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Have Business Method Patents Gotten a Bum Rap? Some Empirical Evidence

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Abstract: This study presents the results of an empirical test of two hypotheses concerning the quality of a group of data processing patents on methods of doing business. The hypotheses are motivated by two frequently voiced criticisms of these patents: that their scope is overly broad and that they cite too little ‘prior art’ (the extant body of knowledge or the array of prior solutions to the problem which the patented invention purports to solve). Using a sample of over 3,500 data processing, software, and internet patents granted between 1975-1999, I tested the two hypotheses on three patent statistics- the number of patent and non-patent prior art citations, and the number of claims. In short, I find little support for the “conventional wisdom” concerning patents on methods of doing business. More specifically, I find that these patents do *not* cite less patent or non-patent prior art, do *not* make more claims, and are *not* assigned to a greater number of patent classes. While these findings don’t completely exonerate business method patents of the charges of inferior quality, they do suggest that, at a minimum, they are *no worse* than other data processing patents along these two aspects of patent quality.

Keywords: Patents, Business Method Patents, Intellectual Property, Data Processing, Electronic Commerce

“There are persistent reports that patents in the software area, perhaps especially, patent’s for “business methods” implemented in software, are of extremely poor quality.”

-Robert Merges, UC Berkeley Law Professor

“The burden of proof is not for the people who defend property rights, but for those who want to take them away.”

-Jay Walker, founder of Walker Digital, an Internet R&D laboratory

INTRODUCTION

Although patents for business methods implemented in software have been granted for a few decades, they gained considerable notoriety after the *State Street Bank* decision (Federal Circuit, 1998) corrected long-standing misconceptions about their patentability. Several important events were set in motion by the courts’ affirmation that mathematical algorithms performed by computers and that provided “useful, concrete, and tangible” results were, indeed, patentable subject matter. New applications for business method patents more than sextupled, climbing from 1320 in 1998 to nearly 8000 by the year 2001. There was also an sharp increase in the quantity, amplitude, and range of the concerns raised in the press (Krigel 1998; Sandburg 1999; Gleick 2000; Dorny 2001) and by legal scholars (Merges, 1999; Thomas, 1999; Dreyfuss, 2000, 2001; Bagley, 2001; Meurer 2002) about patents on methods of doing business, especially those involving the conduct of e-commerce, e.g. Amazon.com’s “1-click” patent. In the spring of 2000, under mounting pressure, the United States Patent & Trademark Office (USPTO) announced a patent quality improvement initiative which incorporated many of the changes proposed by its harshest critics and its staunchest defenders (Dickinson, 2000).

Impatient and distrustful of the USPTO's willingness and ability to reform the examination of business method patents, new legislation was passed which limited how patents on methods of doing business could be used against alleged infringers (e.g. American Inventors Protection Act of 1999). The Business Method Patent Improvement Act of 2000, a bill which never emerged from committee, proposed that business method patents, and *only* business method patents, meet new and higher statutory requirements. Also in 2000, Amazon.com founder Jeff Bezos, relenting to harsh criticism about his firm's decision to enforce its 1-click patent against Barnes & Noble.com, sponsored a web-site known as Bounty Quest which offered money to on-line sleuths to uncover examples of prior art which could be used to invalidate several well-known and many less known business method patents (Felton, 2001). For many, however, these changes and recommendations were too little done too late to prevent what, for most, had become a foregone conclusion: that patents on business methods were possessed of substandard quality and would, as a result of that low quality, eventuate more harm than good for the software industry and the broader economy, introduce more rather than less subjectivity into these patents examination, and a increase the amount of litigation in this area.

One of the more striking facts about the controversy surrounding business method patents, especially in the wake of the State Street decision, is the manner in which the consensus about these patents' quality appears to have been formed. Contrary to some expectations, the many and varied criticisms and the calls for remedial measures were rarely, if ever, supported with empirical evidence. Rather, it seems that the consensus was reached, in large part, on the basis of expert *opinion* supported by anecdotal

evidence. It was *opinion* informed by extensive experience with and a broad understanding of the legal and economic issues attendant to software and internet-based technologies, but which also displayed considerable disdain for business method patents themselves, distrust of the motives for and processes by which the patents were evaluated, and dismay at the anticipated consequences of their unchecked proliferation. Further, it was opinion typically supported by *evidence* obtained from the examination of a handful of arguably unrepresentative business method patents, namely those assigned to high-profile internet start-ups like Amazon.com, Priceline.com, Double-Click, and Open Market.

The above observations raise the distinct possibility that patents on methods of doing business have been both misjudged and prejudged, that remedial measures that have been implemented may not have been necessary, and that legislation specific to these patents might have been passed and/or proposed without a sound basis for doing so. With the State Street decision now five years old, with litigation concerning these patents still possessing the ability to grab national headlines (as evidenced by a recent ruling against E-bay in an infringement lawsuit), and with no empirical studies of the quality of business method patents yet published, a systematic and theoretically-grounded evaluation of the relative quality of business method patents is as warranted as it is overdue.

To that end, I herein develop two hypotheses concerning the quality of business method patents and empirically test them using a random sample of over 3500 data processing patents granted by the USPTO between 1975-1999. In short, I find almost no support for

the “conventional wisdom” concerning patents on methods of doing business. Rather, I find that they compare very favorably to other patents on two fundamental dimensions of quality - the number of citations to the “prior art” and on their scope.

The remainder of this paper is organized as follows. In the next section I outline the major elements of the case that has been made against business method patents. I follow with the articulation of two testable hypotheses concerning the quality of patents on methods of doing business. In the ensuing section I describe the data sample and analytical methods that I employed. I finish with a discussion of the results, placing most my emphasis on their implications and limitations.

THE CASE AGAINST BUSINESS METHOD PATENTS

Although the charges leveled at business method patents are many and varied, they are amenable to a logical ordering which makes them easier to understand and evaluate. As shown in Table 1, below, complaints have been directed at three major areas: the USPTO itself, especially the *processes* and policies governing how it evaluates and grants patents on methods of doing business; the patents’ inherent characteristics, i.e. the *patents qua patents*; and the by-products of their unchecked *proliferation*.

Insert Table 1 About Here

Problems at the USPTO

Many commentators have laid the problem with business method patents at the doorstep of the agency responsible for their examination and approval, the USPTO. By

many accounts, an already perennially under-funded, chronically under-staffed, and increasingly over-worked USPTO was caught off guard by the flood of business method patents that followed in the wake of the State Street decision (Sullivan, 1999). This lack of preparedness, combined with the rapid and broader expansion in patentable subject matter (Thomas, 1999; Hall, Jaffe, & Tratjenberg 2002), is believed to have further degraded the USPTO's already limited capacity to perform adequate searches of prior art in this area (Kahin, 2001; Dreyfuss, 2001). The end result, according to many, was that the USPTO issued far too many low quality patents on methods of doing business (Merges, 1999), *not* that they failed to approve many otherwise "good" ones.¹

Moreover, it was also alleged that Congress, the body with budgetary control over the USPTO, lacked the needed incentives to fundamentally change the status quo concerning patent examination. Since 1990 the money for the USPTO budget was came from the fees the patent office charged inventors for applications, issuance and renewal. These fees, which more than doubled between 1990 and 1993, growing from \$175M to \$423M, and more than doubled again, to \$958M by fiscal year 2000, were well in excess of the costs associated with running USPTO (USPTO Annual Report, FY 2000). Over the last decade, Congress routinely withheld up to 25% of these fees and ,in effect, appropriating to the USPTO less than what had been collected in fees. The consequences of this arrangement for patent quality were not lost on the critics or supporters of business method patents. Merges (1999), as well as Jay Walker, the founder of the

¹ This is a point which may deserve closer attention. As far as I know, no critic of business method patents has ever suggested the numerous problems at the USPTO have resulted in too many "good" business method patents not getting granted – a condition statisticians would call a "Type II" error. Rather, the arguments have been that too many 'Type I' errors have been made, i.e. too many low quality patents have been awarded. Most of the recommendations that have been proposed for reforming the patent office, in general, or the evaluation of business method patents in particular, seem to be focused on reducing the rate of 'Type I' errors. See Hall (2003) for a summary of these recommendations.

privately-held internet R&D laboratory, Walker Digital, and co-inventor of over 200 business method patents (including Priceline.com), suggested that the portion of fees taken by Congress would be put to better use if reinvested in efforts to improve the examination process and to build better prior art databases (Gross, 2000).

