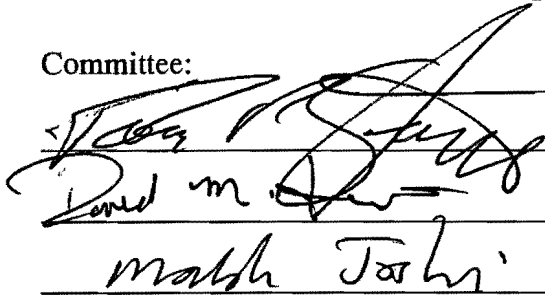


SHOULD BUSINESS METHODS BE PATENTABLE? UNDERSTANDING THE
IMPACT ON SOCIETY OF BUSINESS METHODS PATENTS

by

Kirsten Apple
A Dissertation
Submitted to the
Graduate Faculty
of
George Mason University
in Partial Fulfillment of
The Requirements for the Degree
of
Doctor of Philosophy
Public Policy

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Fall Semester 2013
George Mason University
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DEDICATION

My dissertation is dedicated, first and foremost, to my father, Richard William Sachwitz, who has consistently encouraged me to finish my PhD program. Most phone conversations I have had with him while in the PhD program have ended with “work on that PhD.” I would like to thank my Dad for pushing me to make it to the finish line and complete my dissertation. Both my mother, Elizabeth Graeff Sachwitz and my father has always believed in me, encouraged me to go for what I want, and that as a female academic nothing was out of my reach.

I would also like to dedicate this dissertation to my children, Elizabeth Jane Apple and Zachary Samuel Apple both of which were conceived, born and became vivacious little people while I completed my PhD program. They are the light of my life. Lizzy continues to amaze me with her thoughtfulness, attentiveness and insights in life. Zach lives life to the fullest and makes friend everywhere with his humor and fun nature. Thanks to both of you for letting your mama spend time working on her PhD, and may you reach your dreams in life.

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank my Committee Chair, Dr. Roger Stough, for his guidance and support on my dissertation. Dr. Stough inspires me to think bigger, work faster and make anything possible. He is a brilliant academic, an amazing business man and an excellent fundraiser. I have had the honor to work alongside him in these capacities over the years. He helped me develop my original dissertation proposal and has kept me focused to complete it and to improve the final output. I would also like to thank committee members Dr. David Hart and Dr. Mahesh Joshi for their support and their guidance. I always enjoyed my active debates with Dr. Hart and admire his methodical approach that is always grounding in theory. Dr. Hart was always accessible and he ensure my dissertation was solid scholarly research. Dr. Mahesh Joshi's entrepreneurship and business knowledge gave the research a balanced approach. Thank you to all of my committee members.

I would also like to thank Chidi Oti-Obihari, who was the one that originally challenged me to pursue my PhD and planted the seed in my brain. As well as Susanne Baughman, Justin Vovak, Ryan Zelnio, Kathy Doane and Scott Jackson who have edited this and numerous other papers for me throughout my PhD career. My journey could not have been possible without many others for their words of encouragement and helping hand especially when raising two young children while working full time and completing a PhD. Thank you goes to my siblings Erik Sachwitz, Richard Sachwitz, and their spouses Laura Sachwitz, and Jennifer Sachwitz, and friends Ginger Petrohoff, Kara Sweeney, Kathy Doane and Walter Lamore.

Finally I would like to thank the United States Patent and Trademark Office and in particular the Office of the Chief Economist and the Business Methods Directors and Supervisors for their support throughout my studies. My position as a statistician in the Office of the Chief Economist allowed me to be exposed to interesting questions and brilliant economists all while improving my skill as a researcher including working with large scale databases and with Stata. My position as a Primary Examiner in area of business method patents has allowed me to understand the nuances of this growing area of patenting. In particular I would like to thank, David Kappos, Stuart Graham, Alan Marco, Kambiz Abdi, Jim Trammell, Wynn Coggins, Greg Vidovich, Bob Weinhardt and Jim Hirabayashi and Paul Harrison.

Disclaimer: The author was a patent examiner employed at the USPTO during the time she wrote this dissertation. However, the views and opinions of this dissertation are those of the author in her work as an academic student and not a reflection of role or experience at the USPTO. The view and opinions expressed in this dissertation are not those of the USPTO.

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LIST OF ABBREVIATIONS

Earnings Before Interest and Taxes.....	EBIT
Internal Revenue Service.....	IRS
Manual of Patent Examining Procedure.....	MPEP
National Bureau of Economics Research.....	NBER
Research and Development.....	R&D
Second Pair of Eyes Review.....	SPER
Standard Industrial Classification.....	SIC
United States.....	US
United States Patent and Trademark Office.....	USPTO

ABSTRACT

SHOULD BUSINESS METHODS BE PATENTABLE? UNDERSTANDING THE IMPACT ON SOCIETY OF BUSINESS METHODS PATENTS

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George Mason University, 2013

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Patents have been an accepted method of encouraging research and development. In the recent past “the scope of technologies that can be patented has been increased to include, among other things, gene sequences, computer programs and methods of doing business (Hunt and Bessen 2004).” Business Methods patents have witnessed very rapid growth since the 1998 State Street case (149 F.3d 1368, 1998) outcome which held that there is no patentable subject matter exception for method of doing business (Allison and Hunter 2006). In other words, business methods are now considered patentable subject matter. This paper examines, whether or not there has been a positive impact in innovation, in particular from the Banking industry, which prior to the State Street Bank case was more restricted from obtaining patents for internal banking process innovations.

The hypothesis of this dissertation is that business methods would have results that are similar to the Bessen and Hunt (2007) software study which found that software

patents were a substitute for R&D and contradicted the popular belief of incentive theory.

This empirical work in the area of business method patents is fundamental to understanding this new area of patenting.

CHAPTER ONE: INTRODUCTION AND LITERATURE REVIEW

Patents have historically been an accepted method of encouraging research and development (Trajtenberg 1996, 2002). In the recent past the “the scope of technologies that can be patented has been considerably expanded to include, among other things, gene sequences, computer programs and methods of doing business (Hunt and Bessen 2007).” Business method patents have witnessed huge growth since the 1998 State Street Bank case (149 F.3d 1368, 1998) which held that there is no patentable subject matter exception for method of doing business (Allison and Hunter 2006). In other words, business methods are now considered patentable subject matter. This dissertation examines what impact the State Street ruling has had on patenting in the financial industry and on society as a whole. The research provides a lens for understanding how the landscape of business methods has changed over the past ten years through descriptive statistics, and regression modeling that examines specifically the impact of patents in the area of business methods on research and development.

This introduction is presented in three parts 1) a literature review on patent trends over the recent past including software, biotechnology and business method patents; 2) theories that inform the research framework; and 3) an overview of the dissertation.

Literature Review

Before examining specific types of patents it is useful to consider the historical background for patents and, in particular, the theoretical platform upon why patenting occurs. It is important and necessary to understand how patents began and evolved in order to gain insight into modern day patent thinking and related processes.

In the U.S. patents began with our forefathers and are clearly articulated in the constitution as a right granted to inventors (Spinello 2006). The constitution specified (Art. 1, § 8, cl. 8.) "The congress shall have Power... To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries"

This vision of property rights was not unique for the United States and dates to our European founders and their philosophies.

"Early examples of technology-related patents are: Brunelleschi's patent on a boat designed to carry marble up the Arno River, issued by the Florentine government in 1421; the Venetian patent law of 1474; and various patent monopolies were granted by the English crown between the fifteenth and seventeenth centuries. Modern patenting, which requires a working model or written description of an invention, dates from the eighteenth century, first in Britain (1718) and then in the United States (1790), followed closely by France." (Hall 2007, 3).

Overview of All Patent Research Literature

In their present form patents represent a tradable monopoly right that is licensable, and thus captures a certain economic value. As a consequence economic researchers have long used patent data to study the role of innovation in fields such as

economic growth, technology change and firm strategy (Trajtenberg 2002, Jaffe et.al 2002). While there are many compelling reasons to use patent data, interpretation requires care and a deep understanding of the complexity of the rules and structure of the patent system, as well as the limitations of the results that may be drawn from patent data.

A primary reason for using such data for analysis is the breadth and depth of the information contained in the patent. For example, granted patents themselves include such data at application date, granted date, classification of subject, title, inventors, assignee such as company, attorney, patent examiner and references cited. The United States Patent and Trademark Office (USPTO) has recorded a large number of patents, over a long period, which are individually easily accessible and contain the large range of data noted above.

In 2005 the USPTO received 417,508 patent applications and granted 157,718 new patents. Having enough data is never a problem for researchers using patent data, but additional insight is needed to understand it properly. This body of detailed information dates back over two centuries; the first U.S. patent was granted in 1790 to Samuel Hopkins of Philadelphia for “making pot and pearl ashes”; this patent was for a formula used in soap making. The USPTO grated patent data is publicly available and many sophisticated programs have been developed to help researchers conduct studies.

Databases such as the National Bureau of Economics Research (NBER) Patent Citation File contain about 3 million patents linked to over 16 million citations. They are available free from the NBER website (Hall, Jaffe & Trajtenberg, 2001). This is just one

illustration of the magnitude of data available, which has been used by many researchers (Peri 2005).

In addition to the large quantity and extensive history of patents, each record contains a wealth of information. For example, one database used by patent examiners is called the “East” database and available to the public for research at USPTO locations. It contains 76 different searchable fields such as invention abstract, inventor(s) names and addresses, assignees or company name, and the field or “class” of invention. This is a powerful tool that contains a wealth of information.

The most common use of patents data is patent counts, or the number of patents filed or received. Some researchers use the number of patent applications while others use the number of patents granted. Not all patent applications become a granted patent; therefore, there can be a significant difference in the number of patents filed and granted. The goal of the USPTO is to have patent applications reviewed within an 18 month period, meaning there also is a time difference or lag between the two.

Because patent counts are difficult to establish attempts to determine the value or quality of a patent have received considerable attention and can help distinguish one patent from another. Some scholars have studied patent renewals as an indication of value (Pakes 1986) because to retain a patent requires paying a fee; if the expected future value is lower than the renewal fees a patent owner would not renew the patent.

Other studies have focused on defining the most valuable patents in terms of the level of litigation associated with patents (John R Allison, 2001). According to the American Intellectual Legal Association, fees for a median patent case cost \$1.5 million

per side in 2001; therefore a rational patent holder would not litigate unless the patent was worth millions of dollars. According to Allison, in 1999-2000 310,979 patents were granted but in that same time period only 4,247 lawsuits were pursued and 6,861 patents terminated, so only 2.2% of patents were valuable enough to litigate. Again, Allison's study fails to include both marginally valuable patents and those that are extremely valuable where million dollar fees were still collected through revenue or licensing without litigation.

Recently, patent data has focused on the patent citations to better understand a number of issues. Patent citations are developed during the prosecution of a patent application when it is being evaluated against other inventions to ensure it is novel before becoming a granted patent. Both applicants and patent examiner document the other patents or non-patent literature references that were similar to the application and termed patent citations. The two areas most often studied using patent citations are patent quality and knowledge flows. Patent citations can be a powerful tool in understanding knowledge flow because every patent record explicitly lists all relevant citations. In the words of Giovanni Peri (2005, p. 309), this is the "only" kind of research that uses "a discernible trail left by learning." Jaffe and Trajtenberg (2002) assembled a number of articles in this area, focusing primarily on patent citations for understanding knowledge flow. This work includes an examination of patents with respect to specific sectors of the U.S. economy such as the impact that federal labs (Jaffe, 1998) and universities (Trajtenberg 1996) and the impact they have on international knowledge flows (Trajtenberg 1999).

Policy View of Patents

Patents have a well-known public policy trade off: they provide incentives for research and disclosing of information at the social cost of reducing the innovation's life during the life of the patent (Gallini 2002). Obtaining a patent for a product or service provides that innovation with a legal monopoly which grants it undeniable monopolistic power. This, in turn, either prevents other firms from providing the product or service, or at a minimum, reduces the profits (social cost) of a second firm that must pay a licensing fee, which is then passed on to the consumer in the price of the item.

This dissertation starts from Gallini social cost questions and asks whether business method patents provide an incentive to research and in turn disclose information in all industries. While research and development is not reported by financial services firms, and therefore, cannot be tested directly, a proxy for research or innovation using trademark data was employed to test the main hypothesis of this dissertation.

New Areas of Patent Protection

It has been observed that there has been a “tremendous change in the patent system over the past two decades” to expand and strengthen the protection of inventions (Encaoua 2006, Learner 2002). The main areas which have been cited include: biotechnology, software and business methods (Encaoua 2006, Hunt and Bessen 2007).

Many have conducted studies to question the fundamental basis for the patent system's existence. For example Mansfield asked the question: “To what extent would the rate of development and commercialization of inventions decline in the absence of patent protection?” (1986, page 173) and Kanwar asked “Does intellectual property protection spur technological change?” (2001, page 2). However the debate and evidence

between Mansfield and Kanwar works continued to be drastically different. Using the two papers above Mansfield found that support for view of the the patent system increasing the rate of innovation to be very small while Kanwar found “the evidence unambiguously indicates the significance of intellectual property rights as incentives for spurring innovation” (2001, Abstract).

The above contradicting studies looked at the all patents as equal, but perhaps there are differences across industries. There are three areas that have seen a significant increase in patenting in the past ten years including: biotechnology, software and financial services. These three industry areas are explored in more detail below.

Biotechnology Patents

The rise in biotechnology patents grew out of the 1980 Supreme Court landmark decision in *Diamond versus Chakrabarty* which granted certain claims to a microorganism as patentable subject matter (Adler 1984). This case fundamentally changed the patentable landscape for biotechnology firms. Many have studied the effect of patentability on biotechnology firms. One researched the biotechnology industry using patents and publications of 116 biotechnology firms during the period 1988-1995 (Gittleman and Kogut 2003). Their research showed a negative correlation between scientific papers and high-impact innovation, and similarly that innovation is highly path dependent. They were however unable to extrapolate their findings to other patent types.

Software Patents

The rise of software patents does not have just one pivotal court decision that solidified the position of software patents as a new area but has increased throughout the

nineties (Hunt and Bessen 2007). It should be noted that software to date still cannot be directly claimed in a patent without being tied to statutory patented material such as a machine, normally in the form of a computer. This is reiterated by Allison and Hunter who explain “attorneys had little difficulty drafting a patent application on software as though they claimed machines (2006, pg. 736)”. Because of this, software has never been assigned a classification at the USPTO although it would be agreed that software can be patentable subject matter and granted patent protection (Allison 2006). Therefore it is difficult to define and determine software patents because there is no USPTO classification for patents that claim software. Hunt and Bessen (2007) solved this problem by searching patents with “software” or “computer program” in the description of the invention identifying 130,650 patents from 1976-1999. In addition to patent data (from NBER) they used Compustat¹ data to enrich the company statistics. With this dataset they were able to obtain measures for the variables for a number of statistical analyses including a regression model and further they used the results explicate related theory as described below.

The following patent related variable measure changes were obtained from patent data files (NBER) and Compustat and:

- 1) Number of software patents on an annual basis (increase from about 1,000 in 1980 to nearly 25,000 in 2002)
- 2) Percentage of Software patents to all patents (2% in 1980 to 15% in 2002)

¹ Compustat is a private large scale database that contains publically held company financial data, employment and industrial sector.
<https://www.compustat.com>

- 3) Percentage of Software patents to U.S. inventors (70% versus 53% for all patents)
- 4) Percentage of Software Patents to U.S. firms (70% versus 51% for all patents)
- 5) Percentage of Software Patents to Large Firms (88% versus 80% for all patents)
- 6) Software patent median firm market value (\$24 million versus \$12 for all patents)
- 7) Software patent median firm sales (\$13 million versus \$9 for all patents)
- 8) Software patent research and development (R&D) spend (\$956 million versus \$376 for all patents)
- 9) Software patent firm type (75% manufacturing)
- 10) Top 5 software patent firms (IBM, Motorola, Hitachi, AT&T and Hewlett-Packard)
- 11) Propensity to patent – discussion

Models for testing for a relationship between changes in R&D and software patents over the five year period from 1990 to 1995 were constructed and tested. The findings concluded that an increase in share of software patents is associated with a decrease in research intensity, suggesting software patents are a substitute for R&D.

The paper then outlines three theories in which to compare and contrast their findings, including:

- 1) Incentive theory argues that by making available stronger property rights at lower cost, firms will have an increased incentive to engage in R&D but the finding of software patenting does not support this theory.

2) Productivity shock theory which argues that the U.S. economy has experienced a large productivity shock that favored inventions implemented via computer programs is also not supported by the finding of the analysis of software patents.

3) Patent thickets theory describes firms that are motivated to create barriers and fees on other firms by establishing a large patent portfolio is supported by the findings of the software patents.

