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Bilski and the Information Age a Decade Later

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Bilski and the Information Age a Decade Later

Michael J. Meurer*

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Abstract

In the years from *State Street* in 1999 to *Alice* in 2014, legal scholars vigorously debated whether patents should be used to incentivize the invention of business methods. That attention has waned just as economists have produced important new research on the topic, and just as artificial intelligence and cloud computing are changing the nature of business method innovation. This chapter rejoins the debate and concludes that the case for patent protection of business methods is weaker now than it was a decade ago.

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INTRODUCTION

About two decades ago the Federal Circuit threw open the doors of the U.S. Patent Office to business method patent applicants. *State Street* announced that methods that yield a useful, concrete, and tangible result would be eligible for patent protection.¹ This decision roughly coincided with the birth of ecommerce and an explosion of business method patents in the U.S. About a decade ago the Supreme Court stepped back from *State Street* by installing screens that blocked applicants from patenting business methods claimed as abstract ideas. *Bilski*² characterized claims to a method of hedging against energy price fluctuation risk as abstract, and therefore not eligible for patent protection.³ All nine justices supported this result, but their opinions revealed a significant split on the question of whether any patents on business methods should be permitted. Three justices joined Justice Stevens who called for categorical exclusion of business methods from the patent system.⁴ Three other justices joined Justice Kennedy who praised business inventions from this new “Information Age” and fretted that overly strong screens to eligibility established during the “Industrial Age” were no longer appropriate.⁵ While recognizing the method at hand was claimed too abstractly to be patent eligible, these justices seemed confident that the future would bring forth many

¹ *State St. Bank & Tr. Co. v. Signature Fin. Grp., Inc.*, 149 F.3d 1368, 1373 (Fed. Cir. 1999).

² *Bilski v. Kappos*, 561 U.S. 593, 612 (2010).

³ *Id.* (“The patent application here can be rejected under our precedents on the unpatentability of abstract ideas.”)

⁴ Justice Stevens built a historical case that:

A business method is not a ‘process.’ *Id.* at 644. He also reinforced his case by reviewing patent scholarship and concluding: “I find it hard to believe that many of our entrepreneurs forwent business innovation because they could not claim a patent on their new methods.” *Id.* at 651. In a cautionary note, Justice Kennedy cited his concurrence in *eBay* which lamented that opportunistic patent litigation can be facilitated because “some business method patents raise special problems in terms of vagueness and suspect validity. *Id.* at 608 (citing *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 397 (2006) (Kennedy, J., concurring)).

business method inventions deserving of patents.⁶ The ninth justice, Justice Scalia, found the middle ground; he did not join the portion of Kennedy’s opinion discussing the Information Age.⁷ Nor did he join Stevens by embracing a categorical exclusion of business methods.⁸

Likewise, IP scholars have split on the question of whether business method patents are socially desirable and whether they should be permitted.⁹ Many scholars raised their voices soon after *State Street*, arguing that patent incentives were not necessary to induce invention of new business methods and that the patents would spawn opportunistic and anti-competitive patent litigation.¹⁰ Other voices responded to *Bilski* and *Alice*¹¹ (reaffirming and extending *Bilski* three years later), expressing fears that development of business-related information technologies would be delayed by

⁵ *Bilski*, 561 U.S. at 605.

⁶ Justice Kennedy wrote:

The machine-or-transformation test may well provide a sufficient basis for evaluating processes similar to those in the Industrial Age—for example, inventions grounded in a physical or other tangible form. But there are reasons to doubt whether the test should be the sole criterion for determining the patentability of inventions in the Information Age. As numerous amicus briefs argue, the machine-or-transformation test would create uncertainty as to the patentability of software, advanced diagnostic medicine techniques, and inventions based on linear programming, data compression, and the manipulation of digital signals.

⁷ *Id.* (Scalia, J., concurring).

⁸ *Id.* (Scalia, J., concurring).

⁹ Compare John F. Duffy, *Why Business Method Patents?* STAN. L. REV. 1247, 1279-80 (2011) (“To the extent that a patent claim seems to fit within the rigors of this newly emerging field [of financial engineering], it will be more likely to be held patentable”) to Peter S. Menell, *Forty Years of Wondering in the Wilderness and No Closer to the Promised Land: Bilski’s Superficial Textualism and the Missed Opportunity to Return Patent Law to its Technology Mooring*, 63 STAN. L. REV. 1289, 1312 (2011). (“There is no reason to believe that “business methods” have become a science or technology fitting the functional patent mold during the course of the past two centuries.”)

¹⁰ Rochelle Dreyfuss, *Are Business Method Patents Bad for Business?* 16 Santa Clara High Tech. L. J. 263, 275 (2000); Michael J. Meurer, *Business Method Patents and Patent Floods*, 8 Wash. U. J. L. & Pol’y, 309 (2002); Bronwyn H. Hall, *Business Method Patents, Innovation, and Policy*, (U.C. Berkeley Econ. Dept. Working Paper No. E03-331).

¹¹ *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 573 U.S. 208 (2014).

diminished patent incentives, and that start-ups in fields like fin-tech would particularly suffer.¹²

Given a decade of additional experience with business method patents in the U.S., it's a good time to revisit this debate. IP scholars remain divided on the question of whether business methods should be eligible for patent protection, but we have learned that there is a great appetite for patent protection of business methods in the Information Age, and neither *Bilski* nor *Alice* did much to slow the growth in patenting of business methods. We have also learned that business method patents are favorites of patent assertion entities. Despite solid evidence of social harm from opportunistic assertion of these patents, many scholars remain unconvinced that these practices justify eliminating patent protection of business methods.

The cost-benefit analysis of business method patenting may have changed because the technological landscape for business method inventions is now quite different from a decade ago. Previous analyses had little to say about two new technologies now widely used to implement business methods – cloud computing and artificial intelligence. These new technologies are opaque to would-be imitators and business method innovators can be amply rewarded by trade secrecy, copyright, and other non-patent means for appropriating innovation value.¹³ Contrary to Justice Kennedy's assumption, the advent of an Information Age does not necessarily increase the social value of business method patents.

¹² See Duffy, *supra* note 9, at 1263-69 (2011) (contending that the growth of operations research and financial engineering has made many business methods appropriate inventions for patent protection); Daniel F. Spulber, *Should Business Method Inventions be Patentable?*, 3 J. LEGAL ANALYSIS 265, 272 (2011) (contending that patents on business method inventions support entry and growth of high-tech entrepreneurs).

¹³ See *infra* Part III.B.

This chapter comprises four parts. Part I traces the path of the law of subject matter eligibility for business method inventions during this century. Part II describes an explosion of business method patenting that has not faltered despite limitations imposed by *Bilski* and *Alice*. Part III explains how business method innovators capture value from their innovations using patents and other forms of intellectual property, and by using strategies that do not depend on intellectual property. Finally, Part IV enumerates the social costs from business method patents and compares them to the incentive benefit from these patents.

I. PATENT ELIGIBILITY OF BUSINESS METHODS

The U.S. Patent Act offers limited guidance regarding coverage of business methods. Section 101 offers patent protection to new and useful processes. Section 100(b) unhelpfully defines process as “process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.” The plain meaning of the statute is remarkably broad. It is easy to imagine that American courts and the Patent Office would recognize every new and useful business method as eligible for patent protection. At the turn of the century, after *State Street v. Signature Financial*, that indeed seemed to be the case. For most of the aughts I did not cover the eligibility of business methods or software in my patent class on the belief that any such invention was eligible.

American patent law changed course a decade later.¹⁴ In 2010 *Bilski v. Kappos* rejected as ineligible a claim to a method of hedging against price fluctuations. During

¹⁴ John Duffy observed that “in *State Street*, the Federal Circuit welcomed business method patents.” Duffy, *supra* note 9, at 1277. Duffy continues:

[But] in *Bilski*, the Supreme Court’s tone was utterly different. The Court accepted the patentability of business methods but it did so grudgingly, with the majority opinion even

oral arguments in *Bilski* Justice Breyer jokingly puzzled over the boundary between eligible and ineligible business method inventions by asking whether he could get a patent if he invented “a great, wonderful, really original method to teach antitrust law that kept 80% of the students awake.”¹⁵ The unanimous decision made it clear Breyer’s method falls on the wrong side of the line. The Supreme Court reinvigorated a judicially created exception to the statutory language that on its face apparently allows all method inventions to be patented.¹⁶ The exception bars patent claims directed to abstract ideas like the contested claims in *Bilski*.

After *Bilski*, courts and patent prosecutors struggled to identify the boundary between claims directed to abstract ideas and claims that would pass muster as eligible applications of abstract ideas. Many thought that computer implementation of a business method was sufficient to make the method patent eligible.¹⁷ In 2014 the Court rejected that approach in *Alice v. CLS Bank*.¹⁸

Alice created a two part test of subject matter eligibility building on *Mayo v. Prometheus*,¹⁹ a case decided after *Bilski* that addressed the eligibility of a method for optimizing a certain drug therapy. Step one asks whether the claim is directed to an

emphasizing that the law might not allow “broad patentability” of such inventions. And the difference was more than just tone. In *State Street*, the Federal Circuit held unequivocally that the invention at issue there did fall within patentable subject matter. *Bilski* unequivocally held the opposite.

