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Contemporary Financial Innovation: Orthodoxy and Alternatives

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CONTEMPORARY FINANCIAL INNOVATION: ORTHODOXY AND ALTERNATIVES

*Charles R.P. Pouncy**

TABLE OF CONTENTS

I. INTRODUCTION	506
II. A DEFINITION OF FINANCIAL INNOVATION	513
A. THE FINANCIAL SECTOR AND FINANCIAL INNOVATION	515
B. A CHRONOLOGICAL EXAMINATION OF FINANCIAL INNOVATION	519
1. <i>Traditional Financial Innovation</i>	519
2. <i>Modern Financial Innovation</i>	521
3. <i>Contemporary Financial Innovation</i>	524
a. The Euromarkets.....	524
b. Swaps	527
c. Securitization	531
d. Financial Futures and Options.....	532
C. THE PROCESSES OF TRADITIONAL AND CONTEMPORARY FINANCIAL INNOVATION	535
III. ECONOMIC THEORY	539
IV. CONTEMPORARY FINANCIAL INNOVATION AS AN ECONOMIC PROCESS	545
A. NEOCLASSICAL THEORY	545
1. <i>Neoclassical Economic Scholarship</i>	545
a. Regulation	548
b. Finance Theory	551
i. Efficient Capital Market Hypothesis.....	551
ii. Modern Portfolio Theory	552
iii. The M&M Theorem.....	552
iv. Option Pricing Theory	553
c. Technology.....	553
2. <i>The Neoclassical Explanation</i>	554

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3. <i>The Neoclassical Explanation Considered</i>	556
B. HETERODOX THEORY	559
1. <i>Critique of Rationality</i>	560
2. <i>Technology</i>	562
3. <i>Competition Under Uncertainty</i>	563
4. <i>Asymmetric Reward Structure</i>	564
5. <i>Money and Credit</i>	565
C. FINANCIAL INSTABILITY HYPOTHESIS	566
D. THE HETERODOX EXPLANATION	569
E. HETERODOX RISKS	571
1. <i>Greater Risk Taking</i>	571
2. <i>Increased Speculation</i>	572
3. <i>Monetary Consequences</i>	573
F. THE HETERODOX EXPLANATION CONSIDERED	574
G. REGULATION OF CONTEMPORARY FINANCIAL INNOVATION—FINANCIAL DERIVATIVES	574
V. LEGAL SCHOLARSHIP AND CONTEMPORARY FINANCIAL INNOVATION	576
A. THE LIMITS OF ORTHODOXY	583
B. FINANCIAL INNOVATION ACROSS TIME	584
C. REGULATORY STRUCTURE	585
D. PERCEPTIONS AND SECTORAL DYNAMICS	588
VI. CONCLUSION	589

I. INTRODUCTION

THE second half of the twentieth century has been a period of far-reaching change in the processes and instrumentalities of finance. In the last twenty years, the rate of change has accelerated, resulting in a thorough redrafting of the landscape of the financial markets.¹

1. See Henry T.C. Hu, *New Financial Products, the Modern Process of Financial Innovation, and the Puzzle of Shareholder Welfare*, 69 TEX. L. REV. 1273 (1991) (The 1980s have spawned a plethora of new financial products as well as a distinctive new process of financial innovation rooted in the institutionalization of change and the application of advanced finance theory.); Henry T.C. Hu, *Swaps, the Modern Process of Financial Innovation and the Vulnerability of a Regulatory Paradigm*, 138 U. PA. L. REV. 333, 334 (1989) [hereinafter *Swaps*] (“The past decade has been a golden age for innovation in corporate and international finance.”); Edward D. Kleinbard, *Equity Derivative Products: Financial Innovation’s Newest Challenge to the Tax System*, 69 TEX. L. REV. 1319, 1353 (1991) (“I would respond that this philosophy [incrementalism] fails to address the ever-accelerating pace of financial innovation and its overall benefits to the United States economy.”); Todd E. Petzel, *Derivatives: Market and Regulatory Dynamics*, 21 J. CORP. L. 95 (1995) (“The derivatives industry has experienced unparalleled growth during the last twenty-five years.”); Peter Tufano, *Securities Innovations: A Historical and Functional Perspective*, J. APPLIED CORP. FIN., Winter 1995, at 90 (“The past two decades have produced a remarkable number and variety of seemingly new securities.”).

As a result of this explosion in financial innovation,² new products,³ services⁴ and processes,⁵ have been developed, refined and diffused throughout the sector. Financial innovation has generated products that permit formerly unmanageable business risks to be traded or bargained away.⁶ Advances in “financial science”⁷ are now employed to create “derivative realities.”⁸ These environments are created with financial innovations and limit the extent to which the exchange rate, interest rate, and inflation risk adversely impact the proverbial bottom line. The terms “financial engineering,”⁹ “nuclear finance,”¹⁰ or “particle finance,”¹¹ to use

2. Financial innovation is the process by which new methods are created to provide the fundamental services furnished by the financial sector. *See infra* text accompanying notes 40-64.

3. *See, e.g.,* Greg Ip & Aaron Lucchetti, *Dow Contracts May Appeal to Individuals*, WALL ST. J., June 6, 1997, at C1 (discussing the initiation of a new futures contract based on the Dow Jones industrials index).

4. For example, portfolio insurance is a service that attempts to attain a target rate of return on a portfolio of assets, such as equity securities, by hedging the portfolio with various risk mediating financial instruments. As the generation of the appropriate strategies frequently required development and use of sophisticated mathematical models, portfolio insurance became a service provided to portfolio managers by investment bankers and specialist portfolio insurance providers. *See* JOHN F. MARSHALL & VIPUL K. BANSAL, FINANCIAL ENGINEERING 637-38 (1992).

5. *See infra* text accompanying notes 62-65 and 429-33 for a discussion of index arbitrage.

6. *See* Henry T.C. Hu, *Hedging Expectations: “Derivative Reality” and the Law and Finance of the Corporate Objective*, 73 TEX. L. REV. 985 (1995) [hereinafter *Derivative Reality*]. “Derivatives [a product of financial innovation] allow corporations to insulate themselves from, amplify, or otherwise modulate the impact of changes in interest and exchange rates and commodity, equity, and real estate prices.” *Id.* at 986.

7. Professor Hu characterizes the body of information representing modern finance theory as “financial science.” *See id.* at 989-90. Professor Hu also uses scientific analogies in describing what he views as the competing visions of the world after the introduction of the sophisticated products of contemporary financial innovation, a world run amok as a result of “Jurassic Park” science, or a world of increased order and stability. *See id.*

8. “If clever and careful enough, a corporation can avoid the chaos of the real world. A corporation can enter a private ‘derivative reality,’ a synthetic world purged of risks it deems undesirable.” *Id.* at 986.