Business Method Patents

While there has been tremendous criticism of business method patents little empirical work has been done to assess their impact (Allison and Hunter 2006). Four papers which have evaluated different aspects of business method patents are reviewed. Lerner asked “Where does State Street lead?” (2002) in which he examines finance business method patents from 1971 through 2000. He hypothesized that “no academic finance paper of which the author is aware has previously considered the impact of financial patents from a theoretical or empirical perspective (Lerner 2002, pg. 903).” His data consisted of 445 financial patents between 1971 and 2000 based on the USPTO classification system and included finance business method patents. From this dataset the number of financial business method patents was calculated for:

- 1) Firms holding the largest number of finance business method patents
- 2) Type of firm (domestic corporation, foreign corporation, individual, university or government)

Lerner was disappointed to find that universities only held 1% of finance business patents. The remainder of the paper focused on this gap in university finance business

patents in which a model was created and tested using patent citations and related publications in the top 15 academic financial journals. He concluded that “the absence of academic patenting (in financial business patents) appeared to be due to a lack of awareness or interest on the part of faculty members, rather than the un-patentability of academic research” (Lerner 2002, pg. 928). Lerner’s paper was one of the first reviews of business method patents and it was narrowly focused on academic patenting.

Allison and Tiller (2002) performed additional statistical analysis on business methods entitled “Internet Business Method Patents” which reviewed 1,093 business method patents, defined as classification 705 including all sub-classification from 1990-2000, compared with data from a random sample of 1,000 patents across all other classifications. Their analysis found:

- 1) Percent of business method patents allowed (36% compared with 72% for all patents)
- 2) Average number of prior art cited for business method patents ($24.9 > 15.16$ for all patents)
- 3) Average number of non-patent literature for business method patents ($10 > 2.37$ for all patents)
- 4) Owner of business method patents which were small business ($19.4 > 10.7$ for all patents)
- 5) Owner of business method patents which were large business ($63.13 > 70.7$ for all patents)

6) Inventor of business method patents which were foreign (2.3 UK+5 Japan+0.5 Other < 17.3 UK + 21.4 Japan +5.9 Other for all patents)

Allison wrote a second paper with Hunter (2006) where they empirically reevaluated the quality of business method patents to determine the validity of the contention that the quality of these patents was inferior. This study focused on the quality change enacted in March 2000 called Second Pair of Eyes Review (SPER). The study investigated business method patents, defined as those with the primary classification 705 including all sub-classifications, as compared with patents which had only the secondary classification of 705, both before and after the implementation of the SPER program. They examined the number of prior art references cited as a proxy for quality and concluded that business method patents were similar or of better quality than all other patents. While this study employed a negative binomial regression model it only focused on the Second Pair of Eyes Review program and did not consider R&D as a variable.

Hall (2009) examined financial business method patents; however, her study focused on Europe and did not include U.S. business method patents.

Hunt (2010) discovered that only 1 in 10 business method patents are from financial firms. He examined industry level data on innovation including National Science Foundation R&D data and employment data to see how this has shifted over time as business method patenting has increased. The paper provided a list of key patent litigation cases in the financial services sector, which was helpful and provided insight into the industry's dynamics. Hunt (2010) discussed the research issues confronted while

studying financial services firms. One of the biggest obstacles is that most financial services firms do not report R&D in the same manner as manufacturing firms. His recommendation was to use what he called “research occupations” or inventorying the jobs that are research focused such as an engineer or computer programmer. His paper reviewed the “research occupations” only at an industry level but did not drill down to the firm level. He found that Software Engineers was the top technical occupation in financial services industry.

Summary of Literature Review

While some work has been conducted in the area of business method patents, none has considered its impact from the vantage of the most recently passed decade since the foundation State Street case decision (149 F.3d 1368, 1998). Additionally, none of the work has empirically modeled the interaction of patenting and innovation (as measured using trademarks counts) for business method patents. Modeling innovation and patenting in the financial services sector is the focus of this dissertation.

The core hypothesis is that business method patents would have similar effects on business method innovation as those of software related patents described by Bessen and Hunt (2007). This study found that software patents were a substitute for R&D which was a contradiction of the predictions of incentive theory. However this fundamental work has never been undertaken and completed for business method patents.

To date there has been no empirical research on the justification for allowing business methods to be patentable subject matter. This would be helpful in both understanding the specific question of “should business methods be patentable?” and the

broader question of “what is the innovation impact on society of business method patents?”

Theories that Inform the Research Framework

The research in this dissertation has been grounded in several theories in the literature related to patenting and their impacts on the innovation, economy and competitiveness of the U.S. Three theories are explained and form the framework for this dissertation. These are incentive theory, counterfactual theories of causation, and punctuated equilibrium as applied to innovation. Incentive theory is central to the research problem because it forms the framework for the hypotheses in this thesis. Counterfactual theories of causation and punctuated equilibrium are foundational to the dissertation because they inform the model to be a difference of differences regression model before and after State Street case.

Incentive Theory

Much of the rationale behind patents or intellectual property in general is rooted in an economic view of tradeoffs between societal benefits and inventor benefits: the inventor is granted a monopoly in return for making her invention public rather than maintaining it as a trade secret (Hall 2007 and others). Incentive theory holds that inventors are incentivized to develop inventions because the public policy patent system will provide them a monopoly right to their invention for 20 years. Following the logic of the incentive theory, innovations, traditionally measured in terms of Research and Development (R&D), should increase with patent protection *ceteris paribus*. In addition to providing greater incentives for R&D, the patent system has other social benefits such

as diffusion of innovations, reducing entry barriers faced by innovative start-ups with limited complementary assets, and increasing the efficiency in the market for intellectual property (Arora et al., 2001). However there are also downsides to society for providing a legal monopoly.

As Cotropia (2010) explains there is a balancing act embedded in the incentive theory.

“Intellectual property law exists because exclusive private rights provide an incentive to innovate. This is the traditional upside of intellectual property: the production of valuable information goods that society would otherwise never see. In turn, too much intellectual property protection is typically viewed as counterproductive, as too much control in the hands of private rights’ holders creates more artificial scarcity and imposes more costs on future innovators than the incentive effect warrants. This is the traditional downside of intellectual property: reduced production and impeded innovation.”

Hall (2007) believed that incentive theory is more complex than the two simplified dimensions of giving patent protection rights to stimulate innovation and therefore, making the optimal policy design an extremely difficult task. In order to explain the complexities, Hall (2007) developed a two by two matrix which depicts the trade-off in terms of both innovation and competition. The traditional view of the benefits and cost is depicted on the principal diagonal (cells in white), while the less discussed complications with the patent system are depicted on the other diagonal (cells in gray).

Table 1 The patent system trade-offs

Effects on:	Benefit	Cost
Innovation	creates an incentive for R&D; promotes the diffusion of ideas	impedes the combination of new ideas and inventions; raises transaction costs
Competition	facilitates entry of new small firms with limited assets; allows trading of inventive knowledge, markets for technology	creates short-term monopolies, which may become long-term in network industries

Counterfactual Theories of Causation

The counterfactual theory of causation is based on the assumption that “if A had not occurred, C would not have occurred.” This theory could be extrapolated to the public policy behind patents: “if patent protection did not occur, R&D or innovation would not have occurred.” The counterfactual of incentive theory is difficult to test in the context of the US patent system because the system was created at the founding of the Republic. However, the State Street Case (149 F.3d 1368, 1998) gives U.S. a unique opportunity to see for one industry (financial services) if allowing business method patents led to more R&D or innovation. If yes, then some evidence has been obtained to support a generalization hypothesis to other industries and vice versa.

Punctuated Equilibrium

Punctuated equilibrium is a theory borrowed from evolutionary biology in order to describe radical innovation, which happens over a short period of time, as opposed to incremental improvements, which occur over a long period of time. Typically there is some catalytic event, or reason that punctuates the equilibrium condition. The term

“punctuated equilibrium” originated in biology when rare, rapid events of evolution in species were seen and the idea was appropriated into the management literature to describe when a similar phenomenon happened with firms (Loch 1999).

The hypothesis is that the “State Street case” (149 F.3d 1368, 1998) served as a punctuating event that led to rapid disequilibrium in the environment for financial services firms and thereby contributed to increased business method patenting

Overview of the Dissertation

This dissertation has been divided into four chapters which provide different types of empirical evidence on business method patents which enables the investigation of different aspects of this new area of patent protection growth. Chapter two provides a historical view and legal perspective that lays out the groundwork for further research in business method patents. It includes the foundation cases and patent law descriptions from a non-legal perspective and examines the annual growth of business method patents in the context of the reviewed cases.

Chapter three focuses on the firm and contains an analysis of the top one hundred firms holding business method patents. This analysis and associated results are then described and major trends outlined. Case studies are used to provide greater insight into the analysis and the results.

Chapter four employs a higher level of analysis and uses industry groups to analyze business method patents. In order to understand what types of firms hold patents, the top four divisions and their sub-divisions are examined. Specific patent cases studies

are used for a number of firms to get a broader and deeper understanding of the nature of business method patents in different industry groups.

Chapter five constructs and deploys a regression model to test the main hypothesis and investigate the primary research question of “should business methods be patentable?”

The model directly tests the main hypothesis that “an increased patent protection stimulates an increase in innovation”. Multiple different regression models are tested to gain further insight into possible alternative interpretations of the findings.

Finally, chapter six investigates the implications for future thinking and policy regarding business methods patenting.

CHAPTER TWO – HISTORY AND LEGAL PRIMER ON BUSINESS METHOD PATENTS

Chapter Two is a legal and historical primer on business method patents. There are many disjointed papers and research which consider different aspects of business methods patents. The purpose of this chapter is to provide a full legal and historical integrated overview.

Legal Review of Patentability

There are a number of laws governing the U.S. patent system which define what is patentable. While none of the language of the laws discussed below has changed, it is the interpretation of the language based on court cases that has shifted the landscape for patentable subject matter. The four laws which are discussed are the major ones that have contributed to the changed interpretation. These are:

35 U.S.C. 101 Inventions patentable

35 U.S.C. 112 Specification.

35 U.S.C. 102 Conditions for patentability; novelty.

35 U.S.C. 103 Conditions for patentability; non-obvious subject matter.

Historical Review of 35 U.S.C. 101, Invention Patentable

Inventions patentable - Section 101 (35 U.S.C. 101)

35 U.S.C. 101 law states:

“Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.” This law and all other patent laws can be found at the USPTO website at the online *Manual of Patent Examining Procedure* (MPEP) under Appendix L, Patent Laws. (<http://www.uspto.gov/web/offices/pac/mpep/mpep-9015-appx-l.html>).

The 35 U.S.C. 101 patent law has been the subject of numerous groundbreaking court cases and the foundation of the change in patents in the areas of biotechnology, software and business methods. The definition of what is “process, machine, manufacture, or composition of matter” has been at the heart of the debate.

Novelty –35 U.S.C. 102

35 U.S.C. Section 102 contains the conditions for patentability including novelty and loss of right to patent. It states six conditions necessary to demonstrate that the applicant was the first to create an invention. The patent office will cite prior “useful art”, including other patents, articles or other written material to argue whether or not an invention is novel.

Obviousness - 35 U.S.C. 103

35 U.S.C. Section 103 extends 102 to say that two different prior art references could be combined to make a rejection if it is “obvious” that they could be used together.

Enablement - 35 U.S.C. 112-a

35 U.S.C. Section 112 item (a) requires that someone “skilled in the art” should be able to produce the same invention according to the patent specification.

Court Debates

Most court cases (or board of appeal cases) involving validity of a patent (or application) typically relate to 35 U.S.C. 102 and 35 U.S.C. 103 - is the patent application novel or new combination as described in these sections of the law. Typically firms are arguing in court that the invention is not novel and provide evidence that the invention is the same as something that already existed or is known.

It is rare for a firm to concede that the invention is novel but it is not patentable subject matter under 35 U.S.C. 101. Since 35 U.S.C. 101 is very broad to include “a process, machine, manufacture, or composition of matter” arguing this is very rare and difficult to win. The debate over 35 U.S.C. 101 is rare and is most notably seen in new areas of patent art such as the historical examples of biotechnology, software and business methods.

History of Court Cases Involving 35 U.S.C. 101

The framework rationale for this dissertation derives from a change in the U.S. patent reform from case law and provides a rich opportunity for research and a window of opportunity to explore the very basic question of, “What impact does patent protection have on society?”

There are a number of cases that have had a profound impact in the area of business method patents. The fundamental case that most profoundly affected business method patentability specifically under 35 U.S.C. 101 are described below based on the State Street Case (149 F.3d 1368). Other cases that have also addressed 35 U.S.C. 101 issues are Bilski (545 F.3d 943, 2008) which was later affirmed by Supreme Court with Bilski v. Kappos (130 S.Ct. 3218, 2010).

All of these cases will be reviewed to provide a historical perspective of business method patents from the court decisions based on the case law.

Rapid Growth of Business Method Patents

Business method patents experienced enormous and rapid growth in 1998 subsequent to the State Street Case (149 F.3d 1368, 1998) ruling. On the chart (Figure 1) the number of business method patents granted each year show the growth that happened and continued with the Bilski Court Case. That growth is at the heart of this dissertation to understand what companies filed these patent applications and what the larger effects or impacts of business method patents were and continue to be on society.

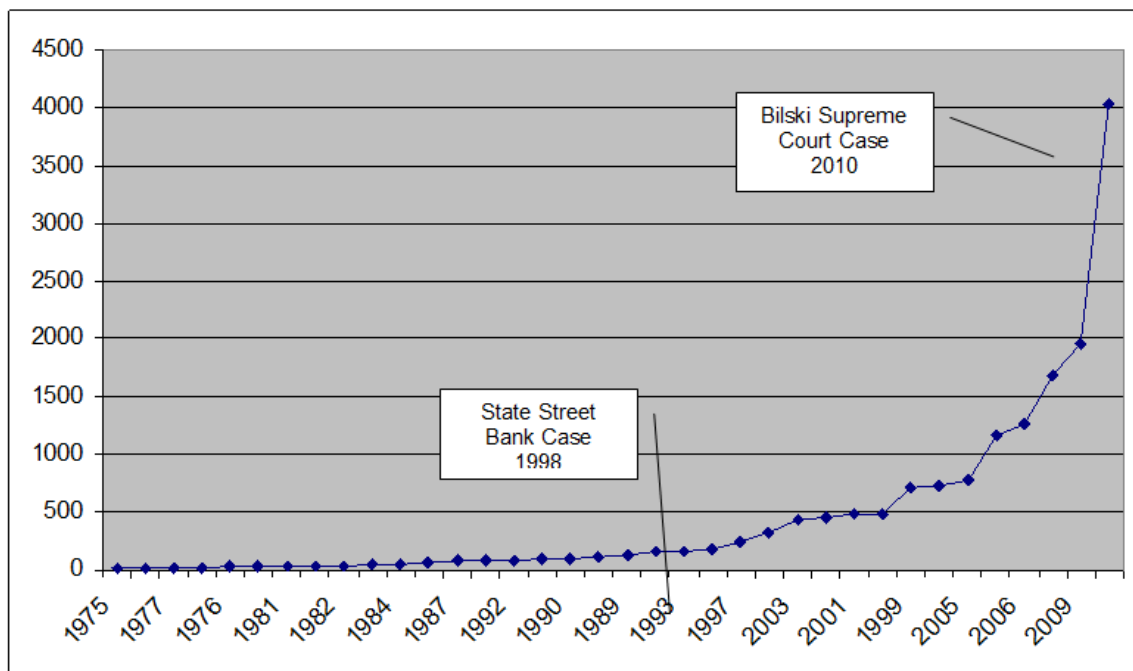


Figure 1 Growth of Business Method Patents since State Street Case

State Street Court Case

Based on a 1908 court hearing regarding a “business methods exception,” many judges and lawyers assumed and argued that business methods were not patentable (Learner 2002). However, since then the Patent Office has awarded a small number of business method patents, but none were ever litigated. This changed after the July 1998 appellate decision of State Street bank versus Signature Financial Group. The patent by Signature Financial Group Inc. contained a method for a software program to calculate the share price of a mutual fund (patent 5,193,056). State Street sued to have the patent invalidated since it contained a “business method.” It was first heard at the U.S. District Court in Massachusetts (927 F.Supp. 502, 1996) and finally at the U.S. Court of Appeals, Federal Circuit (149 F.3d 1368, 1998). The federal circuit court rejected the notion of a “business methods exception” and the Supreme Court refused to hear the case in January 1999. The result of the State Street Case (149 F.3d 1368, 1998) is that applications for patents on business methods dramatically increased at the USPTO.



[54] DATA PROCESSING SYSTEM FOR HUB AND SPOKE FINANCIAL SERVICES CONFIGURATION

[73] Assignor: Signature Financial Group Inc., Boston, Mass.

[51] Int. Cl. G06F 15/28; G06F 15/00

[52] U.S. Cl. 364-408

[53] Field of Search 364-401, 408

[56] References Cited

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Primary Examiner—Ray N. Ervill, Jr.

