Business Method Patents:
Technological Change, Not Judicial Activism

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The last two decades have seen an extraordinary growth in the number of patent applications for business technologies and methods. Critics of business method patents tend to assign responsibility for this development to judicial activism by the judges of the Federal Circuit especially those responsible for the decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* For example, Professor Peter Menell points to the *State Street* decision as one of the "more notable" examples of the Federal Circuit's "strong pro-patent bias in the interpretation of patent law." Professor Leo Raskind describes the *State Street* decision as "so sweeping a departure from precedent as to invite a search for its justification." So too, Judge Mayer of the Federal Circuit, in his opinion dissenting from the en banc ruling in *In re Bilski*, argues not only that the *State Street* "decision to jettison the prohibition against patenting methods of doing business contravenes congressional intent," but also that it "launched a legal tsunami, inundating the patent office with applications seeking protection for common business practices;" led to the patenting of "the somewhat ridiculous to the truly absurd;" and "generated a thundering chorus of criticism." The activism thesis has even entered the political arena, as shown by a 2006 report issued by the Computer and Communications Industry Association (CCIA), which accuses the Federal Circuit of being an "activist court" that "summarily eliminated the judicial rule against business method patents" as a means of expanding the domain of the patent system by "judicial fiat."

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The judicial activism thesis may have a superficial appeal. *State Street* was a highly visible and prominent pronouncement by the federal court having nationwide jurisdiction over patent cases. It may seem reasonable to attribute tremendous implications to such a famous judicial opinion. Yet the judicial activism thesis suffers from multiple glaring problems and plainly cannot account for the timing of the rise in business method patenting, which plainly began well *before State Street*.

The very first problem with any charge of judicial activism against the *State Street* court is that the PTO itself had granted the patent at issue in *State Street* in 1993, a half decade before the judicial decision. Thus, at least by 1993, the agency had either believed that there was no business method exception, or that any such exception was narrower than the district court believed it to be. In fact, the PTO had already issued quite a few patents similar to the one in *State Street*. As early as 1982, the agency had already established subclasses of art for patents involving "Business practice and management" and "Finance (e.g., securities, commodities)." By the time it issued the patent that would be challenged in *State Street*, the PTO had already issued more than two dozen patents just in the art subclass for "Finance," including patents for financial and management inventions such as a "Securities Valuation System," "Securities Brokerage-Cash Management System" and a "Pension Benefits System." Thus, for more than a decade prior to *State Street*, inventors and their companies had been seeking, and the PTO throughout several political administrations had been issuing, patents that covered advances in core business technologies such as finance. Indeed, even the patent application at issue in the *Bilski* case was filed *before* the Federal Circuit decided *State Street*.

A second flaw in the judicial activism thesis is that the Executive Branch, not the Judiciary, moved first to abolish any supposed "business method" exception to patentability.

Prior to 1995, the PTO had endorsed the view that at least some business methods were outside the scope of patentable subject matter. The agency's 1949 first edition of its Manual of Patent Examining Procedure (MPEP) listed "a method of doing business" one of four exceptions to patentable subject matter, but it did not maintain that all methods of doing business fall outside of patentable subject matter. Rather, the MPEP stated merely that a method of doing business "*can* be"—not "must be"—rejected as not being within the statutory classes." That permissive statement remained true after *State Street,* since some business methods may be merely abstract ideas that can be rejected as unpatentable. Moreover, the agency acknowledged that business methods are "seemingly within the category of 'art' or method," thereby recognizing that the text of the statute tended to cut against any per se prohibition on business method patents. In 1995, however, the agency dropped any mention of a business method exception from the MPEP, thus ending its tepid support for the doctrine. Subsequent actions by the PTO confirmed that the agency had acted deliberately in purging any mention of a business method exception from the MPEP. Soon after the Federal Circuit issued its *State Street* decision, the PTO issued an influential white paper describing the "business method claim format" as having been "used in various forms throughout" the twentieth century and opining that the "increase in its use today is an inevitable end result of our progress over the last century."

Third and finally, any charge of judicial activism on the part of the Federal Circuit cannot be reconciled with the precedents from the Supreme Court. In its two most recent cases on patentable subject matter as of the time of *State Street*, the Supreme Court had instructed the lower courts:

- "Congress intended statutory subject matter to 'include anything under the sun that is made by man.'"