Id. at 1277-78.

¹⁵ Daniel Crane, ANTITRUST (2014)

¹⁶ The Supreme Court has repeatedly identified three judicially created exceptions to the statutory language: “Laws of nature, natural phenomena, and abstract ideas are not patentable.” *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 569 US 576, 589 (2013)

¹⁷ Peter Menell resisted this view. “Merely implementing a process—such as running a business or entertaining an audience—on a machine should not thereby make the process or machine eligible for patent protection. The process must make a technological advance.” Menell, *supra* note 9, at 1312–13.

¹⁸ *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 573 U.S. 208, 212 (2014). For a recent iteration of this mode of analysis see *Universal Secure Registry LLC v. Apple Inc.* (Fed. Cir. 2021) (claims to methods of securing electronic payments ruled ineligible subject matter directed to abstract ideas; conventional computer implementation does not disclose an inventive concept).

abstract idea. If yes, then step two asks whether there are additional elements that impart an inventive concept and transform the claim as a whole into a patent eligible application of the abstract idea.²⁰ The contested claims in *Alice* were directed to the abstract idea of using an intermediary to mitigate settlement risk in a financial transaction. Elements in the claims that added a generic computer implementation did not transform that idea into a patent eligible invention.

The courts and the Patent Office have had ample opportunity to flesh out this test from *Alice* (often called the *Mayo* test); *Alice* has served as “the basis of nearly a 1,000 court decisions.”²¹ Despite such intensive use, the test remains controversial and outcomes are hard to predict. Talha Syed recently concluded what many others have said: “Everyone now knows there is an *Alice* two-step test, but no one knows quite what it means.”²²

It is hard to draw a line between business method patents and other software implemented processes, but it seems clear that many business method claims have been assessed for eligibility post-*Alice*, and the test has been difficult to apply to this subset of process claims challenged as ineligible subject matter. Some judges are inclined to rely on their understanding that many business methods are not “technological” to exclude them from patent eligibility.²³ In 2021 the Federal Circuit rejected as ineligible subject matter claims “directed to data privacy, customer loyalty systems, credit card fraud,

¹⁹ 566 U.S. 66 (2012).

²⁰ *Alice* 573 U.S. at 217-18.

²¹ Mark A. Lemley & Samantha Zyontz, *Does Alice Target Patent Trolls?* 18 J. EMPIR. L. STUD. 47, 48 (2021).

²² Talha Syed, *Owning Knowledge: A Unified Theory of Patent Eligibility*, SSRN Working Paper (2020) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3699014.

²³ *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 721 (Fed. Cir. 2014) (Mayer, J., concurring) (“A rule holding that claims are impermissibly abstract if they are directed to an entrepreneurial objective, such as

transmitting and storing data, and retailer finder fees.”²⁴ But other Federal Circuit decisions have been more permissive.²⁵ Daryl Lim contends that: “though ‘labor’ or ‘investment’ in developing technology is generally insufficient to qualify, the Federal Circuit has used economic investment to justify its conclusion that the claimed invention was not ‘conventional, routine, and well-understood’ under *Alice*.”²⁶

Patent prosecutors have adjusted patent disclosures and narrowed claim scope in business method applications to include technological implementations that go beyond the merely generic computer-related limitations appearing in claims in *Alice*. But prosecutors are unsure how far to narrow their claims. Federal Circuit Judge Newman worries: “inconsistency and unpredictability of adjudication have destabilized technologic development in important fields of commerce.”²⁷ Like most commentators, I agree the law has been inconsistent and hard to predict, but in Parts II through IV, I will explain why I doubt that *Alice* has “destabilized technologic development.”

Outside the U.S. the question of whether business methods should be protected by patents is also controversial, and application of eligibility rules is fraught.²⁸ The Japanese Patent Office was skeptical at first, but recently has been more receptive to business

methods for increasing revenue, minimizing economic risk, or structuring commercial transactions, rather than a technological one, would comport with the guidance provided in both *Alice* and *Bilski*.”

²⁴ Anthony J. Fuga, *Top Section 101 Patent Eligibility Stories of 2021*, AIPLA Newstand (Dec. 22, 2021), <https://bit.ly/348wkvp>.

²⁵ *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014) (finding eligibility of a claim to online advertising method).

²⁶ Daryl Lim, *Response: The Influence of Alice*, 105 MINN L. REV. HEADNOTES 345, 349 (2021) (discussing *Exergen Corp. v. Kaz USA, Inc.*, 725 F. App'x 959, 966 (Fed. Cir. 2018)).

²⁷ *Yu v. Apple*, 1 F.4th 1040, 1046-49 (Fed. Cir. 2021) (Newman, J., dissenting).

²⁸ Susan J. Marsnik & Robert E. Thomas, *Drawing a Line in the Patent Subject-Matter Sands: Does Europe Provide a Solution to the Software and Business Method Patent Problem*, 34 B. C. INT'L & COMP. L. REV. 227 (2011) (describing conflicts across European courts and with the EPO regarding patent eligibility of business methods); Eugene F. Derényi et. al., *Protection of Business Method Patents Outside the United States*, 1 No. 5 Landslide 18, 22 (2009) (reporting that in Japan business method patents are rejected on inventive step grounds more often than other types of patents).

method patents.²⁹ The European Patent Convention explicitly excludes business methods “as such” from patentability under Article 52(2)(c).³⁰ But business methods can be protected if they contain novel features that are “technical and solve a technical problem in a non-obvious manner.”³¹ The EPO found the technical effect requirement was satisfied in a case featuring a computer-implemented auction method.³² In contrast, the U.K. refused to grant a patent to a hedge fund “on a computer system that enables it to synchronize trades across multiple exchanges at the same time.”³³ The method was not eligible subject matter because it avoided a technical problem rather than solved a technical problem.³⁴ Similar to the U.S., “considerable consensus exists that the [technical effect] rule in Europe is nebulous and that clarification is needed.”³⁵

II. DID *BILSKI* AND *ALICE* DISCOURAGE BUSINESS METHOD PATENTING?

Bilski and *Alice* constrained business method patent prosecutors by reducing the potential scope of business method patent claims. On average, this sort of constraint increases the expected cost of prosecution and reduces the value of business method

²⁹ “The ambiguities associated with finance patents in the U.S. have also manifested elsewhere. European patent law explicitly excludes methods of doing business and finance from patent protection. But given the complexity of the definitions, some finance patents appear to have made it past these categorical exclusions. Meanwhile, Japan has shifted from one of the most skeptical patent offices regarding business methods to a much more permissive one: its rejection rate for these patents, of which finance constitutes a considerable number, fell from 92% in 2000 to 34% in 2012 through 2014 (Japanese Patent Office, 2019).” Josh Lerner, Amit Seru, Nicholas Short & Yuan Sun, *Financial Innovation in the 21st Century: Evidence from U.S. Patents* 63 SSRN Working Paper (June 22, 2021)

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871977

³⁰ See Robert E. Thomas & Larry A. DiMatteo, *Harmonizing the International Law of Business Method and Software Patents: Following Europe’s Lead*, 16 TEX. INTELL. PROP. L.J. 1, 17 (2007).

³¹ Susan J. Marsnik & Robert E. Thomas, *Drawing a Line in the Patent Subject-Matter Sands: Does Europe Provide a Solution to the Software and Business Method Patent Problem*, 34 B. C. INT’L & COMP. L. REV. 227, 231-32 (2011); ReedSmith, *Business Method Patents in Europe*, https://www.kazpatent.kz/sites/default/files/business_method_patents_in_europe_en.pdf

³² Case T-258/03, *Auction Method/HITACHI*, [2004] O.J.E.P.O. 575, 587 (Technical Bd. Appeal 3.5.01, Apr. 21, 2004).

³³ Jonathan Browning, *Hedge Fund Renaissance Loses Bid to Patent Speedy Algorithm*, Bloomberg Law, July 27, 2021.

³⁴ *Id.*

³⁵ Marsnick and Thomas, *supra* note 28, at 297.

patents. If so, the result should be fewer business method patent applications because patents would no longer get filed on marginal business method inventions. Judge Moore assumed that *Alice* would have a significant effect on business method patents when she lamented “the death of hundreds of thousands of patents including all business method, financial system, and software patents.”³⁶ Although she was looking at the fate of patents already granted, I expect she would have predicted the death of future business method patenting as well. It turns out that has not happened.