Assistant Examiner—David Huntley

Attorney, Agent, or Firm—Pentec & Edmonds

ABSTRACT

A data processing system is provided for monitoring and recording the information flow and data, and making all calculations, necessary for maintaining a partnership portfolio and partner fund (Hub and Spoke) financial services configuration. In particular, the data processing system makes a daily allocation of assets of two or more funds (Spoke) that are invested in a portfolio (Hub). The data processing system determines the percentage share (allocation ratio) that each fund has in the portfolio, while taking into consideration daily changes both in the value of the portfolio's investment securities and in the amount of each fund's assets. The system also calculates each fund's total investments based on the concept of a book capital account, which enables determination of a true asset value of each fund and accurate calculation of allocation ratios between the funds. The data processing system also tracks all the relevant data, determined on a daily basis for the portfolio and each fund, so that aggregate year-end data can be determined for accounting and for tax purposes for the portfolio and for each fund.

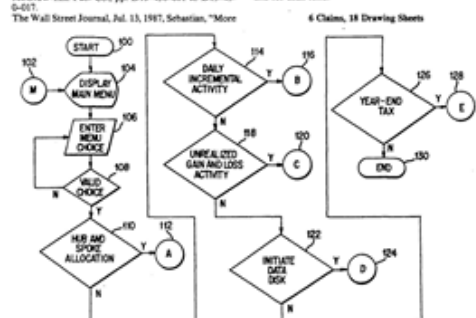


Figure 2 State Street Patent 5,193,056

Bilski Court Cases

Bilski a series of court cases with the final one being heard by the U.S. Supreme Court (130 S.Ct. 3218, 2010).

Bilski was concerned with patent eligibility with respect to 35 U.S.C. Section 101, (patent eligibility) while many cases are related instead to novelty under 35 U.S.C. sections 102 or 103.

The Bilski case, like State Street, was related to patent application 08/833,892 titled "energy risk management method" which consisted of a financial process, i.e.,

PORTFOLIO (HUB)		
	\$ AMOUNT	BASIS POINTS
AVERAGE ASSETS	250,000,000	
EXPENSE TYPE		
INVESTMENT ADVISORY FEE	500,000	0.20%
ADMINISTRATIVE FEES	125,000	0.05%
CUSTODY FEES	60,000	0.02%
CUSTODY TRANSACTION FEES	15,000	0.01%
PORTFOLIO ACCOUNTING	45,000	0.02%
LEGAL	10,000	0.01%
AUDIT	30,000	0.01%
TRUSTEES FEES AND EXPENSES	24,000	0.01%
MISCELLANEOUS	8,500	0.00%
TOTAL EXPENSES	826,100	0.33%

FIG.3

financial business method patent, that, “claimed invention that explains how commodities buyers and sellers in the energy market can protect, or hedge, against the risk of price changes.” (545 F.3d 943, 2008)

Initially the Bilski case was argued at the U.S. Court of Appeals, Federal Circuit (545 F.3d 943, 2008) where Bilski argued “that the examiner erroneously rejected the claims as not directed to patent-eligible subject matter under 35 U.S.C. § 101” and that the USPTO through the Board of Appeals sided with the examiner and upholding the rejection.

The final verdict in the most recent Bilski versus Kappos (130 S.Ct. 3218, 2010) decision by the U.S. Supreme Court which validated that “a business method is simply one kind of ‘method’ that is, at least in some circumstances, eligible for patenting under 101.” These types of patents are not a special exception to general practice, but instead are commonly sought by companies both inside and outside the financial services sector. Increasingly companies throughout the economy are using these patents to protect their innovations and to support their corporate strategies.

Conclusion

The evidence indicates there has been an exponential increase in business method patents following the groundbreaking State Street case (149 F.3d 1368, 1998) confirming that “business method” patents are valid under 35 U.S.C 101, patent eligibility. This was confirmed in additional cases including a Supreme Court case of Bilski versus Kappos (130 S.Ct. 3218, 2010). A business method patent for the remainder of this study is

defined as USPTO class 705 but it is important to understand that process claims can be contained in patents in other UPSTO classifications categories.

CHAPTER THREE: FIRM OVERVIEW -- WHO IS PATENTING BUSINESS METHODS?

Introduction

In 1998, a U.S. appeals court decided in the *State Street Bank versus Signature Financial Group* case (149 F.3d 1368, 1998) that U.S. patent protection extended to so-called “business methods.” While patenting in such business methods has subsequently grown exponentially at the U.S. Patent & Trademark Office (USPTO), there are still many misperceptions and myths about what “business method patents” are and what firms have them. In this chapter these misperceptions and myths are examined and their factual base is clarified. This chapter describes the scale and scope of those businesses that are filing business methods patents and examines the many remaining misperceptions and myths about these patents.

Definition of Business Method Patents

This study will use the USPTO classification system to determine business method patents. A review and assessment of classification 705 and all subclasses will be conducted to determine which patents can reasonably be defined as “business methods”. To test the dataset a keyword search was conducted to validate business methods within 705. In addition, a historical review of the USPTO classification system was explored to

ensure that there were no other major changes that would impact the study dates of 1985-2011.

All patents are classified under a main classification heading and multiple secondary classification headings (Allison and Hunter 2006). The main or primary classification heading was used in this study as it is determined to be the primary area which the claims of a patent are determined to match the classification definition. Determining the correct classification is a rigorous task conducted on every patent at the USPTO. Both machine pre-screening based on key words and multiple levels of patent examiner reviews are done to ensure a patent is placed in the correct main classification.

Business method USPTO class 705 contains many different processes that a business may employ and could include finance, marketing or operations and the use of different subclasses under class 705. These included both processes that may be used by a firm such as, for example, a back-office process of payroll transactions to a process directly involved with an end user such as a location based cell phone advertising application. While business methods is only one class in the USPTO classification system an examination of how that subclass is defined shows that it could involve firms from a number of different industries (Table 2).

Below is a listing of the sub-classification system at the USPTO in classification 705:

Table 2 Subclass in Business Method UPSTO Class 705

705: 1.1 Automated electronic financial or business practice or management arrangement
705: 2-3 Health care management (e.g., record management, ICDA billing)
705: 4 Insurance (e.g., co writing insurance policy, processing insurance claim, etc.)
705: 5-6 Reservation, check-in, or booking display for reserved space
705: 7 Operations research
705: 12 Voting or election arrangement
705: 13 Transportation facility access (e.g., fare, toll, parking)
705: 14.1- 14.73 Discount or incentive (e.g., coupon, rebate, offer, upsale, etc.) - marketing
705: 15 - 25 Restaurant or bar
705: 26 - 27 Electronic shopping (e.g., remote ordering)
705: 28 - 29 Inventory management
705: 30 - 34 Accounting
705: 35 - 45 Finance (e.g., banking, investment or credit)
705: 50 BUSINESS PROCESSING USING CRYPTOGRAPHY
705: 80 ELECTRONIC NEGOTIATION - auction
705: 300-348 Collaborative creation of a product or a service
705: 400 – 418 FOR COST/PRICE
705: 500 MISCELLANEOUS
705: 901-912 DIGITAL RIGHTS MANAGEMENT

Financial Business Method Patents

Both State Street and Bilski were directed to a patent that was related to a financial product. Therefore many times discussion of business method patents are limited to patents related to financial products and processes (Lerner 2002). It is important to note that financial products are just one subcategory within business method patents and the result of the State Street decision impacted all of class 705, not just patents related to financial products. Understanding the extent to which business method

patents are held by different industries including financial services firms will be investigated in chapters three and four. All firms will be used in the regression model in chapter five and not limited to only finance firms

Product versus Process Claims Regarding Business Method Patents

Business Methods class 705 in the USPTO classification system is not the only classification that a method or process can be assigned. The content of the claims made in a patent application is what determines where it is classified. The preamble or beginning of the independent claims describes the type of claim such as “A computer readable product... comprising” or a “A system... comprising” or “A method of... comprising”. If the independent claim is directed to a process, it will typically start with “a method... comprising.”

For example Patent 7,701,355 from USAA titled “Extended smoke alarm system” has the following independent claims (Billman 2010, p13-14):

1. A system comprising: a smoke detector comprising a first computing system, in a home or other building, supporting at least wireless-signal-sending functionality; a hand-held flashlight having at least wireless-signal-receiving functionality; a first offsite device comprising a second computing system; and an second offsite device comprising a third computing system, wherein the first computing system detects smoke or fire within the home or other building and transmits a wireless activation signal that is received by the hand-held flashlight and thereby activates a light beam projection from the hand-held flashlight, transmits data on smoke or fire status of the home or other building from the some detector to the first offsite device associated with an emergency responder, and transmits the data on the smoke or fire status from the smoke detector to a second offsite device associated with an insurance company.

5. A method comprising: detecting smoke or fire near a smoke detector located in a home or other building; transmitting a wireless activation signal from the smoke detector to a hand-held flashlight based on the detecting; receiving the wireless activation signal at the hand-held flashlight; activating a light beam projection from the hand-held flashlight based on the receiving of the wireless activation signal; transmitting data on smoke or fire status of the home or other

building from the smoke detector to a first offsite device associated with an emergency responder; and transmitting the data on the smoke or fire status of the home or other building from the smoke detector to a second offsite device associated with an insurance company.

Claim 1 and Claim 5 have similar content but different preambles; one about a system and the other about a method are, however, considered parallel claims. It is important to note that this patent is in classification 340 (communication, electrical²) and not a classification 705 (business method patent). In other words not all process or method claims are classified in class 705 business method patents. Conversely, business method patents (as defined as those classified in 705) are not only process claims, they also can have product claims such as “a system comprising... ”.

Data Collection

The data used in this study was collected from the United States Patent and Trademark Office (USPTO) using the Patent Bibliographic Data Extract DVD³ including all patents in class 705 from 1985-2011. Class 705 is titled “Business Methods”⁴ which is examined in further detail below. For the study period there were 20,500 patents granted to 7,395 firms. These firms were then ranked in terms of the number of patents. The analysis of this distribution is presented below.

Results: Top 100 firm analysis

The most interesting of the group are the firms which contained the largest number of patents therefore a more detailed review of the top 100 firm will be discussed.

² <http://www.uspto.gov/web/patents/classification/selectnumwithtitle.htm>

³ Patent Bibliographic Data Extract DVD description and purchasing details the USPTO at: http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/misc/data_cd.doc/custom_extract_dvd/

⁴ All USPTO classification can be found at their web site: <http://www.uspto.gov/web/patents/classification/>

Below are the results of the top 100 firms contained a cross-section of non-homogenous firms in terms of their industry classification.

Table 3 Top 100 Firms in Business Methods

Fin. Rank	BusM Rank	Company Name	BusM Patents	All Patents	SIC code
	1	INTERNATIONAL BUSINESS MACHINES CORPORATION	895	63324	
	2	PITNEY-BOWES, INC.	487	2244	
	3	MICROSOFT CORPORATION	232	16539	
	4	FUJITSU LIMITED	219	22817	
	5	TRADING TECHNOLOGIES INTERNATIONAL, INC.	189	9	
	6	SONY CORPORATION	178	29667	
	7	NCR CORPORATION	170	3077	
	8	HITACHI, LTD	166	33778	
	9	SAP AKTIENGESELLSCHAFT	151	1395	
1	10	JP MORGAN CHASE BANK, N.A.	140	99	60, Dep. Inst.
	11	HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P.	133	12847	
2	12	AMERICAN EXPRESS TRAVEL, INC.	128	249	61, Non-Dep. Inst.
	13	WALKER DIGITAL, LLC	125	300	
	14	FIRST DATA CORPORATION	112	211	
	15	I2 TECHNOLOGIES US, INC.	93	93	
	16	MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.	81	27694	
	17	AMAZON TECHNOLOGIES, INC.	79	132	
	18	ORACLE INTERNATIONAL CORPORATION	75	1270	
	19	AT&T CORP.	72	13217	
	20	AMAZON.COM, INC.	70	45	
	21	EBAY INC.	69	79	
	22	AT& T INTELLECTUAL PROPERTY I, L.P.	69	977	
3	23	GOLDMAN, SACHS & CO.	69	16	62, Securities
	24	SHARP KABUSHIKI KAISHA (SHARP CORPORATION)	67	13685	
	25	ACCENTURE GLOBAL SERVICES GMBH	67	136	
	26	DIEBOLD INCORPORATED	66	335	
4	27	CITIBANK N.A.	65	55	60, Dep. Inst.
	28	INTUIT, INC.	63	67	
	29	CONTENTGUARD HOLDINGS, INC.	62	28	
	30	TOSHIBA CORPORATION	61	33366	
	31	GENERAL ELECTRIC COMPANY	59	31367	
	32	FRANCOTYP-POSTALIA AG & CO. KG	53	190	
	33	CANON KABUSHIKI KAISHA	53	42310	
5	34	MORGAN STANLEY	52	14	62, Securities
6	35	BGC PARTNERS, INC.	52	10	62, Securities
	36	ACCENTURE LLP	50	152	
	37	RICOH COMPANY, LTD.	47	12545	
	38	XEROX CORPORATION	44	16829	
	39	INTEL CORPORATION	43	19574	
	40	ELECTRONIC DATA SYSTEMS CORPORATION	43	228	
	41	SIEMENS AKTIENGESELLSCHAFT	43	20020	
	42	CHECKFREE CORPORATION	42	10	
	43	OMRON TETEISI ELECTRONICS CO.	42	551	
	44	NOKIA CORPORATION	41	5145	
	45	UNITED PARCEL SERVICE OF AMERICA, INC.	41	244	
	46	YAHOO, INC.	41	594	
7	47	UNITED SERVICES AUTOMOBILE ASSOCIATION (USAA)	40	51	63, Insurance
	48	SUN MICROSYSTEMS, INC.	39	7621	
	49	STAMPS.COM INC.	39	28	
	50	EASTMAN KODAK COMPANY	38	19684	

	51	LUCENT TECHNOLOGIES INC.	37	9356	
	52	NEC CORPORATION	37	23693	
	53	VISA INTERNATIONAL SERVICE ASSOCIATION	36	49	Misc.
	54	GENERAL ELECTRIC CAPITAL CORPORATION	35	23	
8	55	FANNIE MAE	35	9	61, Non-Dep. Inst.
	56	HEALTH HERO NETWORK, INC.	34	57	
	57	COMPUTER SCIENCES CORPORATION	34	30	
	58	CASIO COMPUTER CO. LTD.	33	2750	
	59	FORD MOTOR COMPANY	33	5297	
	60	GOOGLE, INC.	32	528	
	61	ARIBA, INC.	32	5	
	62	VISA U.S.A., INC.	32	70	
	63	FAIR ISAAC CORPORATION	31	35	
9	64	CAPITAL ONE FINANCIAL CORPORATION	31	51	61, Non-Dep. Inst.
10	65	FEDERAL HOME LOAN MORTGAGE CORP.	30	4	61, Non-Dep. Inst.
11	66	CHICAGO MERCANTILE EXCHANGE, INC.	29	3	62, Securities
	67	BOEING COMPANY	28	7360	
	68	TERADATA US, INC.	27	90	
	69	AOL LLC	26	484	
	70	SILVERBROOK RESEARCH PTY. LTD	26	3648	
	71	NEOPOST LIMITED	25	47	
	72	SIEBEL SYSTEMS, INC.	25	176	
	73	USA TECHNOLOGIES, INC.	25	42	
12	74	MASTERCARD INTERNATIONAL, INC.	25	61	60, Dep. Inst.
	75	SPRINT COMMUNICATIONS COMPANY L.P.	25	990	
	76	MOTOROLA, INC.	25	20415	
	77	TOKYO ELECTRIC CO., LTD.	25	463	
13	78	BANK OF AMERICA CORPORATION	25	64	60, Dep. Inst.
	79	WESTERN UNION COMPANY	24	15	
	80	PANASONIC CORPORATION	24	4737	
	81	CFPH, L.L.C.	23	27	
14	82	THE NASDAQ OMX GROUP, INC.	23	0	62, Securities
	83	PRICELINE.COM INC.	23	4	
	84	CATALINA MARKETING INTERNATIONAL, INC.	23	2	
	85	SEIKO EPSON CORPORATION	22	12862	
	86	HONDA MOTOR CO., LTD.	22	14453	
	87	CISCO TECHNOLOGY, INC.	22	5804	
	88	INTERTRUST TECHNOLOGIES CORP.	21	82	
	89	SYMBOL TECHNOLOGIES, INC.	21	1404	
	90	DELL PRODUCTS, L.P.	21	2096	
15	91	HARTFORD FIRE INSURANCE COMPANY, INC.	21	4	63, Insurance
	92	HEWLETT-PACKARD COMPANY	20	9701	
	93	MEDCO HEALTH SOLUTIONS, INC.	19	18	
	94	BELLSOUTH INTELLECTUAL PROPERTY CORPORATION	19	997	
	95	NIPPON TELEGRAPH & TELEPHONE CORP.	19	1826	
	96	VERI-FONE, INC.	18	58	
	97	NORTEL NETWORKS LIMITED	18	3970	
	98	WALKER ASSET MANAGEMENT LIMITED PARTNERSHIP	18	25	
16	99	CITICORP DEVELOPMENT CENTER, INC.	18	44	60, Dep. Inst.
	100	UNISYS CORPORATION	18		
		TOTAL - Financial Services	783	734	
		TOTAL - All	6650	588847	

Results of Top 100 Firm

The overall results of the top 100 firms holding business method patents show the presence of a number of traditional patent firms such as IBM, Microsoft and Sony. All of the names are large and well known firms.