And while senior patent office executives didn't deny the existence of problems stemming from this arrangement, they didn't exactly take all the responsibility for them either. Instead, they shared it liberally with both Congress and the courts. Witness this exchange between Stanford Law Professor Lawrence Lessig- a specialist in cyberlaw, a vocal critic of software and business method patents, and an advisor to the judge in the Microsoft anti-trust trial- and Q. Todd Dickinson- then director of the USPTO and advisor to the Clinton Administration on intellectual property issues (Cerf, et al 2000). The exchange took place during a debate on business method patents sponsored by the Washington D.C. Chapter of The Internet Society just after Dickinson stated that, in effect, his office's hands were tied by recent court rulings and the refusal of Congress to propose or enact remedial measures:

Lessig: People who are building the Internet clearly don't say they're building it on patent portfolios. If you genuinely are worried about what the consequences of different patent policies would be, you can recommend what Congress should do.

Dickinson: Sometimes, I wish I was a professor and had time to think about these things. I've got an office to run, and I've got 1,500 of these applications coming in every day.

Lessig: (This) seems to be an extraordinary indictment of our government-backed monopoly office. This is the most important part of our economy.

Patents Qua Patents

According to Chapter 10 of the U.S. Patent Act, an invention must satisfy three statutory requirements to be considered patentable: it must be useful, novel, and non-obvious.² Typically, any arguable use for an invention suffices to meet the usefulness requirement. Novelty and non-obviousness are established relative to the “prior art”, i.e. the extant body of knowledge or the array of prior solutions to the problem that the invention purports to solve. Once granted, a patent may be declared invalid if courts determine that it is not novel, i.e. if the solution to the problem was previously “known or used by others” or that it is obvious to a “person having ordinary skill in the area” of the subject matter. Events that constitute prior art for the purposes of determining novelty also constitute prior art for the purposes of determining obviousness. Criticism of business method patents themselves has focused more heavily on novelty and obviousness, as well as on one other non-statutory aspect, the patents’ scope.

Scope

Among criticisms the most frequently forwarded criticisms of business method patents are those asserting that they possess excessive scope (e.g. Frieswick 2001; Merges 1999). Although such criticisms were usually made without reference to a specific measure for scope, the breadth the patent’s claims seems to have been the primary concern (e.g. Merges, 1999 O’Connell, 2001). Far more often than not, criticisms of business method patents’ scope were supported by recourse to e-commerce and Internet patents like those assigned to Amazon.com, Priceline.com, or Walker Digital. For example, Walker Digital’s U.S. Patent Number 5794207, made several claims concerning on-line

² *United States Code, sections 101, 102, 103, covering the Patentability of Inventions.*

execution of what is widely-known as a "reverse-auction", i.e. an electronically-mediated bidding system wherein an intermediary informs sellers of a customer's preferred price for some good or service and, with that price then known, one of the sellers makes a successful bid. Another Walker Digital patent, U.S. Patent Number 5884274, describes a method and system that first estimates the fluctuation of a foreign currency during a specified time period and then calculates the cost of insurance according to the fluctuation. The concern many observers had with these patents was that the scope of the invention, absent the use of computers and software, seemed to encompass the definition of an entire business. If enforced literally and fully, it was feared that such broad patents could have effectively monopolized entire lines of business activity, not just the method or system of performing specific business processes. Thus, any firm seeking to perform a reverse-auction online, for example, could have been seen as infringing on the intellectual property claimed by Walker's reverse-auction patent.

Novelty

Much has also been made about business method patents' perceived lack of novelty. Much of that criticism seems to have been motivated by the perception that business method patents simply instantiated already well-known and widely used business practices and processes. The same critics who noted the patent office's numerous problems, particularly their lack of access to prior art and expertise in evaluating it, were also less than sanguine about the patent examiners' ability to distinguish novel business concepts from the "mere automation" of previously-known, manually-performed processes (Brown 1998). The USPTO was no doubt aware of these criticisms when, in

the summer of 2000, it issued revised examination guidelines in a joint report with the US, Japanese, and European patent offices. The report stated, among other things, that

...while a technical aspect is necessary for a computer-implemented business method to be eligible for patenting ...to merely automate a known human transaction process using well-known automation techniques is not patentable (USPTO, 2000).

A similar set of objections was raised by critics of business method patents applicable to business processes performed on the Internet. Several such commentators viewed internet and e-commerce patents' only novelty as being the first to "merely place" a previously well-known process on the internet (Business Method Improvement Act of 2000; Pressman, 2001). Lessig (2000a) went even further, by suggesting that the patenting of business method patents by Internet start-ups represented, at best, an inefficient allocation of resources away from those involved in truly inventive activity:

Awarding patents of that type [business method patents] siphons off resources from technologists to lawyers - from people making real products to people applying for regulatory privilege and protection. An increasingly significant cost of Net startups involves both defensive and offensive lawyering - making sure you don't "steal" someone else's "idea" and quickly claiming as yours every "idea" you can describe in a patent application.

Obviousness

If criticisms about business method patents' obviousness were not the most frequently voiced, they were certainly the most clichéd. Many a pundit could scarcely resist the temptation to describe patents on methods of doing business as "patently obvious" (Harbert 2000; Quinter 2001) and "patently absurd" (Gleick 2000; Pickering 2000).

Though much less dismissive in nature, the opinions of several prominent legal scholars essentially endorsed this notion. Bagley (2001:272), for example, labeled as "a glaring

omission” Amazon’s failure to cite any “bricks and mortar” or “real world business model prior art” in relation to its 1-click patent. This led her to the conclusion that were such prior art routinely considered, patents like “1-click” would be declared “obvious by analogy.” This would be best accomplished, she maintained, if the courts would simply recognize the Internet as “just another ‘place’, another location in which to shop, listen to music, check bank accounts, to do many of the things that are also done in more concrete locations” (p. 276). Although not limiting their concern to only patents on the Internet, the sponsors of the Business Method Patent Improvement Act of 2000 clearly had the same idea in mind when they advocated new standards for obviousness for business method patents:

Under the proposed standard, a business method invention will be presumed obvious when prior art references disclose a business method that differs from what is claimed only in that the claim requires a computer technology to implement the practice of the business method invention. (House Resolution, 1332, April 3, 2001).

