

# The Emerging Role of Patent Law in Risk Finance

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**T**o the Founding Fathers borrowing from English patent law, extending patent protection to financial innovations would have seemed quite strange. As one leading scholar has noted:

[I]t would have been seen as absurd for an entrepreneur to file a patent on a new finance technique such as publicly traded corporate shares, techniques for obtaining private financing for a bridge to compete with an existing bridge, or a security interest in uncut timber. These were the earmarks of commerce, of enterprise; laudable surely, but something altogether distinct from the realm of “invention” and the “useful arts.”<sup>1</sup>

Nevertheless, two hundred years later few can doubt that new finance techniques are patentable subject matter.

This article explores the potential implications of patent law for risk finance. As Christopher L. Culp notes in his forthcoming risk management text,<sup>2</sup> “perhaps nowhere are the opportunities for structured risk management solutions more interesting ... than in the [alternative risk transfer] area of insurance—an area that has quite rapidly come to include total risk and integrated insurance, securitized products, and derivatives.” While few can question the important role that continuing financial innovation will have on traditional financial

and insurance products, little concern has been focused on the possible effects of intellectual property law—especially patent law—on the alternative risk transfer field. Trends in patent law and litigation, combined with increased patenting activity in insurance, securitized products, and derivatives, suggest that alternative risk transfer professionals should take seriously the changing legal landscape.

It is difficult to overestimate the potential effects of a valid patent on any field of commercial endeavor. Patents are enormously powerful legal devices. The owner of a United States patent has the legal right to exclude others from making, using, offering to sell, or selling the patented invention for a term of 20 years. The patent owner may license these rights to others, granting them the right (on an exclusive or nonexclusive basis) to make, use, or sell the patented invention. In addition—and perhaps more visibly—patent owners can enforce their patent rights in a federal civil lawsuit. If victorious in a patent infringement lawsuit, patent owners can recover damages and/or permanent injunctions forbidding the acts that infringe the patent. For companies whose existence rests on patentable technologies, patent litigation can be all out legal warfare. For that company’s customers, patent litigation can determine whether products or services it has purchased in the past will be available in the future, and at what price and quality. More ominously, customers themselves can face liability for infringement.

The arcane world of patents and patent law is emerging as an important business concern to risk professionals. *Risk* magazine recently reported on widespread criticism of a patent awarded to Columbia University for a quasi-Monte Carlo method (U.S. Patent No. 5,940,810: "Estimation Method and System for Complex Securities Using Low-Discrepancy Deterministic Sequences"). A recent *Wall Street Journal* article reports on an emerging legal battle between the American Stock Exchange and two inventors over a patented process related to exchange-traded funds (U.S. Patent No. 5,806,048: "Open End Mutual Fund Securitization Process"). In August 2000, Amex filed a complaint in U.S. District Court (patent cases must be brought in federal court, not state court), seeking a declaration that the patent is invalid, while the patent's owner, Mopex, Inc., filed its own patent infringement lawsuit against Amex only days later.

Applications for new financial and insurance patents are now surely but secretly in process at the United States Patent and Trademark Office (patent applications are now held secret by the Patent and Trademark Office for the first 18 months after filing). The increase in financial patenting activity is mainly attributable to changes in the legal landscape. In particular, both the federal courts and Congress have signaled that financial inventions, once previously thought to be outside the scope of strong patent protection, will be treated by the patent laws as on par with inventions in more traditional fields like bioengineering and manufacturing machines. The changing legal landscape may have a significant effect on future development and sale of cutting-edge financial and insurance products.

Already, it is clear that financial patents are proliferating. Lerner [2000] estimates that hundreds of financial and insurance patent applications are in process at the United States Patent and Trademark Office. The main effect of recent legal developments has been to increase confidence that these patents—if granted by the Patent and Trademark Office—will be upheld by the federal courts in later litigation. It is also clear that some owners of these patents will aggressively assert them against alleged infringers. Visible examples of patent lawsuits—such as Amazon.com's successful effort to enjoin Barnes&Noble.com from using "one-click" technology (*Amazon.com, Inc. v. Barnes&Noble.com, Inc.*, 53 U.S.P.Q. 2d 1115 [W.D. Wash. 1999])—are likely to embolden financial patent holders in their discussions with potential infringers. Bottom line: the proliferation of financial patenting and the aggressive assertion of patent rights against alleged infringers may lead to

high stakes litigation over intellectual property rights in the alternative risk transfer field.