9. “Financial engineering involves the design, the development, and the implementation of innovative financial instruments and processes, and the formulation of creative solutions to problems in finance.” John D. Finnerty, *Financial Engineering in Corporate Finance: An Overview*, in THE HANDBOOK OF FINANCIAL ENGINEERING 69 (Clifford W. Smith, Jr. & Charles W. Smithson eds., 1990). The term, “financial engineer,” came into popular usage in London in the mid-1980s to describe the teams of professionals employed in designing financial solutions to corporate risk management problems. *See* MARSHALL & BANSAL, *supra* note 4, at 6. Although financial engineers may be “deal makers,” “idea generators” or “loophole exploiters,” they are all proficient in financial theory and the applied mathematics necessary to craft their products. The conceptual tools of financial engineering are valuation theory, portfolio theory, hedging theory, accounting, and taxation. Their physical tools are the various available securities, futures, options, swaps and related financial instruments. *See id.* at 6-8.

10. *See* GREGORY J. MILLMAN, THE VANDAL’S CROWN 195, 199-200 (1995) (describing the efforts of one scientist who is “working on a series of mathematical models that will duplicate the functions of the human brain, but with much greater power, and enable the firm he serves to anticipate more in the world’s financial markets.”).

11. *See* Michael Peltz, *Paradigm Lost*, INSTITUTIONAL INVESTOR, Apr. 1995, at 39 (discussing Sanford’s comparison of the “revolution in risk management techniques to the revolution in quantum mechanics at the beginning of the century”).

some of the terms employed to describe this enterprise, have been promoted as potential sources of increased financial and, therefore, economic, stability.¹² Moreover, it is suggested that the economic environment we will be able to construct from these innovative financial techniques will be both exceptionally robust and increasingly efficient.¹³

However, the practitioners and scholars who focus on the financial sector appear to have embraced the products of financial innovation without a searching inquiry into the process that created them. Legal scholarship has not produced critical examinations of financial innovation as an economic process. Nonetheless, the law and legal practitioners remain deeply involved in important aspects of the design, characterization, and marketing of financial innovations. The primary reason for the lack of legal scholarship lies in the apparent belief that there is no need to examine what we assume we fully understand. Our confidence in our understanding of financial innovation is based on the assumption that financial innovation is similar to the process of technological innovation. Legal scholarship assumes that both processes are the natural result of bursts of entrepreneurial creativity. It further assumes that these processes arise in response to consumer demand.¹⁴ Financial innovators, like the technological innovators of the late nineteenth and early twentieth centuries, are motivated by the prospect of material gain. Therefore, they develop products and services that present novel solutions to current problems, or suggest new processes and services to meet unrecognized needs.¹⁵ The products generated are readily accepted and adjudged good. We assume they lead toward two of our society's most treasured

12. *See id.*

13. *See, e.g.,* Peter Tufano, *How Financial Engineering Can Advance Corporate Strategy*, HARV. BUS. REV., Jan.-Feb. 1996, at 136 (discussing the use of financial derivatives to solve strategic corporate problems, such as product differentiation and changing the characteristics of holding stock).

14. *See, e.g.,* MERTON H. MILLER, FINANCIAL INNOVATIONS AND MARKET VOLATILITY (1992). "To say that financial innovations, like innovations generally, are basically unforecastable improvements is not to suggest that their emergence is merely a matter of chance or of artistic creative impulse." *Id.* at 4.

15. *See* Mark D. Flood, *Two Faces of Financial Innovation*, FEDERAL RESERVE BANK OF ST. LOUIS REVIEW, Sept.-Oct. 1992, at 3, 4. The legal scholarship appears to assume that the processes of technological innovation and financial innovation have the same origins and operation. For example, Professor Hu relies on Schumpeterian descriptions of technological innovation to provide a foundation for his discussion of financial innovation. *See* Hu, *Swaps*, *supra* note 1, at 337 n.8. Although Schumpeterian analysis is useful in understanding the adoption and diffusion of the products of contemporary financial innovation, *see infra* text accompanying notes 360-62, it is less helpful in understanding the process of contemporary financial innovation. Schumpeter described innovation in the context of industrial production, examining, *inter alia*, the existence of market imperfections, i.e., monopolistic market structures and the role they play in providing real sector firms with incentives to innovate. With the possible exception of exchanges, financial markets are highly competitive, and financial products and processes enjoy limited, if any, intellectual property protection. Under such markets and under such circumstances, Schumpeterian analysis could be read to suggest that innovation ordinarily, should not occur. *See* FRANKLIN ALLEN & DOUGLAS GALE, FINANCIAL INNOVATION AND RISK SHARING 52-53 (1994).

goals, the "new" and the "better." In fact, "consensus reality"¹⁶ has come to expect the introduction of new technologies that result in an "improved" way of life.¹⁷

Entrepreneurial imagination and a general fascination with novelty are strongly implicated in our belief in the desirability and the inevitability of progress. They are credited with responsibility for the material amenities provided by modern society. However, novel manifestations of entrepreneurial creativity also have led to social,¹⁸ environmental¹⁹ and economic catastrophes²⁰ when their use caused unanticipated consequences. Some of these adverse consequences could have been avoided or minimized if we had more information about their real-world operation before they became widely available. Frequently, useful information may not be considered if it is not consistent with accepted paradigms or ideologies.²¹

The law will increasingly confront innovative financial products and services, and it will be required to make decisions concerning the character, operation and enforceability of these innovations. It also will have a role in deciding the extent to which these innovations will be able to restructure the potential risks, benefits and viability of economic activity structures.²² The assessments of potential costs and benefits will be made without the ability to foresee the long-term repercussions of such innova-

16. Consensus reality is a shared view of the nature of reality expressed in a paradigmatic set of assumptions. See THOMAS S. KUHN, *THE STRUCTURE OF SCIENTIFIC REVOLUTIONS* 10-12 (1970). For, example, consensus reality in the West is based, among other things, on Aristotelian logic, in which "[s]omething is either A or not A, but it cannot be both, at least not simultaneously." Greg K. McCann et al., *The Sound of No Students Clapping: What Zen Can Offer Legal Education*, 29 U.S.F. L. REV. 313, 330 (1995). However, that view of reality in non Western thought is said to embrace the fallacy of mutual exclusivity and false dichotomy, precluding a more holistic view of reality. See *id.* at 330-31; Kenneth B. Nunn, *Law as a Eurocentric Enterprise*, 15 LAW & INEQ. J. 323, 334 (1997) ("The dichotomous reasoning found in Eurocentric cultures may be contrasted to the diunital form of reason prevalent in African and other non-European cultures. Diunital reasoning leads to 'both/and' conclusions and permits the consideration of information that is not neatly categorized or compartmentalized.")