Proliferation (or *The Usual Suspects*)

A final set of criticisms concerning business method patents involve the anticipated consequences of their unchecked proliferation. These criticisms were by no means new or unique to business method patents, in general, or Internet related business method patents, in particular. Rather, they were in essence the same criticisms raised during patent “floods” following technological breakthroughs in software, biotechnology, and railroads (Meurer 2002; Merges 2003). Among the most frequently expressed concerns were that business method patents would dramatically reduce incentives for innovation, unduly and unfairly limit competition (Merges 1999; Fields and Roediger 2001; Shelby 2001), particularly on the internet (Bezos, 2000; Lessig, 2000b), and dramatically

increase the costs and frequency of patent litigation (Posner, 2002; Dickinson, 2000; Yoches, 1999; Business Method Patent Improvement Act of 2000). According to the sponsors of the Business Method Improvement Act of 2000, the primary motivation for that legislation was to prevent such anticipated consequences from becoming a reality:

Something is fundamentally wrong with a system that allows individuals to get patents for doing the seemingly obvious . . . We're introducing this legislation in an effort to repair the system before the PTO awards more monopoly power to people doing the patently obvious" (Congressional Record, E1651-52, 2000).

The quote above is for instructive for a few other reasons. First, it demonstrates the link between all the three major areas of concerns with business method patents- the USPTO, patent quality, and adverse consequences. It also suggests that, just like criticisms of the patents' quality, the specter of adverse consequences became accepted fact, both in the US and abroad, on the basis of little or no objective evidence and in plain view of some evidence to the contrary.

SOME EXONERATING EVIDENCE

Despite the near unanimity of the numerous objections raised to patents on methods of doing business, as well as the undoubtedly sound legal bases for so many of them, five years of hindsight makes clear than many criticisms were perhaps too reliant on unrepresentative anecdotes, overly aware of the immediate context of the controversy, and imprecise in their definitions of key parameters of the debate. For example, rarely, if ever, did critics mention that patents on business methods have been routinely, albeit infrequently, granted for over 200 years by the USPTO, or that the systems and

procedures by which they were classified have steadily evolved (USPTO, 2001). Few took note of the fact that business method patents were just one of eleven (11) classes of “data processing” patents, a group of information technology patents whose functions were often similar to those on business methods, yet much less controversial. And although it was readily admitted that there existed many different kinds and possible definitions of business method patents, commentators seemed to ignore the fact that militated *against* their ability to generalize reliably about those patents’ quality or patent-worthiness. Moreover, operational definitions of quality and of business method patents themselves were rarely forthcoming. Quality, it seemed, lay in the eye of the beholder.

There was also, at times, considerable confusion as to how to define business patents, as evidenced by the fact that they were both compared with and/or referred to as “software” patents, “Business Model” patents, “Internet” patents, and “E-commerce” patents (e.g. Kirsch 2000). Moreover, few if any of these patents’ critics acknowledged the wealth of patent data that was available through a variety of sources- data that would permit the performance of systematic comparisons of business method patents to other information technology patents. It should also be noted that much of the criticism of business method patents followed immediately on the heels of the bursting of the dot.com bubble, subsequent decline of the information technology-laded NASDAQ, and the spectacular and highly publicized failure of numerous Internet start-ups. The leaves open the possibility that much of the criticism may have been the by-product of the operation of what management theorists have called fads and fashions in managerial discourse (Abrahamson and Fairchild 1999).

Finally, as previously observed, critics of business method patents rarely supported their conclusion with more than a few examples. Curiously, on at least one occasion when the lack of more concrete, empirical evidence about business methods was mentioned, this fact was used against the presumption of validity of business method patents, rather than in their favor. Stanford Law Professor Lawrence Lessig, at the aforementioned Internet Society debate offered this suggestion to patent office commissioner, Q. Todd Dickinson, as a way of addressing uncertainty attendant to lack of conclusive data (Cerf, et al, 2000):

So (my) proposal is... we have a moratorium on offensive use of (business method) patents until Congress conducts or commissions a significant and serious analysis to answer the question whether we have any reason to believe it's going to do us good to extend patents in this way.

While this proposal does not seem to have ever been seriously considered by the USPTO, it is not hard to see why such a moratorium would have seemed necessary in the early days after the State Street ruling, when its immediate implications were still so unclear and with so little comparative data available. Unfortunately, five years after the State Street decision, and three years after the Internet Society debate, the situation has changed very little: published empirical research on the quality of business method patents is nascent in the legal field and apparently non-existent in the economics of technological innovation and management information systems literatures. To date only it appears that only two empirical studies of business method patents have been published: one in legal studies entitled “The Business Method Patent Myth” (Allison & Tiller, 2003) and another in the area of financial management entitled “Where Does

State Street Lead? A First Look at Finance Patents” (Lerner , 2002). Notably, the authors of these two papers report varying degrees of support for the conventional wisdom concerning business method patents. The former study focused on business method patents involving the Internet. Its authors reported that Internet-related business method patents had significantly more patent references, non-patent references, and total references than patents in general, and that the non-patent prior art was of generally the same quality as other technology patents. They also report that Internet patents made significantly more claims, had more inventors, and insignificantly longer pendency times. Based upon these results, they concluded that

Internet business method patents appear to have been no worse than the average patent, and possibly even better than most. They also appear to have been no worse, and possibly even better than patents in most individual technology areas (p. 1).

Lerner’s (2002) studied an even narrower subset of business method patents, those issuing in the area of financial management. Among the findings of his examination of 455 finance patents issued between 1971 and 2000 were that they (1) made about one citation to academic prior art per every 20 such patents, a level approximately one-eighth that typical in the other academic-related patent classes (2) had longer pendency times and (3) experienced more rejections. He also observed that their examiners were (1) generally less experienced (2) less likely to have a doctorate in the field and (3) less likely to add citations to academic articles that examiners of patents in other academic-related patent classes. Interestingly, rather than attributing the relative failure of finance patents to cite relevant academic prior art less to a lack of patentability of the

subject matter, Lerner concluded that it may have been a reflection of a deficit in the training and experience of the patent's examiners.

HYPOTHESIS DEVELOPMENT

Of all the concerns raised about the quality of business method patents, two are especially amenable to empirical analysis: those concerning references to the prior art citations and those related to the patent scope. Inventors are legally required to cite all prior art of which they are aware and failure to cite relevant prior art has been found to be the most common basis for court decisions invalidating patents (Allison and Lemley, 1998) and patent scope has been found to be an important indicator of a patent's economic value, as well as to litigation outcomes (Lerner, 1994; Lanjuow & Schankerman, 2001). Above all, prior art is central to all the aforementioned concerns about business method patents, these two included. The numerous problems at the USPTO were thought to have impaired its ability to find and evaluate prior art. Patent examiners and the courts use prior art as the baseline upon which to infer (non)obviousness and novelty. The prior art represents the extant knowledge upon which new inventions build and over which they cannot make a claim.

According to Section 112 of the Patent Act, patent applications must contain written descriptions and drawings of the invention for which its inventor wishes to obtain a patent. The description and drawings must possess detail sufficient enough for a hypothetical, ordinarily skilled practitioner in the art to replicate the invention without recourse to experimentation. Following the description the applicants must define their invention, i.e. they must delimit the boundaries of their proposed invention, in one or

more claims. If inventors and patent attorneys fail to properly account for all of the relevant prior art when drafting the patent's claims, the breadth of those claims (not the number of claims) is likely to be broader than they should be because the claims encompass something already in the prior art. If during the examination of the patent, the PTO arrives at such a determination, the examiner may require that the claim(s) be narrowed. If the examiner fails to properly take into account all of the relevant prior art, then the patent will issue with one or more overly broad claims. And should the patent become the subject of an infringement suit, the court will once again construe the breadth of the litigated claims in light of the prior art considered by the examiner and by the prior art produced by the alleged infringer, that the examiner did not consider.