## THE BASICS OF PATENTABILITY

The essence of patent protection is the right to exclude others from making, using, and selling the claimed invention. The congressional authority to enact patent legislation derives from Article I, Section 8, Clause 8 of the United States Constitution, granting the power "To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Pursuant to this authority, Congress has enacted several patent laws through the years. While even a basic introduction to patent law is beyond the scope of this article, the conditions for patentability are important to an understanding of the emerging role of patent law in risk finance.

In general, an inventor wishing to obtain a patent must comply with four legal requirements for patentability. A patentable invention is 1) of patentable subject matter; 2) useful; 3) new; and 4) nonobvious.

Not everything is patentable. Some inventions are outside the scope of patent law, no matter how useful, new, or nonobvious they might be. For example, a printed book is not patentable subject matter (but may be protectable under copyright law) despite the fact that its teachings might be useful, new, and not at all obvious to any reader. Typically, patentable subject matter was thought to include machines and manufactures, with later acceptance of processes, chemical compositions, and bioengineered products. Outside of the patentable subject matter category were laws of nature, natural phenomena, and abstract ideas.

Only "useful" products or processes are patentable: the patented product or process must "work" to produce some result of some benefit. It need not work well, however, and (and least on its own) the usefulness requirement does not require that the patented product or process work better than anything preceding it does. A patent application on a "time machine" claiming the invention of allowing travel back to a prespecified date would likely be rejected as impossible, and thus not useful. Further, a chemical compound with no known use to humanity would also likely be rejected on these grounds. However, a chocolate-powered automobile that traveled at speeds up to 2 miles per hour might very well pass the usefulness test.

A patentable invention must be "new." The patent laws test the novelty of an invention by reference to the relevant "prior art" in the field of the patent's invention.

## EXHIBIT 1

### The Legal Requirements of Patentability Under U.S. Law

Requirement	Explanation
Patentable Subject Matter	The invention must fall into a category eligible for patent protection; not everything can be patented.
Useful	The invention must have some utility, though it need not work well and need not be superior to pre-existing products or processes.
New	The invention must not have been described in a relevant piece of prior art (e.g., in a prior patent or published article).
Nonobvious	The invention must not have been obvious to a hypothetical person of ordinary skill in the art, assumed to be knowledgeable of all the relevant prior art.

In general terms, fleshed out by particular statutes and case law, an invention is not new if the elements of the claim are contained in a single piece of relevant prior art. For example, suppose a relevant published journal article contained each element—either expressly or inherently—of a patent “claim.” [Patent claims are statutorily required (35 U.S.C. §112) statements “particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.”] That claim would be “anticipated” by the prior art. Put simply, an anticipated invention is not new, and is not patentable.

Finally, an invention is not patentable if it is “obvious.” Obviousness differs from anticipation in the sense that no single piece of relevant prior art must contain (either expressly or inherently) all the teachings of a particular claim. Instead, the test is whether the invention would have been obvious to a person of ordinary skill in the art. The “person of ordinary skill in the art” is a legal construct, a hypothetical individual assumed to be aware of all of the pertinent prior art, but not necessarily a genius in the field.

While the conditions of patentability must be satisfied first at the patent application stage, each of these matters can be (and usually is) revisited in litigation. That is, although an issued patent enjoys a legal presumption of validity (35

U.S.C. § 282), the alleged infringer during the course of litigation may rebut that presumption. Because of the unique challenges of overcoming this presumption, and because of the typically high stakes involved, patent litigation is typically highly complex and costly civil litigation that requires the skills of top trial teams and technical experts.

#### AN ILLUSTRATION: METHOD OF EXERCISING A CAT (U.S. PATENT NUMBER 5,443,036)

In litigation, financial patent holders will face intense scrutiny of, among many other things, their satisfaction of the legal requirements for patentability described above and summarized in Exhibit 1. To fix ideas about the four requirements described above it is useful to examine a short, easily understood patent. Exhibit 2 provides excerpts from U.S. Patent Number 5,443,036, “Method of Exercising a Cat.” Despite the topic of this article, the “cat” exercised in the method of the patent is an animal, and not a financial instrument related to catastrophic risk. Putting aside the pun, the patent reveals some of the issues that might arise in risk finance patent litigation, without delving into the complex factual matters likely to arise in real finance patents.