17. Popular culture at times appears to attribute an agency or entity quality to the process of technological change. See, e.g., Michael H. Shapiro, *Illicit Reasons and Means for Reproduction: On Excessive Choice and Categorical and Technological Imperatives*, 47 HASTINGS L. J. 1081, 1092 (1996). See also Nunn, *supra* note 16, at 362 ("A key part of the European belief system is faith in the linear notion of 'progress,' the belief that later historical developments are superior to preceding ones and that the course of human history flows from worse to better.")

18. See, e.g., Paul A. Lombardo, *Medicine, Eugenics, and the Supreme Court: From Coercive Sterilization to Reproductive Freedom*, 13 J. CONTEMP. HEALTH. L. & POL'Y 1 (1996) for a discussion of the sociological and anthropological assumptions that were embodied in eugenics legislation.

19. See, e.g., RACHEL CARSON, *SILENT SPRING* (1962).

20. See, e.g., LAWRENCE J. WHITE, *THE S&L DEBACLE* (1991).

21. See KUHN, *supra* note 16, at 11.

22. An interesting example of such a financial "innovation" is the viatical settlements market, in which interests in the life insurance policies of terminally ill individuals are traded at a discount for cash. See, e.g., SEC v. Life Partners, Inc., 87 F.3d 536 (D.C. Cir. 1996) (considering whether such interests should be regulated as securities within the meaning of the Securities Act of 1933).

tive products and services. Unfortunately, the law's understanding of financial innovations may coalesce without the benefit of doctrinal or theoretical models, or at best, with only poorly fitting ones.²³ It is reasonable to anticipate that recent financial innovations may have the ability to reorder our consensus view of the appropriate means and legitimate goals of finance. In fact, it can be argued that it already has had that effect. However, financial innovation as an economic process remains unexplored territory.

Financial innovation is beginning to be exposed to adversary, legislative, and political processes. Unfortunately, these inquiries are taking place as a result of the debacles produced by the inappropriate or uninformed use of financial innovations and have been limited in scope.²⁴ Despite the magnitude of the losses resulting from the use of some financial innovations, the law and legal scholarship continue to view the process of contemporary financial innovation²⁵ as susceptible to a limited range of risks. This view results from almost universal acceptance by legal scholars of the analysis provided by one school of economic thought. Legal scholarship continues to maintain that most, if not all, financial processes are adequately explained by mainstream economics, namely neoclassical economic theory.²⁶ Gradually, some legal scholars

23. Processes such as parental surrogacy, patenting of life forms, and free speech on the internet have at their extremes, and at even less remote points on their continuum of potential outcomes, consequences with the potential to reorder our consensus view of social reality. But we may have reason to believe that we sufficiently understand the processes of human reproduction, genetic engineering, and mass communications to interpret our legal principles as to elucidate and explicate the relationships, rights, and liabilities consequent to these new applications. It also may be the case that as a society we believe these developments and their social consequences to be inevitable, propelled by human nature, fate, divinity, entropy, or other factors beyond our ability to control. However, there are arguments and examples from history that suggest that progress toward increasing technological complexity is neither inevitable nor uncontrollable. See CLARENCE E. AYRES, *THE THEORY OF ECONOMIC PROGRESS* (1994).

24. See, e.g., Brandon Becker & Jennifer Yoon, *Derivative Financial Losses*, 21 J. CORP. L. 215, 216-18 (1995), in which the authors list over 100 firms, public institutions, states and other political subdivisions that experienced financial losses attributed in the press to financial derivatives. As a consequence of the losses attributed to trading and use of financial derivatives, Congress explored a number of regulatory strategies to lessen the likelihood of future dramatic losses. See Derivatives Supervision Act of 1994, H.R. 3748, 103d Cong., 2d Sess., 140 Cong. Rec. H73-01 (1994). This bill would have created a new agency, the Federal Supervision Commission, consisting of the Chair of the Federal Reserve, the Secretary of the Treasury, the Comptroller of the Currency, the Chair of the Commodities Futures Trading Commission, the Chair of the Securities Exchange Commission, and the Director of the Office of Thrift Supervision. *Id.* § 103. This agency would be responsible for, among other things, the promulgation of uniform accounting and capital adequacy standards. *Id.* § 105. See also Brett D. Fromson, *Lawmakers Eye More Scrutiny of Derivatives, Hedge Funds*, WASH. POST, Apr. 13, 1994, at F7; Laurie Lande, *Top Securities Executives Tell Congress Legislation Covering Derivatives Isn't Needed*, OIL DAILY, May 11, 1994, at 1; Kenneth H. Bacon & Gregg Hitt, *Derivatives Face New Regulation From Congress*, WALL ST. J., May 11, 1994, at A4; *Your Financial Future, Regulation of Derivatives (Editorial)*, ECONOMIST, May 14, 1994, at 15.

25. This Article will use the term, "contemporary financial innovation," to refer to the process and products from the year 1950 forward.

26. Many legal scholars have questioned the wisdom of using the assumptions underlying neoclassical economic theory in determining the efficiency, and therefore, the propriety

have begun to recall that economics is, ultimately, a theory of behavior, and that neoclassical economics is not the only theory that explains the behavioral process generally characterized as economics. Nonetheless, orthodox theory has continued to provide virtually all the vocabulary and doctrinal tools with which legal scholars discuss and analyze economic activity.

Therefore, it becomes important to ask whether orthodox theory provides legal scholars with a sufficiently complete explanation of the process of contemporary financial innovation. If so, then legal scholarship is adequately positioned to make accurate assessments of the costs and benefits of this process and its consequences. We can engage in fruitful discussion of policy implications and make useful recommendations concerning regulatory options. There is, however, reason to question the adequacy of the orthodox explanations of contemporary financial innovation. Orthodox theory has viewed financial innovation as the interaction of a set of factors²⁷ which establish incentives²⁸ to create innovations in financial instruments, processes, markets, and institutions.²⁹ However, such discussions are premised largely on fragmentary anecdotal observations.³⁰ Orthodoxy also employs models that fail to accurately distinguish genuine financial innovation from old products in new packaging.³¹ Orthodox economics views contemporary financial innovation almost exclusively through the lens provided by its consequences. This viewpoint supports the conclusion that contemporary financial innovation as an economic process is not worthy of study in its own right.³² This neglect is understandable. The assumptions on which neoclassical economics is based obviate the need for an examination of contemporary financial in-