As noted previously, several concerns were raised about the amount of prior art cited by business method patents. *Merges* (1999:589), for one, held this to be true for “software implemented business concepts”:

People familiar with the technology involved and the history of various developments in it report that patents in this area are routinely issued which overlook clearly anticipating prior art. The average number of prior art references cited in software implemented business concept patents has been said to be fewer than five. Three out of five are citations to other US patents, leaving an average of two non-patent citations per patent.

Anecdotal evidence from recent infringement cases suggests that business method patents may indeed be deficient on this score. Amazon's original preliminary injunction against Barnes & Noble was vacated by the latter's presentation of prior art that the

former had neglected cite, i.e. the “CompuServe Trend System”, a service developed by CompuServe in the early 1990's that permitted investors to purchase stock charts with a single mouse-click (Taffet and Hanish, 2001). More recently, E-bay was ordered to pay \$35 million in damages after it was found to have infringed on a patent that was filed several months before founder Pierre Omidyar launched the auction site using a combination of his own programming and shareware (Wolverton 2002; Rosencrance 2003).

The “conventional wisdom” concerning the propensity of business method patents to cite prior art is somewhat at odds with the limited empirical evidence, however. Allison and Tiller (forthcoming, 2003) report that the subset of business method patents related to the Internet make *more* citations than patents in general. Lerner's (2002) study of finance patents, a sub-class of business method patents, had a higher proportion of applicant-supplied prior art to examiner-added prior art than patents in other relevant areas. He took this to indicate that patent examiners were less familiar with academic research in finance, a major source of prior art. Because many business method patents do not concern finance-related activities, pre-date the advent of the internet, and/or do not involve internet-related technologies, it is not clear whether their findings can be generalized to patents on business methods as a whole. Thus, lacking conclusive evidence to the contrary, my first hypothesis is consistent with the predictions of the “conventional wisdom”, i.e. that

H1: Business method patents cite less prior art than other patents.

As noted above, at least two economic studies have identified patent scope is associated with patent's economic value and litigation status. Lanjouw & Schankerman (2001), using the number of a patent's claims as a measure of scope, found that litigated patents tended to have more claims than unlitigated ones, thereby suggesting that patents that make more claims are more valuable. The assumption underlying this conclusion is that because patent litigation is so expensive, firms would only litigate those patents that they feel are worth the expense incurred. There are not a sufficient number of litigated business method patents, however, to determine whether this finding holds for that subset of patents. Allison & Tiller (forthcoming, 2003) report that internet-related business method patents made many more claims than did other technology patents. This finding of a greater number of claims is consistent with the "conventional wisdom" concerning business method patent scope if one takes the *number* claims as the better indicator of patent scope, but inconclusive if the *breadth* of those claims is the concern.

It is worth noting, as well, that although few of the critics of business method patents' scope specifically mentioned claims at all, a few legal scholars pointed to excessive breadth as a potential problem (e.g. Dreyfuss, 2000). That said, it is quite possible that the concern should not be limited to only the breadth of claims. Rather, it is clear that the two may, in fact, be related. For example, it could be the case that the greater number of claims a business method patent possesses, the greater the chance there is that it contains one or more overly broad claims. Thus, business method patents might be perceived as overly broad because they make too many claims. Conversely, the opposite could be the case. According to Allison & Lemley (1998), patents typically have just two to three rather broad *independent* claims which define the invention and

between seven to twelve, more narrow, *dependent* claims which further limit and qualify the scope of the *independent* claims with which they are associated. If the scope of business method patents is, in fact, as excessive as some have claimed, that excess may be reflected in a *smaller* number of total claims- smaller because the patents contained the same number of independent claims but many fewer dependent claims.

Thus, while it may be unclear whether the number or the breadth of claims is the most appropriate way to conceptualize scope, it is clear that they are not unrelated, and that possess a significantly different number of claims, could constitute evidence of the excessive scope of business method patents. Thus, in the absence of empirical evidence to refute the conventional wisdom concerning the scope of business method patents, at least as indicated by the number of claims, I hypothesize that:

H2: Business method patents do not make the same number of claims as do other patents.

RESEARCH METHODS

Data

The primary data for this study comes from the National Bureau of Economic Research (NBER) patent citation data file (Hall, Jaffe, & Trajtenberg, 2001)³. The data set contains detailed information on nearly 3 million patents issued by the USPTO between January 1963 and December 1999, a list of the nearly 16 million citations made to these patents between 1975 and 1999, and other information that makes possible the matching of the patents to all publicly-traded firms in the U.S. stock market (Hall, Jaffe, and Trajtenberg 2001). In addition to information on the number of citations and claims each patent made and received, the file includes data for several constructed variables, such as the share of “self-citations”, i.e. how many of the assignees’ own patents were cited, and demographic variables like the state and/or country of the first inventor and whether or not the assignee is an individual, corporation, or government entity. In that data file I identified 35,184 *data processing* patents, i.e. patents belonging to U.S. classes 700-707 and 715-717, granted by the USPTO between 1975 and 1999. The eleven (11) data processing classes are the larger group to which patents on methods of doing business are assigned by the USPTO. They cover a broad range of information technologies, such as generic control systems (Class 701), artificial intelligence (706), speech and signal processing and language translation (704), database management (707), software development tools (717), as well as patents on method of doing business (705).⁴

³ The data set can be obtained from <http://www.nber.org/patents>

⁴ The data processing classes are distinguished from patents on electrical computers and digital processing systems, classes 708-713, by the fact that the former concern methods and /or apparatuses used to process data and information while the latter cover the hardware and systems (class 708) and processor architectures (Class 712) with which the data is processed, as well as the methods, processes and apparatus for transferring data or instruction information between a plurality of computers or processes (class 709), for interconnecting or communicating between those computers (Class 710), for addressing, accessing, and controlling memory (Class 711), and for establishing the original operating parameters or data for a computer or digital data processing system (class 713).⁴

The subset of the 35,184 data processing patents that were assigned to primarily to class 705 (business methods) consisted of 3118 patents (8.9%). I drew a 10% random sample (n = 3519) of the data processing patents for use in this study. The sample contained 328 patents on business methods, i.e. patents whose primary classification was class 705. The sample data set was supplemented with patent data from two other sources: the Delphion® patent service and the USPTO website. The former was used to obtain the names of the primary patent examiner and the country of origin of the first inventor listed on each patent, the number of internal patent subclasses to which each patent was assigned, and information on the non-patent references. A software agent to obtain missing observations on the number of claims searched the latter.

Dependent Variables

Three patent statistics were used to test the two hypotheses concerning business method patents: the number of patent references, the number of non-patent references, and the number of claims. All of these statistics have been used extensively in empirical studies of patent characteristics in both economics (e.g. Jaffe, Tratjenberg, & Henderson, 1993) and law (e.g. Allison & Lemley, 1998, 2000).