In addition to ranking the firms by the number of business method patents held, an additional variable of non-business method patents held was employed to examine the overall patent strategy of firms. A non-business method patent was any patent held by the firm that was classified in any areas other than USPTO class 705, business methods. The non-business method patents was as large as 63,324 for IBM and as small as 2 for Catalina. The results showed that all firms involved in business method patenting also were patenting in non-business method areas. The amount of this effort differed greatly between companies. One explanation may be that the top firms in business method patents already have a organizational capacity for patenting in general and are most successful in filing and obtain patents in the new area of business methods.

Business Method Myths

The results of the above analysis can be used to examine popular myths that are often held by patent analysts and observers.

Myth 1: A Business Method Patent is a “Special” Type of Patent

A business method patent is a type of utility patent relating to a “method” for a business process such as payments, banking, advertising or logistics, which frequently has parallel apparatus or systems elements as well. The State Street decision (149 F.3d 1368, 1998, p8), by the U.S. Supreme Court allowing as patentable “anything under the sun that is made by man,” held that business methods were not exempt from patentable

subject matter, so long as they met the other requirements of patentability such as novelty, utility, and non-obviousness. While the term “business method patent” is a common expression used in the popular and scholarly literature (Schwartz 2010; Allison and Tiller 2002), legally the application is treated no differently than any other type of standard utility patent. Accordingly, these applications have the same legal and regulatory treatment as a new chemical molecule, a new machine, or a new manufacturing process.

The State Street case did not change existing law – it merely interpreted it different than in the past. Over 50 years ago the U.S. Congress declared that patentable subject matter extends to “any new and useful process, machine, manufacture, or composition of matter,” and the State Street court found that an invention, a business method used to calculate a stock price, was a “useful process” under that language (Lerner 2002).

In conclusion, business method patents are not a “special” type of patent. The subject matter of these patents – methods of doing business – is permissible as a “useful process” under U.S. law, but like any invention must meet the other requirements of patentability (such as utility, novelty, and non-obviousness) to be granted by the USPTO.

Myth 2: Business Method Patents are Sought Mainly by Financial Services Firms

While previous research had suggested a relationship between financial services firms and business method patenting (Lerner 2002, Hall 2009), more recent analysis shows that less than 10% of business method patents (as defined by class 705) are sought by financial services firms (Hunt 2010). To investigate whether business methods are

held primarily by financial services companies the top 100 firms and their respective industries is evaluated. In the USPTO technology classification system, business method inventions are commonly assigned to class 705. Business method patents related to financial processes are classified in class 705 subclasses 35-45, while other key areas include marketing in subclasses 14.1-14.73, logistics in subclasses 7.11-12 and health care (including health care insurance) in subclasses 2-4.

By collecting data from USPTO records, the top 100 company assignees of patents (by number) in class 705 through December, 2010 were identified. Using Compustat financial data to match these companies to their Standard Industrial Classification (SIC) code, we found that only 16 of the 100 were classified in the two-digit SIC “FIRE” (Financial Services, Insurance or Real Estate) category.

We found that none of the top three business-method patenting companies are financial services firms. IBM (1st) had the most with 895 patents, followed by Pitney-Bowes (2nd) with 487 patents, followed by Microsoft (3rd) with 232 patents. The highest ranked “FIRE” company is 10th in the list: JP Morgan which was assigned 140 business method patents through 2010. The balance of the top 100 list includes some “FIRE” companies, but also a widely distributed mix of internet companies (such as Amazon, eBay, and Yahoo!), telecommunications firms (such as AT&T, Sprint, and Motorola), consulting services (such as Accenture), and traditional manufacturing companies (such as General Electric, Xerox, Boeing, Honda, and Hewlett-Packard).

So while financial services firms are engaged in business method patenting, the “FIRE” industry does not dominate this area. Furthermore, when we examine the sixteen

“FIRE” companies that are listed in the top 100 patenting, we see that the types of businesses represented are mixed. Among these are five depositary institutions, four non-depositary institutions, five securities and commodity brokerage firms, and five insurance companies (see Table 1).

In conclusion, business method patents are not sought primarily by financial services firms. Only a small portion (approximately 10%) of business method patents are being sought by “FIRE” companies, with the remainder being demanded by a wide variety of industries. So the myth that they are sought primarily by financial services firms is not supported.

Myth 3: Financial Services Firms are Filing Business Method Patents Exclusively

There is a widely held perception that patenting by financial services companies began with the State Street case (149 F.3d 1368, 1998) and that all patenting activity by these companies occurs in business method patenting. However, our analysis of the 16 financial services companies listed in Table 1 demonstrates that patenting by these companies in class 705 (business methods) totals 783 while all other patenting (outside of class 705) totals 734. So, less than 50% of patenting in these “FIRE” companies is distributed among other technology classes.

For some companies business methods patenting began much earlier than 1998. For instance, Citibank was granted a patent on a system for automated data and entry and display in 1978, while MasterCard was issued a patent on a security system for electronic funds transfer in 1983. Clearly, financial services companies have been engaged in the patenting of inventions before business methods were declared patentable subject matter

in State Street, and continue today in technologies outside of the “business method” subject matters.

It is likely that many of the patents classified outside of class 705 are not business methods, but others may be. While most researchers, including this one, rely upon class 705 as a convenient definition for “business method patents,” inventions disclosing methods of doing business are routinely classified in related classes such as “telecommunication - billing” (class 455/406) and “database - data structure management,” among others. Thus, patents assigned to class 705 are not necessarily the universe of “business method” patents, and a precise census of the universe of such patents would require the use of different methods such as bibliographic analysis of the claim language (Hunt and Bessen 2007).

As a result, financial services companies do not appear to be restricting themselves to patenting in business-method subjects, and in fact were patenting related processes prior to the State Street decision. Many of these companies continue to innovate in technologies, methods, and service offerings and approximately one half of the patents they have sought over time are in fields outside of the “business method” patent classification at the USPTO. So this myth has little supporting evidence.

Myth 4: Business Method Patents are Held by Non-Traditional Firms

In traditional or mature sectors such as automotive all of the major firms are patenting at some level. The level of patent activity may vary depending on the year and from firm to firm depending on factors such as firm size, age, or strategy; but in mature businesses with tangible products all competitors have some level of a patent portfolio.

Examining case studies on the firm level the reality appears to be very different than this more general description. Non-traditional patenting firms appear to make a strategic decision to either patent or not patent. It also seems reasonable to assume that a traditional firm like IBM was heavily into patenting in the past and will continue to be heavy into patenting following the 1998 State Street Supreme Court decision (149 F.3d 1368, 1998). IBM has the internal infrastructure to easily expand into patenting innovations classified under business methods.

Non-traditional firms such as financial services firms that believed themselves ineligible to patent pre-1998 State Street Supreme Court decision (149 F.3d 1368, 1998) would have to have created a whole new internal infrastructure to initiating these patents. This infrastructure could include hiring internal or external patent attorneys and training employees to understand and identify newly created business methods to patent.

To further investigate the approach of the non-traditional firms, two homogenous financial services firm cases are investigated which had very different patenting strategies.

Case Study: USAA and Navy Federal

The first case study firm is USAA. USAA⁵ is a financial services firm that was created 1922 and serves the military community with financial products such as insurance, retail banking, such as checking accounts and financial investment products such as mutual funds. USAA is seventh largest financial services firm and number 47 out of the top 100 firm holding business method patents. USAA has made a strategic

⁵ <http://www.usaa.com/>

decision to aggressively seek out business method patents given the relatively large number of business methods patents it holds.

Navy Federal is also a financial services firm which was created in 1933. It focuses on the insurance, banking and investment products of its military customers. Most would consider Navy Federal and USAA to be very similar firms and relatively homogenous in size, customers, products and market. Navy Federal is not listed in the top 100 firms for business method patents. As a matter of fact, in extensive research by a patent examiner it appears that Navy Federal has never applied for any patent from the USPTO. It appears that Navy Federal has made a strategic decision or otherwise is constrained or unaware and is choosing not to patent any of their business method innovations.

In summary, USAA and Navy Federal are two very similar firms with two very different business method patenting results. These cases suggest that business method patenting strategy will vary considerably among different firms in general and in particular among financial services firms.

Conclusion: The Future of Business Method Patents

The recent Bilski versus Kappos decision by the U.S. Supreme Court validated that “a business method is simply one kind of ‘method’ that is, at least in some circumstances, eligible for patenting under 101.” These types of patents are not a special exception to general practice, but instead are commonly sought by companies both inside and outside the financial services sector. Increasingly companies throughout the economy

are using these patents to protect their innovations and to support their corporate strategies.

This chapter also uncovered four myths common to business method patents by investigating the top 100 firms and their industries. In particular it was found that business method patents are not a special type of patent, business method patents are not just sought by financial firms and primarily held by traditional, large, well known firms. Also finance firms are not get obtaining business method patents but they are obtaining utility patents in areas outside of the business method classification.

CHAPTER FOUR – INDUSTRY OVERVIEW, WHAT INDUSTRIES HOLD BUSINESS METHOD PATENTS?

Introduction

The intent of this chapter is to investigate the industry break-down of business method firms using descriptive statistics. The results show that it is a non-homogenous group of firms from different industries that have been employing business methods as a strategy for their firms.

Data Collection

The data used in this study started with the 1985-2011, class 705 (business methods) collected from Patent Extracts DVD set from the USPTO. This dataset was merged with the Compustat database in order to determine the SIC code for every firm. This dataset was then used to analyze the types and industries of the various firms holding business method patents.

Organizational Type Breakdown

The USPTO classifies all assignees or firms who own patents into distinct categories including: unassigned, U.S. organization, foreign organization, U.S. government or foreign government. Unassigned patents are those that are not yet assigned to a company and currently only in the investors' name. There are various reasons that a patent could be unassigned, it could be from an inventor that does not work for a company or has not yet established a company. It could also be that the firm has not

yet assigned the patent rights to the firm. Thirty six percent 36% of all business methods for the study period or 2,679 patents are unassigned. The largest category of business method patents are U.S. organizations, predominantly U.S. corporations, and also organizations such as small businesses, nonprofit organizations, universities, etc⁶. 3,820 U.S. organizations or 52% have business method patents. The remaining significant category is for foreign organizations, which include all corporations, non-profits and universities not headquartered in the U.S. There are 874 foreign organizations or 12% of the organizations that hold business method patents in the dataset.

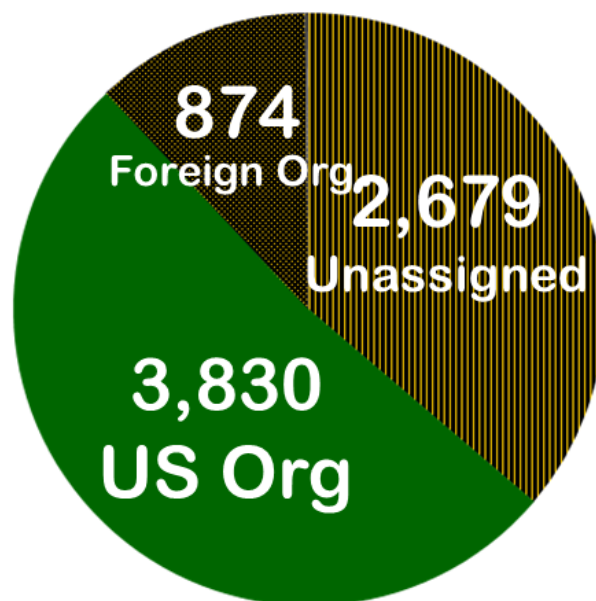


Figure 2 Organization Type for Business Method Patent Breakdown (1985-2011)

⁶ See Basic Bib file in Patent Bibliographic Data Extract DVD:
http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/misc/data_cd.doc/custom_extract_dvd/

Table 4 Organization Type for Business Method Patent Compared to All Patents (1985-2011)

	All Patents		Bus Method Patents	
1: unassigned	725,517	72%	2,679	36%
2 : US org	148,678	15%	3,830	52%
3: foreign org	127,703	13%	874	12%
6 : US Gov	38	0.00%	9	0.12%
7: foreign Gov	326	0.03%	3	0.04%
	1,002,262		7,395	

It is important to note that all the assignment data used for this study is the assignee at the time the patent was granted and does not take into consideration any patents that have been sold or otherwise transferred.

Organization Type Conclusion

It is reasonable to assume that U.S. corporations are the largest group of firms patenting business method patents. This is similar to patenting activity in general that U.S. firms hold the majority of all patents in the U.S. Consequently, the next analysis will only examine U.S. firm data to understand the industry composition of these U.S. firms.

Industry Breakdown

Data and Related Constraints

All 3,830 U.S. firms were used to examine the organization type breakdown. However, due to Compustat data constraints described below fewer firms will be used for the industry analysis. To analyze the industry structure of the distribution of business methods patents, each firm was assigned an industry code using Compustat. Because

Compustat does not have an exhaustive list of all firms in the U.S., it was not possible to match all firms to an industry code. In particular, Compustat only contains publicly traded companies; therefore, a small or medium sized business that has not had an initial public offering of traded stock is not listed in Compustat and therefore, is not included in the analysis.

Background on SIC classification

The Standard Industrial Classification (abbreviated SIC) is a system for classifying industries by a four-digit code. Established in the United States in 1937, it is used by government agencies such as the U.S. Securities and Exchange Commission (SEC) to classify industry areas.

The SIC codes are grouped into different levels of industry classifications including: divisions, major groups and industry groups. The divisions are the highest level and are denoted by letters, the first two digits indicate the major group, followed by 3 digits of the SIC code which indicate the industry group.⁷

A second classification system, NAICS codes is also investigated in the data analysis and will be discussed in the SIC versus North American Industry Classification System (NAICS) classification system later in this chapter in more detail.

Industry Top Level Results – SIC Division Level

Definition of SIC Division Level

⁷ http://en.wikipedia.org/wiki/SIC_codes

The first level of analysis using the SIC codes⁸ is at the highest level of aggregation which is known as the division level. This level is employed to obtain a broad overview of the distribution of the industry for the firms holding business method patents. The division level contains a letter classification and is made up of the following ten divisions:

Division A: Agriculture, Forestry, and Fishing

Division B: Mining

Division C: Construction

Division D: Manufacturing

Division E: Transportation, Communications, Electric, Gas, And Sanitary

Services

Division F: Wholesale Trade

Division G: Retail Trade

Division H: Finance, Insurance, and Real Estate

Division I: Services

Division J: Public Administration

Results of Industry Division Breakdown

In the USPTO classification system, the majority of firms typically are contained within the same division level of the SIC classification system, or that the majority of firms patenting a particular USPTO classification are homogenous in nature. This is not true for business method patents as shown in the previous chapter. The top four industry

⁸ All SIC code classification including the division level can be found at:
https://www.osha.gov/pls/imis/sic_manual.html

divisions in terms of business method patents include manufacturing, services, finance (including: finance, insurance, and real estate) and communications (including: transportation, communications, electric, gas, and sanitary services). These divisions make up 91% of all firms holding business method patents in this study.

