the chemical industry. This is likely true, if for no other reason than the financial service industry's heavy reliance on these technologies (see section 3B). In particular, innovations in the processes used to provide financial services are typically cumulative in nature.<sup>50</sup> And, as noted earlier, financial markets and payment systems often exhibit network effects. This may complicate the proper estimation of the incremental contribution of a single patented attribute to the value of the financial product or service being provided.

#### D. Opposition Procedures

The bills contain a number of provisions intended to increase the quality of issued patents by increasing the information available to the patent office. That information is likely to come from interested third parties. The general idea is to reduce uncertainty over the validity of patents before they result in very costly trials. The proposal come in two general forms depending on whether the intervention occurs before or after a patent is granted. These are often called pre-grant or post-grant oppositions.

In the first instance, third parties would have an opportunity to submit (written) prior art to the patent office before it makes a final decision about the application. In most instances this would occur after the original application is published (see section 6A). Such a process already exists under current law, but it is little used for a number of reasons. First, any pre-grant opposition from a third party must occur within two months of the publication date of a pending application (Thomas and Schacht 2007), which may very well be the first time that a third party becomes aware of an issue affecting its business. Some of the bills would amend the deadline to permit third-party submissions before the date the patent is granted, or six months after the patent application is published, whichever is later.

Post-grant opposition procedures are available in some other industrialized countries, and the U.S. has enjoyed a limited version (*ex parte* re-examination proceedings) since 1981. Initially the role of third parties was simply to bring prior art not considered in the original examination to the attention of the patent office. The role of third parties in this process was expanded in 1999. But this *inter partes* re-examination procedure is rarely used, perhaps for strategic reasons: A party using the procedure may

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<sup>49</sup> See Thomas (2007) for examples from a number of recent decisions.

<sup>50</sup> But one could argue that new financial instruments are more like discrete innovations than the processes used to provide them to end users.

not use the argument presented, or any other argument it *could* have raised during the proceedings, as a defense in a subsequent patent infringement case.<sup>51</sup>

One of the patent reform bills would establish a new post-grant review proceeding that third parties could use within a year after a patent was granted (the so-called first window). The other bill would also permit a third party to initiate an opposition proceeding when it has received a notice of potential infringement from the patent owner (the second window).<sup>52</sup> Third parties who unsuccessfully participate in this process would be barred from using the same argument as a defense in subsequent litigation, but they would be permitted to use other arguments they could have raised at the time of the review proceedings.

#### E. Special Relief for Particular Industries

Two interesting amendments were included in the versions of the reform bills reported out of the Judiciary committees. One specifically states that tax planning methods are not patentable subject matter.<sup>53</sup> The other would eliminate remedies for infringement by financial institutions using patented check collection systems in compliance with federal laws (Bills 2007b).<sup>54</sup>

Other aspects of the reform proposals seek to more closely harmonize U.S. patent law with that of other countries (e.g., moving to a first-to-file system, eliminating the best mode requirement, and revising grace periods). Another bill introduced in 2007 (HR 34) would create a US District Court Patent Pilot Program to provide training to judges and law clerks in five federal district courts. Patent cases within these districts could then be referred to these judges by other judges who would prefer not to hear patent cases.

### 7. Conclusions

Business method patents in financial services are very likely here to stay. Financial institutions have recognized this fact and are in the process of adapting their management practices to both exploit the benefits and protect themselves from the risk.<sup>55</sup>

Too little time has passed, and too little data are available to make concrete statements about the effect of these patents. At present we know (1) more and more of these patents are being obtained, (2) they appear to be litigated more often than other patents, and (3) in some instances significant settlements have been reached with large financial institutions or their vendors. There does not appear to be any clear change in the sector's trend rate of growth in investments in innovation—these investments were growing prior to *State Street* and they continue to increase today.

It will be several years before we can say much more, but to do so, we must do a

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<sup>51</sup> See 35 U.S.C. § 315(c). The purpose of this restriction is to prevent abuse of the opposition process.

<sup>52</sup> For a more detailed discussion of post-grant review procedures, see Hall et al. (2003).

<sup>53</sup> See Section 10 of H.R. 1908, as reported out of the House Judiciary Committee.

<sup>54</sup> See Section 14 of S. 1145, as reported out of the Senate Judiciary Committee.

<sup>55</sup> As an example, in 2005 the Securities Industry Association established an IP clearinghouse with the objective of increasing cooperation among industry participants defending themselves in patent litigation.

better job of measuring innovation in financial services (both inputs and outputs), and we must do a much more systematic job of understanding how these firms develop, protect, and exploit their innovations.