A. What Kinds of Business Methods Are Patented?

Measuring the numbers, trends, and characteristics of business method patents is tricky because there is no consensus on how to define business methods, and given a workable definition it is hard to identify patents containing claims that match the definition. Some commentary fails to distinguish business method patents from software patents. Such a distinction is easy to motivate by comparing the claims in *Bilski* directed to a method of hedging against price fluctuations that the applicant claimed without a software limitation to the claims in *Alice* directed to a method for mitigating settlement risk that the applicant claimed with generic software limitations. The *Bilski* patent is a business method patent but not a software patent. Even before *Bilski* patented business methods typically featured software used to implement administrative tasks within a firm or to offer new services to customers (often in markets for financial products).³⁷ Of course, most software patents do not cover business methods, and thus the analyst must

³⁶ CLS Bank Int’l v. Alice Corp. Pty, 717 F.3d 1269, 1313 (Fed. Cir. 2013) (Moore, J., dissenting in part).

³⁷ “The majority of [financial sector] R&D is spent on software development and the majority of its R&D workers are programmers and software engineers. Using the definition of Bessen and Hunt (2007), four out of five business method patents are also software patents.” Robert M. Hunt, *Business Method Patents and U.S. Financial Services 1* (Fed. Rsrv. Bank of Phila., Working Paper No. 08-10/R, 2011) [hereinafter Hunt, *Business Method Patents*] (citing James Bessen & Robert M. Hunt, *An Empirical Look at Software Patents*, 16 J. ECON. MGMT. AND STRATEGY 157).

be careful to exclude patents directed to non-business methods implemented using software.

Analysts use patent classifications, the text of patents, the identity of assignees, and other data to identify business methods.³⁸ Most of the older studies identified U.S. patents in Class 705: *Data Processing: Financial, Business Practice, Management, or Cost/Price Determination* as business method patents.³⁹ This reasonable approach is underinclusive because of classification errors but especially because applicants sometimes disguise their application to avoid Class 705 and the increased scrutiny that sometimes has been given to business method patent applications.⁴⁰ In addition to relying on USPTO classification, Lerner et al. made use of whether a patent was assigned to a financial institution, and examined the patent text with machine learning techniques to identify business method patents.⁴¹

Business methods can be organized into functional categories or by industry. Functions have been defined as: “new products or services (e.g., structured investments), new processes/procedures (e.g., risk management systems), and new organizations (e.g., internet banking).”⁴² This type of categorization may be helpful when thinking about

³⁸ The U.S. Patent Classification (USPC) was replaced by the Combined Patent Classification scheme in January 2013, and class G06Q is new counterpart to class 705. Lerner et al., *supra* note 29, at 11.

³⁹ See e.g., Stefan Wagner, *Business Method Patents in Europe and their Strategic Use: Evidence from Franking Device Manufacturers*, 17(3) ECON. INNOVATION & NEW TECH. 173 (2008) (using U.S. patents in Class 705 that were also filed in Europe to study European business method patents); Megan M. La Belle & Heidi Mandanis Schooner, *Big Banks and Business Method Patents*, 16 U. PA. J. BUS. L. 431 (2014) (studying finance industry patenting in the U.S.).

⁴⁰ John R. Allison & Emerson H. Tiller, *The Business Method Patent Myth*, 18 BERKELEY TECH. L. J. 987, 1082 (2003).

⁴¹ See e.g., Lerner et al., *supra* note 29 (using machine learning analysis of patent text to identify finance-related business patents). “[M]ost finance patents were classified under the current system within G06Q 40 (Finance; Insurance; Tax strategies; Processing of corporate or income taxes), a substantial number of blockchain and cryptocurrency patents were classified within H04L 09 (Cryptographic mechanisms or cryptographic arrangements for secret or secure communications).” *Id.* at 11.

⁴² La Belle & Schooner, *supra* note 39, at 437 (deriving categories from Frame and White. W. Scott Frame & Lawrence J. White, *Empirical Studies of Financial Innovation: Lots of Talk, Little Action?* 3 (2002),

trade secrecy as a substitute for patent protection (more likely for back office procedures that can be hidden like risk management).

Most business method patents are assigned to corporations, thus analysts have studied industry patenting patterns. “Business method patents are prevalent in the finance and information technology industries, but about thirty percent of the patents have been acquired by firms in manufacturing and trade.”⁴³ Scholars have devoted particular attention to finance related patents. Lee and Soh identified certain terms as especially common in recent finance related patents: “auction marketplace, consumer authentication, asset allocation system, advisory service, and trading system.”⁴⁴ Lerner et al. find that over 24,000 financial patents were granted in the U.S. before February 2019 that had application dates from 2000-2018.⁴⁵ Immediately after *State Street* most of these patents were owned by computer makers and other large technology companies, but more recently there has been a growth in patenting by financial services companies and fintech start-ups.⁴⁶ Before 2006 only Citigroup did much patenting in Class 705, but during 2007-2012, seven of the eight largest financial institutions did substantial patenting in Class 705.⁴⁷ The portfolios of business method patents owned by these financial

available at http://www.philadelphiafed.org/researchand-data/events/2002/financial-services-and-payments/papers/frame_white.pdf. It is not commonly studied but a recent paper identified a significant number of organizational business method patents. Valery Yakubovich & Shuping Wu, *Is Organizational Innovation a Technology? Evidence from Patent Data 1* (February, 2021) (significant number of U.S. patents granted that cover organizational innovation).

⁴³ Tian Heong Chan, Anandhi Bharadwaj & Deepa Varadarajan, *Business Method Innovation in US Manufacturing and Trade*, SSRN Working Paper (2021)
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3275005.

⁴⁴ Won Sang Lee and SoYoung Soh, *Identifying Emerging Trends of Financial Business Method Patents*, 9 *Sustainability* 1 (2017).

⁴⁵ Lerner et al. *supra* note 29, at 2.

⁴⁶ La Belle & Schooner, *supra* note 39, at 474-76; Lerner et al., *supra* note 29, at 3 (“[T]he surge in financial patenting was driven by U.S. information technology firms and those in other industries outside of finance.”); Lee & Soh, *supra* note 44.

⁴⁷ La Belle & Schooner, *supra* note 39, at 472.

institutions are similar in size to the portfolios of large firms in other patent-intensive industries.⁴⁸

Application of artificial intelligence to business methods is likely to significantly reshape the business method patent landscape.⁴⁹ Artificial intelligence is widely used in the financial services, consulting and advertising industries.⁵⁰ Machine learning has been applied to business methods such as: automated customer service, customer recommendation engines, chatbots, marketing, pricing and price discrimination, accounting, procurement, investment choices, recruiting new employees farm management, fraud detection. processing of loan applications, and equipment maintenance schedules.⁵¹ Lin and Rai report that the USPTO granted 6,583 artificial intelligence-related U.S. patents since 2011, but they do not break out patents that are related to business methods.⁵²

⁴⁸ *Id.* at 471-72.

⁴⁹ “More than half of all AI-related patent applications have been published since 2013.” *citing* WIPO Technology Trends 2019, Artificial Intelligence, https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf at 13.

⁵⁰ Christian Rammer, Gastón P. Fernández & Dirk Czarnitzki, *Artificial Intelligence and Industrial Innovation: Evidence from Firm-Level Data*, 4, 9 SSRN Working Paper (2021) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3829822 (finding German firms in financial services that used AI methods in 2018 accounted for one-half of sales in that industry, while for consulting and advertising services AI adopters accounted for one-quarter of sales).

⁵¹ Forbes Technology Council, 15 *Business Applications for Artificial Intelligence and Machine Learning*, (Sep 27, 2018)

<https://www.forbes.com/sites/forbestechcouncil/2018/09/27/15-business-applications-for-artificial-intelligence-and-machine-learning/?sh=7d284757579f>; Monideepa Tarafdar, Cynthia M. Beath & Jeanne W. Ross, *Using AI to Enhance Business Operations*, 37, 38 SUMMER 2019 MIT SLOAN MGMT. REV.

⁵² Yu-Kai Lin & Arun Rai, *Patent Protection and Software Innovation: Evidence from Alice*. SSRN Working Paper (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3703055. The Quinn Emmanuel blog warns that: “[g]iven the limitations articulated in *Alice* and its progeny, it is unclear how many of the AI-related patents that have made their way through the U.S. Patent Office would survive in eventual litigation.” Jordan R. Jaffee, et al., *The Rising Importance of Trade Secret Protection for AI-Related Intellectual Property*, QUINNEMMANUEL, <https://www.quinnemanuel.com/media/wi2pks2s/the-rising-importance-of-trade-secret-protection-for-ai-related-intellect.pdf> (last visited Dec. 30, 2021).

B. Characteristics of Business Method Patents

Bilski and especially *Alice* had significant effects on business method patents, but the headliner in this domain is not the Supreme Court, instead it is the Federal Circuit with its *State Street* decision.⁵³ There were hardly any business method patents before *State Street*, and despite frequent eligibility invalidations after *Alice*,⁵⁴ the number of business method patent applications and grants in the U.S. is still large.⁵⁵ Looking specifically at finance related patents, Lerner et al. find that the share of granted finance patents in comparison to all granted patents in 2018 is only half of that share in 2013 (before *Alice*), but the share is roughly equal to the share in 2008 (before *Bilski*) when the boom was underway.⁵⁶

Firms apparently believe business method patents are still valuable enough to justify incurring prosecution costs. This belief is justified if one understands *Bilski*, *Alice* and their progeny as cases that constrained the freedom of prosecutors when they write patent claims.⁵⁷ Certain claim language will be rejected on subject matter grounds if it is too abstract, but that does *not* mean that business method inventions are unpatentable.