of legal rules. See, e.g., Jeffrey L. Harrison, *Egoism, Altruism, and Market Illusions: The Limits of Law and Economics*, 33 UCLA L. REV. 1309, 1314 (1986) ("the current application of economic analysis to law should be regarded as an interim step toward the integration of law with the behavioral, natural, and social sciences"). However, legal scholarship concerning financial economics rarely departs from the neoclassical synthesis, and when it does so, it is for the purpose of achieving better fitting assumptions. See Lawrence A. Cunningham, *From Random Walks to Chaotic Crashes: The Linear Genealogy of the Efficient Capital Market Hypothesis*, 62 GEO. WASH. L. REV. 546 (1994); Thomas Lee Hazen, *Rational Investments, Speculation, or Gambling?—Derivative Securities and Financial Futures and Their Effect on the Underlying Capital Markets*, 86 NW. U. L. REV. 987 (1992); Donald C. Langevoort, *Theories, Assumptions, and Securities Regulation: Market Efficiency Revisited*, 140 U. PA. L. REV. 851 (1992); Louis Lowenstein, *Efficient Market Theory: Let the Punishment Fit the Crime*, 51 WASH. & LEE L. REV. 925 (1994); Lynn A. Stout, *Betting the Bank: How Derivatives Trading Under Conditions of Uncertainty Can Increase Risks and Erode Returns in Financial Markets*, 21 J. CORP. L. 53 (1995).

27. See *infra* text accompanying notes 247-50.

28. See Flood, *supra* note 15, at 4.

29. See T.M. PODOLSKI, FINANCIAL INNOVATION AND THE MONEY SUPPLY 106 (1986).

30. See *id.*

31. See Tufano, *supra* note 1; *infra* notes 471-75 and accompanying text.

32. For the most part, orthodox theory's exploration of financial innovation has been limited to the work of a few monetary economists who perceive contemporary financial innovation as an obstacle to the maintenance of effective monetary policy, and therefore, view the process of financial innovation primarily as the creation of money and monetary substitutes. See PODOLSKI, *supra* note 29; Tufano, *supra* note 1; *infra* text accompanying notes 441-44.

novation as a dynamical process.³³ However, heterodox economics takes a very different view of the process of contemporary financial innovation.³⁴ The explanations provided by heterodox theory indicate that the process of contemporary financial economics may pose serious risks to the financial sector, and possibly to the economy as a whole.³⁵

This Article examines contemporary financial innovation as an economic process as it relates to a category of financial innovations characterized as financial derivatives.³⁶ It compares the orthodox, or neoclassical, explanations of the process of contemporary financial inno-

33. Orthodox theory tends to focus on the activities of individual economic actors motivated by the rationally heuristic and to emphasize equilibrium rather than mechanics. See generally PODOLSKI, *supra* note 29. Additionally, it uses a model of economic activity in which modern financial institutions are not present. See *infra* notes 212-20 and accompanying text. Financial innovation, therefore, appears comparable to any other entrepreneurial activity.

34. A fair reading of the history of modern economics could conclude that economics has been consistently characterized by a lack of orthodoxy. Rather, heterogeneity, in formulation, methodology, and policy guidance has been the rule. See Warren J. Samuels, *Introduction*, HELMUT ARNDT, *ECONOMIC THEORY VS. ECONOMIC REALITY* 11 (William A. Kirby trans., 1984). Thus, the concepts of orthodoxy and heterodoxy are necessarily somewhat fluid, and can be difficult to apply to economists and economic theory because significant differences of observation and interpretation exist within each school of thought. Academic economics makes the process somewhat easier by producing journals that restrict the work published to orthodox or heterodox theory based on the editors' intradisciplinary allegiances.

35. If our understanding of the process of contemporary financial innovation is incomplete, then our assessment of the costs and benefits of this process and its products may be unreliable. Therefore, policy recommendations based on such an incomplete understanding may be inappropriate, and may fail to protect the financial sector from unrecognized risks. A discussion of contemporary financial innovation and financial sector behavior from the perspectives of various economic theories should enrich the legal scholarship in this area, if for no other reason than to demonstrate why such theories fail, and, therefore, why our current understanding provides an appropriate platform upon which to construct policy and law.

36. Generally, financial derivatives are "financial contracts such as options, forward contracts, swaps, caps, floors, and similar devices that provide value measurements by reference to movements in debt, interest rate, currency, equity, or commodity markets. While these financial products derive their value from fluctuations in their referenced markets, they do not require direct participation in those markets." Steven D. Conlon & Vincent M. Aquilino, *U.S. Tax Considerations for Institutional Investors Acquiring Derivative Products: A Methodology for Evaluating Tax Risks*, in *THE HANDBOOK OF DERIVATIVES AND SYNTHETICS* 761 (Robert A. Klein & Jess Lederman eds., 1994). More technically, a financial derivative may be defined as:

a financial instrument that by its terms, at inception or upon the occurrence of a specified event, provides the holder (or writer) with the right (or obligation) to participate in some or all of the price changes of an underlying (that is, one or more referenced financial instruments, commodities, or other assets, or other specific items to which a rate, an index of prices, or another market indicator is applied) and, except as noted below, does not require that the holder or writer own or deliver the underlying.

A contract that requires ownership or delivery of the underlying is a derivative financial instrument if (a) the underlying is another derivative, (b) a mechanism exists in the market (such as an organized exchange) to enter into a closing contract with only a net cash settlement, or (c) the contract is customarily settled with only a net cash payment based on changes in the price of the underlying.

Philip N. Hablutzel, *Foreward: On the Borderlands of Derivatives: Rocket Science for the Next Millenium*, 71 CHI.-KENT L. REV. 1043, 1044 (1996) (quoting COOPERS & LYBRAND,

vation with the heterodox, or post-Keynesian, explanation of the process,³⁷ concluding that orthodoxy fails to fully explain contemporary financial innovation. Although this Article will recommend ways in which the law should view the process of contemporary financial innovation, its higher goal is to provoke additional research on the economic processes that technology is forcing, welcomed or otherwise, into our social reality and individual lives.³⁸

Part II of this Article defines the term financial innovation. It then examines, from a chronological perspective, the process and products of financial innovation and concludes that the process of contemporary financial innovation is not different from earlier processes that resulted in what we now view as traditional financial products. Part III charts the development of modern economic theory and the division of economic theory into its orthodox and heterodox camps. Part IV compares the neoclassical view of contemporary financial innovation with the view espoused by the post-Keynesian theorists. Neoclassical thinkers view it as a predictable response to regulatory excesses. However, post-Keynesian theorists conclude that contemporary financial innovation may be coincident to, if not a consequence of, weaknesses in the financial sector. They also conclude that the process of contemporary financial innovation may transform financial fragility into financial crisis. Part V examines legal scholarship's approach to contemporary financial innovation by examining its analysis of the risks presented by financial derivatives and criticizes that analysis using the tools provided by heterodox theory. It then concludes with observations on the implementation of heterodox analysis and concerns of regulatory policy.³⁹

II. A DEFINITION OF FINANCIAL INNOVATION

The term "financial innovation" appears with relative frequency in legal scholarship,⁴⁰ generally without a meaningful effort to define it.