Finally, there is some recent evidence that at least some decisions about patent policy will be made by institutions other than the Federal Circuit. This offers some prospect of improving the quality of patents that are issued and the manner in which they are examined by the courts. As a bellwether for changes in the patent system, business method patents will be significantly affected by these changes.

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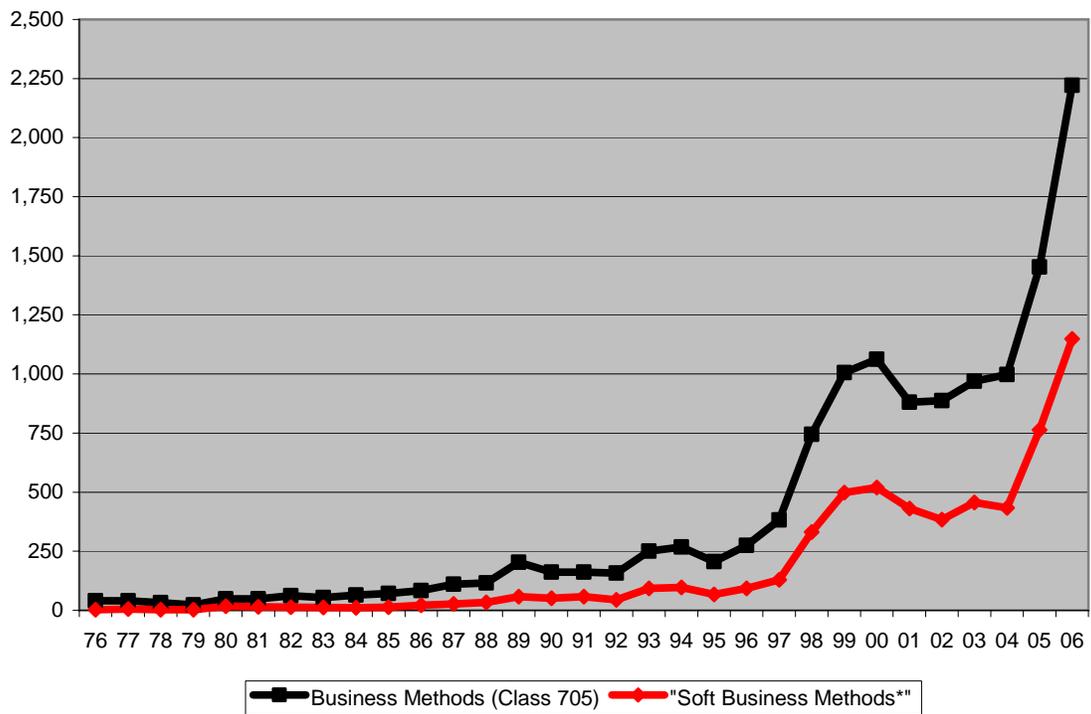
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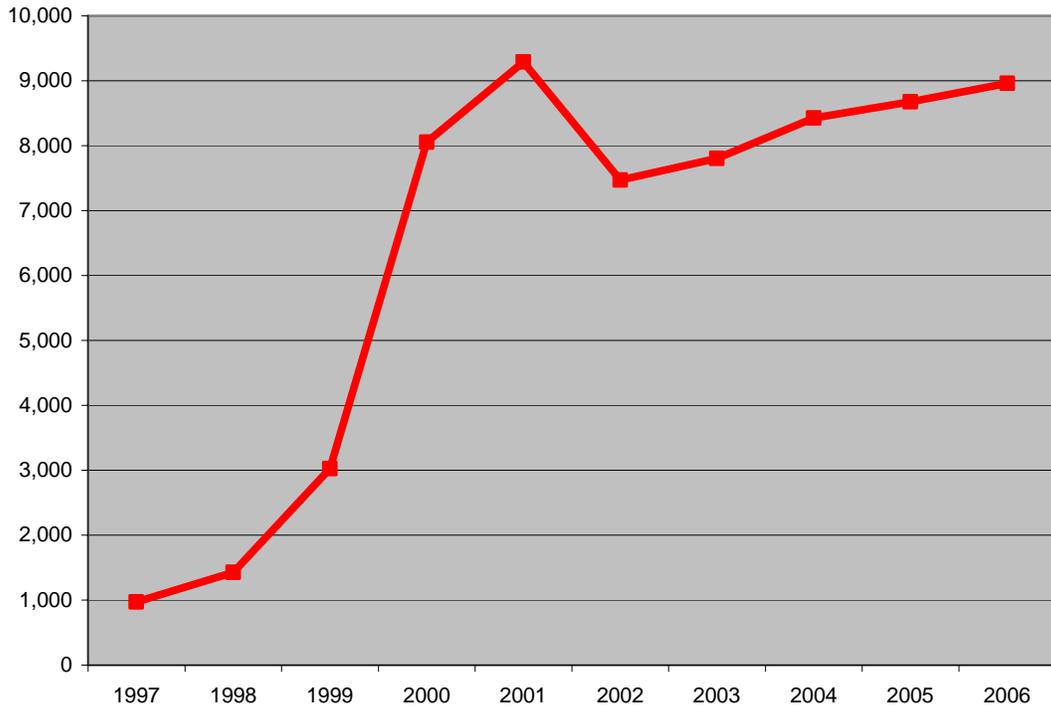
Figure 1: Patents on Computer-Implemented Methods of Doing Business in the U.S. (by calendar grant year)