Control Variables

Hall, Jaffe, & Tratjenberg (2001) note that patent cohorts may differ markedly with regard to their propensities to cite other patents, thus I added 23 dummy variables for the patent application years 1976-1998, leaving 1975 as the comparison category. Because a substantial proportion of variation in several patent statistics is attributable

to unobserved differences among patent examiners, I also added 45 patent examiner dummy variables (Cockburn, Kortum, and Stern, 2002). This number stems from my observation that the top 20% of the 225 examiners named in the data set examined nearly 84% of the 3519 data processing patents contained therein. Because of differences in the propensity of foreign inventors to cite patent and non-patent prior art, as well as different policies regarding the patentability of business method across the European, Japanese, and US patent offices, I also included three dummy variables to indicate whether the country of origin of the first inventor was either the United States, Japan, or one of the 20 European Patent Office member states. Finally, to account for impact on the propensity to cite that might be attributable to the rising number of patents granted, I also included the log of the US patent number in each regression. Since patent numbers are granted sequentially, this quantity indicates the (log of the) total number of granted by the USPTO.

Independent Variables & Analytical Model

The two citation variables, as well as the number of claims, were each non-negative, count variables and were highly over-dispersed, i.e. the variance is larger than the mean. Thus, I employed a negative binomial maximum-likelihood (generalized Poisson) rather than an ordinary-least squares (Cameron & Trivedi, 1998) regression. Each of the three dependent measures was regressed hierarchically on one or more of the above covariates, making for fifteen (15) regressions in all. The first of each set of five models featured the regression of the dependent measure on just a single categorical variable indicating membership in class 705. The second and third models include controls for the number of patent references (where appropriate), the log of patent number, and the

year dummies. The fourth model always adds forty-four (44) examiner dummies while the fifth and final model replaces the single independent variable with three categorical variables representing membership in one of three sub-classes business method patents: 705/001 (Automated Electrical Financial, Business Practice, or Management Arrangement); 705/050 (Business Processing using Cryptography); and 705/400 (Cost/Price Determination). The latter two models restrict the sample to only those patents examined by the top forty-five (45) examiners. Thus, the sample size in the fourth and fifth models is reduced from 3519 to 2951. Appendix 1 provides detailed descriptions of the largest subclasses of business method patents. Table 2, below, contains descriptive statistics and a correlation matrix for the key independent and control variables, respectively.

Insert Table 2 About Here

RESULTS

Table 3, below, contain the results of regression analyses performed to test the first and second hypotheses, respectively. In short, there is little to no support for either of the two hypotheses. The results of Model 1 indicate that there exists a very strong positive correlation between the number of patent citations made and membership in class 705 ($b = 0.257$, $z = 5.802$, $p < 0.001$). Model 2 shows that the strength of this relationship is weakened, yet still highly significant, after the inclusion of several controls ($b = 0.168$ $z = 3.865$, $p < 0.001$). The inclusion of year dummies, as shown in Model 3, significantly strengthens the model ($p < 0.001$) but does not lessen this positive relationship. The inclusion of examiner dummies in Model 4 does, however, capture some of the variation

attributed to membership in class 705, as evidenced by the fact that the magnitude of the coefficient on the independent variable is only half the level it had in Model 1 ($b = 0.128$, $z = 2.269$, $p < 0.05$). Model 5 shows there is almost no difference among the three subclasses of business method patents' citing of patent prior art relative to other data processing patents ($0.101 < b < 0.416$, $1.426 < z < 1.658$, $0.097 < p < 0.154$).

Insert Table 3 About Here

The case of non-patent prior art is quite different. The results indicate that the strong correlation between the number of non-patent references and membership in class 705 (Model 6, $b = 0.408$, $z = 3.624$, $p < 0.001$) is not maintained when the first group of controls is included (Model 7, $b = -0.149$, $z = -1.444$, $p > 0.10$). Model 8 indicates that, again, the inclusion of year dummies significantly improves the model ($p < 0.001$) with no change to slope coefficient of the independent measure ($b = -0.151$, $z = -1.464$, $p > 0.10$). The inclusion of examiner dummies also significantly improves the model ($p < 0.001$) but at the cost of furthering weakening the relationship between membership in class 705 and the number of non-patent prior art citations ($b = -0.044$, $z = -0.314$, $p > 0.10$). From Model 10 it can be observed that patents belonging to subclass 705/400, i.e. those involving cost/price determination, contain many fewer non-patent references than other data processing patents ($b = -1.337$, $z = -4.253$, $p < 0.001$) and that patents belonging to subclass 705/001 make an insignificantly larger number of such references ($b = 0.258$, $z = 1.623$, $p = 0.105$).

It is also worth noting the significant influence of several of the other controls. The log of the patent number is a highly significant predictor of the number of patent and non-patent references made across all eight (8) models where it is included ($p < 0.001$). In Models 2-5 it is the most significant predictor of the number of patent references made. In Models 6-10, it is second, however, to the number of patent references as a predictor of the number of non-patent references made. This suggests that much of the variation in the number of patent and non-patent citations is attributable to the increasing number of patents available to be cited. It was evident that some of the variation in the amount of prior art cited was attributable to the country of the first inventor. Patents assigned to US inventors were cited significantly more non-patent prior art than data processing patents from inventors in other countries ($p < 0.001$). Patents by Japanese inventors, however, generally cite significantly less patent-related prior art ($0.010 < p < 0.104$). Model 11, the first of Table 3 shows that membership in class 705 is highly correlated with the number of claims made by the patent ($b = 0.205, z = 4.791, p < 0.001$). This relationship is only marginally significant, however, when the first group of controls is included, as shown in Model 12 ($b = 0.076, z = 1.834, p > 0.10$). The strength of the relationship is diminished further by the inclusion of year and examiner dummies, as shown in Models 13 and 14 ($p > 0.13$). Model 15 indicates that there is no significant difference among the three subgroups of business method patents regarding the number of claims made ($-0.116 < b < 0.056, -1.094 < z < 0.856, p > 0.10$). Table 5, below, summarizes the results described above.

Insert Table 4 About Here

DISCUSSION

The above analysis provides scant support for the conventional wisdom concerning the quality of business method patents, i.e. that they are uniquely and innately inferior. Rather, my analysis suggests that these patents compare quite favorably to other data processing patents along several dimensions: on the whole they cite somewhat more patent prior art, not less; they make no fewer non-patent prior art citations; and they do not make a greater number of claims. The first two results cast serious doubt on whether business method are significantly under-reporting or overlooking prior art. The last finding suggests that business method patents are unlikely to have undue or excessive scope.

Further it should be noted that, with a few exceptions, each subclass of business method patents has a similar profile of patent statistics. This is evidenced by the fact that the replacement of the variable indicating membership in class 705 with three subclass variables did not generally improve the strength of the regression. Only in Model 10, was it observed that there was significant variation within the class of business method patents. Business method patents belonging to class 705/400, Cost/Price Determination, do make many fewer non-prior art citations ($b = -1.337$, $z = -4.253$, $p < 0.001$). This may be due to the fact that this class is populated by inventions related to postage, parking, and utility metering- technologies seemingly unlikely to generate large amounts of discussion in the popular press or to be the subject of academic and scholarly investigation.