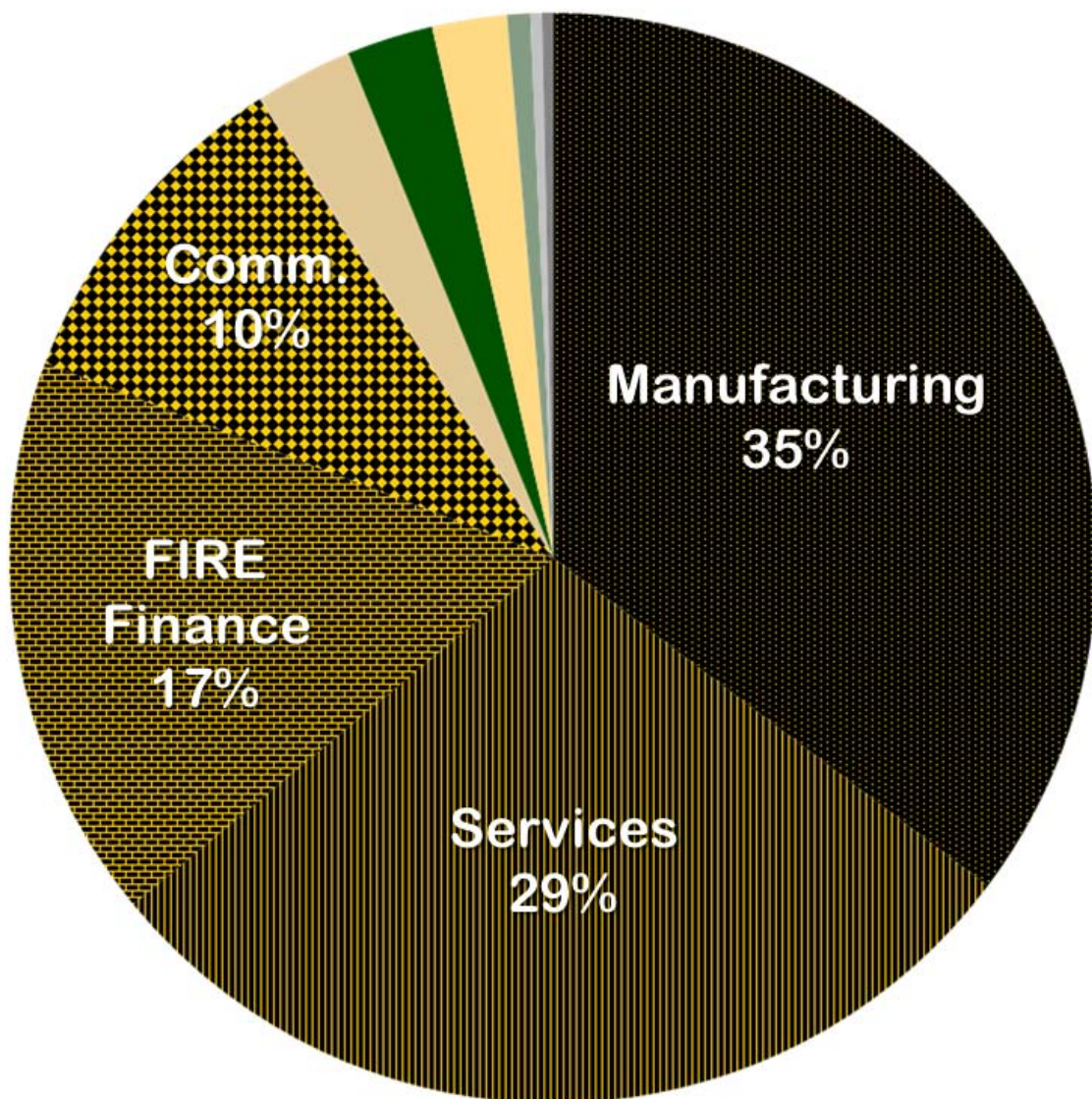


Figure 3 SIC Industry Division for Business Method Patent Breakdown⁹

Manufacturing firms have a long history of patenting and maybe described as traditional firms that patent. Service, finance and communication firms for the most part less-traditional and also newer to patenting.

Some assume financial services firms to be the majority of firms that are holding business method patents (Learner 2002). The results from the previous chapter show that although there are a number of financial firms that hold business method patents these firms are not the predominate ones in this industry group as traditional manufacturing firms are the largest number. Perhaps this is because manufacturing firms already had in-house patenting systems in place at the time of the State Street decision and could easily adapt and take advantage of the newly created opportunity of business method patents; or perhaps it was a strategic decision to more heavily focus on this area. Regardless of the reason, the results are clear - traditional manufacturing firms are the largest industry group holding business method patents.

NAICS versus SIC classification system

North American Industry Classification System (NAICS) codes are a different industry classification system than SIC. They were developed in 1997 by Census in collaboration with other agencies and governments¹⁰. Compustat continued to report the

⁹ Additional division after Comm.: Retail Trade 3%, Wholesale 3%, Mining 2%, Public Adm. 1%, Construction 0.3% and Agriculture 0.3%.

¹⁰ <http://www.census.gov/eos/www/naics/>

SIC codes after 1997 by utilizing a concordance¹¹. Therefore it was decided that for the timeframe of 1985-2011 that the SIC codes were a more appropriate and accurate measure of the industry classification and the one chosen for this dissertation. However, the major industry categories using NAICS codes were done for verification and completeness of the industry analysis. The results appeared to be similar to the SIC codes with a few minor variations. NAICS codes Manufacturing was 10% larger with NAICS Information industry being smaller than SIC Services Industry. It appears some firms moved from being classified in NAICS Manufacturing to SIC Service. The rest of the breakdowns are remarkably similar with Finance being within 2% and the remaining within 1%.

The remainder of the discussion on industry analysis in this chapter will use only the SIC code categories.

¹¹ <http://www.census.gov/eos/www/naics/concordances/concordances.html>

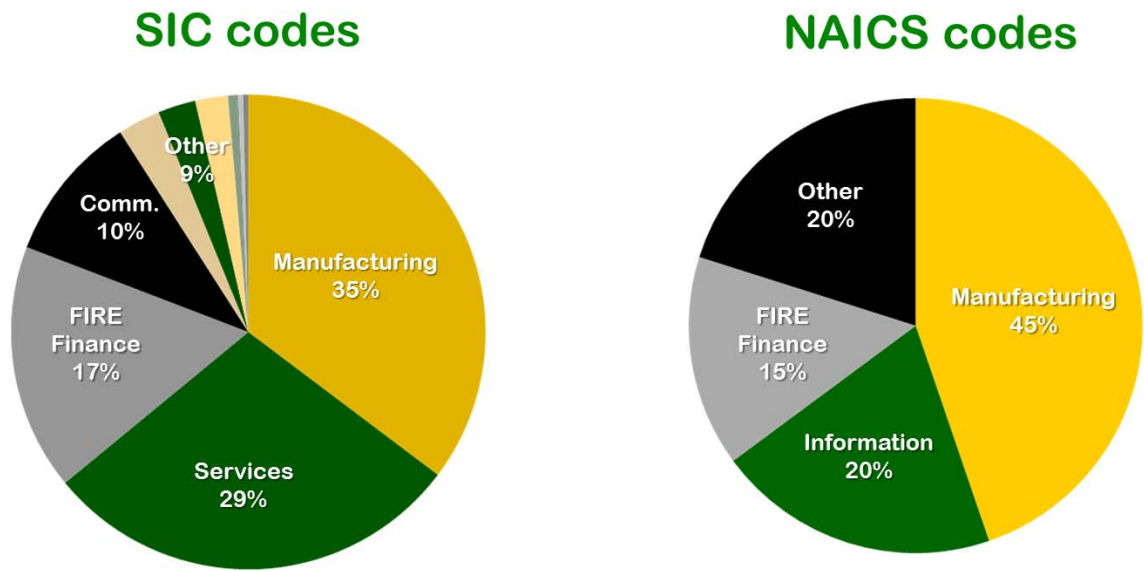


Figure 4 SIC versus NAICS Industry Level Analysis

Results of Industry Concentration

The results are even more striking when examining industry concentrations defined as the ratio in a given industry of firms with business method patents to all firms with or without business method patents. For example, if a firm holds one or more business method patents it is counted on the numerator and this is divided by the number of all firms in the industry. In other words, in the manufacturing industry 206 firms in hold business method patents and Compustat lists 786,993 as the number of all firms in division D manufacturing. The resulting industry concentration ratio for manufacturing is .000262. This number by itself is not particularly useful because it only shows that only 0.026% of manufacturing firms in the sample used for this study hold a business method patents, but when comparing that to other industries it gives a ratio of what the

industry concentration is compared to other industries. By multiplying the ratio by 1,000,000 we can treat it as an index and thus becomes somewhat easier to use to make comparisons.

The results show manufacturing with a 262 concentration index which is more concentrated than the services industry concentration index of 16. The index scores for finance and communication firms are 58 and 67, respectively. This enables a conclusion that the finance and communication firm sectors are doing more business method patenting than services but less than manufacturing which is the highest.

Table 5 Industry Concentration Index (firms with business method patents over total firms, 1985-2011)

# BM org	% BM org	Industry Title	All Org	Ind Con (BM/All)
206	35%	Manufacturing	786,993	262
168	29%	Services	10,577,481	16
98	17%	Finance, Insurance & Real Estate	1,703,725	58
59	10%	Transportation, Communications,	880,164	67
17	3%	Retail Trade	2,979,158	6
15	3%	Wholesale Trade	936,035	16
13	2%	Mining	40,167	324
4	1%	Public Administration	6,905,776	1
2	0%	Agriculture, Forestry & Fishing	879,976	23
2	0%	Construction	1,793,980	1
584			27,483,455	

Why manufacturing is the highest and finance and communication is higher than services firms as a percentage of total industry size is unclear and perhaps future qualitative techniques such as interviewing might help surface an answer. Perhaps manufacturing firms have better infrastructure, perhaps they are more technologically

patent focused, or perhaps they are more aware or have more money. Perhaps it is just good luck, but most likely all of the above.

The rest of the industries appear to have similar relative low levels of business method patents with all having lower concentrations indexes than the finance and communication category except mining. Mining has the highest concentration index score (324) of all industry sectors. The mining sector has a relatively small number of firms and appears to be concentrated within the technology savvy sub-sector and most likely has been patenting in other areas long before the rapid expansion of business method patents. Once again, pointing to the conclusion that traditional technology sectors are currently outpacing the other sectors in of the ownership of business method patents.

Industry Second Level Results – SIC Major Group, Two Digit

To this point it has been shown that business method patents are not held by a homogenous group of firms and there are four industry groups that hold the majority of business method patents. To further understand the firms and industries, each of the top four division industry groups are further examined below.

Manufacturing SIC Major Groups

Manufacturing or division D of the SIC codes has 35% of all the business method firms and a 262 industry concentration index making it the second highest concentration level of all major industries. Manufacturing is the industry with one of the highest concentrations of business method patents although the mining industry level of concentration is higher at 324. Eighty five percent of manufacturing firms are contained

in its top five sub-categories (out of the twenty possible manufacturing major codes or sub-categories), also known as two-digit SIC codes. All 20 manufacturing categories include:

Major Group 20: Food And Kindred Products

Major Group 21: Tobacco Products

Major Group 22: Textile Mill Products

Major Group 23: Apparel And Other Finished Products Made From Fabrics And Similar Materials

Major Group 24: Lumber And Wood Products, Except Furniture

Major Group 25: Furniture And Fixtures

Major Group 26: Paper And Allied Products

Major Group 27: Printing, Publishing, And Allied Industries

Major Group 28: Chemicals And Allied Products

Major Group 29: Petroleum Refining And Related Industries

Major Group 30: Rubber And Miscellaneous Plastics Products

Major Group 31: Leather And Leather Products

Major Group 32: Stone, Clay, Glass, And Concrete Products

Major Group 33: Primary Metal Industries

Major Group 34: Fabricated Metal Products, Except Machinery And Transportation Equipment

Major Group 35: Industrial And Commercial Machinery And Computer Equipment

Major Group 36: Electronic And Other Electrical Equipment And Components,
Except Computer Equipment

Major Group 37: Transportation Equipment

Major Group 38: Measuring, Analyzing, And Controlling Instruments;
Photographic, Medical And Optical Goods; Watches And Clocks

Major Group 39: Miscellaneous Manufacturing Industries

Manufacturing Industry Results

The top two major groups in manufacturing are related to electronic and computer commerce, and likely the internet in general which is include in the broader Electronics sub-sector with 30% and Computer Equipment sub-sector with 22%. These two industrial sub-sectors make up over half of the manufacturing firms and consist of firms that could be actively holding business method patents.

Table 6 Manufacturing Major Industry Group Breakdown

Manufacturing 35%			
65	30.4%	36	Electronic, Electrical Equipment & Components
47	22.0%	35	Industrial Machinery and Computer Equip.
30	14.0%	28	Chemicals and Allied Products
24	11.2%	38	Instruments; Photo/Med/Opt; Watches/Clocks
15	7.0%	37	Transportation Equipment
24	15.4%	15 more	15 more categories
214			

Manufacturing Industry Case Study Sony Corporation

To learn more about the nature of the Electronic and Computer Equipment firms and their business method patents a case study of the Sony Corporation which is in SIC code 3571 was undertaken. The results of that study are reported now.

The Sony Corporation, in SIC code 3571 is listed in the sub-sector group called “computer equipment.” It has the following business method patents:

- US Patent #6,198,906: Method and apparatus for performing broadcast operations
- US Patent #6,912,513: Copy-protecting management using a user scrambling key
- US Patent #6,963,860: Information recording and reproducing system and method and distribution

While this list does not exhaust the possibilities, it does give a flavor of the nature of the types of business method patents Sony has obtaining. Sony is a manufacturer of recording equipment and is obtaining business method patents related to the process of broadcasting and copy-protection. While manufacturing a Sony Walkman may be the primary business of Sony, creating and protecting methods supporting the physical devices is an equally important area that it are in.

It is also important to note that Sony’s primary SIC code is 3571, defined as the sub-sector or Major Group “computer equipment.” The company operates in a number of business units and areas of business. Therefore, Sony has a number of secondary SIC codes including:

3575 Computer terminals

3577 Computer peripheral equipment

3651 Household audio and video equipment

3652 Prerecorded records and tapes
3661 Telephone and telegraph apparatus
3663 Radio & TV communications equipment
3674 Semiconductors and related devices
3944 Games, toys, and children's vehicles
5045 Computers, peripherals & software
5112 Stationery and office supplies
6081 Foreign bank & branches & agencies
6311 Life insurance
6331 Fire, marine, and casualty insurance
6411 Insurance agents, brokers, & service
7812 Motion picture & video production
7822 Motion picture and tape distribution

This shows the complexity of classifying a business into one SIC code in particular for larger corporations.

Manufacturing Industry Conclusion

In conclusion, the manufacturing industry division is leading the others in the total number of business method patents has and second in concentration index. It appears from the Sony case study that these business method patents are related either to direct lines of business they are in indicated by either the primary or secondary SIC code. While this appears to be a logical to patent in a firms direct business areas this phenomena it is not the case for other industries that will be discussed below. It appears

those firms with primary SIC codes in manufacturing have an advantage or have made a strategic decision to focus on business method patents and are succeeding as the industry with the largest number of business method patents.

Service Industry Results

The service industry was the second largest division of firms that hold business method patents and include top service firms like Microsoft Corporation and IBM. The service industry has a relatively low concentration index and ranked sixth.

In investigating the next level of firm analysis, the sub-division level just below this division, i.e., Service, the results showed that the firms holding business method patents were highly concentrated in one major division known as “business services”, which has a two-digit SIC code 73 (see Table 6). Eighty nine percent of all services firms with business method patents are in the business services sub-sector with the remaining 11% distributed in small numbers in the other 14 subsectors. This high concentration in one sub-sector is very different from the results in manufacturing, communication and finance where business methods patents were spread across several different subgroups or sub-sectors.

Table 7 Service Major Industry Group Breakdown

Services 29%			
161	89%	73	Business Services
20	11%	14 more	14 more subcategories
181			

The categories in Services subdivision or sub-sectors are:

Major Group 70: Hotels, Rooming Houses, Camps, and Other Lodging Places

Major Group 72: Personal Services

Major Group 73: Business Services

Major Group 75: Automotive Repair, Services, and Parking

Major Group 76: Miscellaneous Repair Services

Major Group 78: Motion Pictures

Major Group 79: Amusement and Recreation Services

Major Group 80: Health Services

Major Group 81: Legal Services

Major Group 82: Educational Services

Major Group 83: Social Services

Major Group 84: Museums, Art Galleries, and Botanical And Zoological Gardens

Major Group 86: Membership Organizations

Major Group 87: Engineering, Accounting, Research, Management, And Related Services

Major Group 88: Private Households

Major Group 89: Miscellaneous Services

The business services sector is composed of companies that would be obtaining business method patents, since it is a patent for a novel method of conducting a business service. Many business services include subcategories of “Computer Programming,

Data Processing, and Other Computer Related Services” three-digit SIC code Industry Group 737. For example, Microsoft’s primary SIC Code is 7372 - Prepackaged Software and the other SIC Codes: 3861 - Photographic Equipment and Supplies and 3944 - Electronic Games. Also IBM’s SIC Code is 7371 Computer Programming Services.

A few examples of some business method by the service industry company IBM include:

- US Patent #7,734,516: Method for providing re-visional delta billing and re-billing in a dynamic project environment
- US Patent #7,363,259: Value-based framework for inventory management
- US Patent #7,356,493: Apparatus and method for passing information between catalogs in a computer operating system

IBM is most likely creating computer systems and software for billing and inventory management systems related to the three patents described above. In addition to developing these systems, it is patenting any novel methods that are employed on these systems.

The services industry group is very homogenous with most of the services firms holding business method patents being concentrated in the business services subcategory.