FASB'S PROPOSED STANDARD ON ACCOUNTING FOR DERIVATIVE AND SIMILAR FINANCIAL INSTRUMENTS AND FOR HEDGING ACTIVITIES 2 (1996)).

37. Post-Keynesian theory represents the uneasy cohabitation of Keynes's colleagues and disciples, institutionalist economists, and continental marxists under one roof. See *A GUIDE TO POST-KEYNESIAN ECONOMICS* 4 (Alfred S. Eichner ed., 1979). See also *infra* notes 346-47 and accompanying text.

38. Legal scholarship has increasingly recognized the benefits of expanding the range of discourse around issues of economic theory. See Marcel Kahan & Michael Klausner, *Path Dependence in Corporate Contracting: Increasing Returns, Herd Behavior and Cognitive Biases*, 74 WASH. U. L. Q. 347 (1996); Linda A. Schwartzstein, *Austrian Economics and the Current Debate Between Critical Legal Studies and Law and Economics*, 20 HOFSTRA L. REV. 1105 (1992); Edward L. Rubin, *The New Legal Process, The Synthesis of Discourse, and the Microanalysis of Institutions*, 109 HARV. L. REV. 1393 (1996).

39. This Article makes no effort to indulge in the mistaken dichotomy of truth versus falsity, as those concepts may be applied to economic theory and ideology. Rather, it is an exploratory examination of the intersections of law, contemporary finance, and economic theory, and it should be viewed as the first step on a journey of indeterminate duration and destination.

40. See, e.g., Peter Z. Grossman, *The Market for Shares of Companies with Unlimited Liability: The Case of American Express*, 24 J. LEGAL STUD. 63, 66 (1995) ("At the same

Rather, its meaning has been treated as tautological, or self-evident. This appears to result from the willingness of legal scholars to view financial innovation as equivalent to the products and processes it has produced. That focus provides a direct path to discussions of the policy implications of innovative financial products with respect to corporate governance,⁴¹ taxation,⁴² and other regulatory considerations.⁴³ This focus also facilitates examination of the risks presented by the products of financial innovation to individuals, entities, and the financial sector itself. However, it is difficult to meaningfully discuss the costs and benefits, as well as the policy implications of financial innovation, without a working understanding of the process' underlying mechanisms.

Legal scholarship's failure to engage in a thorough analysis of financial innovation stems from the reading of economic processes required by neoclassical macroeconomics. Neoclassical theory characterizes the economy as the aggregation of the activities of individual economic actors.⁴⁴ The activities of all economic actors are motivated by the same factors: those of utility maximization. Therefore, the cause of financial innovation is the desire to make money. However, heterodox economic theory argues that the economy is greatly influenced by the interaction of societal institutions, including financial institutions,⁴⁵ and psychological processes.⁴⁶ Therefore, utility maximization cannot provide a sufficient

time, the 1950s represent an era before the modern financial innovations of the 1970s and 1980s."); Steven A. Bank, *Devaluing Reform: The Derivatives Market and Executive Compensation*, 7 DEPAUL BUS. L.J. 301, 323 (1995) ("Financial innovation, as evidenced by the new breed of stock options, can be used to fine-tune the tools of executive compensation."); Mark D. Young & William L. Stein, *Swap Transactions under the Commodity Exchange Act: Is Congressional Action Needed?*, 76 GEO. L.J. 1917, 1940 (1988) ("The development of financial futures and options under the CEA rightfully can be called one of the most significant financial innovations of the past decade."); Carrie Stradley Lavargna, *Government Sponsored Enterprises Are "Too Big to Fail." Balancing Public and Private Interests*, 44 HASTINGS L.J. 991, 998 n.27 (1993) ("The growth in asset securitization is deemed to be one of the most significant financial innovations of the last twenty years."); Frank Partnoy, *Financial Derivatives and the Costs of Regulatory Arbitrage*, 22 J. CORP. L. 211, 218 (1997) ("Swaps were, without a doubt, one of the major financial innovations of the 1980s."); Gary W. Glisson, *United States Regulation of Foreign Currency Futures and Options Trading: Hedging for Business Competitiveness*, 8 J. INT'L. L. BUS. 405, 434 (1987) ("The controlling regulatory scheme, however, should provide enough flexibility to accommodate financial innovation in both markets."); Helen A. Garten, *Subtle Hazards, Financial Risks, and Diversified Banks: An Essay on the Perils of Regulatory Reform*, 49 MD. L. REV. 314, 324 (1990) ("As banks faced serious competition from nonbank providers of financial services and customers began to demand new and better financial products, the effect of restrictive regulation on financial innovation became an issue for the first time in forty years.")

41. See, e.g., Adam R. Waldman, *OTC Derivatives & Systemic Risk: Innovative Finance or the Dance into the Abyss*, 43 AM. U. L. REV. 1023, 1083 (1994).

42. See, e.g., Scott Marc Kolbrenner, *Derivatives Design and Taxation*, 15 VA. TAX REV. 211 (1995).

43. See, e.g., Steven McGinity, *Derivatives-Related Bank Activities as Authorized by the Office of the Comptroller of the Currency and the Federal Reserve Board*, 71 CHI.-KENT L. REV. 1195 (1996).

44. See *infra* text accompanying notes 212-15.

45. See *infra* text accompanying notes 347-50.

46. See *infra* text accompanying notes 354-67.

explanation of contemporary financial innovation as an economic process. Moreover, the question of which confluence of factors and processes will result in financial innovation cannot be deemed self-evident, but a legitimate topic for scholarly discourse.⁴⁷ This inquiry begins by defining basic terms.

A. THE FINANCIAL SECTOR AND FINANCIAL INNOVATION

Finance is the work of the financial sector.⁴⁸ The financial sector of the economy provides three primary services: (1) a system of exchange (currency and other forms of money) and a payments system (checks, drafts, credit cards, etc.); (2) methods of intermediation in which savings are channelled into investments (commercial banking, thrifts, securities markets); and (3) opportunities to mediate various risks associated with, or flowing from, business, commercial or other economic activities (insurance, derivatives markets).⁴⁹ Thus, our initial focus will be consequentialist, examining financial innovation as the creation of "new" or "better" instruments, institutions and markets, to augment, if not replace, the instruments, institutions and markets previously found in this sector. However, this definition is inadequate.⁵⁰ The terms "new" or "better" are not

47. See *infra* text accompanying notes 408-425.

48. A financial sector exists within a financial system. The financial system consists of all "the financial instruments, financial institutions, and financial markets operating in a given place at a given time . . ." RAYMOND W. GOLDSMITH, *PREMODERN FINANCIAL SYSTEMS: A HISTORICAL COMPARATIVE STUDY* 1 (1987).