## EXHIBIT 2

### Method of Exercising a Cat (U.S. Patent Number 5,443,036)

<b>Title</b>	Method of Exercising a Cat
<b>Number</b>	5,443,036
<b>Inventors</b>	Kevin T. Amiss; Martin H. Abbott
<b>Issued/Filed Dates</b>	August 22, 1995/November 2, 1993
<b>Abstract</b>	A method for inducing cats to exercise consists of directing a beam of invisible light produced by a hand-held laser apparatus onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats, and to any other animal with a chase instinct.
<b>Background of the Invention</b>	<p>1. Technical Field</p> <p>The present invention relates to recreational and amusement devices for domestic animals and, more particularly, to a method for exercising and entertaining cats.</p> <p>2. Discussion of the Prior Art</p> <p>Cats are not characteristically disposed toward voluntary aerobic exercise. It becomes the burden of the cat owner to create situations of sufficient interest to the feline to induce even short-lived and modest exertion for the health and well-being of the pet. Cats are, however, fascinated by light and enthralled by unpredictable jumpy movements, as for instance, by the bobbing end of a piece of hand-held string or yarn, or a ball rolling and bouncing across a floor. Intense sunlight reflected from a mirror or focused through a prism, if the room is sufficiently dark, will, when moved irregularly, cause even the more sedentary of cats to scamper after the lighted image in an amusing and therapeutic game of "cat and mouse." The disruption of having to darken a room to stage a cat workout and the uncertainty of collecting a convenient sunbeam in a lens or mirror render these approaches to establishing a regular life-enhancing cat exercise routine inconvenient at best.</p>
<b>Summary of the Invention</b>	<p>Accordingly, it is an object of the present invention to provide an improved method of exercising a cat in normal day and night lighting environments.</p> <p>It is a further object of the present invention to provide a method of providing amusing, entertaining, and healthy exercise for a cat.</p> <p>It is yet another object of the present invention to teach a method of exercising a cat effortlessly at any time.</p> <p>In accordance with the present invention, a light amplification by stimulated emission of radiation (laser) device in a small hand-held configuration is used to project and move a bright pattern of light around a room to amuse and exercise a cat.</p> <p>The method is effective, simple, convenient, and inexpensive to practice and provides healthy exercise for the cat and amusement and entertainment for both the cat and the owner.</p>
<b>Claims</b>	<p>What is claimed:</p> <ol style="list-style-type: none"> <li>1. A method of inducing aerobic exercise in an unrestrained cat comprising the steps of:             <ol style="list-style-type: none"> <li>(a) directing an intense coherent beam of invisible light produced by a hand-held laser apparatus to produce a bright highly focused pattern of light at the intersection of the beam and an opaque surface, said pattern being of visual interest to a cat; and</li> <li>(b) selectively redirecting said beam out of the cat's immediate reach to induce said cat to run and chase said beam and pattern of light around an exercise area.</li> </ol> </li> <li>2. The method of Claim 1 wherein said bright pattern of light is small in area relative to a paw of the cat.</li> <li>3. The method of Claim 1 wherein said beam remains invisible between said laser and said opaque surface until impinging on said opaque surface.</li> <li>4. The method of Claim 1 wherein step (b) includes sweeping said beam at an angular speed to cause said pattern to move along said opaque surface at a speed in the range of 5 to 25 feet per second.</li> </ol>

Consider first the patent's "abstract" appearing on the front page of the patent as a matter of course. The abstract provides a summary of the patent:

A method for inducing cats to exercise consists of directing a beam of invisible light produced by a hand-held laser apparatus onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats, and to any other animal with a chase instinct.

In other words, the patent concerns a method for causing a cat to exercise by using a laser pointer to create a point of light that will evoke the chase instinct of the cat.

The '036 patent (practitioners typically refer to a patent by its last three numbers) has 4 claims:

1. A method of inducing aerobic exercise in an unrestrained cat comprising the steps of:
  - (a) directing an intense coherent beam of invisible light produced by a hand-held laser apparatus to produce a bright highly focused pattern of light at the intersection of the beam and an opaque surface, said pattern being of visual interest to a cat; and
  - (b) selectively redirecting said beam out of the cat's immediate reach to induce said cat to run and chase said beam and pattern of light around an exercise area.
2. The method of Claim 1 wherein said bright pattern of light is small in area relative to a paw of the cat.
3. The method of Claim 1 wherein said beam remains invisible between said laser and said opaque surface until impinging on said opaque surface.
4. The method of Claim 1 wherein step (b) includes sweeping said beam at an angular speed to cause said pattern to move along said opaque surface at a speed in the range of 5 to 25 feet per second.