- "In choosing such expansive terms [in section 101 of the statute] . . . modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope."
- "Courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed.'"

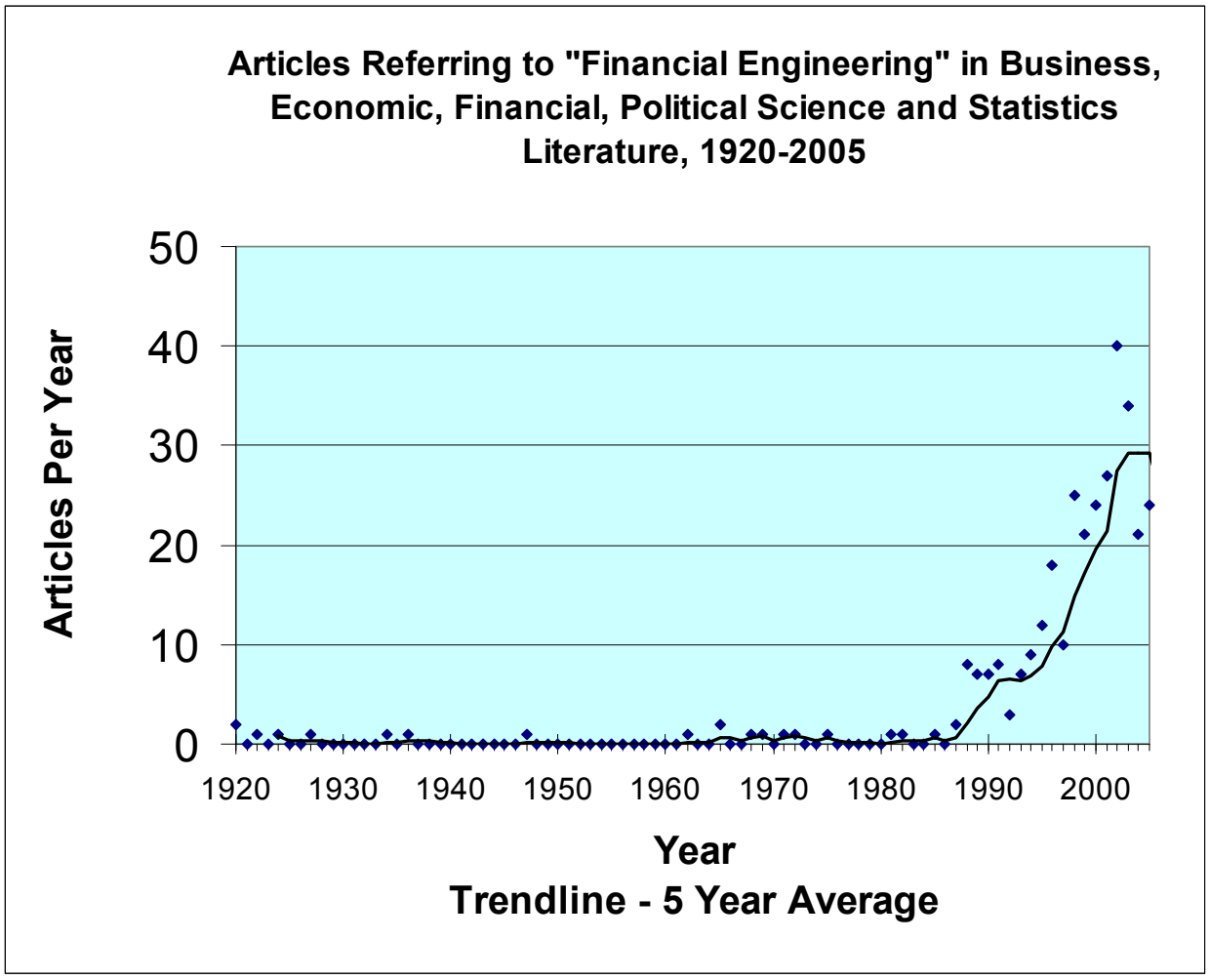
In light of that language, a responsible lower court might have reasonably thought it wrong to read into the statute a per se rule against business method patents that neither the Congress nor the Supreme Court had ever endorsed and that the Executive Branch was eschewing.