Finance Industry Results

Finance Industry or division H of the SIC codes has 17% of all the business method firms and 5.7% of all finance firms hold a business method patent. Finance includes all firms in Finance, Insurance and Real Estate known (FIRE) and include the following major groups:

Major Group 60: Depository Institutions

Major Group 61: Non-depository Credit Institutions

Major Group 62: Security and Commodity Brokers, Dealers, Exchanges, and Services

Major Group 63: Insurance Carriers

Major Group 64: Insurance Agents, Brokers, and Service

Major Group 65: Real Estate

Major Group 67: Holding and Other Investment Offices

There are 16 financial firms in the top 100 list of firms including:

Table 8 Top Financial Services Firms of Top 100 Firms in Business Methods

Financial Service Firm Rank	Business Methods Firm Rank	Company Name	Total Business Methods Patents	Total Non-Business Methods Patents	SIC code
1	10	JP MORGAN CHASE BANK, N.A.	140	99	60, Dep. Inst.
2	12	AMERICAN EXPRESS TRAVEL, INC.	128	249	61, Non-Dep. Inst.
3	23	GOLDMAN, SACHS & CO.	69	16	62, Securities
4	27	CITIBANK N.A.	65	55	60, Dep. Inst.
5	34	MORGAN STANLEY	52	14	62, Securities
6	35	BGC PARTNERS, INC.	52	10	62, Securities
7	47	UNITED SERVICES AUTOMOBILE ASSOCIATION (USAA)	40	51	63, Insurance
8	55	FANNIE MAE	35	9	61, Non-Dep. Inst.
9	64	CAPITAL ONE FINANCIAL CORPORATION	31	51	61, Non-Dep. Inst.
10	65	FEDERAL HOME LOAN MORTGAGE CORP.	30	4	61, Non-Dep. Inst.
11	66	CHICAGO MERCANTILE EXCHANGE, INC.	29	3	62, Securities
12	74	MASTERCARD INTERNATIONAL, INC.	25	61	60, Dep. Inst.
13	78	BANK OF AMERICA CORPORATION	25	64	60, Dep. Inst.
14	82	THE NASDAQ OMX GROUP, INC.	23	0	62, Securities
15	91	HARTFORD FIRE INSURANCE COMPANY, INC.	21	4	63, Insurance
16	99	CITICORP DEVELOPMENT CENTER, INC.	18	44	60, Dep. Inst.
		TOTAL	783	734	

The breakdown of the financial services industry is disbursed among all of the subgroups with the largest being depository institutions at 27.5%, followed by security firms at 26.6%, and non-depository institution at 15.6%. It is important to note, like in other industries, an institution can have a number of business areas they work in and will only be classified here under the primary SIC code. For example, USAA's primary SIC code is 60, depository institution, since it has checking accounts but USAA also provides insurance (major group 63) to their members.

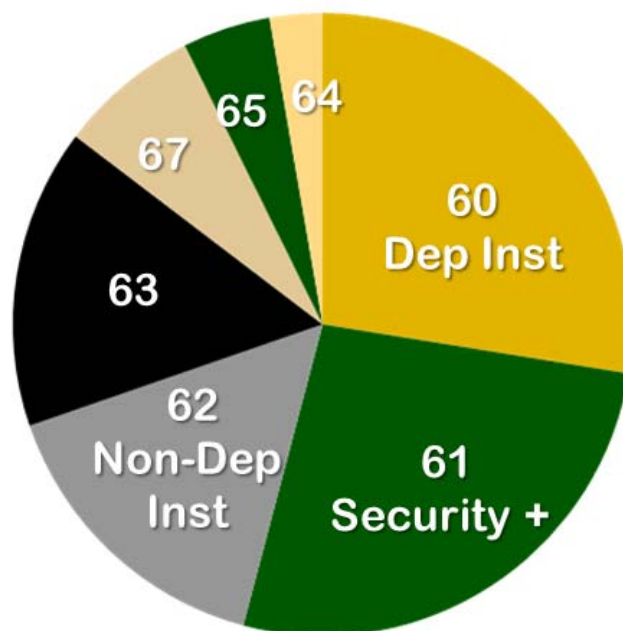


Figure 5 Finance Major Groups for Business Method Patent Breakdown

Table 9 Finance Major Industry Group Breakdown

FIRE (Finance, Insurance & Real Estate) 17%			
30	27.5%	60	Depository Institutions
29	26.6%	62	Security & Commodity Brokers, Dealers
17	15.6%	61	Nondepository Credit Institutions
17	15.6%	63	Insurance Carriers
8	7.3%	67	Holding and Other Investment Offices
5	4.6%	65	Real Estate
3	2.8%	64	Insurance Agents, Brokers and Service
109			

Finance Industry Case Study: USAA

A manufacturing company like Sony has always been patenting since it makes physical and tangible consumer devices. Financial services firms rarely make physical or tangible things; instead, most of their business is centered on non-physical agreements like insurance and checking accounts. The evidence provided above indicates that the State Street Supreme Court case (149 F.3d 1368, 1998) decision had a more profound impact on the finance industry allowing firms that could never patent before to have a new strategic business opportunity.

One might assume that all of the patents from financial firms would be logically classified in UPSTO classification under business method patents (Class 705).

Investigating the top 16 financial firms reveals that they hold 783 business method patents; interestingly, they also hold 734 other patents not in the USPTO classification under business method patents.

USAA's Business Method Patents Examples (USPTO Class 705)

- US Patent #7,725,378: Single premium immediate annuity with adjustable payment
- US Patent #7,734,485: Systems and methods for insurance coverage
- US Patent #7,774,277: Performance based auto loans

USAA business method patents appear reasonable with respect to business model including offering annuities, insurance and auto loans. Prior to the State Street Supreme Court case (149 F.3d 1368, 1998) most likely all of these business method patents would not have achieved patent protection due to 35 U.S.C. 101 rejections. The non-business method patents of USAA are less central to the direct financial services products USAA offers and include the following:

USAA's Non-Business Method Patents Examples (All other USPTO Classes except 705)

- US Patent #7,600,148: High-availability data center, Class 714/4, Process or apparatus for detecting and correcting errors in electrical pulse or pulse coded data.
- US Patent #7,680,628: Estimating processor usage, Class 702/186: Data Processing; measuring, calibrating, or testing.
- US Patent #7,701,355: Extended smoke alarm system, Class 340/628: Communications: Electrical

The first two relate to data processor or physical computer equipment, and while USAA most likely is not selling data processor equipment to other users, this hardware is

needed for their own internal businesses. It is capitalizing on this by patenting the products and processes for the hardware that are used or created to service financial products to their customers. The third patent is related to a smoke detector and while it is not widely known that USAA sells smoke detectors at home improvement stores, such as Lowes, to consumers, they are tangentially involved with smoke alarms because they have insurance that covers fires. It is unclear, if the State Street Supreme Court case (149 F.3d 1368, 1998) had never happened and business method patents were not easy to obtain, if USAA would still be patenting the non-business method patents which appear to be more tangential to their core financial products.

Communication Industry Results

Communication Industry or division E of the SIC codes has 10% of all the business method firms and 6.7% of all communication firms hold a business method patent. Communication industry is shorthand for all the areas including Transportation, Communications, Electric, Gas and Sanitary, and are made up of the following subcategories or two-digit major group SIC codes:

Major Group 40: Railroad Transportation

Major Group 41: Local And Suburban Transit And Interurban Highway Passenger Transportation

Major Group 42: Motor Freight Transportation And Warehousing

Major Group 43: United States Postal Service

Major Group 44: Water Transportation

Major Group 45: Transportation By Air

Major Group 46: Pipelines, Except Natural Gas

Major Group 47: Transportation Services

Major Group 48: Communications

Major Group 49: Electric, Gas, And Sanitary Services

Three major groups make up 91% of the communications firms holding business method patents including communication with 40%, Electric, Gas and Sanitary Services with 31%, Motor Freight Transportation with 20%, followed by Transportation by Air with 9% and less than 1% for the other two categories.

Table 10 Communications Industry Major Group Breakdown

Transportation, Communications, Electric, Gas & Sanitary 10%			
28	40%	48	Communications
22	31%	49	Electric, Gas and Sanitary Services
14	20%	42	Motor Freight Transportation
6	9%	45	Transportation by Air
0	0%	2 more	2 more categories
70			

The communication industry division interestingly has more dispersed subgroups than the services industry division. The first major subcategory of communications would be logical as an area of business method patents with the explosion of cell phones and the different business activities such as banking or advertising and numerous “apps”.

Some of the top firms in the communication industry include AT&T in “Telephone Communications, Except Radiotelephone” which has a SIC four-digit code

4813, and Sprint having SIC 4812 “Radiotelephone Communications”. Some examples of AT&T business method patents include:

- US Patent #6,206,283: Method and apparatus for transferring money via a telephone call
- US Patent #7,664,488: Location blocking service from a web advertiser
- US Patent #5,420,926: Anonymous credit card transactions

AT&T business method patents locally proceed from the methods that are created from their primary industry, which is the telephone. The first patent is directly related to residential fixed line telephone calls and a novel business method process for transferring money via a telephone call. The second patent, when looking at the abstract, is related to cell phone calls. The third business method patent, #5,420,926, does not mention the use of a phone. Without knowing the assignee, one might guess this patent is held by Capital One or Bank of American, and not AT&T. In further investigation, it is clear from the abstract that Patent #5,420,926 involves “communication exchanges” which may be hardware that AT&T manufactures, develops or sells.

This patent example illustrates the “wild-wild-west” nature of business method patents. It is unclear, based on the industry a firm operates in, which patents they may seek coverage for. When there are many industry players involved in a business method patent it is simply a question of who invents and patents it first. It also appears from this example that firms are seeking business method patents in areas non-primary in their business. The decision for what business method patents firms choose needs further

investigation and more qualitative techniques, such as interviews, to be helpful understanding the internal decision on what business method patents to seek.

One might expect “communications” to dominate but the other areas of communication are equally strong in business method patents. Some of these firm are involved in logistics such as UPS (United Parcel Service), which is in SIC code 42 Motor Freight Transportation.

CHAPTER FIVE DOES CHANGE IN BUSINESS METHOD PATENTS LEAD TO MORE INNOVATION?

Introduction

The previous chapters describing the top firms and a detailed breakdown of industries holding business method patents provide insight into the types of firms involved in business method patents. This chapter adopts a regression modeling approach to test hypotheses about the drivers of the rapid growth of business method patenting following the State Street decision. A regression model is employed using variables that are candidates for explaining this change in patenting. The related analysis takes advantage of the policy change the State Street Case (149 F.3d 1368, 1998) signified to investigate if an increase in business method patents resulted in more innovation.

Hypothesis:

The hypothesis is grounded in incentive theory (see chapter 1 for more background on incentive theory) that implies that patents encourage innovation, or when viewed more broadly from a societal perspective, it is assumed that monopolies are granted in the form of patents to individuals and firms to encourage innovation resulting in new products and services that are valorized in terms of social and economic benefits.

The hypothesis is:

Increased patent protection stimulates an increase in innovation

Support for this hypothesis if achieved would provide evidence in support of incentive theory. In other words, society is expected to benefit from an increase in innovation by providing more patent protection. This hypothesis was tested by Bessen and Hunt in terms of software patenting (2004 and 2007). (Detailed background on the study can be found in chapter 1.) When they asked the question: “Is the evidence consistent with this [incentive] theory?” Their analysis provided evidence that suggested that the answer was no (Bessen 2007 p 29). Therefore if business method patents have similar effects to the Bessen and Hunt study then the hypothesis when tested against the business methods data would be negative and thus would not support incentive theory.

Timeframe for the Regression Model

The regression models developed for this dissertation examine business method patents from 1985 to 2011. These two dates were chosen because they represent an equal number of years before and after 1998, when the eligibility of business methods patents opened with the State Street case (149 F.3d 1368, 1998). This twenty six year window provides a meaningful timeframe for conducting a before and after State Street analysis. Further, a good dataset exists for conducting such an analysis as described above and in more detail below.

Dataset Used:

Three firm level datasets available for this study were integrated to create a unique dataset. The first two datasets were from the USPTO and include the Patent Bibliographic Data Extract DVD (herein referred to as the Patent Bib Dataset). The Patent Bib Dataset DVD¹² can be purchased from the USPTO and contains 4,650,302 granted patents from 1975-2011 and the corresponding elements of the patent. The Patent Bib Dataset contains essentially all the data that is on the front page of granted patents as shown in the highlighted example below. The data includes: patent title, investor, assignee, application number, filing date, continuation data, classification data, patent citations and the names of examiners and attorneys. Of the 4,650,302 granted patents in the Patent Bib Dataset, 20,500 were determined to be business method patents from USPTO classification 705 for the period 1985-2011, the study period for this dissertation. The 20,500 business method patents were held by 7,395 firms as many firms hold more than one business method patent.

¹² Patent Bibliographic Data Extract DVD can be ordered from the USPTO at:
http://www.uspto.gov/web/offices/ac/ido/oeip/taf/data/misc/data_cd.doc/custom_extract_dvd/



US005989095A

United States Patent [19]

Wotton

[11] Patent Number: 5,989,095

[45] Date of Patent: *Nov. 23, 1999

[54] DECORATIVE FIGURE ASSEMBLY FROM COMBINATION OF COMPONENT BAGS

[75] Inventor: Michael C. Wotton, Plantsville, Conn.

[73] Assignee: Sun Hill Industries, Inc., Stamford, Conn.

[*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No. 08/992,014

[22] Filed: Dec. 17, 1997

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/653,759, May 23, 1996, Pat. No. 5,733,170.

[51] Int. Cl.⁶ A63H 3/04; A63H 3/16; B65D 65/00

[52] U.S. Cl. 446/385; 446/73; 446/223; 206/457; 206/575; 428/16

[58] Field of Search 446/73, 385, 221, 446/223; 428/16; 206/457, 575

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[57] ABSTRACT

A decorative combination of component bags representing the head, torso, two arms, and two legs of a festive, seasonal, holiday, or non-holiday figure is provided. Each of the bags is comprised of a bag member formed of a flexible waterproof material and has an initially open end. The initially open end is for receiving filler material. A closing means is provided for closing the initially open ends of the component bags. The bags may have fanciful indicia for representing festive, seasonal, holiday, or non-holiday figures. Once assembled, the figure resembles a costumed male or female human, is substantially human-proportioned, and preferably has articulable appendages. The components of the figure may also be supplied in a kit.

37 Claims, 7 Drawing Sheets

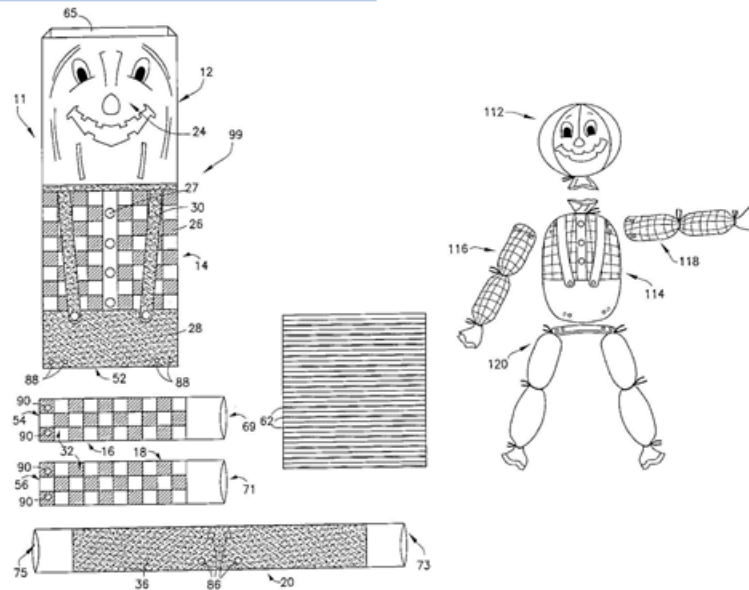


Figure 6 Example of Granted Patent Front Page Data Captured in Patent Bib Dataset

Next the 7,395 firms holding business method patents from 1985-2011 were combined with the trademark case file dataset (herein referred to as the trademark dataset) to add necessary additional data elements to the firm level data. The trademark dataset is maintained by the Office of the Chief Economist at the USPTO and is available for free via downloading from the USPTO website (www.uspto.gov/EconomicsData). The trademarks dataset contains base level information on trademark applications filed with or registrations issued by the USPTO from 1987-2012. This base level information for trademarks is similar to the data points in the 'patent bib' dataset including title, ownership, filing data and classification data. Name level matching on 7,395 firm owners of business method patents with the trademark dataset was undertaken which resulted in 4,653 matched organizations, of which 3,830 firms were U.S. organizations. In other words, 63% of the business method patent firms were found in the trademark dataset. It is not certain why the remaining 37%, or 823 firms, could not be matched. Possibly they never had a registered trademark, perhaps it was a name disambiguation issue, or perhaps just a data related error due to entering the related data.

The resulting 3,830 U.S. firm files were then further augmented by adding control variables that measured the structure and size of each organization. The control variables include market value, revenue, earnings (EBIT) and number of employees to improve the regression as the inclusion of these variables in the model acts to remove firm level differences. Each control variable is discussed in more detail later in this chapter. The Compustat dataset was used to identify and provide a measure for these variables.

Compustat is a private company¹³ as described and referenced above that has been supplying company financial database products since 1962. To help with name disambiguation issues, the National Bureau of Economics Research (NBER) dataset was used as an intermediate tool to identify a unique company ID to help identify companies in Compustat. This helped to minimize the associated name disambiguation issues of companies that could not be identified otherwise.

It is important to note that despite the size of the Compustat data base there are still limitations. For example, Compustat only contains data for publically held U.S. companies and therefore, generally only includes larger U.S. firms that have had an initial public offering and are listed on a stock exchange. The result of the merging of the file of 3,830 firms with the Compustat data base identified 474 firms (13%) additional firms with measures for the control variables. Again it is unclear if the 87% of the firms with missing control variable data are simply non-publically held or smaller firms, or if there are data level errors, or name disambiguation issues.