⁵³ New business method patent applications grew sharply after *State Street*, with about 11,000 new applications a year. Robert M. Hunt, *Business Method Patents and U.S. Financial Services*, 28 *Contemp. Econ. Pol'y* 322, 327 (2010).

⁵⁴ After *Alice*, the number of patent applications fell in bio-informatics, business methods, and software. Jay P. Kesan & Runhua Wang, *Eligible Subject Matter at the Patent Office: An Empirical Study of the Influence of Alice on Patent Examiners and Patent Applicants*, 105 *MINN L. REV.* 527, 563 (2020). The finance and e-commerce subcategories of business methods had the most *Alice* and Sec. 101 rejections by examiners. *Id.* at 559.

⁵⁵ The U.S. PTO calculated filing trends for U.S. business method patents over 1997-2017. Their data show 11,667 serialized filings in 2017 compared to 16,124 in 2014, and 9,122 in 2010. Measured instead in terms of RCE filings the levels are: 9,810 in 2017, 9,381 in 2014, and 8,739 in 2010.

<https://www.uspto.gov/sites/default/files/documents/FilingTrendsInBusinessMethods1997to2017.pdf>

The data from Europe and Japan indicate business method patent grants are still common around the world. *See supra* note 29.

⁵⁶ Lerner et al. *supra* note 29, at 34.

⁵⁷ There is wide consensus that *Alice* narrowed the scope of patent protections for software. Lin & Rai, *supra* note 52.

Recent empirical studies support the view that effective patent prosecutors responded to *Alice* by adjusting claim language in ways that possibly reduce patent value, but avoid subject matter rejection at the USPTO.⁵⁸ Kesan and Wang split their data on business method patent applications into one set that was filed before *Alice* but examined after and another set that was filed after *Alice*.⁵⁹ Business method applications filed before but examined after were four times more likely to be rejected.⁶⁰ They conclude that patent applicants were successful at overcoming *Alice* for applications filed after *Alice*.⁶¹

III. HOW DOES BUSINESS PROFIT FROM BUSINESS METHOD INNOVATION?

Business method innovation has flourished in the U.S. and elsewhere for decades before patents became a significant source of reward for these inventions. Evidently, inventors found other ways to capture enough profit from new business methods to cover their cost and motivate their creation. That said, it is possible that some types of business method inventions would be neglected if not for the opportunity to patent. Perhaps this problem of under-reward will grow more serious in the Information Age because business methods inventions are growing more risky or more costly. A closer look at theory and evidence from the past two decades suggests that patents are usually not an important tool used by innovators to profit from new business methods.

⁵⁸ Lin and Rai used *Alice* as a natural experiment and found evidence that it caused a reduction in the scope of software patents. Lin & Rai, *supra* note 52, at 3.

⁵⁹ Kesan & Wang, *supra* note 54, at 38.

⁶⁰ *Id.* at 47. Kesan and Wang used difference-in-difference analysis to show that the USPTO implementation of *Alice* caused more rejections of the earlier applications under Sec. 101. *Id.* at 43-44.

⁶¹ *Id.* at 57-58.

A. How Important are Patents?

Researchers have not been able to demonstrate that patent availability causes, or is even correlated with an increase in business method innovation.⁶² Although there is evidence that certain business method patents deliver value to publicly traded American firms that obtain them,⁶³ they may not matter much for funding of high-tech start-ups. Taylor conducted a survey of “475 venture capital and private equity investors” to study the impact of patent eligibility law on investment decisions.⁶⁴ He concluded that: “[i]nvestors overwhelmingly indicated... that the elimination of patents would either not impact their firms’ decisions whether to invest in companies or only slightly decrease investments in companies developing technology in the construction, software and Internet, transportation, energy, and computer and electronic hardware industries.”⁶⁵ By way of contrast, patent eligibility rules mattered considerably to inventors in life science industries.⁶⁶ Relatedly, research by Wagner and Cockburn suggests patents do not improve the survival prospects of start-ups:⁶⁷

Interestingly for the debate about business method patents, we find that they have very little impact on [start-up] survival compared to patents classified in other classes. Based on this finding it can be argued that business method patents – on average –

⁶² See Hunt, *supra* note 53, at 349. (“There is at present very little evidence to argue that business method patents have had a significant effect on the R&D investments of financial institutions.”); Stefania Fusco, *The Patentability of Financial Methods: The Market Participants’ Perspectives*, 45 LOY. L.A. L. REV. 1, 17 (2011) (surveying members of the financial industry and concluding “that patent protection has not been responsible for the innovation that occurred in the financial industry in the time between *State Street* and *In re Bilski*.”).

⁶³ Chan, Bharadwaj, & Varadarajan, *supra* note 43 (noting publicly traded American manufacturers gained seven percent in market value after *State Street* if they owned patents in Class 705, while firms in retail, wholesale, warehousing, and transportation gained twenty-five percent in market value); Sarah Hinchliffe, *Class 705 Business Method Patents in the United States: A Study from 1998 to 2010*, 69 DRAKE L. REV. 73, 105-108 (2021) (stock market event study showing share value increased in the twenty day window centered on the grant of a Class 705 business method patent).

⁶⁴ David O. Taylor, *Patent Eligibility and Investment*, 41 CARDOZO L. REV. 2019, 2027 (2020).

⁶⁵ *Id.* at 2066-67.

⁶⁶ *Id.* at 2069 (finding “the most negatively impacted would be the pharmaceutical, biotechnology, and medical device industries”).

⁶⁷ S. Wagner & I. Cockburn, *Patents and the Survival of Internet-Related IPOs*, 39 RSCH. POL’Y 214, 226 (2010).

convey little economic value to the patentee. From a managerial perspective, it seems questionable whether benefits from patenting methods to conduct business outweigh the cost of patenting (cost of drafting the application, filing and examination fees, renewal fees and cost of enforcement).⁶⁸

Instead of patents, business method innovators have used trade secrecy, contracts, and employment law to discourage suppliers, customers, and departing employees from making unauthorized use of business methods. Secrecy may effectively limit imitation of back-office administrative methods, for example, secret algorithms that are used for human resources management and marketing tasks. Trade secrecy has little or no role to play when business methods provide services that are revealed to customers, and therefore are not secret. For example, the creators of new financial products normally must comply with disclosure regulations that are incompatible with trade secret protection.⁶⁹

The absence of effective patent or trade secret protection may be especially challenging for innovators in the insurance industry or other financial products that require expensive regulatory approval.⁷⁰ The problem is that imitators can copy the innovation and avoid most of the expense of regulatory approval and thus free-ride on both the research and regulatory expenditure of the innovator.⁷¹

⁶⁸ *Id.* at 217 (analyzing the effects of patents on firm survivability during dot com boom of the late 1990s using data from collection of 356 firms that made IPO on NASDAQ between February 1998 and August 2001).

⁶⁹ Christopher Petruzzi, Margueritte Del Valle & Stephen Judlowe, *Patent and Copyright Protection for Innovations in Finance*, 17 FIN. MGMT. 66, 67 (1988).

⁷⁰ Robert M. Hunt, *Business Method Patents and U.S. Financial Services*, 10 Fed. Reserve Bank of Philadelphia Working Paper No. 08-10/R (2011)

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.363.5251&rep=rep1&type=pdf>

⁷¹ Petruzzi, et al., *supra* note 69, at 67 (creators of new financial products bear significant risk and expense and imitation is often cheap and easy); Gabriel Rauterberg, *Innovation in the Stock Market and Alternative Trading Systems*, 13-14 (Dec. 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3728768 (imitators can free ride on costly regulatory approval with respect to innovations in financial markets.)

Nevertheless, extensive commentary suggests that firms have adequate incentive to create finance-related business methods absent intellectual property protection.⁷² Financial innovators rely on “reputational gains, tacit knowledge, and first mover advantages” to derive rewards from their innovations.⁷³ Network effects are often present in financial markets and can arise via an interoperability requirement in many such services.⁷⁴ Hunt observes:

Firms in the financial sector “protect their innovations in ways similar to those observed among manufacturing firms. Historically, patents have not been a significant part of the story for these firms, and yet their absence has not prevented them from investing in new products (financial instruments) or the processes (e.g. trading platforms, pricing algorithms) required to offer them.”⁷⁵

The same range of non-IP incentives are likely responsible for motivating foundational business innovations that apply across all industries. Business scholars have compiled lists of the most significant management innovations of the twentieth century. Examples include: “the industrial research laboratory at GE, the use of capital budgeting and general metrics for evaluating division performance at DuPont, brand management at Procter & Gamble, organizational innovation at GM and Visa, and open source software

⁷² See Hunt, *supra* note 53. (“Studies by Silber (1981) and Caskey (2003) present evidence that an established contract on one exchange enjoys an advantage in terms of liquidity that is often difficult to overcome when a similar contract is introduced on another exchange. Anderson and Harris (1986) argue that regulations that delay imitation by rival firms reinforce first mover advantages, increasing the rents associated with financial innovations. And among investment banks, there is evidence that first mover advantages play an important role in generating sustained profits from the introduction of new financial instruments (Tufano 1989).”).