The '036 patent may appear ridiculous to some observers, and indeed the patent is a favorite of critics of the patent system and the review applied by the United States Patent and Trademark Office. Nevertheless, it is important to examine the issues raised by the '036 patent in legal terms. Doing so shows just how difficult the problem of dealing with an asserted U.S. patent can be.

Suppose, for example, that one wanted to challenge the validity of the '036 patent on the basis of the four requirements of patentability discussed above. Consider first the requirement of patentable subject matter. To pass this requirement, the method of exercising a cat covered by the '036 claims must fall within the types of subject matter covered by patent law. A method for exercising a cat may very well do so. A "process" can be patented (35 U.S.C. § 101): "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." The patent statute [35 U.S.C. § 100 (b)] further defines the term *process* to include a *method*: "The term 'process' means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material."

But there are some interesting issues for litigation here. For example, what would be the effect of the necessity for human participation in the method? As a general rule, the requirement of human mental participation renders a process unpatentable. See, for example, *Johnson v. Duquesne Light Co.*, 29 F.2d 784 (W.D. Pa. 1928), *aff'd*, 34 F.2d 1020 (3d Cir. 1929). As Claim 1 states, the method requires that the individual engages in the action of "selectively redirecting said beam out of the cat's immediate reach[.]" That sounds like a requirement for substantial human mental participation, and may render the claim invalid.

Next, consider the requirement that the invention be "useful." Here, matters seems easy, as they often are in utility inquiries. The author of this article will attest that the method works. Using a laser pointed to create a pinpoint of light can induce the cat to chase the pinpoint, providing the intended exercise.

Whether or not the invention is new—that is, whether elements of the claim are contained in a single piece of relevant prior art—would require substantial research. The lawyer (or his/her expert) would scour publications in the field and past patents to determine if anyone had ever disclosed the method of exercising a cat using a laser pointer. Note that here it does not matter whether anyone (including the author) had employed the method in secret prior to the application date (November 2, 1993). What matters is whether all the elements of the claimed invention appeared in a reference that could be available to a potential inventor. Suppose, counter-factually, that there was a published article in *Cat Fancy* magazine, titled "Exercise Your Cat With A Laser Pointer" dated January 1993, and disclosing the

## EXHIBIT 3

### Examples of Risk Finance Patents

<b>Title</b>	Estimation Method and System for Complex Securities Using Low Discrepancy Deterministic Sequences	System and Method of Risk Transfer and Risk Diversification Including Means to Assure with Assurance of Timely Payment and Segregation of the Interests of Capital	System and Method for Replacing a Liability with Insurance and for Analyzing Data and Generating Documents Pertaining to a Premium Financing Mechanism Paying for Such Insurance
<b>U.S. Patent Number</b>	5,940,810	5,704,045	6,026,364
<b>Issued/Filed Dates</b>	August 17, 1999/ July 30, 1997	December 30, 1997/ January 9, 1995	February 15, 2000/ July 28, 1997
<b>Inventors</b>	Joseph F. Traub, Spassimir Paskov, Irwin F. Vanderhoof	Douglas L. King, Alasdair G. Barclay, Rockie C. Wellman	Brian L. Whitworth
<b>Assignee</b>	The Trustees of Columbia University in the City of New York	Investors Guaranty Fund, Ltd.	
<b>Subject Matter</b>	Quasi-Monte Carlo Derivatives Pricing	Risk Transfer	Premium Financing Mechanism

exact method taught by the '036 patent. In that case, the patent would be invalid because the invention would not be "new." Obviously, the search for prior art is an important part of any patent litigation effort.