An alternative to the judicial activism thesis is that the rise in business method applications was the result of enormously important developments that were occurring *outside the legal system*. During the last quarter of the twentieth century, the methods of business, finance and management underwent a tremendous transformation as vastly better information technologies and empirical tools became available. Increasingly rigorous and mathematical approaches were deployed to address problems of economics and business, and scientific methods were generally extended into these fields.

This transformation of the business field is easy to document, if developments outside the legal practice are considered. The intellectual precursors of the movement toward a technological approach to business date back at least to the middle of the twentieth century. In 1959, for example, Professor Herbert Simon of the Carnegie Institute of Technology noted the arrival of new and "flourishing area of work" that was being "carried forward under such labels as 'management science,' 'engineering economics,' and 'operations research,'" and was being populated "by mathematicians, statisticians, engineers, and physical scientists."

About two decades later, that academic trend was migrating into the practical world of Wall Street. In 1981, the New York Times reported that American Express was naming an "Ex-Physicist" to head a newly created group on consumer financial services. By mid-decade, the employment of scientific talent was a commonplace on Wall Street, with another New York Times article describing the phenomenon: "The Street's newest professionals are the "rocket scientists" and "quants"—oftentimes former academics in the pure sciences of mathematics and physics—who search for new ways to apply the computer to all sorts of problems." Nor has the 2008-09 upheaval in the financial markets decreased Wall Street's appetite for financial "quants." As Professor Andrew Lo, the Director of MIT's Laboratory for Financial Engineering, has observed, "[t]he recent debacle has only increased the hunger for scientists on Wall Street."

The "quant"-ification of Wall Street's workforce was not the only dramatic trend that began in the 1980s. The academic literature changed too. The figure below gives the number of articles per year that used the term "financial engineering" in academic literature from the fields of finance, economics, business, political science and statistics. The term was almost unknown in the literature until the 1980s. Beginning in the late 1980s, however, a significant change occurs: the academic literature begins to employ the term "financial engineering" to describe the heavily mathematical, quantitative forms of finance that were becoming increasing common in that era. Since then the number of articles per year on "financial engineering" has continued rise at a relatively steady pace.



A final indicator of the transformation of business can be observed in university programs, especially the programs at top engineering and technical schools. Since the 1980s, numerous universities have created courses, programs, laboratories, and even whole departments dedicated to the study of topics like "financial engineering." A good example is Princeton University, which has created the "Department of Operations Research & Financial Engineering" as a center for the study of "engineering for business, commerce, and industry." Princeton is not unique. As shown in Appendix 1 below, 8 of the top 10 and 14 of the top 20 engineering universities in the nation have degrees, programs, concentrations or laboratories directed toward "financial engineering," or as it is less commonly called, "quantitative finance" or "financial

mathematics." These programs began to appear in the early and mid-1990s, and new ones continue being created. The programs tend to be interdisciplinary, with the locus of the program often (though not always) in the university's business school, but with participation from other university departments in engineering, mathematics, and statistics. Even the schools that lack a specific program in "financial engineering" have courses that cover the subject. For example, Harvard University has no program directed specifically to financial engineering but does teach "Corporate Financial Engineering" as a course in its business school.

CONCLUSION

A profound transformation of business practices has occurred in the last few decades: Economics and other related "social sciences" have come increasingly to resemble physical sciences, and the applied branches of those social sciences have come to resemble engineering. While the intellectual predicate for this transformation began as early as the 1950s, the practical revolution did not occur until the last two decades of the century. It was then that branches of business accelerated their ventures into the technological realm; that the line between a physicist and financier blurred; that employers on Wall Street began to seek out physicists and engineers; and that academic institutions began to develop not only wholly new literature, but also wholly new departments, dedicated to fields such as "financial engineering."

Unsurprisingly, as the practitioners of those transformed disciplines began to think of themselves as technologists and engineers—and indeed as these fields drew in people trained in traditional fields of science and engineering—the practitioners borrowed, or brought with them, the legal tools familiar to science and engineering, including patents. Indeed, the historical record is clear that private parties sought business method patents *first*. Patents followed the progress of science and technology. The courts validated that development only *later*. Courts were therefore

followers, not leaders, in building a new legal reality that tracked the development of new science and new applied science. A contrary view—that an activist judiciary or an activist legal system brought patents into a new field where they were unneeded, unwanted and unwelcome—can be maintained only by embracing a legal-centric view that is blinkered from some of the most important industrial developments of our age.