⁷³ La Belle & Schooner, *supra* note 39, at 442 *citing* Tamar Frankel, *Cross-Border Securitizations: Without Law, But Not Lawless*, 8 DUKE J. COMP. & INT’L L. 255 (1998); Petruzzi, et al., *supra* note 70 (identifying lead time advantages that motivate financial innovation); Gary B. Gorton & Ping He, *Economic Growth and Bank Innovation*, 10 (Nat’l Bureau of Econ. Rsch., Working Paper No. 29326, 2021) (“In the period 1929-1941, banks innovated by developing methods of credit risk analysis and covenant design. During 1987-2016, as loan maturity continued to increase, banks innovated to shift the risk to nonbank, institutional, investors.” “Bank innovation that has resulted in these reallocations of risk are a very significant contributor to economic growth.”) *Id.* at 27.

⁷⁴ Hunt, *supra* note 53, at 329-330.

⁷⁵ Hunt, *supra* note 37, at 9.

development by Linux and others.”⁷⁶ These methods were invented without thought of patent protection and they would not get effective patent protection under current law. Claims broad enough to block imitation would likely be characterized as abstract ideas – ineligible for patent protection.⁷⁷

Her review of similar considerations lead Dreyfuss to conclude patents are not needed to incentivize creation of business methods:

But neither the free-rider nor the disclosure rationale justifies business method patents. Businesses are largely practiced in public. Accordingly, there is little need to especially encourage disclosure. Business methods are also hard to free ride on. They depend in strong ways on the social structure within the firms utilizing them – on compensation schemes, lines of reporting, supervising policies, and other business factors. Moreover, as we saw, sticky business methods are their own reward. With lock in, network effects, and even good old fashioned loyalty, lead time (the first mover advantage) goes a long way to assuring returns adequate to recoup costs and earn substantial profit. In sum, while business innovations are certainly desirable, it is not clear that business method patents are needed to spur people to create them.⁷⁸

B. Profiting from Business Method Innovation in the Information Age

A skeptic may not be convinced that innovation incentives are still adequate without patent protection in the Information Age. Despite *Alice*, patent applications covering artificial intelligence are trending up. “More than half of all AI-related patent applications have been published since 2013,”⁷⁹ and many of these applications relate to business methods.⁸⁰ Perhaps aggressive patenting signals that business method innovation is becoming either easier to imitate or more costly and risky.

⁷⁶ Julian Birkinshaw, Gary Hamel, & Michael Mol, *Management Innovation*, 33 ACAD. MGMT. REV. 825, 829 (2008).

⁷⁷ Most of these methods could not be protected by secrecy either.

⁷⁸ Rochelle Dreyfuss, *Are Business Method Patents Bad for Business?* 16 SANTA CLARA HIGH TECH. L. J. 263, 275 (2000).

⁷⁹ WIPO, *supra* note 49, at 13.

⁸⁰ Iain M. Cockburn, Rebecca Henderson & Scott Stern, *The Impact of Artificial Intelligence on Innovation: An Exploratory Analysis*, in THE ECONOMICS OF ARTIFICIAL INTELLIGENCE: AN AGENDA 115, 132 (Ajay Agrawal, Joshua Gans, & Avi Goldfarb, eds., 2019) (finding 95 AI-related business software patents granted in the U.S. from 1990-2014 -- author’s calculation based on Table 4.5).

There are two reasons these fears may be unfounded. First, many advances in artificial intelligence take place in an environment of collective invention in which tools and techniques have been widely shared. Second, other more specialized advances take place in an environment in which imitation is difficult even without patent protection.

The term collective invention refers to historical episodes in which competing firms or inventors share research and development results.⁸¹ During the Industrial Revolution, profound advances from collective invention occurred in England in blast furnace and steam engine technologies.⁸² Open source development of software like the Linux operating system and the Apache web server arguably fits the collective invention model.⁸³ Much of the research activity in machine learning also seems to fit the collective invention model.⁸⁴ OpenAI, a nonprofit organization, makes AI tools and research widely available. There are open source tools for curating data and training algorithms.⁸⁵ The impact of open source is likely to be reduced cost⁸⁶ for some kinds of business method innovation and less need for patent incentives.

In the domain of propriety development of AI-based business methods, imitation is often difficult because the technology is opaque, and many of the inputs that would be needed to imitate are in short supply. Consider opaqueness first. Machine learning algorithms and other software implementations of innovative business methods often

⁸¹ Robert C. Allen, *Collective Invention*, 4 J. ECON. BEHAV. & ORG. 1 (1983).

⁸² Alessandro Nuvolari, *Collective Invention during the British Industrial Revolution: The Case of the Cornish Pumping Engine*, 28 CAMBRIDGE J. ECON. 347 (2004).

⁸³ Alessandro Nuvolari, *Open Source Software Development: Some Historical Perspectives* (Dept. of Tech. Mgmt. Technische Universiteit Eindhoven, The Netherlands, Working Paper No. 03.01, 2003).

⁸⁴ Many prominent AI researchers have insisted on retaining the right to publish their results when joining companies such as Baidu, Facebook, and Google. See Jack Clark, *Apple's Deep Learning Curve*, Bloomberg Business Week (Oct. 29, 2015).

⁸⁵ Open source program Hadoop is widely used by business for distributed database management. Apache Hadoop, <https://hadoop.apache.org/> TensorFlow is an open source platform for building machine learning models. TensorFlow, <https://www.tensorflow.org/>

reside in the cloud, and they are protected as trade secrets.⁸⁷ Patenting is not a profitable strategy “if the invention is for an AI algorithm that runs on a server that cannot be observed by the public, it may be impossible to tell which, if any, competitors are infringing on the technology.”⁸⁸ Furthermore, “[d]ue to the prohibition on patenting abstract ideas, acquiring meaningful patents on artificial intelligence systems is not straightforward. Thus companies are increasingly turning to trade secret protection to protect their AI-related intellectual property.”⁸⁹

If there is no patent disclosure and steps to protect the secrecy of AI-based business methods make it hard to learn and copy, then imitators will need access to the inputs used by the innovator to develop the new business method. Attempts to imitate will fail if competing firms cannot access engineers with the right skills and the data used to train machine learning algorithms. There are reports of a “critical talent shortage”⁹⁰ slowing the diffusion of AI, but it is hard to know how extensive and long-lasting that might be.⁹¹

More significantly, limits on data access may create durable barriers to imitation in many settings.⁹² Dominant firms in an industry naturally have bigger and more diverse

⁸⁶ Cockburn et al., *supra* note 79, at 140 (explaining how deep learning may reduce the marginal cost of research dependent on prediction).

⁸⁷ “[I]t is likely that most intellectual property generated in the United States today related to AI is being protected through the use of trade secrets.” Jordan R. Jaffee et al., *supra* note 52.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ Holger Hürtgen, Sebastian Kerkhoff, Jan Lubatschowski, & Manuel Möller, *Rethinking AI Talent Strategy as Automated Machine Learning Comes of Age*, McKinsey Analytics (Aug. 14, 2020).

⁹¹ Christian Rammer, Gastón P. Fernández & Dirk Czarnitzki, *Artificial Intelligence and Industrial Innovation: Evidence from Firm-Level Data*, 4 (Leibniz Ctr. for Econ. Rsch. Discussion Paper, Paper No. 21-036, 2021).

⁹² A durable advantage arises in part because algorithms get updated as new data becomes available. “[A]lgorithms are re-trained as more data accumulates. Roughly a quarter of firms report refreshing their models daily, weekly, or monthly each. 13% of firms report having models that are not refreshed with new data.” James Bessen, Stephen Michael Impink, Lydia Reichensperger & Robert Seamans, *The Business of AI Startups*, 18 (B.U. Sch. of L., L. & Econ. Series, Working Paper No. 18-28, 2018).

customer databases. Smaller imitators who want to develop machine learning-based algorithms to support innovative marketing, advertising, and pricing practices may end up with inferior processes because of their smaller databases.⁹³

In other settings, it is not size but expertise or exclusive access to specialized data that will give a firm an advantage in training an algorithm.⁹⁴ AI start-ups and their funders are mindful of the possibility of building a durable business advantage by having special access to data.⁹⁵ “Proprietary data—data that a firm can exclude others from using—is the most important type of data for AI startup growth. [Bessen et al. use] a recent survey to show that AI startup firms that use proprietary data receive more venture capital (VC) funding.”⁹⁶

Finally, it is important to acknowledge that access to data does not create a barrier to imitation when the necessary data is provided by the government, available from an open source repository, or available at competitive prices in the market from data

It is not clear how much of an advantage flows from access to a larger set of data used to train an algorithm. Some reports describe significant quality increases derived from increasing the size of databases over a broad range, other reports suggest, in some settings, there is a quality plateau once a certain database size is reached. Also, researchers are discovering techniques that promise to reduce data needs required for effective training. See e.g., Martin J. Willemink, et al., *Preparing medical imaging data for machine learning*, 295 *Radiology* 4 (2020); Theophano Mitsa, *How Do You Know You Have Enough Training Data?* (Apr 22, 2019) <https://towardsdatascience.com/how-do-you-know-you-have-enough-training-data-ad9b1fd679ee>.