49. William L. Silber, *Innovation in the Financial Sector*, in *FINANCIAL INNOVATION* 1 (William L. Silber ed., 1975). There are, of course, varying ways of characterizing the work of the financial sector. For example, Niehans characterizes the three essential functions of the financial sector as "the exchange of present money against future money . . . the bringing together of borrowers and lenders . . . [and] the execution of payments on behalf of customers." Jürg Niehans, *Financial Innovation, Multinational Banking, and Monetary Policy*, 3 *J. BANKING & FIN.* 537 (1983). Podolski views the principle functions of the financial "system" as "monetization and the payments mechanism, intermediation, and asset transmutation." PODOLSKI, *supra* note 29, at 38. Podolski's view of asset transmutation embraces aspects of both savings intermediation and risk intermediation, in that it is concerned with the way various financial assets and claims can be changed to better serve the interests of their holders. See *id.* at 41-43. The Global Financial System Project of the Harvard Business School characterizes the functions of the financial systems as clearing and settling payments; pooling resources; transferring economic resources both in space and time; risk management; proving price information; and managing agency risk and informational asymmetries. See DWIGHT B. CRANE ET AL., *GLOBAL FINANCIAL SYSTEM PROJECT, THE GLOBAL FINANCIAL SYSTEM: A FUNCTIONAL PERSPECTIVE* viii (1995). The six functions isolated by the Global Financial System Project readily collapse into the three generally recognized functions of the financial sector.

50. This definition, of course, removes financial innovation from the realm of modernity and contemporary achievement, and suggests that financial innovation is as least as old as civilization, if not older. Thus, with respect to the exchange function of the financial sector, financial innovation is the process that brought human societies from barter, to commodity money or specie, to commodity-indexed money and then to fiat money. Each of these developments lowered transaction costs and permitted increasing commercial sophistication. See PODOLSKI, *supra* note 29, at 39. Moreover, when we apply the generally accepted definition of a financial derivative as a product whose value is derived from the value of another product, financial function or relation, it becomes clear that commodity-indexed money is a financial derivative. Each of the aforementioned innovations changed not only the process of financial exchange, but also reflected and precipitated changes in

congruent with the innovative.⁵¹ It remains important to separate the "plain improvement" from the true innovation.⁵²

A genuine financial innovation has been analogized to the unanticipated breaks that will occur in listing of data organized by time sequence.⁵³ Therefore, innovations are "surprises," events whose occurrence could not be extrapolated from trends or past practices or current structures.⁵⁴ However, merely being unanticipated does not distinguish the "improvement" from the "innovation." Rather, it simply demonstrates inconsistency. In examining "new" products or processes in the financial sector, distinguishing between the merely different and the truly innovative requires a qualitative assessment of the character of the new product or process. The fact that something "new" has been observed does not indicate that an innovation has occurred. Instead, it must be demonstrated that this unanticipated process or product departs from expectations in ways that change the available opportunity set for the participants in the financial sector.⁵⁵

It has been argued that innovation can be distinguished from the merely "new" by focusing on whether the new product or process changes the relevant opportunity set. Those new products or processes that reconfigure the opportunity set are "true," as opposed to merely "adaptive" innovation.⁵⁶ Adaptive innovations are new ways of "bundling" and unbundling the basic services provided by the financial sec-

the societies in which these innovations were developed. They gained popular acceptance by changing the set of risks and opportunities presented to economic actors. The same is true of the contemporary process and products of financial innovation.

51. Attempts have been made to apply the distinctions between "inventions" and "innovations" appearing in the literature of technological innovation to the process of financial innovation. For example, with respect to technology,

[An] invention is a new concept, discovery, or device and . . . [i]t has value only if it is put into use by society as either a building block for further development or as a new product or process. [An innovation is] a complex series of activities . . . when the original idea is conceived; proceeding through a succession of interwoven steps of research, development, and management decision making . . . culminating . . . when a product, which may actually be a thing, a technique, or a process, is accepted in the marketplace.

BETSY ANCKER-JOHNSON, INVENTIONS, INNOVATIONS AND INCENTIVES, THE PUBLIC NEED AND THE ROLE OF THE INVENTOR 6 (1976), quoted in R. Stephen Parker et al., *The New Independent Inventor: Implications for Corporate Policy*, REV. BUS., Spring 1996, at 7, 8.

52. See MILLER, *supra* note 14, at 4.

53. Miller describes the introduction of innovation by reference to time-series analysis.

Time-series analysts break into two parts the change over time in the value of any series such as the gross national product or consumer prices. One part is the change that could, in principle at least, have been forecast by extrapolating known past information. The other part is thus the unanticipated, unforecastable change—the "surprise," It is these surprises that have been aptly dubbed the "innovations" in the time series.

Id. at 4.

54. See *id.*

55. See Niehans, *supra* note 49, at 538.

56. See *id.*

tor.⁵⁷ For example, adding negotiability to a previously non-negotiable instrument is an adaptive, as opposed to a true, innovation.⁵⁸ Adding negotiability simply rebundles the characteristics of an existing instrument. "True" innovations are changes in instruments, institutions, markets and processes that make markets more efficient (in the sense of lowering transaction costs), make markets more complete, or provide both changes.⁵⁹ This argument furthers our understanding of financial innovation, but does not provide a completely satisfactory definition. There are "innovations" that consist of the "mere" rebundling of financial components, which nonetheless result in lowered transaction costs, the essential indicia of innovation under the "true" versus "adaptive innovation" definition.⁶⁰ The "adaptive" versus "true" distinction, though helpful, appears more apparent than real. Nonetheless, these definitional candidates point the way toward a qualitative definition that focuses on the role the innovation plays upon introduction into the market. Therefore, we can begin the process by defining a financial innovation less restrictively, as a "new" or "better" way of providing the fundamental services of the financial sector, which increases the opportunity set of sector participants and lowers transaction costs.

This definition would enable us to distinguish many mere improvements from genuine innovations, but it still results in an appreciable gray area. For example, the development of index arbitrage program trading has been characterized as a financial innovation.⁶¹ Index arbitrage program trading combines traditional arbitrage principles with mathematical models, computer-based decision-making and electronic order processing.⁶² Computer programs generate orders to buy or sell the cash asset (such as equity securities) while selling or buying the derivative product (such as equity index futures or options).⁶³ Our current definition of a financial innovation places index arbitrage program trading in a gray area. We must determine whether index arbitrage program trading con-

57. Niehans suggests that adaptive innovations are only "entrepreneurial adaptations to changing market conditions," which should fall into disuse if the underlying conditions that prompted their adoption disappear. *Id.* Niehans acknowledges that adaptive innovations may not be entirely reversible, characterizing their persistence as a consequence of a hysteresis effect. *See id.* It is likely, however, that a set of conditions different from those that prompted creation of an adaptive innovation may contribute to its persistence. *See ALLEN & GALE, supra* note 15, at 38.