Appendix 1: Financial Engineering at the Top 20 Engineering Schools

University (Rank)	Financial Engineering or Quantative Finance Department, Program, Lab or Concentration	School or Department for the Financial Engineering Program	Date Started	Degrees Offered	Representative Courses or Research Projects
MIT (1) Overall: #4 Business: #5	Yes – "The Laboratory For Financial Engineering" http://lfe.mit.edu/	Sloan School of Management	1992	A financial engineering track is also offered at the School of Management	The Lab's current research projects include: - Trading Technology and Market Microstructure - Empirical Validation and Implementation of Financial Asset Pricing Models - Public Policy Implications of Financial Technology
Stanford (2) Overall: #4 Business: #2	Yes http://finmath.stanford.edu/	Department of Mathematics and Department of Statistics. See http://finmath.stanford.edu/index.html ("The Departments of Mathematics and Statistics, in close cooperation with the Departments of Economics and Management, Science & Engineering and the Graduate School of Business, offer an Interdisciplinary Master of Science	2000	M.S. in Financial Math In 2007, the Stanford Center for Professional Development introduced a non-degree 6-month executive program that is called the Stanford Financial Engineering Program and is offered by the Department of Management Science and Engineering: http://www.stanford.edu.hk/program.html	- "Financial Modeling and Risk Management" http://finmath.stanford.edu/academics/courseDesc.html - "Advanced Topics in Financial Engineering" (http://www.stanford.edu/~japrimbs/msande345.htm)

		Degree in Financial Mathematics.")			
California-Berkeley (3) Overall: NR Business: #7	Yes http://mfe.haas.berkeley.edu/index.html	School of Business		M.S. in Financial Engineering	- "Financial Risk Measurement and Management" - "Fundamentals of Financial Economics" - "Behavioral Finance"
Georgia Tech (4) Overall: NR Business: NR	Yes http://www.qcf.gatech.edu	Interdisciplinary with units in: College of Management, School of Industrial and Systems Engineering, and School of Mathematics		M.S. in Quantitative and Computational Finance	- "Stochastic Processes in Finance I" - "Design and Implementation of Systems to Support Computational Finance" - "Numerical Methods in Finance"
Illinois-Urbana-Champaign (5) Overall: NR Business: NR	Yes – Financial Engineering is an area of specialization. http://www.business.uiuc.edu/finance/areas.aspx?code=E	College of Business (Department of Finance)		Financial engineering is an area of specialization	- "Financial Derivatives" - "Financial Engineering I" - "Managing Financial Risk for Insurers"
Carnegie Mellon (6) Overall: NR Business: #15	Yes http://www.tepper.cmu.edu/master-in-computational-finance/index.aspx http://www.tepper.cmu.edu/mba/mba-programs-coursework/mba-tracks/financial-engineering/index.aspx	School of Business, Department of Mathematical Sciences, Department of Statistics and School of Public Policy and Management	1994	M.S. in Computational Finance (Though the program is named "computational finance," it touts itself as the #1 ranked program in financial engineering.) Specialized MBA track in Financial Engineering (Business School)	- "Advanced Derivative Modeling" - "Financial Computing" - "Quantitative Asset Management" - "Studies in Financial Engineering" - "Simulation for Option Pricing" - "Multi-Period Asset Pricing"

Cal Tech (7) Overall: #6 Business: NR	No	Division of Humanities and Social Science		Elective course offered in the Ph.D. in Social Science curriculum	- "Mathematical Finance"
Southern California (7) Overall: NR Business: NR	Yes http://mapp.usc.edu/mastersprograms/degreeprograms/FE/MSFE.html	School of Engineering, School of Business, and Department of Economics		M.S. in Financial Engineering	" Stochastic Systems and Finance" - "Uncertainty Modeling and Stochastic Optimization" - "Nonlinear and Adaptive Control"
Michigan (9) Overall: NR Business: #13	Yes http://financialeng.engin.umich.edu/	College of Engineering School of Business, and Department of Mathematics and Department of Statistics	1997	M.S. in Financial Engineering	- "Capital Markets & Investment Strategies" - "Fixed Income Securities and Markets" - "Optimization Methods in Finance"
Texas (10) Overall: NR Business: #18	No.	School of Business (Department of Finance and the Department of Management Science and Information Systems)	2005	Ph.D. in Information, Risk and Operations Management with a specialization in quantitative finance, which includes financial engineering http://www.mccombs.utexas.edu/dept/irom/phd/ MBA with concentration in Risk Management http://www.mccombs.utexas.edu/dept/irom/bba/risk/mba_program.asp	- "Investment Theory & Practice" - "Financial Risk Management" - "Stochastic Models and Inventory Theory" - "Managing Corporate Risk" - "Financial Risk Management" - "Stochastic Models and Inventory Theory"