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

\*: "Soft Business Methods" counts only patents in the subclasses of 705 that are most closely associated with financial services and which contain a smaller share of patents on mechanical inventions. These classifications were identified with the assistance of CHI Research.

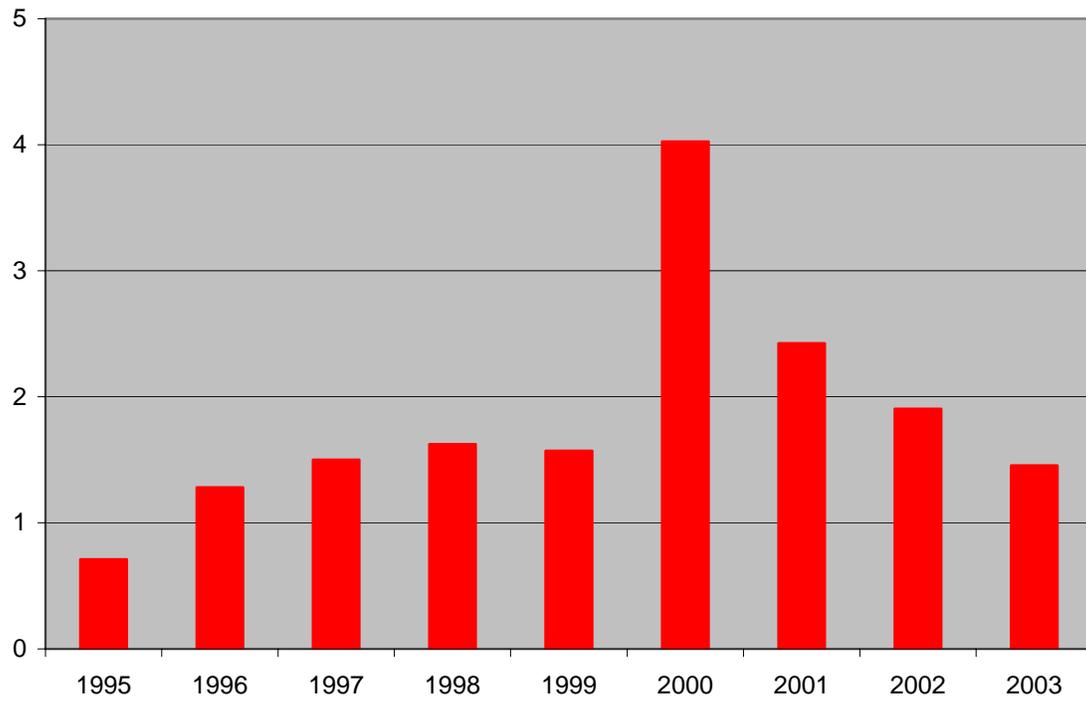
Figure 2: Applications for Business Method Patents\*