That patents belong to class 705/001-automated business methods- do not differ from other data processing patents on any of the four patent statistics employed here, is also particularly important. This is the subclass to which the much-maligned Amazon, Double-Click, and Priceline patents belong. As shown in Table 5, below, a post-hoc comparison of these three patents' statistics to the average and standard deviations of the class as a whole shows that they did stand out markedly in only a few regards. Priceline's reverse auction patent made more than five times the average number of claims (101 vs. 19.6) as other business method patents ($p < 0.001$) and cited more than seven times as much non-patent prior art (23 vs. 3.1; $p < 0.01$). Double-Click's Banner Ad patent made more than 2.5 times the average number of claims (50 vs. 19.6), an amount significant at the 1% level. The arguably most controversial of all business method patents, Amazon's "1-click" patent, did not differ significantly along any of the four patent statistics employed in this study. This fact raises an interesting question: why it is that the most controversial business method patent, as well as the other members of subclass 705/001, received attention and scrutiny inversely proportional to their objective difference from a reasonably similar group of patents. Allison & Tiller (2003) attributed the yawning gap between the "myths" about the "singular inferiority" of business method patents and conclusions drawn from the objective appraisal of patent statistics to "bandwagon effects" and "information cascades", to the working out of socio-economic processes very similar to the managerial fads and fashions described by Abrahamson & Fairchild (1999).

Insert Table 5 Here

I offer here an alternative and perhaps complementary explanation. Perhaps the controversy can also be explained by examining what it is that distinguishes patents on method of doing business from other data processing patents. According to the USPTO Classification Manual, class 705 patents are expressly intended to cover inventions of method and apparatus “uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data.” Class 705/001, in particular, includes patents on healthcare record management and billing, computer implemented systems and methods for writing insurance policies; reservation, check-in, or booking systems; voting or election arrangement; the distribution or redemption of coupons or incentive/promotion programs; point of sale terminals or electronic cash registers; electronic shopping and remote ordering, inventory management, and a variety of accounting and financial transactions.

A careful examination of the description of the eleven (11) classes of data processing patents, as shown in Appendix 2, would seem to indicate that business method patents are far more concerned with human, economic, and managerial interaction than with physical action or transformation. That is to say, they concern the application of information technology to managerial work and to the interaction, communication, and decision-making between and among task groupings and economic actors. As such, they are less likely to involve performance of data processing strictly between computers and systems as much as to and between economic actors via these systems. Business method patents are far less likely, then, to concern data processing that pertains to the control, representation, positioning, or manipulation of tangible objects in physical space as they are with the exchange of information goods, services, in and through cyberspace.

MIS scholars might recognize these technologies as the strategic and inter-organizational systems that link firms to their environments, trading partners, and customers (Segars & Grover, 1998; Clemons & Row, 1992); that they are coordinative and collaborative technologies for improving efficiency and effectiveness of internal processes and upon whose existence modern organizations are increasingly dependent (Quinn, 1992); that they are the embodiments of the “set of logically related tasks performed to achieve... defined business outcome(s)” (Davenport & Short, 1990). The adoption, use, and impacts of these technologies have not been without controversy of their own- a controversy whose origins extend back to the first applications of information technology to business processes (e.g. Osborn 1954; Leavitt & Whisler, 1958; Simon, 1960; Hoos, 1960). What the MIS scholars may recognize in the controversy surrounding business method patents is yet another installment in a decades long conversation about the propensity of information technologies to impact the conduct, content, and the productivity of work (Dewan & Min, 1997), as well as the perceptions of workers and the cultures of the organizations where that work takes place (e.g. Barley, 1986; DeSanctis & Poole, 1994; Manning, 1996; Barrett and Walsham, 1999). What has been learned from five decades of study of the organizational use and consequences of information technology (IT) may be of considerable import to questions surrounding the quality of business method patents.

For example, research on the use of IT in the (re)design of business processes (Broadbent, Weill, & St. Clair, 1999) is not as trivial as phrases like “merely automating” (*Proceedings of the Trilateral Technical Meeting, 2000*) would seem to suggest. Similarly, studies of the design of e-commerce business models (Weill & Vitale, 2001)

and the performance of existing functions in the on-line environments may be neither as analogous to off-line processes or as obvious as has been suggested (e.g. Bagley, 2001). Empirical studies of the initial difficulties experienced by several “brick & mortar” firms in moving their operations past the “brochureware” stage (Greenberg, 2000), of internet-enabled retailing (Scott-Morton, Zettlemeyer, & Silva-Rosso, 2001) and consumer decision making (Smith & Brynjolfsson, 2001) and of the “sharing” habits of millions of on-line music lovers (Poblocki, 2001) all indicate that electronic business is not just an electronic copy of existing practices, that it consists of much more than the overlaying of web interfaces on well-known electronic or manual processes.

Research studies like these could make several contributions to the research and understanding of business method patents and perhaps even help repair their damaged reputation. First and foremost, the studies constitute a valuable source of non-patent prior art. As is the case with other classes of patents, academic and scholarly journals were frequently found among the non-patent references of several business method and data processing patents in this sample. Still, many of the patents were quite ahead of empirical research in areas such as on-line retailing. Going forward, however, the results of the growing body of empirical research on IT-enabled business processes and methods should take on increasing importance as prior art. For example, it is possible that the quality of empirical research that is cited could be an indicator of the quality of the patent as measured by other measures.

Secondly, the study of business method patents by MIS scholars could lead to better theories about the interaction between information technology (IT) and institutions

(Orlikowski & Barley, 2001). This might, in turn, lead to a deepened understanding of which business method patents should be considered novel and/or (non)obvious. An added benefit could be an eventual shift in the discourse and research away business method patents' alleged quality problems and towards the study of their consequences for the firms that use the technologies. Of especial interest might be an examination of the formerly "impossible" (Merges, 1999) business models, organization forms, patterns of communication, and types of work that they make possible, as well as whether they encourage innovation, alter competitive dynamics, and facilitate new entry (Merges, 2003).

Finally, it is possible, if not highly likely, that the work of many scholars in the MIS field may itself be patentable subject matter. Lerner (2002) found that not only was the work of academic researchers highly relevant to many of the types of financial patents that he studied, but that many finance faculty, especially those at universities with very aggressive technology transfer offices, had sought and obtained finance patents related to their academic and consulting work. Given the widespread interest among academics and practitioners in business process redesign and total quality management, software-enabled tools for business process analysis, internet security, knowledge management, and methods for organizing virtual work, there is little inherent reason why the work of MIS faculty should not also be patented.

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Table 1 Categorization of Criticisms of and Concerns about Business Method Patents

PROCESSES	PATENTS QUA PATENTS	PROLIFERATION
<p><i>The USPTO... is Overworked, Under-funded, Understaffed, etc.</i></p> <p><i>(Sullivan 1999; Gross 2000; Ratliff 2000; Pickering 2001)</i></p>	<p><i>Business Method Patents are... Too Broad</i></p> <p><i>(Poynder 2000; Sullivan 1997, 1999; Chiapetta, 2001; Merges, 1999; O'Connell 2001; Dreyfuss, 2000)</i></p>	<p><i>Business Method Patents Will... Stifle Innovation</i></p> <p><i>(Merges, 2003; BMPIA, 2000; Law, 2002; Pumfrey, 2000; Shapiro, 2000; Stoll, 2001; Development, 2001; Seminerio, 2000)</i></p>
<p><i>Lacks In-house Expertise</i></p> <p><i>(BMPIA 2000, Kirsch 2000; Fisher and Zollinger 2001; Kuester and Thompson 2001)</i></p>	<p><i>Obvious and/or Not Novel</i></p> <p><i>(Bagley, 2001; Shapiro, 2000; A. Ross, 2000; Lessig, 2000a; Hall, 2003; Quinn, 2002; Quinter, 2001)</i></p>	<p><i>Present Undue Barriers to Competition</i></p> <p><i>(Fields, 2001; Shelby, 2001; Merges, 1999, 2003; Bezos, 2000; BMPIA 2000)</i></p>
<p><i>Performs inadequate searches of Prior Art</i></p> <p><i>(Hart, Holmes et al. 1999; Buckingham and Sender 2000; National Research Council 2000)</i></p>	<p><i>Overlooks and/or cite too little relevant prior art</i></p> <p><i>(Dreyfuss, 2000; Hackett, 2001; Morgan, 2000; Morgan 2002; Development, 2001)</i></p>	<p><i>Increase Patent Litigation</i></p> <p><i>BMPIA 2000, Posner, 2002, Yoches, 1999; Dickinson, 2000</i></p>