58. *See Silber, supra* note 49, at 63-64.

59. *See Niehans, supra* note 49, at 539-40; *see also* James C. Van Horne, *Of Financial Innovations and Excesses*, 40 J. FIN. 621, 621-22 (1985). Niehans's focus was on the "technological" innovations that reduced transaction costs in banking transactions. Van Horne recognized that transaction costs may also be reduced by new instruments, markets and processes, not only by technological changes.

60. For example, the securitization of pools of loans in essence repackages loan components, which lowers transaction costs for some investors by allowing them to invest in these loans without having to assume the costs of qualifying the borrowers. *See infra* notes 165-71 and accompanying text.

61. *See MARSHALL & BANSAL, supra* note 4, at 31-32.

62. Arbitrage strategies permit traders to profit by capitalizing on price differentials between cash and derivative markets. *See id.* at 3.

63. *See id.* at 3-4.

stitutes a new and better way of providing a fundamental function of the financial sector, or whether it is only a tool in the performance of a fundamental function of the financial sector. First, it can be argued that program trading, or any type of trading, is not one of the functions of the financial sector. Instead, it is a tool used by the capital markets in the performance of their basic function: intermediation. As a tool, it can take a wide variety of forms,⁶⁴ but the financial service or function involved is intermediation, for which trading is an instrumentality. Therefore, the evolution from traditional arbitrage trading to index arbitrage program trading should be viewed as utilization of improved technology, not as a financial innovation. However, although index arbitrage program trading can be characterized as a tool, its use in a market does significantly change the opportunity set. Index arbitrage program trading lowers transaction costs for some participants, and alters market dynamics for all investors. A market within which index arbitrage program trading occurs may not be a new and better market, but it is a market that provides elements of its basic intermediation function in ways that create new costs, benefits and risks for market participants.

The gray area produced by products like index arbitrage program trading indicates the need for a more inclusive definition. Therefore, a financial innovation will be defined as: (1) "new" or "better" way of providing the fundamental services of the financial sector, which increases the opportunity set of the sector participants and lowers transaction costs; and (2) as new instrumentalities and processes that facilitate the delivery of the fundamental services of the financial sector. Therefore, financial innovation as an economic process will be viewed as the confluence of factors that result in the creation and adoption of what we have defined as financial innovations. An examination of the chronology of financial innovation will be the next step in identifying some of the factors that give rise to financial innovation as an economic process.

64. For example, trading can be accomplished by, among other methods, open outcry and computer matching. Trading by open outcry involves a broker with an order . . . indicat[ing] his position at the pit by shouting and gesticulating with standardized hand signals. Someone willing to enter the contract responds across the pit in similar fashion, and the deal is made. Observers on raised pulpits alongside the pit record the transaction and feed the information into a communications system, publicizing it to other traders who, in any event, had an opportunity to witness the transaction in the pit. *Leist v. Simplot*, 638 F.2d 283, 287 (2d Cir. 1980), *aff'd sub. nom.*, *Merrill Lynch v. Curran*, 456 U.S. 353 (1982). In a computer matching system of trading, traders enter their offers to buy or sell into an interactive computer system. When the system observes the entry of off-setting offers, it notifies the traders that their orders have been executed and generates the necessary documentation to complete the transactions. See *Board of Trade of Chicago v. S.E.C.*, 923 F.2d 1270, 1271-73 (7th Cir. 1991) (considering whether a computer-based trading system was an "exchange" within the meaning of the Securities Act of 1934).

B. A CHRONOLOGICAL EXAMINATION OF FINANCIAL INNOVATION

1. *Traditional Financial Innovation*

The origins of financial innovation are necessarily shrouded in the midst of obscurity. It cannot be determined when the first matriarch decided to lend another kinship group her family's excess maize with the understanding that the debt would be repaid in as of yet unborn livestock. However, the earliest documents memorializing commercial transactions are associated with the Mesopotamian civilizations and date from approximately 3500 B.C.E.⁶⁵ Written records from that period indicate that temple and royal treasuries were used for deposits and loans of grain and silver.⁶⁶ During this period, at least two banking firms were operating, and the use of drafts "drawn on one place and payable in another" were fairly commonplace.⁶⁷ By 1800 B.C.E., the Babylonian Code of Hammurabi provided for interest rate ceilings, creditors' rights, and chattel mortgages.⁶⁸

The theoretical underpinnings of forward⁶⁹ and futures⁷⁰ transactions were in use in China as early as 2000 B.C.E.⁷¹ Contracts that resemble modern futures transactions were in use in what is now Bahrain Island at

65. See MICHAEL CHATFIELD, *A HISTORY OF ACCOUNTING THOUGHT* 5 (photo. reprint 1979) (1977). This Article uses the designations, "B.C.E.," before the common era, and "C.E.," common era, instead of "B.C." and "A.D."

66. See GOLDSMITH, *supra* note 48, at 13. Originally, the loans made by the temples were interest free. They generally became interest bearing in the second millennium. See *id.* at 14.

67. See CHATFIELD, *supra* note 65, at 5. Whether one agrees that these firms were really banks in the modern usage of the term depends, of course, on what is in essence a bank. Goldsmith complains that it is inappropriate to call these firms banks because they did not engage in intermediation, in that loans were made from the "bankers'" own funds, and deposits were not commingled and were not repayable on demand. See GOLDSMITH, *supra* note 48, at 14. Davies, however, focusing on the safekeeping and lending activities, has no trouble in calling them banks. See GLYN DAVIES, *A HISTORY OF MONEY: FROM ANCIENT TIMES TO THE PRESENT DAY* 49-50 (1994).

68. See JONATHAN BASKIN & PAUL J. MIRANTI, JR., *A HISTORY OF CORPORATE FINANCE* 313 (1997). The Code of Hammurabi fixed maximum interest rates of 20% on loans of silver and 33.3% on grain loans, formalized lending procedures, requiring, *inter alia*, that loan agreements be witnessed by an official witness, and permitted the pledge of land, building, slaves, wives, and children to secured loans. See *id.* at 314. See generally C.H.W. JOHNS, *BABYLONIAN AND ASSYRIAN LAWS, CONTRACTS, AND LETTERS* 44-68 (1904) (providing a detailed study of the Code of Hammurabi).