Cornell (11) Overall: #14 Business: #17	Yes http://www.orie.cornell.edu/orie/fineng/index.cfm	School of Operations Research and Industrial Engineering; School of Management; Department of Economics; Department of Applied Economics and Management	1995	M.S. in Engineering (Concentration in Financial Engineering); Ph.D. in Operations Research	- "Statistics for Financial Engineering" - "Monte Carlo Simulation" - "Fixed-Income Securities and Interest-Rate Derivatives"
Purdue (12) Overall: NR Business: NR	Yes (existing program is described as "computational finance") http://www.stat.purdue.edu/purdue_comp_finance/	School of Management; College of Science (Department of Mathematics and Department of Statistics)		A Specialization in Computational Finance may be earned in conjunction with: MBA; M.S. in Mathematics; M.S. in Statistics	- "Mathematics of Finance" - "Adv. Probability, Options, and Num. Methods" - "Simulation Design and Analysis"
California-San Diego (12) Overall: NR Business: NR	No	School of Engineering (Center for Control Systems and Dynamics)		Faculty research is conducted at the center in Finance and Optimization: http://ccsd.ucsd.edu/about/	- "Mathematics of Finance" - "Convex Optimization and Applications"
Texas A&M (14) Overall: NR Business: NR	No				- "The Mathematics of Contingent Claims" See http://www.math.tamu.edu/~stecher/425/425-index.shtml; see also http://www.math.tamu.edu/~stecher/425/syllabus.shtml (noting that the text used in the class is *Mathematics for Finance: An Introduction to Financial Engineering* by Marek Capinski and Tomasz Zastawniak)

UCLA (14) Overall: NR Business: #14	Yes http://www.anderson.ucla.edu/x17276.xml	School of Management	2008	M.S. in Financial Engineering	- "Empirical Methods in Finance" - "Quantitative Asset Management" - "Fundamentals of Corporate Finance and Accounting"
Wisconsin (16) Overall: NR Business: NR	Yes http://www.bus.wisc.edu/qmf/default.asp	School of Business (Department of Banking, Investment and Finance)	1993	Quantitative Masters in Finance & M.S. in Finance Program (designed for as preparation for "careers in mathematical finance, financial engineering, and financial modeling")	- "Econ Statistics and Econometrics" - "Futures and Options" - "Methods of Computational Math"
Maryland (17) Overall: NR Business: NR	Yes	School of Business		MBA / M.S. in Finance with a concentration in financial engineering. See http://www.rhsmith.umd.edu/finance/masters.aspx (describing "the cross-functional Financial Engineering concentration")	- "Computational Finance (Financial Engineering)" - "Financial Restructuring and Strategy" - "Applied Equity Analysis and Portfolio Management"
Harvard (18) Overall: #1 Business: #1	No	School of Business			- "Corporate Financial Engineering" http://www.hbs.edu/mba/academics/coursecatalog/1426.html - "Functional and Strategic Finance" - "Computational Finance"

Princeton (18) Overall: #2 Business: NR	Yes http://orfe.princeton.edu http://www.princeton.edu/bcf	School of Engineering and Applied Science Bendheim Center for Finance	1999 2001	Ph.D. in Operations Research and Financial Engineering Master in Finance with course track in Financial Engineering and Risk Management	- "Applied Stochastic Analysis and Methods" - "Financial Econometrics" - "Analytical and Computational Methods for Financial Engineering" - "Modern Regression and Applied Time Series" - "Corporate Finance and Financial Accounting" - "Financial Investments"
California-Santa Barbara (18) Overall: NR Business: NR	No	Department of Mathematics; Department of Statistics and Applied Probability		B.S. in Financial Mathematics and Statistics	- "Introduction to Mathematical Finance" - "Term-Structure Models and Portfolio Theory" - "Introduction to Risk Management and Financial Engineering"

The top 20 engineering schools were determined by the 2009 *US News* rankings. http://grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-engineering-schools/rankings
Information on the financial engineering programs is based on the schools' websites.