Source: U.S. Patent and Trademark Office

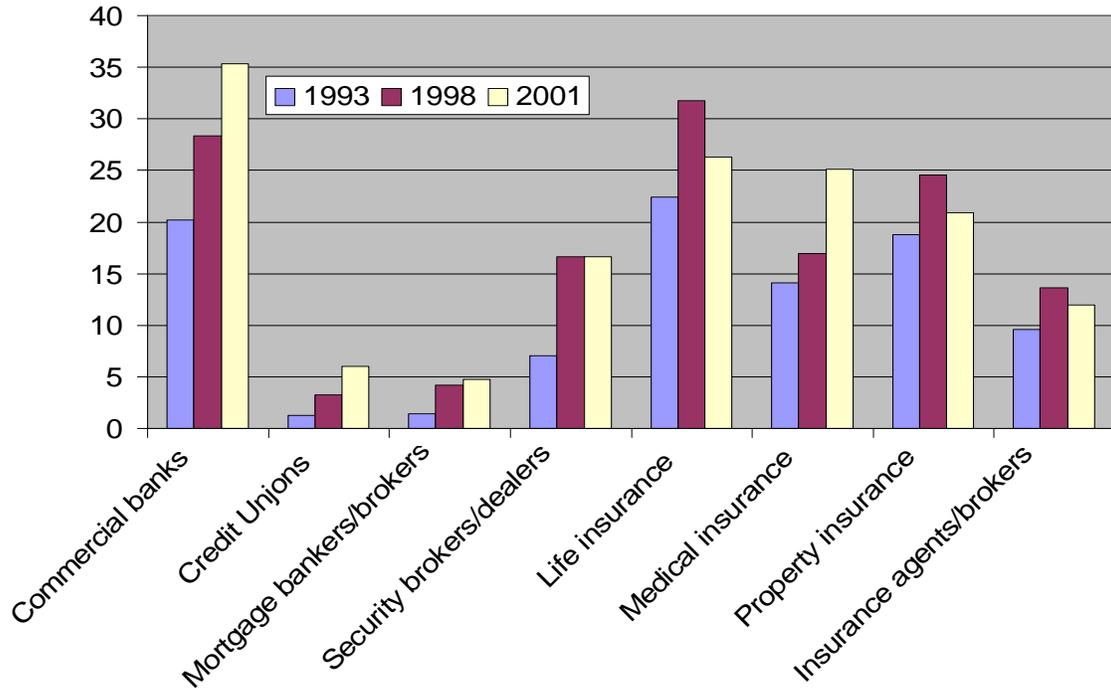
\*: Counts by fiscal year.

Figure 3: R&D in Financial Services (\$US billions)



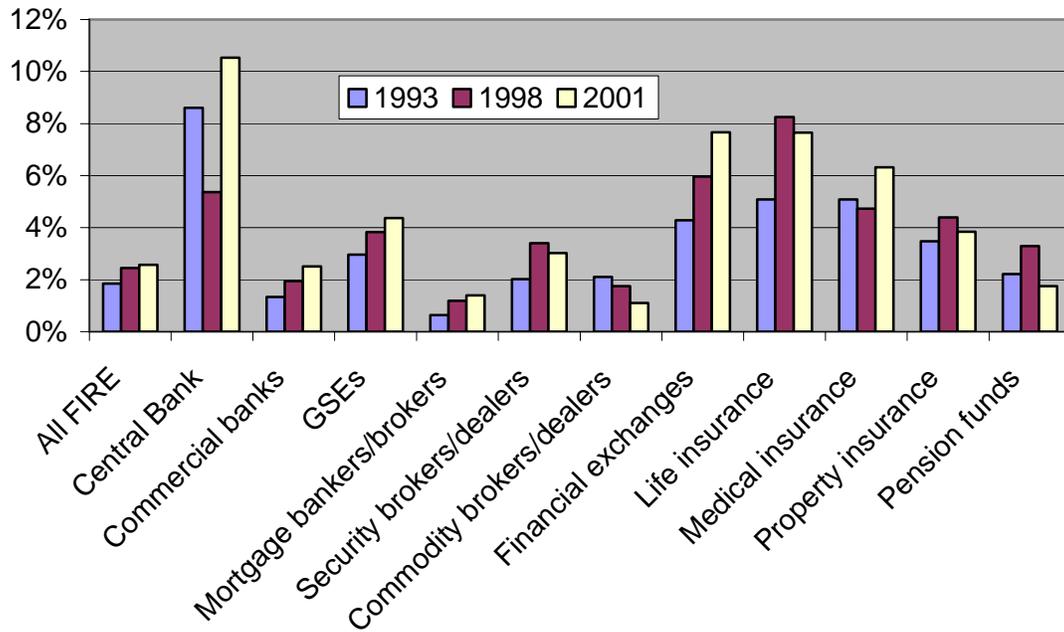
Source: National Science Foundation and author's calculations

Figure 4: Employment of Scientists and Engineers by Financial Sector (thousands)



Source: National Science Foundation and author's calculations

Figure 5: Employment of Scientists and Engineers by Financial Sector (share of workforce)



Source: National Science Foundation and author's calculations