⁹³ Firms can protect both their data and algorithms using contracts and trade secret law. Bessen et al, *supra* note 92 at 19 (“To protect their access to data, startup firms who use customer data retain secondary reuse rights 52% of the time. To control the use of proprietary data between the firm and its customers, 83% of the firms use legal contracts that specify data uses. Additionally, firms use a variety of technical means to protect and control data access, including de-identification, encryption, passwords, access logs, and application program interfaces ...”)

⁹⁴ Outside of the business method context, IBM teamed with Sloan Kettering to gain access to 12 million pages of medical literature and patient case histories to train health care AI. *Memorial Sloan-Kettering Cancer Center, IBM to Collaborate in Applying Watson Technology to Help Oncologists*, (Mar 22, 2012) <https://newsroom.ibm.com/2012-03-22-Memorial-Sloan-Kettering-Cancer-Center-IBM-to-Collaborate-in-Applying-Watson-Technology-to-Help-Oncologists>,

⁹⁵ “As such, using proprietary training data leads to less imitable products, positively impacting a startup’s ability to collect additional rents from the market and develop an initial competitive advantage in this nascent industry.” James Bessen, Stephen Michael Impink, Lydia Reichensperger & Robert Seamans, *The Role of Data for AI Startup Growth* 13 (B.U. Sch. of L., Research Paper Series No. 21-23, 2021).

brokers.⁹⁷ There are hundreds data brokers in U.S.⁹⁸ They may be useful sources of data that encourages imitation for certain algorithms related to targeted advertising, background checks, credit, and risk mitigation.⁹⁹

Thus far I have argued that business method innovation is incentivized largely by non-patent factors like network effects, reputational and lead time advantages, and trade secrecy. Further, I have argued that in the Information Age it is increasingly difficult to get broad patent claims or detect infringement in the case of business method inventions. Why then are business method patent applications and grants still common? Often there is private value in business method patents that can be asserted in an opportunistic, anti-competitive, or other strategic way. These patents may not offer protection over a technology that the inventor intends to commercialize, but they may be used valuably to harass another firm when it introduces a new technology. Part IV describes the social costs of strategic patenting of business method patents.

IV. THE SOCIAL COSTS OF BUSINESS METHOD PATENTS

Strategic prosecution and assertion of business method patents creates multiple social costs. First, a patent “arms race” arose in the semi-conductor industry in the 1990s, when semi-conductor firms amassed defensive patent portfolios to deter competitor

⁹⁶ *Id.*

⁹⁷ Bessen et al, *supra* note 92, at 25 (“80% of startups use customer data and 63% use data available from third parties, including publicly available data. While data might pose a barrier to entry in some markets, like search, where large amounts of diverse data are needed, there are clearly many markets where it does not.”)

⁹⁸ See Paul Boutin, *The Secretive World of Selling Data About You*, NEWSWEEK (May 30, 2016), <http://www.newsweek.com/secretive-world-selling-data-about-you-464789>.

⁹⁹ See Federal Trade Commission, *Data Brokers: A Call for Transparency and Accountability* (May 2014).

suits.¹⁰⁰ La Belle and Schooner forecast that a similar arms race is emerging in the financial industry.¹⁰¹ Given the disruption to the industry caused by fin-tech, there is a risk that a patent détente will not last and the industry could move to litigation battles.¹⁰² Second, low quality patents that are narrow in scope or possibly invalid can be used by established firms to slow or block new competitors.¹⁰³ Amazon may have been practicing this strategy when it sought a preliminary injunction against Barnes & Noble to stop their online book sales at the start of the holiday shopping season.¹⁰⁴ Third, strategic patenting creates a simple numbers problem – a deluge of applications slows examination and creates a thicket of patents that innovators may need to evaluate when they conduct patent clearance reviews.¹⁰⁵ Fourth, substantial costs arise from weak or frivolous patent assertions intended to extract settlement payments from targeted firms.¹⁰⁶ Many commentators apply the label “patent troll” to these asserters, which of course builds in a

¹⁰⁰ Bronwyn Hall & Rosemarie Ziedonis, *The Patent Paradox Revisited: An Empirical Study of Patenting in the Semiconductor Industry, 1979-1995*, 32 RAND J. ECON. 101 (2001).

¹⁰¹ La Belle & Schooner, *supra* note 39, at 434; Megan M. La Belle & Heidi Mandanis Schooner, *Fintech: New Battle Lines in the Patent Wars?* 42 CARDOZO L. J. 277, 339-46 (2020).

¹⁰² Eugene Mar, & Ashleigh Nickerson, *Tips For Banks As USAA Check Deposit Patent Dispute Grows*, Law360 (Jan. 28, 2021), <https://www.law360.com/articles/1347649/tips-for-banks-as-usaa-check-deposit-patent-dispute-grows> (USAA owns patents covering remote check deposit. “Wells Fargo initially tried to challenge [three of] these patents under the covered business method review, arguing that the patents were invalid for claiming the abstract concept of taking a photograph. The PTAB dismissed the CBM petitions on the basis that USAA’s patents provided a technical solution for capturing images of a check remote deposit and thus fell into the “technological invention” exclusion for CBM review.”)

¹⁰³ Michael J. Meurer, *Controlling Opportunistic and Anticompetitive Intellectual Property Litigation*, 44 BOSTON COLL. L. REV. 509 (2003); Ted Sichelman, *The Vonage Trilogy: A Case Study in “Patent Bullies,”* 90 NOTRE DAME L. REV. 543 (2014). Wagner, *supra* note 39, at 17-20, describes the anti-competitive use of business method patents by Pitney-Bowes, the dominant firm in the franking machine market.

¹⁰⁴ Leslie Kaufman, *Amazon Sues Big Bookseller over System for Shopping*, N.Y. TIMES (Oct. 23, 1999), <https://www.nytimes.com/1999/10/23/business/amazon-sues-big-bookseller-over-system-for-shopping.html>.

¹⁰⁵ Gaétan de Rassenfosse & Alexandra Karin Zaby, *The Economics of Patent Backlog* (July 10, 2016), <https://ssrn.com/abstract=2615090>; La Belle & Schooner, *supra* note 101 at 347.

¹⁰⁶ Daniel Harris Brean, *Business Methods, Technology, and Discrimination*, 2018 MICH. ST. L. REV. 307, 313-14 (2018). “Computer-implemented business practices are the clear favorite type of patent asserted by PAEs. Those kinds of methods-involving, e.g., online shopping, digital marketing, and payment processing-tend to be widely used by many successful businesses, allowing a single patent to be enforced against many such businesses to collect license or settlement fees from each. Making such methods largely ineligible for patent protection greatly diminishes the ‘in terrorem power’ of PAEs, albeit indirectly.” *Id.*

normative judgment. In what follows I will use the less freighted term patent assertions entities (PAEs) and provide a variety of evidence about the social costs from this practice.

In theory, social gains rather than social costs could arise from PAE activity. A favorable narrative identifies PAEs as specialists who identify and purchase valuable patents and monetize them for the (direct or indirect) benefit of the original owners of those patents. The monetization process requires detecting users of the patented technology and negotiating a license payment backed up by the threat of litigation. These settlement payments are not social costs, but instead socially valuable transfer payments that support the inventive effort of the original patent owner.

In practice, the favorable narrative breaks down because PAEs typically monetize low quality patents that are not associated with significant technological advances, and the targets of the assertions are socially valuable innovators vulnerable to a patent assertion because they introduced new technology.¹⁰⁷ The threat of these assertions increases the cost of introducing a new technology and imposes a business method patent tax on innovators.¹⁰⁸

Many commentators have noted the problem of low quality business method patents that may be asserted in socially harmful ways.¹⁰⁹ Critics contend that the PTO

¹⁰⁷ NPEs acquire patents with vague claims and greater obviousness problems. See Josh Feng & Xavier Jaravel, *Who Feeds the Trolls? Patent Trolls and the Patent Examination Process* (Harv. Univ., Working Paper, 2016) (“NPE patent portfolios are disproportionately made up of patents that were granted by “lenient” patent examiners, that is, examiners who spend relatively little time reviewing and narrowing patent claims.”)