Also important is the obviousness inquiry. To many, it is here where the '036 patent might have its most serious problem. The patent itself—in the section titled "Background of the Invention"—discloses the well-known fact that "[I]ntense sunlight reflected from a mirror or focused through a prism, if the room is sufficiently dark, will, when moved irregularly, cause even the more sedentary of cats to scamper after the lighted image in an amusing and therapeutic game of 'cat and mouse.'" (The author of this article was once fond of "exercising" his own cat by reflecting light off the back of a CD and onto the walls of his apartment.) Is the use of a laser pointer obvious to anyone who has employed these methods? If so, the patent could be invalid on these obviousness grounds alone, even if the method was never written down in a relevant piece of prior art.

In litigation, all these questions of patentability (and many other questions as well) are up for grabs, and juries will decide questions like anticipation. In many cases,

expert analysis may help, but the task is not an easy one. Consider the use of expert analysis to show that certain financial patents were "obvious" in light of prior art. There must be some motivation to combine the prior art references or practices in ways that render the invention obvious. That motivation can come from the prior art references themselves, the knowledge of one of ordinary skill in the art or even from the nature of the problem to be solved, but the showing must be clear.

The road for an alleged infringer is not an easy one for another reason as well. Patent cases are typically tried to juries. Juries are prone to form a strong hypothesis that a patent issued by the Patent and Trademark Office is valid, not knowing that most inventions are never tested by examiners, that patent examiners are often overworked and sometimes underqualified, and that patent applications are secret and not subjected to any meaningful adversary process unless litigated.

But alleged infringers are not the only ones with problems. The problem of detecting infringement is substantial for patent holders, especially for methods that can be practiced in relative secrecy. Consider again the '036 patent. How could the inventors know whether or

not the author of this article had ever given up the CD method for the (admittedly superior) laser pointer method? If the infringer cannot be identified, the right to exclusive use is worth little. A similar problem may face some current and future financial patent holders.

## EXAMPLES OF RISK FINANCE PATENTS

Moving beyond arguably silly patents, it is instructive to look at some real risk finance patents. These are patents that on their face purport to claim rights to inventions that have undoubted application to risk finance applications. Exhibit 3 presents brief descriptions of three such patents (see Heaton [2000] for detailed examples of several other financial patents).

The first patent (U.S. Pat. No. 5,940,810) is the controversial one issued to Columbia University for quasi-Monte Carlo methods. Rather than covering a risk finance product per se, the Columbia University patent covers a tool for pricing a financial instrument. Its subject matter is most easily grasped by reference to its abstract. The abstract reads:

In securities trading, in setting the initial offering price of a financial instrument, or in later revaluation as financial parameters such as interest rates may change, an estimate of the value of the instrument may be represented as a multidimensional integral. For evaluation of the integral, numerical integration is preferred with the integrand being sampled at deterministic points having a low-discrepancy property. The technique produces approximate values at significant computational savings and with greater reliability as compared with the Monte Carlo technique.

To a lawyer, the real meat of a patent is its "claims." Claim 1 of the '810 patent provides a more technical description of the invention, using language meant to convey as precisely as possible what exactly the inventor intends to claim:

1. A method for one of buying, holding and selling a complex security, comprising:
  - (i) deriving a multivariate integrand which, when integrated over a domain of integration having at least 50 dimensions, represents an estimated value of the security;

- (ii) calculating, by computer, integrand values at points in the domain of integration are obtained from a low-discrepancy deterministic sequence;
- (iii) combining the integrand values, by computer, to approximate the estimated value; and
- (iv) effecting, based on the estimated value, one of buying, holding and selling the security.

The '810 patent contains 21 additional claims, many of which relate to (or, in patent parlance, are "dependent" on) the claim recited above.

In simple terms, the '810 patent claims the exclusive right to use any method that contains all the elements of any of its claims. In this case, those claims relate to the use of what are more commonly known as "quasi-Monte Carlo" methods. To fall under Claim 1, for example, use of the method must be "by computer" since that is a recited limitation in element (ii). If, for example, it were possible to solve in one's head the integration problem presented in element (i), then that use would not infringe the '810 patent. The limitations of such a "design around" are obvious to all but the most gifted mental calculators.

The second patent described in Exhibit 3—U.S. Patent Number 5,704,045—purports to cover a "System and method of risk transfer and risk diversification including means to assure with assurance of timely payment and segregation of the interests of capital." Again, the abstract provides a snapshot of the patent's intended coverage:

A system and method of accepting risk through contractual obligations transfers a portion of the risk to investors and includes means for absolute assurance of timely payment to contract holders, and segregation, of the interests of particular investors to specifically identified risks in a risk to capital matching system. The system creates separate ledgers and segregated reserves to tailor particular products for specific needs including transferring difficult to place risks. The system creates agreements which promise payments, based on loss from risks including investment risks. Data processing provides legally segregated relationship management links, supervising and balancing the interests of professionals in a risk transfer and diversification system.