Regression models and analyses were conducted using the 474 business method firms with both the trademark and financial data from Compustat to calibrate the models. A sample of 474 which may have some selection bias because of size, data errors or name disambiguation issues is sufficiently large to allow for the necessary degrees of freedom to obtain meaningful results. Selection bias issues and implications of the results are discussed after the presentation of the regression analysis results.

¹³ <http://en.wikipedia.org/wiki/Compustat>

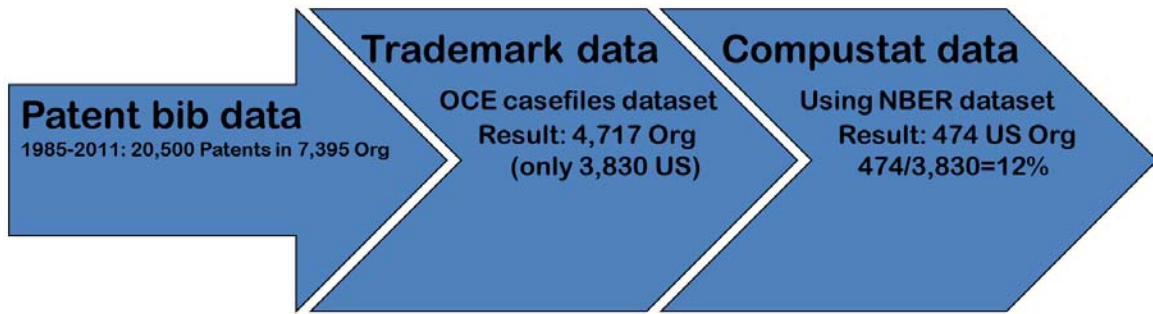


Figure 7 Sequence of Datasets Used and Combined for the Study and Analysis

Construction of the Regression Model

The modeling frame for this study is presented below in figure 9.

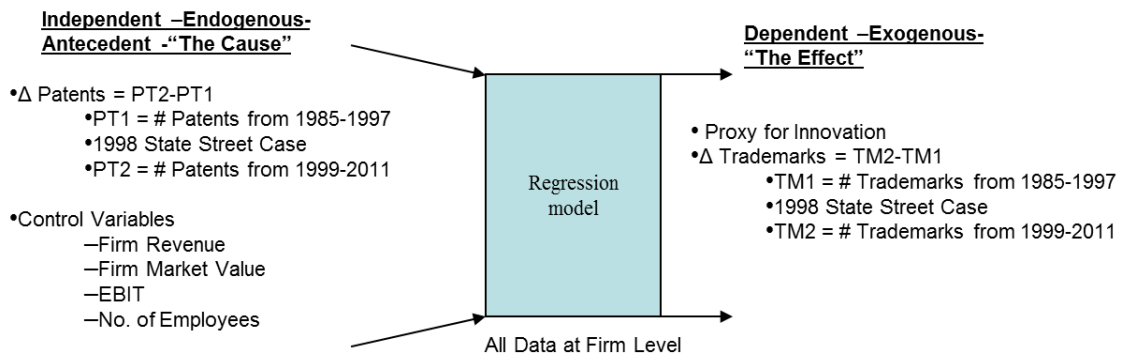


Figure 8 Regression Model

Dependent Variable – Trademarks

The dependent variable used in this study is the change in trademark counts at the firm level. This design captures the time element and policy window defined by the State

Street Case (149 F.3d 1368, 1998) which radically changed the rules for patenting business methods. Prior to State Street the primary IP (Intellectual Property) option for financial service firms was to trademark each new product with a unique name to protect other firms from copying and bringing the same product to market (Lerner 2002, Mendonca 2004). There is extensive literature supporting “trademarks as an indicator of innovation”, which is the title of one such survey paper that discusses all the studies using trademarks as a unique tool to assess innovation particularly in service industries such as financial services (Mendonca 2004).

A registered trademark must be used “otherwise it may be cancelled or applied for by another company after a grace period (Mendonca 2004, p 1387).” In short, it is a measure of innovation because it cannot be granted if it is not being used which is a central and critical aspect (use) of the concept of innovation. A patent on the other hand not need be in commercial use to be granted, litigated or renewed. In other words, a trademark must have an established product in the marketplace for which it is granted intellectual property protection. Thus it is a solid proxy for innovation.

At the same time it is important to note that the dependent variable - trademarks - is perhaps the most controversial variable in the model. The tradition variable used for investigating patent impact is Research and Development (R&D) dollars spent. R&D was the dependent variable used in the Bessen and Hunt (2007) software study and the literature standard. The fundamental problem with the R&D measure for this dissertation is that a significant number of the firms that receive business method patents are financial services firms and by their nature they are neither required to nor to report R&D

expenditures. In a study by the author of the top ten financial services firms holding business method patents all reported zero (0) for R&D. This outcome also is expected because the IRS (Internal Revenue Service) does not allow financial services firms a R&D tax credit. Specifically, IRS form 6765, page 3¹⁴, states the R&D tax credit amount is “not to include S corporations, personal holding companies, and service organizations”. Finance companies are prohibited from receiving any tax benefit and therefore R&D is absent from finance firms (Hunt 2009). In other words, while financial services firms most likely do engage in some form of R&D, they are not eligible for a tax credit so they do not track or consistently report it.

Some alternative variables were considered as proxies for the dependent variable including labor data and SEC filing data. The labor data that was considered was occupational firm level data. It was assumed that research occupation titles could be reviewed and a determination of the types of jobs that are related to more research intensive positions could be determined. Jobs could be counted in terms of full time equivalents (FTEs) per company and the percent or proportion of R&D FTE computed. This data could have been collected from the U.S. Bureau of the Census microdata files or from Department of Labor data. However, this data would have been both difficult and time consuming to collect, but also it would have been less accurate than trademark data. Further, while Census microdata would include small and medium size firms it does not have R&D for financial services firms.

¹⁴ <http://www.irs.gov/pub/irs-pdf/f6765.pdf>

Alternatively, industry level data from the National Science Foundation (NSF) or Occupations Employment Statistics from the Bureau of Labor Statics¹⁵ could have been a source of research employment. However, this data is only available in aggregated categories and thus not available at the firm-specific level.

Further, time was taken to investigate SEC filings of banks as a proxy for innovation. In theory, if a bank wants to open a new line of business or form a new fund it must file forms to be approved though SEC regulations. The more new business and products a firm offers, the more innovative the bank would be in theory. Investigating the SEC bank filing forms to determine which forms to count would be extremely labor intensive to the point that it was deemed unrealistic. In addition, banks were only a sub-part of the types of companies that file business patents so the companies in other industries would then have to be excluded.

Given the difficulties and limitations of alternative measures for the dependent variable in the model, change in trademarks over the study period was selected because it is readily available and there is precedent for using trademarks as a proxy for innovation in the literature (Mendonca 2004).

In addition to choosing trademarks instead of the traditional R&D variable as a measure of innovation there also is debate if trademarks should be the dependent or independent variable. Other studies use patents as the dependent variable (Bessen 2004, Hall 2001) with R&D as the independent variable. R&D is considered an input and patents are the result or output. The hypothesis of this dissertation - *Increased patent*

¹⁵ <http://www.bls.gov/ces/>

protection stimulates an increase in innovation - defines the causal direction of the input and output variables. Patent protection is the input or independent variable. An increase in patents would, therefore, stimulate or “cause” an increase in innovation (output), here measured by trademarks.

Main Independent Variable - Patents

The first variable that will be examined as an indicator of patent strength is the patent count, which is available from the U.S. Patent & Trademark Office (USPTO) using the number of patents granted by firms. A small number of business method patents “pre-State Street” (149 F.3d 1368, 1998) existed followed by a large and steady increase after 1998 (see Figure 10 below).

There is some debate about the independent and dependent variables both being related to intellectual property and thus that they may be related to one another. This model has been structured to investigate how they are related to one another across different time frames.

Control Variables

Finally, several control variables were used in the model to control for fixed effects of firm composition such as size. For example one would expect a large firm to have more total number of business method patents than a small firm; the control variable serves to address this issue. This analysis relies on an earlier “patent production function” model used by Hall and Ziedonis (2001) and Bessen and Hunt (2004, 2007) in their study of software patents and innovation. However, some modifications in the original model were made to the model used in this study to accommodate the constraints

faced by financial service firms (namely that they do not report R&D expenditures). The most significant difference from the traditional patent production function model in this study is that this model uses trademarks rather than R&D as a proxy for innovation and thus may be described as a trademark (innovation) production function. Because the firms in the study were from different size firms across many industry sectors several variables were added to control for firm differences. The control variables used in this dissertation's model include:

Revenue of the firms as a top level differentiator between firm's size, complexity and success in the marketplace.

Revenue was calculated on an annual basis per firm in U.S. dollars. In the regression output the revenue coefficient is multiplied by 1,000,000 to better express and interpret the results.

Market value for each firm was used to capture its market position irrespective of sales and also the market capitalization of a firm.

Market value was the total market value of a firm fiscally. This was computed by multiplying the total shares by the price per share of the publically held company. In the regression output the market value coefficient is also multiplied by 1,000,000 to better express and interpret the results.

Earnings before interest and taxes (EBIT) was also employed as alternative measure of scale. In the regression output the EBIT coefficient is also multiplied by 1,000,000 to better express and interpret the results.

Employees per firm was used which also provides another measure of firm size. This is important because economies of scale likely occur when maintaining an internal versus external legal function. The employment measure is found in the Compustat database. An alternative could be to use the large and small firm statues in the NBER database to sort firms by size or size categories. In the regression output the employee coefficient has not been altered.

Industry of firm was used to capture the effects of different business sectors. This was developed with a dummy variable for two specific industries (manufacturing and finance). The two industry dummy variables include manufacturing as defined as SIC division D and finance industry SIC division H (a discussion of why the NAICs industry classification system was not used in this study is described in Chapter 4).

Regression Results

The discussion begins with the primary model and its results and then to a discussion of the other regression models and results that were computed to aid in understanding the analysis results regarding the findings with respect to support for the hypothesis or its rejection.

Model 1-5: Primary Model

Model 1 is the base model for this dissertation. Model 1 has the highest R^2 or goodness of fit in all the models at $R^2 = 0.15$. This indicates that there is a relationship between the dependent and independent variables of the model but that the relationship is weak. It can be seen in models 2-5 that as the control variables are removed the R^2 drops further, providing evidence that model 1 and its results are the most defensible.

Further investigation of model 1 results shows that all of the variables are statistically significant except employees. The most interesting is the independent variable of the change in patents. The patent variable indicates that business method patenting after the State Street Case decision in 1998 had a negative 8% impact on the number of trademarks and thus a negative impact on innovation. The negative sign is significant and thus provides support that the hypothesis is not supported by the analysis and, further, that increased patent protection does not stimulate an increase in innovation. In other words, increased patent protection may actually contribute to a decrease in innovation as measured by trademark filings of new products for business method patents.

Model 2-4 are the same as Model 1 showing the effect of sequentially removing a control variable each time. All of these models produce a lower R^2 than model 1. In addition, the order of the control variables was altered and no significant change in the results of Models 2-4 was found.

Table 11 Regression Models 1-5: Base Model with Various Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5
Dependent Variable	Δ Trademark	Δ Trademark	Δ Trademark	Δ Trademark	Δ Trademark
Δ Patents	-0.08 (0.04)*	-0.09 (0.04)*	-0.10 (0.04)**	-0.07 (0.03)*	-.02 (0.01)**
Revenue	-696 (0.00)***	-781 (0.00)***	-676 (0.00)***	-148 (0.00)***	
Market Value	244 (0.00)***	227 (0.00)**	364 (0.00)***		
EBIT	1,398 (0.00)***	1,532 (0.00)***			
Employees	-0.06 (0.05)				
constant	1.50 (2.03)	0.87 (1.93)	0.87 (1.93)	0.87 (1.93)	0.87 (1.93)
R-squared	0.15***	0.14***	0.12***	0.02***	0***
Time period	1985-2011	1985-2011	1985-2011	1985-2011	1985-2011
No. observations	462	469	474	640	4714
* p<0.05, ** p<0.01, *** p<0.001					

Model 6-7: Industry Control Models

Additional models, 6 and 7 include control variables (dummy variables) for the two industry sectors, manufacturing and financial services. Neither of these control variables are statistically significant; however, the remaining results of the model are almost identical to those of model 1. This suggests that industry is not an important factor or variable.

Table 12 Regression Models 1, 6 and 7: Base Model with Industry Control Variables

	Model 1	Model 6	Model 7
Dependent Variable	Δ Trademark	Δ Trademark	Δ Trademark
Δ Patents	-0.08 (0.04)*	-0.09 (0.04)*	-0.08 (0.04)*
Revenue	-696 (0.00)***	-674 (0.00)***	-699 (0.00)***
Market Value	244 (0.00)***	251 (0.00)***	241 (0.00)**
EBIT	1,398 (0.00)***	1,287 (0.00)***	1,439 (0.00)**
Employees	-0.06 (0.05)	-.06 (.05)	-.06 (.05)
Manufacturing Dummy Var.		-5.53 (3.86)	
Finance Dummy Var.			-1.17 (5.82)
constant	1.50 (2.03)	3.23 (2.38)	1.64 (2.14)
R-squared	0.15***	0.15***	0.15***
Time period	1985-2011	1985-2011	1985-2011
No. observations	474	468	468
* p<0.05, ** p<0.01, *** p<0.001			

Forecast Model, Alternative Explanation

In addition to the prior regression analysis an alternative approach was adopted.

The time series graph (Figure below) shows that patents increase exponentially after State Street case in 1998 (149 F.3d 1368, 1998), at the same time trademarks fall slightly. One explanation is that patents are a substitute for trademarks when companies choose their intellectual property protection mechanism (Mendonca 2004).

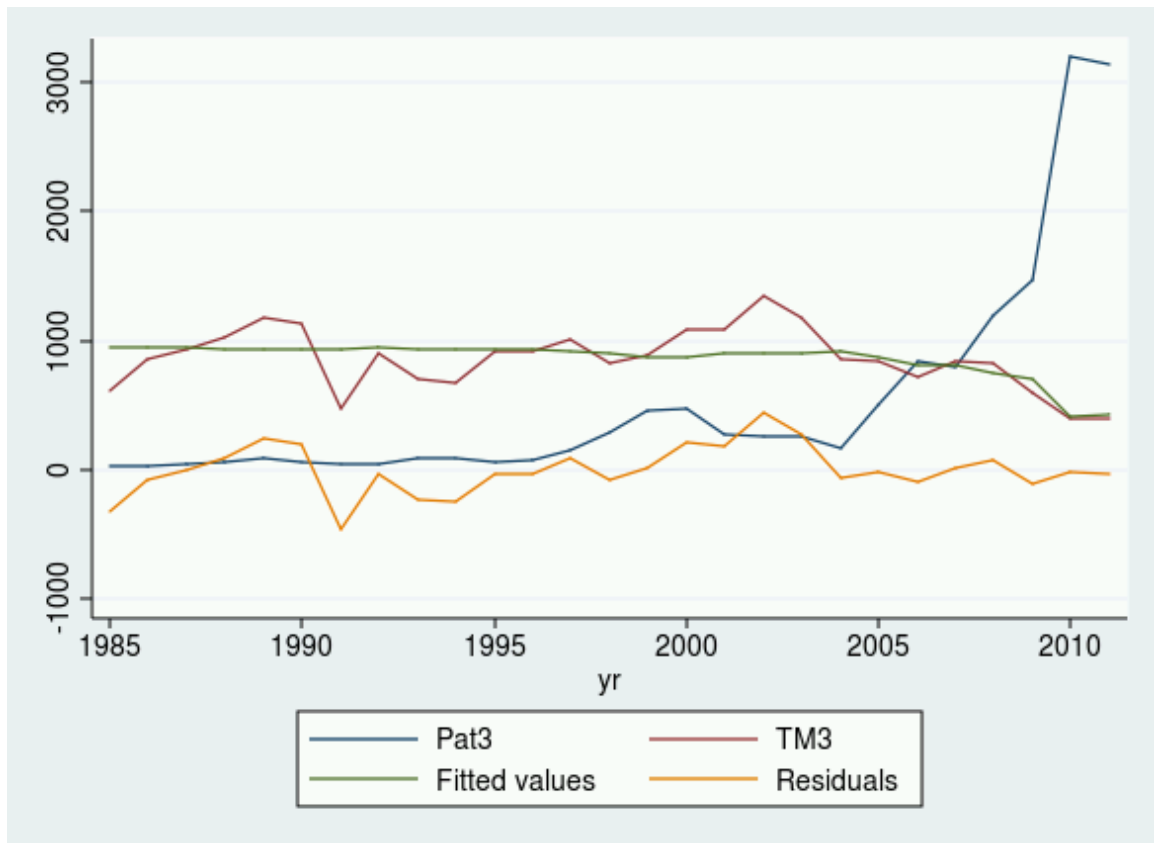


Figure 9 Patents and Trademarks (actual and estimated) by time period

Model 8-11: Before and After State Street Models

Another way to investigate the hypothesis is to construct two models one before the 1998 State Street (149 F.3d 1368, 1998) court decision and a second after State Street court decision. Therefore before and after models were constructed and calibrated.