¹⁰⁸ See James Bessen & Michael J. Meurer, *PATENT FAILURE: HOW JUDGES, BUREAUCRATS, AND LAWYERS PUT INNOVATION AT RISK* 144 (2008); La Belle & Schooner, *supra* note 39 at 450. (the increase in patent litigation has outpaced the increase in patent grants); Hunt, *supra* note 53, at 339 (business method patents are litigated at a higher rate compared to patents at a whole); Josh Lerner, *The Litigation of Financial Innovations* (Nat’l Bureau of Econ. Rsch., Working Paper No. 729, 2008) (finding business method patents are litigated at a rate 27 times higher than for patents as a whole).

¹⁰⁹ See e.g., *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 397 (2006) (Kennedy, J., concurring); John R. Allison, Mark A. Lemley & Joshua H. Walker, *Extreme Value Or Trolls on Top? The Characteristics of*

grants many patents, including business method patents that lack novelty or are obvious.¹¹⁰ Other critics emphasize that lack of clarity in patent claims degrades the notice that patents should provide about scope of rights.¹¹¹ The combined effect of these quality problems is that a firm may inadvertently stray within the bounds of a patent claim thinking the claim was invalid or that the claim would be read more narrowly. Increasingly, firms are taking defensive measures to mitigate potential harm from PAE assertion of business method patents.¹¹²

Economists have identified certain characteristics associated with low quality patents, and business method patents do not fare well in comparison to other patents. First, they are more often opposed at the European Patent Office,¹¹³ and they are more

the Most Litigated Patents, 158 U. PENN. L. REV. 1, 18 (2009) (finding software business method patents are overrepresented in their group of “most-litigated” patents).

¹¹⁰ Dan L. Burk, *The Role of Patent Law in Knowledge Codification*, 23 BERK. TECH. L.J. 1009, 1027 (2008) (tacit knowledge of management innovations cannot be used as prior art which makes it easier for business method inventions to jump the nonobviousness hurdle).

¹¹¹ Bessen & Meurer, *supra* note 108, at 153 (finding that claim construction of business method patents was appealed to the Federal Circuit 6.67 times more often than the typical patent). *But see* Spulber, *supra* note 12 at 310-13 (addressing arguments that business method patents are intrinsically vague, and concluding that generally applicable standards are sufficient to weed out vague patents).

¹¹² Tim Anderson, *Wells Fargo Patent Troll Case Has Finance World All Aquiver so Barclays, TD Bank Sign up to Open Invention Network*, THE REGISTER (Feb. 15, 2021), https://www.theregister.com/2021/02/15/barclays_td_bank_join_oin/. (Barclays Bank and Toronto-Dominion Bank Group are joining the Open Innovation Network to mitigate harm caused by patent troll lawsuits in financial sector.) Eugene Mar & Ashleigh Nickerson, *Tips For Banks As USAA Check Deposit Patent Dispute Grows*, LAW360 (Jan. 28, 2021), <https://www.law360.com/articles/1347649/tips-for-banks-as-usaa-check-deposit-patent-dispute-grows/> (“Lastly, there will undoubtedly be renewed focus by banks on their vendor agreements, especially at times of renewal, to ensure that the vendor provides a robust indemnity provision along with ironclad warranties of no intellectual property liability. Conversely, such warranties and robust indemnity protection will likely come at a more expensive price, but that may still pale in comparison to expensive litigation that results in nine-digit damage awards and attorney fees in the millions.”) <https://www.fbm.com/publications/tips-for-banks-as-usaa-check-deposit-patent-dispute-grows/> Susanne M. Hopkins, *Patent Trolls Continue to Target Financial Institutions, But Change May Be Near*, THE BANKERS STATEMENT (Spring 2014), <https://www.vorys.com/publications-1261.html> (advising financial institutions to seek indemnification from technology vendors to gain protection against patent trolls).

¹¹³ Wagner *supra* note 39, at 22. Business method patents are more likely to be opposed than other patents, even after controlling for the identity of the patent holder.

frequently litigated.¹¹⁴ Frequent challenges suggest these patents contain invalid claims or have uncertain scope.¹¹⁵ Second, they cite less non-patent prior art.¹¹⁶ Patents on inventions that make strong technological advances tend to cite more non-patent prior art, while patents that are accrued for strictly strategic reasons may be prosecuted less carefully and thus cite less prior art. Third, they take longer to prosecute and they are older when asserted.¹¹⁷ These characteristics are associated with low quality if they reflect skepticism by examiners or the strategic choice to move the patent slowly through the system to surprise rivals when it is eventually granted.

PAEs are willing to acquire and assert low quality patents because litigation costs tend to fall more heavily on alleged infringers during the early stages of litigation – this

¹¹⁴ Bessen and Meurer, *supra* note 108, at 153 (finding that the rate of lawsuits filed per patent is nearly ten times higher for business method patents than the typical patent); Josh Lerner, Mark Baker, Andrew Speen & Ann Leamon, *Financial Patent Quality: Finance Patents After State Street* (Harv. Bus. Sch., Working Paper No. 16-068, 2015) (“finance patents are more likely to be litigated than non-finance patents, but increased academic citations appear to reduce that possibility relative to others”); Business method patents relating to financial innovations are especially likely to be the subject of litigation La Belle & Schooner, *supra* note 39 at 454.

¹¹⁵ More valuable patents also tend to get challenged more often, but business method patents and software patents generally tend to have low average value. Bessen and Meurer, *supra* note 108, at 153.

¹¹⁶ Lerner, et al., *supra* note 114. (“We show that relative to two sets of comparison groups, finance patents in aggregate cite fewer nonpatent publications and especially fewer academic publications.”) (“In addition, it appears that patents assigned to individuals and associated with non-practicing entities (NPEs) cite less academic work than those assigned to non-NPE corporations. While not statistically significant due to the small number of academic citations in finance patents, we observe qualitatively similar patterns of under-citation when we restrict our analysis to finance patents held by individuals and NPEs, as opposed to non-NPE corporations. These findings raise questions about the quality of finance patents.”) However, Wagner finds that European business method patents tend to cite more prior art than other patents and examination tends to take almost a year longer. Wagner, *supra* note 39, at 13. Business method patents receive an average of two times as many citations as other patents, but it is unclear if patent holders are making more money from those patents. *Id.* at 14.

¹¹⁷ See Brian J. Love, *An Empirical Study of Patent Litigation Timing: Could a Patent Term Reduction Decimate Trolls Without Harming Innovators?* 161 U. PENN. L. REV. 1309, 1312 (2013); Michael Risch, *Patent Troll Myths*, 42 SETON HALL L. REV. 457, 490 (2012); Lauren Cohen, Umit G. Gurun & Scott Duke Kominers, *Patent Trolls: Evidence from Targeted Firms*, 65 MGMT. SCI. 5461, 5470 (2019). There are other notable differences between patents asserted by practicing entities and non-practicing entities. NPEs assert the same patent more often, their patents have more independent claimers, and their patents are issued at times when the USPTO is especially busy. *Id.*

makes many targeted firms willing to make early settlement payments to PAEs.¹¹⁸ Though sometimes the target resists and a PAE that wants to maintain a reputation for being tough has to litigate. A recent dispute between Innovation Science and Amazon is a good illustration.¹¹⁹ Innovation Science bundled eleven patents in a confusing mélange of assertions that a range of Amazon products used patented methods of making secure credit card payments over the internet, displaying video transmitted over the internet on televisions, and alerting Alexa users when a diaper needs to be changed.¹²⁰ Most of the asserted claims were invalidated as ineligible subject matter,¹²¹ Amazon prevailed completely and was awarded fees from Innovation Science because of the frivolous nature of the assertions.¹²²

A growing body of empirical research measures costs arising from opportunistic patent assertions and provides evidence that PAE activity depresses research and the performance of innovative firms. Some of the research I cite is specific to business method patents but most of the research addresses PAE activity as a whole. Since PAE activity overwhelming involves software patents, and since the effect of assertion of business method patents is likely not different from the effect of assertion of other sorts of software patents, the general evidence is quite relevant.¹²³

¹¹⁸ See La Belle & Schooner, *supra* note 39, at. at 459. (One common patent troll tactic is acquiring vague patents and broadly claiming infringement to extract licensing fees while avoiding litigation. Because patent trolls often do not manufacture products, they can litigate more aggressively because of the low countersuit risk and because their discovery costs are relatively low.)

¹¹⁹ Innovation Science sued Amazon in both the Eastern District of Virginia, and the Eastern District of Texas. Jack Queen, *Amazon Alexa Devices Didn't Infringe Patents, Jury Finds*, IP Law360 (Sept 3, 2020).

¹²⁰ Innovation Sciences, LLC v. Amazon.com, Inc., 778 F. App'x 859 (Fed. Cir. 2019)

¹²¹ Va. Innovation Scis., Inc. v. Amazon.com, Inc., 227 F. Supp. 3d 582 (E.D. Va. 2017).