Table 2

Descriptive Statistics & Correlation Matrix

	Descriptive Statistics				Zero-Order Correlations									
	Min	Max	Mean	St. Dev	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Business Methods (Class 705)	0	1	0.09	0.29	---									
(2) - Business Practice (Class 705/001)	0	1	0.06	0.24	0.805 ^a									
(3) - with Cryptography (Class 705/050)	0	1	0.01	0.12	0.378 ^a	-0.031 ^d								
(4) - Cost/Price (Class 705/400)	0	1	0.02	0.13	0.400 ^a	-0.033 ^b	-0.016							
(5) Number of Patent References	0	328	10.78	14.61	0.061 ^a	0.008	0.116 ^a	0.017						
(6) Number of Non-patent References	0	177	2.80	7.43	0.052 ^b	0.059 ^a	0.052 ^b	-0.041 ^c	0.470 ^a					
(7) Number of Claims	1	177	16.33	13.74	0.077 ^a	0.086 ^a	0.016	-0.003	0.131 ^a	0.176 ^a				
(8) Log of Patent Number	6.60	6.78	6.72	0.04	0.076 ^a	0.103 ^a	0.032 ^d	-0.054 ^b	0.137 ^a	0.189 ^a	0.184 ^a			
(9) 1st Inventor Country = US	0	1	0.60	0.49	0.123 ^a	0.112 ^a	0.032 ^d	0.037 ^c	-0.007 ^a	0.139 ^a	0.216 ^a	0.075 ^a		
(10) 1st Inventor Country = Japan	0	1	0.27	0.44	-0.102 ^a	-0.064 ^a	-0.058 ^a	-0.058 ^a	-0.070 ^a	-0.122 ^a	-0.167 ^a	-0.077 ^a	-0.736 ^a	
(11) 1st Inventor Country= Europe[%]	0	1	0.10	0.31	-0.030 ^d	-0.070 ^a	0.036 ^c	0.030 ^d	-0.009	-0.045 ^b	-0.084 ^a	-0.046 ^b	-0.415 ^a	-0.208 ^a

[%] Any of the 20 member countries of the European Patent Office as of 12/31/1999: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, Netherlands, Portugal, Spain, Sweden, Switzerland, Turkey, and the United Kingdom,

^a $p < 0.001$ ^b $p < 0.010$ ^c $p < 0.050$ ^d $p < 0.10$, 2-tailed test

Table 3 Negative Binomial Regression of the Number of *Patent References*, *Non-Patent References*, and *Claims* on Class 705 Membership

	Patent References					Non-Patent References					Number of Claims				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Business Methods (Class 705)	0.257 ^a (5.802)	0.168 ^a (3.865)	0.165 ^a (3.808)	0.128 ^c (2.269)		0.408 ^a (3.624)	-0.149 (-1.444)	-0.151 (-1.464)	-0.044 (-0.314)		0.205 ^a (4.791)	0.076 ^d (1.834)	0.062 (1.510)	4.16E-04 (0.007)	
- <i>Business Practice (Class 705/001)</i>					0.101 (1.535)					0.258 (1.623)					0.056 (0.856)
- <i>with Cryptography (Class 705/050)</i>					0.416 ^d (1.658)					-0.691 (-1.209)					-0.306 (-1.186)
- <i>Cost/Price (Class 705/400)</i>					0.149 (1.426)					-1.337 ^a (-4.253)					-0.116 (-1.094)
Patent References							0.022 ^a (8.151)	0.022 ^a (8.459)	0.026 ^a (8.441)	0.025 ^a (8.462)		0.005 ^a (5.281)	0.005 ^a (5.030)	0.006 ^a (5.269)	0.006 ^a (5.307)
Log of Patent Number		4.107 ^a (14.116)	7.764 ^a (4.697)	5.897 ^a (3.242)	5.940 ^a (3.262)		12.550 ^a (16.802)	24.550 ^a (6.529)	27.104 ^a (6.293)	26.037 ^a (6.082)		3.084 ^a (11.385)	10.977 ^a (6.704)	12.343 ^a (6.528)	12.205 ^a (6.454)
United States		0.032 (0.423)	0.057 (0.770)	-0.068 (-0.836)	-0.067 (-0.829)		0.614 ^a (3.466)	0.664 ^a (3.747)	0.666 ^a (3.308)	0.653 ^a (3.259)		0.363 ^a (5.106)	0.366 ^a (5.177)	0.385 ^a (4.712)	0.384 ^a (4.703)
Japan		-0.158 ^c (-2.052)	-0.125 (-1.627)	-0.232 ^b (-2.767)	-0.230 ^b (-2.746)		-0.211 (-1.511)	-0.179 (-0.973)	-0.170 (-0.819)	-0.184 (-0.886)		-0.002 (-0.033)	0.005 (0.064)	0.014 (0.167)	0.123 (0.147)
EPO		-0.033 (-0.398)	-0.009 (-0.103)	-0.149 (-1.664)	-0.151 ^d (-1.687)		0.074 (0.375)	0.101 (0.514)	0.189 (0.853)	0.201 (0.910)		0.029 (0.364)	0.040 (0.506)	0.077 (0.860)	0.081 (0.904)
Year Dummies (n=23)	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Examiner Dummies (n = 44)	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Model df	1	5	28	72	74	1	6	29	73	75	1	6	29	73	75
Model Chi-square	35.3 ^a	278.3 ^a	354.7 ^a	503.3 ^a	504.9 ^a	14.4 ^a	634.0 ^a	694.2 ^a	806.1 ^a	828.6 ^a	23.9 ^a	417.1 ^a	477.9 ^a	510.5 ^a	514.1 ^a
Change in Model df	--	4	23	44	2	--	5	23	44	2	--	5	23	44	2
Change in Model Chi-square		243.0 ^a	76.4 ^a	148.6 ^a	1.6		619.6 ^a	60.2 ^a	111.9 ^a	22.5 ^a	--	393.2 ^a	60.8 ^a	32.6 ^a	3.6
Number of Observations (N)	3519	3519	3519	2951	2951	3519	3519	3519	2951	2951	3519	3519	3519	2951	2951

^a p < 0.001 ^b p < 0.010 ^c p < 0.050 ^d p < 0.10, 2-tailed test

Table 4 Summary of Comparisons between Business Method and other Data Processing Patents

	<i>Prior Art (H1)</i>		<i>Scope (H2)</i>
	Less Patent Prior Art?	Less Non-patent Prior Art?	More Claims?
Business Methods	No	No	No
- <i>Business Practice</i>	No	No	No
- <i>Cryptography</i>	No	No	No
- <i>Cost/Price Determination</i>	No	Yes	No

Table 5 Comparison of Three Highly-Criticized Business Method Patents with Class 705 Averages