The '045 patent has 74 claims. Claim 1 is as follows:

*any of the patents' claims.* The patents have over 130 claims relating to these types of transactions, so the coverage is quite broad. We will do our best to prevent accidental infringement and prevent unnecessary worries regarding analysis or transactions which will not infringe.<sup>4</sup>

## THE EVOLUTION OF FINANCIAL PATENTS: A THUMBNAIL SKETCH

The United States Supreme Court has noted that Congress intended that patent protection might extend to “anything under the sun that is made by man.”<sup>5</sup> Still, most readers will note that patents have played no significant role in the surge of financial innovation over past decades (see Lerner [2000]).

Simplicity certainly cannot explain the paucity of financial patents. To the contrary, financial engineering is a highly technical and complex field, whose “inventions” are often beyond the grasp of those without strong training in mathematics, computer science, and modern financial economics. At a technical level, critical financial innovations may be every bit as “complex” as more traditional fields of patent law protection like biotechnology and electrical engineering.

Nor can the failure to employ patent law protection be ascribed to any obvious superiority of other forms of intellectual property protection. Consider the two alternative mechanisms traditionally employed by financial innovators to “protect” the fruits of financial invention: secrecy and first-mover advantages. Secrecy probably has been the predominant means of protection for financial inventions like the computer code and financial mathematics underlying cutting-edge derivatives pricing models. Secrecy can facilitate significant nonpatent legal protection, including contractual nondisclosure agreements and state trade secrets law. First-mover advantages—getting to market first and exploiting the gains from doing so—have been more important for protecting the financial innovation embodied in new security designs (see Tufano [1989]). Although few doubt the ability of competing investment banks to reverse-engineer widely offered products, first-movers appear to gain something from being first out the door with an innovative new offering.

However, both secrecy and first mover advantages possess inherent weaknesses. Secrecy is vulnerable to the constant risk of disclosure, and (with an important recent exception noted below) secret inventions are not protectable against subsequent patents on the same inventions.

First-mover advantages are less susceptible to this problem since the invention is disclosed in the first use or sale, limiting its later patentability and enforcement against the first inventor.<sup>6</sup> But the first-mover advantage may leave significant value on the table for competitors. Tufano [1989], for example, found that rivals imitated 35 of 58 studied financial innovations within one year of introduction. In addition, the incrementalism so prevalent in financial engineering—where one financial innovation builds in small ways on an earlier one—means that an early patent might allow even greater returns from an important financial innovation than otherwise available from the first-mover’s nonlegal advantages alone.

Finally, the paucity of patent protection in the financial field cannot be explained by any general discomfort with legal and regulatory rules. Indeed, observers link many important financial innovations directly to legal and regulatory rules, especially tax rules (see Miller [1986], Gergen and Schmitz [1997]).

The best explanation for the past rarity of financial patents is instead that few financial “inventors” believed that their financial innovations were patentable subject matter. Or, more accurately, the risks that a court would find that a given financial invention was not patentable subject matter was high enough that the value of the patent was low. What has been important in the evolution of financial patents is the development of greater certainty over the patentability of computing methods and mathematical algorithms. Financial patents tend to implicate both areas.

Even a summary of the long and twisting legal history of the patentability of computing methods and mathematical algorithms is beyond the scope of this article. Suffice to say, however, that legal standards eventually began to embrace the patentability of computer implemented inventions and then to dismiss with the need for a computer-implementation per se, so long as the mathematical algorithm was not simply a mathematical formula in the abstract.

In a series of important decisions, the Supreme Court first presented seemingly high hurdles to patentability, suggesting that computer programs might be simply unpatentable mathematical algorithms. The Court then appeared to soften this position for computer programs performing useful functions. The lower courts further developed tests to determine whether computer programs were patentable subject matter, and the role that the presence of a “mathematical algorithm” might play in that determination.