¹²² Innovation Scis., LLC v. Amazon.com, Inc., No. 1:16-cv-00861, 2020 WL 4934272 (E.D. Va. Feb. 18, 2020); Queen, *supra* note 119.

¹²³ See James Bessen & Michael J. Meurer, *The Direct Costs from NPE Disputes*, 99 CORNELL L. REV. 387, 413, 418 (2014).

One strand of research evaluates the impact of PAE activity on alleged infringers who are publicly traded firms. A prominent study found that public firms decrease their R&D on average by about twenty percent in response to PAE assertions.¹²⁴ A second study finds that the constraints imposed on patent prosecutors by *Alice* resulted in increased R&D by firms that faced a heightened risk of PAE suits.¹²⁵

Another strand of research undercuts the view that business method patents promote high-tech start-ups and thereby offer social benefits. Spulber conjectures that stringent patent protection of business methods would encourage entrepreneurs to create new business methods, thus decreasing firms' reliance on corporate R&D and increasing the likelihood of innovative entrepreneurship.¹²⁶ While some start-ups may benefit from PAE activity, many others are targeted as alleged infringers.¹²⁷ These assertions disrupt start-up business plans and divert key personnel from essential research and management activity.¹²⁸ Furthermore, PAE activity interferes with the funding of start-ups. Assertions are often timed to disrupt initial public offerings.¹²⁹ A pair of econometric studies suggests that: PAE activity caused a 14% drop in venture capital funding over a five year

¹²⁴ See Cohen, Gurun & Kominers, *supra* note 117, at 5477.

¹²⁵ See Sridhar Srinivasan, *Do Weaker Patents Induce Greater Research Investments?*, SSRN Working Paper (2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3185148.

¹²⁶ See Spulber, *supra* note 12 at 293-96. See also Hunt, *Business Methods Patents*, *supra* note 37 at 10 (“[I]n certain areas of insurance ... an innovating firm incurs the expense required to develop a new product and to obtain the necessary regulatory approvals. If the new product is successful, it is quickly imitated by competitors ... In such an environment, the availability of patents may enable entry by new firms that do not own the complementary assets enjoyed by established firms.”)

¹²⁷ See Colleen Chien, *Startups and Patent Trolls*, 17 STAN. TECH. L. REV. 461 (2014); La Belle & Schooner, *supra* note 101 at 348.

¹²⁸ See Colleen Chien, *Reforming Software Patents*, 50 HOUS. L. REV. 2 (2012) (software startups found that 41% reported “significant operational impacts” from patent troll lawsuits, causing them to exit business lines or change strategy); Robin Feldman, *Patent Demands & Startup Companies: The View from the Venture Capital Community*, 16 YALE J. L & TECH. 236 (2014).

¹²⁹ See Robin Feldman & Evan Frondorf, *Patent Demands and Initial Public Offerings*, 19 STAN. TECH. L. REV. 52 (2015) (surveying in-house legal staff at companies that have recently gone public and finding almost half of all responding companies received patent demands either shortly before their IPO or within a year following its completion).

period;¹³⁰ and the adoption of state anti-troll laws “lead to a 4.4% increase in employment at high-tech startups.”¹³¹ The laudable effect of the anti-troll law was attributed to “[i]ncreased access to financing, both venture capital and patent-backed lending....”¹³²

In addition to state anti-troll laws which punish bad faith patent assertions,¹³³ there is limited evidence on four other reforms that mitigate harm from PAE activity. Econometric analysis finds that the *eBay*¹³⁴ decision, which reduced the availability of injunctive relief and weakened the bargaining power of PAEs, reduced the magnitude of the patent tax on innovators.¹³⁵ An econometric study of *Alice* found that affected patent claim scope shrunk, software firms did not lose share value, their sales increased, and they substantially increased their participation in open source projects.¹³⁶ The authors conclude that narrowing patent protection for software could have both private and social benefits.¹³⁷ An econometric study of the Second Pair of Eyes program in which the USPTO examined business method patents more carefully than other types of patents suggests the program succeeded in increasing the length of approved claims which is a

¹³⁰ See Stephen Kiebzak, Greg Rafert & Catherine E. Tucker, *The Effect of Patent Litigation and Patent Assertion Entities on Entrepreneurial Activity*, 45 RSCH. POL'Y 218 (2016).

¹³¹ See Ian Appel, Joan Farre-Mensa & Elena Simintzi, *Patent Trolls and Startup Employment*, 133 J. FIN. ECON. 708, 708 (2018).

¹³² *Id.*

¹³³ See Qian Huang, Grace King, & Tim Rawson, *Navigating the Landscape of Anti-Trolling Legislation*, PILLSBURY LAW (June 2016), <https://www.pillsburylaw.com/images/content/1/0/v2/104295/054-056IPM-June-2016Feat.pdf>.

¹³⁴ *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006).

¹³⁵ See Filippo Mezzanotti, *Roadblock to Innovation: The Role of Patent Litigation in Corporate R&D*, 67 MGMT. SCI. 7362, s (2021); Filippo Mezzanotti & Timothy Simcoe, *Patent Policy and American Innovation After eBay: An Empirical Examination*, SSRN Working Paper (2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3183402.

¹³⁶ See Lin & Rai, *supra* note 52 at 3.

¹³⁷ *Id.* at 14-15. This result complements the survey by Taylor who found that *Alice* did not have a significant negative effect on financing firms in the information and communication technologies: “most investors (62%) were not familiar with any of the Supreme Court’s eligibility cases, and even among investors with familiarity most (61%) had not changed their investment decisionmaking after these decisions.” Taylor, *supra* note 66, at 2089.

proxy for reduced claim scope.¹³⁸ Finally, mixed anecdotal evidence suggests either that the covered business method review (CBM) mitigated harm from PAE activity, or that it had little effect.¹³⁹

The CBM was created by the America Invents Act for patents relating to financial products as a cheaper alternative to federal district court for invalidating business method patents.¹⁴⁰ Supporters of the CBM believed it would weed out low quality business method patents and reduce the leverage of PAEs in patent litigation.¹⁴¹ A sunset provision terminated the program in September of 2020.¹⁴² An indication that the program was effective is that many PAE lawsuits involving financial patents appear to have been delayed until after the program was terminated.¹⁴³ Some of the benefits of the program are also provided by other review mechanisms created by the America Invents Act, and it will take some time before enough data is available to rigorously evaluate the impact of the CBM on PAE assertion of financial patents.

¹³⁸ See Teruki Amano, *The Effect of USPTO's Quality-improving Initiatives in 2000 on the Claim Scope of Business Method Patents*, SSRN Working Paper (2020), <https://ssrn.com/abstract=3636231>.

¹³⁹ See La Belle & Schooner, *supra* note 39, at 459; *CBM Review: A Postmortem*, NAT'L REV. (Sept. 3, 2020), <https://www.natlawreview.com/article/cbm-review-postmortem>

¹⁴⁰ See Jarrad Wood & Jonathan R.K. Stroud, *Three Hundred Nos: An Empirical Analysis of the First 300+ Denials of Institution for Inter Partes and Covered Business Method Patent Reviews Prior to In Re Cuozzo Speed Technologies*, 14 J. MARSHALL REV. INTELL. PROP. L. 112, 131 (2015); Matthew Bultman, *Banks Face Lawsuit 'Frenzy' After Business Patent Reviews End*, BLOOMBERG LAW (Apr. 13, 2021), <https://news.bloomberglaw.com/ip-law/banks-face-lawsuit-frenzy-after-business-patent-reviews-end>.

¹⁴¹ See Daniel Harris Brean, *supra* note 106, at 313. ("The creation of the CBM program was ostensibly motivated by two related factors: (1) skepticism concerning the quality and strength of many business method patents; and (2) the observation that patent assertion entities (PAEs), also known as "patent trolls," have wielded weak business method patents to obtain many settlement payments in mass litigation campaigns.")

¹⁴² See Bultman, *supra* note 139.

¹⁴³ *Id.* ("Lawsuits against banks and e-commerce companies over financial services patents are piling up, following the expiration of a patent office challenge process that many saw as a potent defense mechanism against some litigation. Nearly three times as many patent suits have been filed against financial institutions such as JPMorgan Chase Bank NA and Bank of America Corp. since August 2020 as in the previous eight months, Bloomberg Law data show. E-commerce companies have also faced new patent suits.")

CONCLUSION

American patent law missed an opportunity to carve out a categorical exclusion of business method patents in *Bilski*. But *Bilski* and *Alice* moved away from the laissez-faire approach of *State Street*. Did those cases arrive at an optimal eligibility rule? Did they change behavior much compared to *State Street*? Few commentators think the fuzzy doctrine embedded in the *Mayo* test is an optimal rule. And given the continued popularity of business method patenting, and the continued harm arising from PAE business method patent activity, the state affairs has changed less from the dot.com era than many commentators claim. Software as a service and machine learning implementation of business methods are making trade secrecy and other non-patent sources of return from innovation more important, while the social costs of business method patents do not seem to be declining. The case for categorical exclusion of business methods is stronger today than it was in 2010.