Patent	Patent Citations ¹	Non-patent Citations ²	Claims ³
Amazon's "1-Click" US Patent No. 5,960,411 Title: Method and system for placing a purchase order via a communications network	12	11	26
Priceline's "Reverse Auction" US Patent No. 5,897,620 Title: Method and apparatus for a cryptographically assisted commercial network system designed to facilitate buyer-driven conditional purchase offers	10	23 ^b	101 ^a
Double Click's "Banner Ad" US Patent No. 5,948,061 Title: Method of delivery, targeting, and measuring advertising over networks	11	5	50 ^c

Legend: ¹ mean (st. dev) = 13.6 (11.5); ² mean (st. dev) = 3.1 (8.0); ³ mean (st. dev) = 19.6(16.4); ^a p < 0.001 ^b p < 0.010 ^c p < 0.050, 2-tailed test

Appendix 1 Business Method Patent (Class 705) Sub-Class Descriptions

705/001: Automated financial, business practice, or management

arrangement. Subject matter wherein an electrical apparatus and its corresponding methods perform the data processing operations, in which there is a significant change in the data or for performing calculation operations wherein the apparatus or method is uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data. Includes: Health care management (e.g., record management, billing); Insurance (e.g., computer implemented system/method for writing policy); Reservation, check-in, or booking display for reserved space; Operations research; Voting or election arrangement; Transportation facility access (e.g., fare, toll, parking); Distribution or redemption of coupon, or incentive or promotion program; Restaurant or bar; Including point of sale terminal or electronic cash register; Electronic shopping (e.g., remote ordering); Inventory management; and Accounting; Finance (e.g., banking, investment or credit).

705/050: Business processing using cryptography. Subject matter including cryptographic apparatus or methods uniquely designed for or utilized in the practice, administration, or management of an enterprise, the processing of financial data, or where a charge for goods or services is determined, including: Usage protection of distributed data files; Postage metering system; Utility metering system; Secure transaction (e.g., Electronic Funds Transfer/Point of Sales);Home banking, and Electronic negotiation. Excluded herein is subject matter related to business processing having only nominal recitation of cryptographic processing such as encrypting, scrambling, etc.

705/400: Cost/price Determination. Subject matter wherein the data processing or calculating computer is designed for or utilized in determining charges for goods or services. Includes systems for the determination of charges for postage, utility usage, fluids, weight, distance (e.g., taximeter) and time (e.g., parking meter).

*Source: United States Patent Office Classification Manual,
<http://www.uspto.gov/go/classification/uspc705/defs705.htm#C705S400000>*

Appendix 2 Major Classes of Data Processing Patents

Source: United States Patent Office Classification Manual,
<http://www.uspto.gov/go/classification/selectnumwithtitle.htm>

CL 700: Generic Control Systems or Specific Applications. This is the generic class for the combination of a data processing or calculating computer apparatus (or corresponding methods for performing data processing or calculating operations) AND a device or apparatus controlled thereby, the entirety hereinafter referred to as a "control system". An example of such a control system includes a data processing or calculating computer interactively connected to an external device to sense a condition (e.g., position) of such external device. The processed data representing the sensed condition develops a control signal to be applied to such external device to perform a control function (e.g., optimization).

CL701: Vehicles, Navigation, & Relative Location. This class provides for electrical computers, digital data processing systems, and data processing processes for transferring data between a plurality of computers or processes wherein the computers or processes employ the data before or after transferring and the employing affects the transfer of data there between. More specifically, this class provides for the following subject matter: electrical apparatus and corresponding methods to: indicate a condition of a vehicle; to regulate the movement of a vehicle; to monitor the operation of a vehicle, or to solve a diagnostic problem with the vehicle, to determine the course, position, or distance traveled; to determine the relative location of an object (e.g., person or vehicle); and may include communication of the determined relative location to a remote location.

CL702: Measuring, Calibrating, or Testing. This class provides for apparatus and corresponding methods wherein the data processing system or calculating computer is designed for or utilized in an environment relating to a specific or generic measurement system, a calibration or correction system, or a testing system.

CL703: Structural Design, Modeling, Simulation, & Emulation
This class provides for electrical data processing apparatus and corresponding methods for the following subject matter: Processes or apparatus for: sketching or outlining of layout of a physical object or part; representing a physical process or system by mathematical expression; modeling a physical system which includes devices for performing arithmetic and some limited logic operation upon an electrical signal, such as current or voltage, which is a continuously varying representation of physical quantity; modeling to reproduce a non-electrical device or system to predict its performance or to obtain a desired performance; for modeling and reproducing an electronic device or electrical system to predict its performance or to obtain a desired performance; and that permits the data processing system to interpret and execute programs written for another kind of data processing system.

CL704: Speech Signal Processing, Linguistics, Language Translation, & Audio (De)Compression. This is the generic class for apparatus and corresponding methods for constructing, analyzing, and modifying units of human language by data processing, in which there is a significant change in the data. This class also provides for systems or methods that process speech signals for storage, transmission, recognition, or synthesis of speech. This class also provides for systems or methods for bandwidth compression or expansion of an audio signal, or for time compression or expansion of an audio signal.

CL705: Financial, Business Practice, Management, or Cost/Price Determination. This is the generic class for apparatus and corresponding methods for performing data processing operations, in which there is a significant change in the data or for performing calculation operations wherein the apparatus or method is uniquely designed for or utilized in the practice, administration, or management of an enterprise, or in the processing of financial data. This class also provides for apparatus and corresponding methods for performing data processing or calculating operations in which a charge for goods or services is determined. This class additionally provides for subject matter described in the two paragraphs above in combination with cryptographic apparatus or method.

CL 706: Artificial Intelligence. This is a generic class for artificial intelligence type computers and digital data processing systems and

corresponding data processing methods and products for emulation of intelligence (i.e., knowledge based systems, reasoning systems, and knowledge acquisition systems); and including systems for reasoning with uncertainty (e.g., fuzzy logic systems), adaptive systems, machine learning systems, and artificial neural networks. This class includes systems having a faculty of perception or learning. This class also provides for data processing systems and corresponding data processing methods for performing automated mathematical or logic theorem proving.

CL 707: Database & File Management or Data Structures. This is the generic class for data processing apparatus and corresponding methods for the retrieval of data stored in a database or as computer files. This class provides for data processing means or steps for organizing and inter-relating data or files (e.g., relational, network, hierarchical, and entity-relationship models); and generic data, file and directory up-keeping, file naming, and file and database maintenance including integrity consideration, recovery, and versioning.

CL 715: Presentation Processing of Document. This class provides for data processing means or steps wherein human perceptible elements of electronic information (i.e., text or graphics) are gathered, associated, created, formatted, edited, prepared, or otherwise processed in forming a unified collection of such information storable as a distinct entity.

CL 716: Design & Analysis of Circuit or Semiconductor Mask
This class provides for electrical data processing apparatus and corresponding methods for the following subject matter: Processes or apparatus for sketching, designing, and analyzing circuit components and for planning, designing, analyzing, and devising a template used for etching circuit pattern on semiconductor wafers.

CL 717: Software Development, Installation & Management
This class provides for software program development tool and techniques including processes and apparatus for controlling data processing operations pertaining to the development, maintenance, and installation of software programs. Such processes and apparatus include processes and apparatus for: program development functions such as specification, design, generation, and version management of source code programs; debugging of computer program including monitoring, simulation, emulation, and profiling of software programs; and translating or compiling programs from a high-level representation to an intermediate code representation and finally into an object or machine code representation, including linking, and optimizing the program for subsequent execution.