An important application of this development occurred in a relatively early and important patent case surrounding a financial patent. In 1983, the U.S. District Court of Delaware held that a patent related to Merrill Lynch's Cash Management Account ("CMA") claimed patentable subject matter because the claims covered the use of a computer to effectuate a business activity. Linking the computer to the business method of the CMA proved the key to Merrill Lynch's litigation success, and Dean Witter Reynolds eventually paid Merrill Lynch a license fee to offer its own CMA product.

By any measure, however, the concern with financial patents is related to a recent and highly influential opinion of the Court of Appeals for the Federal Circuit. The Federal Circuit has responsibility for patent law appeals in the United States. In 1998, it decided the case of *State Street Bank v. Signature Financial*, 47 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1998). In that case, the district court (the lower court where the initial complaint was filed) ruled that subject matter claimed in the patent was not patentable subject matter. On appeal, the Federal Circuit reversed, holding that that Signature Financial's software system for managing a "Hub and Spoke" mutual fund pooling system was patentable subject matter.

Against the background of earlier case law, the State Street decision was influential because it laid to rest any continuing doubt as to the patentability of "business methods," made clear that computer programs were patentable subject matter, and eliminated substantial doubt over the patentability of mathematically derived inventions. In perhaps its most important holding for financial patenting, the court stated:

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces a useful, concrete and tangible result—a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

In the later case of *AT&T Corp. v. Excel Communications, Inc.*, 50 U.S.P.Q.2d (BNA) 1447 (Fed. Cir. 1999), the Federal Circuit made clear that the presence of a "machine" was unimportant: the patentability of claims containing mathematical algorithms is the same regardless

of the form, machine, or process in which a particular claim is drafted.

The general viability of the Federal Circuit's interpretation was confirmed when, on November 29, 1999, Congress amended 35 U.S.C. §273 to provide that an alleged infringer of a business method patent can assert as a defense that it reduced the subject matter to practice at least one year prior to the effective filing date of the patent, and commercially used the subject matter before the effective filing date of the patent. The amendment was intended to protect users of business methods who had not patented their earlier inventions, but now were being sued by those who had. The implicit acceptance by Congress of the business method patent suggests that the Federal Circuit is unlikely to change its position in the future.

Thus, the important legal changes leading to greater financial patenting concern clarification of subject matter requirement. Decisions like *State Street* and *AT&T v. Excel* make clear that the subject matter requirement is no longer going to prevent most interesting financial inventions from being patented. This means that other requirements of patentability—usefulness, novelty, and nonobviousness—will become the key focus, as is the case in patent litigation in more well-established fields. Since inventions that are not useful are typically of little financial value, this means that the real focus will be on novelty and nonobviousness.

## CONCLUSION

This article has explored the emerging role that patent law will play in financial and insurance innovation. Given recent legal shifts, it seems likely that patent law will become increasingly important in controlling the sale and use of newly designed financial products and widely used pricing and risk management software (as opposed to proprietary models). The evolution of legal views of patentable subject matter, and an increasing willingness of small companies to leverage intellectual property rights, suggests that intellectual property law—the laws pertaining to patents, copyrights, trademarks, and trade secrets—will play an increasingly important role in the process of financial innovation.

It is also important, however, to keep patent law in its proper perspective. Many financial firms will continue to rely on first mover advantages and trade secret protect their intellectual property investment. This may be particularly true in financial engineering. Trade secret law, in particular, offers substantial advantages in that it enables a

company to keep its proprietary information secret. Considering that the technological life of pricing models and the like may be obsolete by the time a patent issues, secrecy will continue to be an important source of protection for inventions in the financial engineering field. Nevertheless, the message to alternative risk transfer professionals is that as innovation in the field continues, the once-ignored possibility of patent protection must be taken seriously from both offensive and defensive standpoints.

## ENDNOTES

<sup>1</sup>Merges [1999].

<sup>2</sup>See Culp [2001, Ch. 26].

<sup>3</sup>The '045 patent is described at Investor Guaranty Fund, Ltd.'s home page at <http://styx.forgedesign.com/domains/igf/pages/home/home.html>.

<sup>4</sup>The quoted language was found at <http://www.financialpatents.com/Whyus.html>.

<sup>5</sup>*Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (quoting a 1952 Senate Report).

<sup>6</sup>The patent laws contain severe restrictions on the patentability of inventions that were in public use or on sale during times prior to application. For example, one U.S. District Court recently held that a company's demonstrations of its computer software to nonemployees without assurances of confidentiality could be such a public use.

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