Inspection of the data in Figure 10 shows that there is a major increase in total patent growth after the State Street decision. This growth is non-linear and appears to be exponential. Thus, a log transformation of the data was conducted so that models 8 and 9 (see Table 13) that are calibrated without the log adjusted data could be compared with

the log adjusted models. The analyses using the log transformed data appear as models 10 & 11 (see Table13). In additional, other studies have transformed employment to a log function (Bessen 2004) as it too is often non-linearly distributed, so the employee variable was also transformed using a log function.

First, with the before and after models calibrated with the non-log transformed data, the coefficient patents is 4.45 in model 8. Thus every new business method patent from 1985-1997 resulted in 4.45 trademarks per firm. This is quite different from the model 9 results which estimate a patent coefficient of 0.18 indicating that for every new business method patent there was considerably less than one trademark (0.18) created per firm. These results provide findings comparable to the base model and related analyses (models 1-7). Allowing business method patents did not result in more innovation measured as trademarks. Models 10 and 11 are the same as model 8 and 9 except they used log transformed data for the number of patents and employment in the calibration. The R^2 decreased in the before model (10) and increased considerably in the after model (11). Because there is a log function the coefficients are not as easy to interpret as a one to one output. However the relation of the before model (10) results versus the after model (11) express the same conclusion as the other models. There is less trademarking activity per business method patent after the State Street court decision in 1998.

Table 13 Before and After Regression Models 8-11

	Model 8	Model 9	Model 10	Model 11
	Before	After	Before	After
Dependent Variable	Trademark	Trademark	Trademark	Trademark
Patents	4.45 (0.67)***	0.18 (0.02)***		
Log_Patents			31.42 (7.32)***	3.73 (0.03)*
Revenue	1,068 (0.00)***	352 (0.00)***	1,078 (0.00)***	-148 (0.00)***
Market Value	-305 (0.00)***	-142 (0.00)***	-281 (0.00)***	-0.06 (0.00)
EBIT	-1,693 (0.00)***	-171 (0.00)	-1,739 (0.00)***	-410 (0.00)
Log_Employees	2.34 (0.93)**	1.91 (0.44)***	2.22 (0.95)*	0.94 (1.24)
constant	3.86 (2.31)*	3.34 (1.09)**	3.55 (2.37)*	-3.78 (3.84)
R-squared	0.32***	0.36***	0.28***	0.41***
Time period	1985-1997	1985-1997	1999-2011	1999-2011
No. observations	429	429	429	155
* p<0.05, ** p<0.01, *** p<0.001				

Extra Models Employing Logs and Normalizing Variables

In addition to the above 14 models and additional 28 regressions were conducted by logging and normalizing the variables.

First the variables were normalized by converting them to a z score. Then the same regressions as in all 14 models above were conducted. The results did not improve in any of these cases the fit or the R^2 so the results were not used.

In addition the trademark, patents and the employment variables were logged. Models 10 and 11 employ the log function for patents and employees, however the other models did not report results with these two variables logged.

Model Conclusion

In conclusion, model 1 offers a defensible test of the hypothesis of this dissertation. The results provide support for rejecting the hypothesis and indicate that an

increase in patents following the 1998 State Street Case (149 F.3d 1368, 1998) decision resulted in an 8% decrease in innovation (as measured in trademarks). The conclusion that the evidence does not support the hypotheses or incentive theory is consistent with the outcome of the Bessen and Hunt's Software Study (2007). This is an argument against expanding patent protection because society does not appear to benefit from increased innovation. The two model analysis of the before/after behavior of the relationship between patents and trademarks support this conclusion and further the R^2 improves considerably with this approach indicating that the strength of the model fit increases. Regardless both models provide support for rejecting the hypothesis.

It is less clear why this is happening. There could be other benefits to society that are not captured in this model. For example financial services firms may not create more innovation, new products or conduct R&D but they may be creating more economic wealth in terms of firm growth, new employees and competitiveness that benefit from patent protection and advance American society and economy. Also services firms may operate differently than traditional manufacturing firms. For example, service firms do not have traditional R&D but they may have additional outputs measured by new products, new jobs and thus stimulate the economy. To better understand why this is happening a more qualitative analysis such as interviews is suggested as one direction for future research.

CHAPTER SIX – SUMMARY AND NEXT STEPS

This concluding chapter is comprised of three parts: a summary, a discussion on future directions and an examination of policy implications.

Summary

The goal of this dissertation was to obtain a clearer understanding of business method patents. Business method patents increased exponentially following the State Street Court case (149 F.3d 1368, 1998) and decision, and gave an opportunity to investigate an area of patenting before and after a fundamental change. The first objective was to create a historical review of the law and cases that impacted business method patents. With this understanding, a more detailed analysis of the agents and some analyses of business method cases were undertaken. This step included investigating firms and industries held business method cases. In addition, a number of case studies of specific firms and their business method patents were examined. After the landscape was well understood, a detailed regression model was deployed to understand the causal relationship with business method patents. The research affirmed that an increase in business method patents before and after the 1998 State Street Court Case (149 F.3d 1368, 1998) did impact innovation as measured by an increase in trademarks over the same period. This “difference of differences” regression approach took advantage of a policy change to investigate the fundamental incentive theory of patenting.

The overarching results reinforced a belief that business method patents are complex and held by a non-homogenous set of firms from different industries patenting in their core and non-core business areas. The results of each chapter are described in more detail below.

Chapter Two outlined the historical perspective of business method patents and the accompanying case law. The most influential case was the State Street Court case in 1998 (149 F.3d 1368, 1998), which undoubtedly was the lynch pin to the flood gate of business method patents. The State Street case focused primarily on 35 U.S.C. 101, patent eligibility and what is allowed to be patented. There have also been additional court cases since State Street that also address 35 U.S.C. 101. Most notably confirming that process patents, including business method patents, are a legal form of patent eligibility.

Chapter Two also evaluated other patent classes outside of business method patent (class 705) and reinforced the fact that a process claim can be classified in other classes outside of business method patents class 705. The other parts of the dissertation analysis were limited to business method patents in class 705 because patents in this class undergo a rigorous review process before being assigned and also 705 defines a consistent boundary of business method patents for the study. Obtaining a deeper understand of the complexities of the classification definition is augmented with case studies and examples throughout the paper to achieve a better understanding of this classification.

Chapter Three sought to understand the agents that hold business method patents.. The top 100 firms in terms of business method patents held were evaluated, including the number of business method patents, the number of non-business method patents, and the industry classification of the firm. The most striking result was that these firms are not homogenous in that they come from a variety of different industries and yet have a disproportionate number of non-business method patents. Some of the consistent findings are that the majority of them appeared to be large, internationally known firms like IBM and Sony, and all had both business method patents and non-business method patents.

As a result of the findings from the examination of the top 100 firms, four major myths about business method patents were rejected. The first myth was that a business method patent is a “special” type of patent. The second was that business method patents are sought mainly by financial services firms and the third was that financial services firms are filing business method patents exclusively. The final myth was that business method patents are mainly held by non-traditional firms. All three of these myths were found to be ungrounded.

A case study of USAA Federal Savings Bank and Navy Federal Credit Union indicated that firms are employing very different strategies to business method patent portfolios. USAA and Navy Federal are highly similar firms and, while USAA has obtained 44 business method patents through 2011, Navy Federal appears to have not even applied for a single patent. This suggested that firms seeking or not seeking business method patents have very different strategies regarding the protection of their

intellectual property. It also illustrates that non-homogeneity is a characteristic with respect to business method patenting.

Chapter Four continues the investigation into the ownership of business method patents by analyzing the distribution of business method patents at the industry level. Once again it is not a homogenous group with a number of different industries holding business method patents both at the divisional and major group level.

Case studies and examples of business method patent titles were employed to obtain a deeper understanding of the nature of the business method patents held in various industry divisions. The results revealed that business method patents are being sought in core and non-core business areas. For example, USAA, a financial service firm, patented a non-business method for a smoke detector product; and vice versa, AT&T, a phone company, obtained a business method patent for credit card transactions. Perhaps this is because business method patents are relatively new and the market needs to stabilize, or perhaps the nature of business method patents and this phenomenon will continue long after the maturity of the business method patents occurs in the marketplace. Regardless of why this is happening or whether it will continue, it is clear that there currently is considerable diversity in approaches to business method patenting.

Chapter Five reports on analysis and testing of the hypothesis and the use of “difference of differences” regression model approach. The unique dataset was created from a combination of data from three unique datasets, each containing millions of unique firm level data points including the USPTO patent biography, the USPTO

trademarks, and Compustat datasets. The data was used to combined the data needed for the analysis for 646 unique U.S. organizations that held business method patents.

The hypothesis that increased patent protection stimulates an increase in innovation. Multiple regression models were calibrated and included control variables for scale and industry effects. Consistent results were obtained across the multiple analyses that in the area of business method patents, that there is not an increase in innovation arising from these patents.

Policy Implications of this Research

This research has a number of policy relevant findings. These include contributing to an extended understanding of today's service economy, investigating the need for more precise tools for defining a business method patent, and balancing the patent trademark relationship and its societal impact.

Service Economy

There is considerable evidence that with internationalization and off-shore manufacturing, that the U.S. has entered an era of "post-industrialization" and transformation into a "service economy" (Daniels 2004). Accordingly institutions must and do adapt and change to these economic transforming factors. In the U.S. it is not surprising that the decisions of its courts support firms given their fundamental role in the economy. Perhaps this was part of the set of factors related to the State Street case which helped reshape the patenting institution that brought it more into conformity with the contemporary economy. From this perspective expanding patent protection for service firms appears to support U.S. economic growth as a service economy. While this

dissertation only considered the U.S., comparing the U.S. patenting processes to other countries may show that expanding business method patenting has had a positive impact on the service economy of the U.S in relationship to other countries' economies.

Confusion over Business Method Patents

While it seems logical and useful for the patent institution to increase innovation in business method patent in the era of a service economy, has the “pendulum” swung too far in allowing anything including any process to be a patentable? The results of the analyses in this dissertation provide evidence that perhaps the pendulum has swung too far and that the threshold for successful patenting is too low. Incentive theory argues that strengthening property rights will increase a firm's innovation capacity--typically evidenced in more R&D and ultimately productivity. The results of the analyses indicate the opposite--that increased patent protection in business method patents has a negative impact on innovation.

The author does not believe nor do the results indicate that business method patents should be abolished, but perhaps a natural maturity of the marketplace and tightening of the case law and guidelines for allowable business method patent content would be helpful.

The natural maturity of the marketplace is already underway. While an examiner originally needed to use almost all non-patent literature rather than other patent cases to evidence an inventor's patent application was frequent (35 U.S.C. 102 and 103), today the majority of references are other patents in the same area.

The tightening of the case law of patent subject matter (35 U.S.C. 101) to support clear guidelines as to what can be an acceptable business method patent would be helpful. Whereas the State Street case (149 F.3d 1368, 1998) affirmed that a State Street business method patent was allowable subject matter, Bilski (130 S.Ct. 3218, 2010) denied the patent as patentable subject matter but gave little guidance for future cases like State Street or not patentable subject matter like that considered in the Bilski case.

One such test brought forward and then essentially discarded was the “useful, concrete and tangible” requirements. If the claims of the case had a useful, concrete and tangible result then it was patentable subject matter; if no, it then it would not qualify. Having clear guidelines and similar tests would be helpful for examiners and applicants and would limit business method patents, to provide a quality standard and improvement of the overall system.

Balancing the Patent Trade-off

A patent system was established on the principal of a creating an aggregate benefit trade-off between individual inventors and society. The simple rationale is that a patent gives an individual monopoly in return for disclosure to society. Patent law is very specific about the details of this exchange including the length of the monopoly in that the monopoly granted “shall be for a term beginning on the date on which the patent issues and ending 20 years from the date on which the application for the patent was filed” (35 U.S.C. 154, contents and term of patent) and disclosure to society must be “full, clear, concise” (35 U.S.C. 112, specification) enabling another to be able to make the same invention.

While full disclosure is required for a patent, it is important to investigate the timing of the disclosure. A U.S. patent application is confidential until the eighteen month pre-grant publication date or granted patent date, whichever comes first. At the same time product lifecycles being reduced many to under the eighteen month window.

This dissertation provides evidence that business method patents are an expanded area of patenting which has grown exponentially over the past decade. A similar trend was found in software with “a dramatic increase in software patenting, and software patent propensity, over time” (Bessen 2007). There also has been an increase in the total number of patents over the past decade. This suggests the patent system has experienced a loosening of standards, and an increase in number of patents granted, in individual monopolies. However, no significant change in the disclosure to society has occurred over the same period.

Perhaps one solution to this would be to decrease the confidentiality window from eighteen months before patent publication to a shorter period. This would both balance the patent equation and would help with shortened product lifecycles. The most extreme scenario would be to publish patent applications immediately making them accessible to the public. A more reasonable change might be to institute a six-month or a year of confidentiality before publication to society. The time period of confidentiality could also differ across classifications such as shorter for business method patent application in class 705, but longer for pharmaceutical patents with much longer R&D cycles.

Perhaps a second or concurrent solution would be to provide more upfront input from the public to the patent examiner at the time of application. Currently the USPTO

patent examiners are not allowed to receive any input from outside the inventors regarding “prior art” or competing inventions. Traditionally, a small trial is held to conduct a public peer review process at which the public is allowed to comment on the patentability and prior art of a patent application before the examiner has reviewed the case. This has many benefits: it may enhance the terms of the review of the patent office, reduce the workload, and build an innovation community to share in the knowledge of the patent system.

Next Steps and Future Research

No one study can answer all the relevant questions in any area of public policy. In fact investigation like this dissertation contributes to the evolving knowledge that serves to guide policy. It would be ideal in the case of this dissertation to further verify the findings and obtain a better understanding of the choices firms are making regarding business method patents through case studies. Why does USAA have so many business method patents and Navy Federal have none? Asking top management in both of these firms a set of probing strategy questions would likely be enlightening.

From a qualitative perspective, the most limiting aspect of this study was the lack of firm-level data for the control variables. Collecting complete data, particularly more control variables, would certainly add rigor and perhaps deeper understanding. Compustat was the best datasource at the time of this study; however, Census has been working on a joint project with the USPTO that would allow more firms, in particular small firms which are missing for Compustat, to be included in a replaced version of this study. This more complete dataset would be available through Census Research Data

Centers and would be a logical solution for obtaining more detailed and specific firm-level data.

Beyond business method patents is a broader question that has been introduced with this research that pertains to how our economy is changing and the role of patenting changes (especially business method patenting) as there are more service rather than traditional manufacturing firms. This study only evaluated patenting and more specifically business method patents but how will other institutions change or be changed? This of course is a topic that has generated an enormous literature as many are concerned with this question (Daniels 2004). However, with respect to innovation and the protection of intellectual property should the IRS, for example, consider offering tax credit to service firms for R&D?

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BIOGRAPHY

Kirsten currently works at the U.S. Patent and Trademark office as a Patent Examiner of Financial Business Process Patents and works as an independent consultant with small businesses. She also is on special assignment in the Office of the Chief Economist at the Patent Office studying macro level patent data.

Kirsten Apple is also a seasoned entrepreneur and venture capitalist with a particular passion for early stage technology companies. Kirsten has been a partner in three Venture Capital firms, founded four companies and has worked with hundreds of start-ups launch. Her passion and expertise is in starting new organizations.

Kirsten founded and managed Minerva Seed Fund. Minerva Seed Fund was a \$3 million venture capital firm connected to George Mason University. Prior to Minerva Seed Fund she spent over four years in Europe running two early-stage venture funds. Kirsten was Venture Partner of Brainspark a \$35 million early-stage venture fund and incubator facility in London, England. In this roll she was on the board of directors of three of the investee companies and headed the Cambridge office. Prior to Brainspark, she was Venture Director at Antfactory where she started the wireless team leading enabling technology investment throughout Europe.

Kirsten has also spent time as a consultant and she was the first London employee of Cluster Consulting growing the office to over 60 employees. While at Cluster she worked with telecoms companies in Germany, France, Netherlands and Finland.

Kirsten is an adjunct professor at George Mason University and has been a guest lecture in the area of entrepreneurship worldwide including, Tomsk University in Russia, Kenan Institute in Thailand, Cambridge University & Imperial University in England, University of Maryland, Georgetown and George Washington University. In addition, Kirsten founded the Mason Mentors program with Mason's technology transfer office helping promising technology project to spin out of the university and is pursuing her PhD in the area of Entrepreneurship in the School of Public Policy at Mason.

Kirsten is a techie at heart, starting her career as an engineer designing the BMW Z3 and Mercedes Benz SUV. Kirsten graduated from Kettering University (formally General Motors Institute) in Mechanical Engineering and holds an MBA and Masters of Engineering from Duke University. Kirsten's is Hoover High School graduate in North Canton Ohio where she was on the honor roll and received two athlete scholar awards

from the Army and high school as the captain of her swim team and letterman in track, basketball and volleyball.

Kirsten resides in Falls Church, Virginia and has two children.