69. A forward contract is a buy and sell agreement for the future delivery of a commodity at a prespecified price. Unlike futures contracts, forward contracts are generally not traded on regulated exchanges and are not marked to market; for example, profit and loss on the contract is not calculated each day, as it is with exchange traded futures contracts. See T. Craig Tapley, *Mathematics of Finance: Money and Time*, in *THE WG&L HANDBOOK OF FINANCIAL MARKETS* 180-81 (Dennis E. Logue ed., 1995).

70. "The term 'futures' is an abbreviation of the phrase 'contract for future delivery,' and refers to executory contracts requiring the delivery or receipt of a standardized quality and quantity of a commodity to a specific location, by a date certain, and for a stated price." Charles R.P. Pouncy, *The Scierter Requirement and Wash Trading in Commodity Futures: The Knowledge Lost in Knowing*, 16 *CARDOZO L. REV.* 1625, 1628 (1995).

71. See *id.* at 1628 n.14.

about the same time.⁷² The Chinese, during the Chao Dynasty (1122-256 B.C.E.) introduced coined money as a medium of exchange and established a governmental authority, which performed functions comparable to those of central banks.⁷³ The Greeks began coining gold and silver around 630 B.C.E.,⁷⁴ and, in the fifth century B.C.E., Athenian temples were performing banking intermediation, accepting deposits and making loans.⁷⁵ Although installment loans⁷⁶ and real estate mortgages⁷⁷ were used in Rome early in the Common Era, there is little evidence of further financial innovation after the fall of Rome.⁷⁸ In twelfth century Europe, instruments similar to futures contracts were reintroduced, first appearing at medieval trade fairs.⁷⁹ Bank deposits and bankers' acceptances⁸⁰ were reintroduced in the city states of northern Italy in the thirteenth century.⁸¹

The fundamental distinction between traditional financial innovations occurring during the period 3500 B.C.E. to 1200 C.E., and the changes that would follow in the modern period, may be attributed to the development and use of double-entry bookkeeping in the late thirteenth and early fourteenth centuries.⁸² In double entry accounting, each transaction was recorded both as a debit and a credit; total debits had to equal total credits; all accounts were recorded using the same monetary unit;

72. See Jerry W. Markham, "Confederate Bonds," "General Custer," and the Regulation of Derivative Financial Instruments, 25 SETON HALL L. REV. 1, 5 n.12 (1994) (citing FUTURES INDUSTRY ASS'N, AN INTRODUCTION TO THE FUTURES MARKETS 2 (1984)).

73. See CHATFIELD, *supra* note 65 at 8. Chinese coins, whether shaped round as are modern coins, or cast as spades, hoes and adzes, were made of base metals. As such, large quantities were needed to engage in the smallest transactions and they were easy to counterfeit. See DAVIES, *supra* note 67 at 54-55.

74. See CHATFIELD, *supra* note 65, at 10; DAVIES, *supra* note 67, at 62.

75. See CHATFIELD, *supra* note 65, at 10; GOLDSMITH, *supra* note 48, at 27.

76. See CHATFIELD, *supra* note 65, at 13.

77. See GOLDSMITH, *supra* note 48, at 43.

78. An interesting legal development, the *wakf*, appears to have developed in the Abbasid Caliphate, whose heartland was present day Iran and Iraq, during the seventh or eight centuries C.E. The *wakf* is analogous to a trust, in which property is segregated and its income used for a philanthropic purpose or to provide for the family members. See *id.* at 68-69.

79. See Ed Jones & John F. Cook, II, *The Commodity Futures Trading Commission Act of 1974*, 5 MEM. ST. U. L. REV. 457, 458 (1975).

80. Bank acceptances were first developed in ancient Greece. See ALLEN & GALE, *supra* note 15, at 11.

81. See *id.* The Medici bank, for example, was organized in Florence in 1397. At one point it had as many as nine branches in European cities and corresponding relationships in several others. See GOLDSMITH, *supra* note 48, at 157-58. International banking was well established in the early fifteenth century with approximately 72 international banking firms operating in 1422. See *id.*

82. There is some controversy as to whether double-entry bookkeeping was an independent development in accounting theory in the West, or the adoption of Islamic recording technology by the West. Chatfield takes the view that double-entry bookkeeping was fundamentally different from anything that preceded it. See CHATFIELD, *supra* note 65, at 34. However, it is doubtful that any system of accounts would have gained widespread usage without the adoption of Arabic numerals, which were in general usage in Italy in the thirteenth century. See *id.* Double-entry bookkeeping did not arrive in England until the middle of the fifteenth century. See *id.* at 58.

and real and nominal accounts were treated alike.⁸³ By 1581, accounting was professionalized and monopolized in Italy with the formation of the first society of accountants in Venice.⁸⁴ The formalization of accounting principles and practices permitted the type of thinking about financial transactions that would encourage the creation and use of new financial products.⁸⁵

2. Modern Financial Innovation

The first modern equity instruments⁸⁶ originated with the European mercantile exploits of the sixteenth and seventeenth centuries.⁸⁷ Prior to this period, business organizations for the most part were structured as sole proprietorships or as one of a variety of forms of general and limited partnership.⁸⁸ However, all of the prerequisites for the creation of a modern corporation were in place. After the grant of the principal indicia of incorporation (such as limited liability and perpetual existence to towns and guilds by the fourteenth century), it would be just a matter of time until these attributes were granted to business entities as well.⁸⁹

The modern period saw the introduction of many new devices to permit intermediated investment. The Muscovy Company, which was founded in 1553, is believed to have issued the first modern equity instrument.⁹⁰ It was followed by the East India Company in 1600⁹¹ and the

83. See *id.* at 34.

84. See *id.* at 33.

85. See generally BASKIN & MIRANTI, *supra* note 68, at 50-58.

86. Equity instruments represent the stock of a holding company that has been divided into shares, equal units to which attach contingent interests in the current assets and future earnings of the company and a right to participate in the company's governance. See JULIAN WALMSLEY, *THE NEW FINANCIAL INSTRUMENTS* 59 (1988).

87. See *id.* at 3.

88. See BASKIN & MIRANTI, *supra* note 68, at 47-50. Partnerships existed in antiquity but generally required extremely high levels of confidence in potential partners as bankrupts could be imprisoned or sold into slavery. See *id.* at 38. In twelfth century Italy, traditional partnerships, *societas*, were gradually supplanted by the *compagnia*, which permitted a more flexible capital structure in which partners contributions were fixed. See *id.* Later, *commenda* partnerships were developed, which limited a non-participating investors liability to the amount of her investment. See CHATFIELD, *supra* note 65, at 77-78. In 1673, the French Code Savary permitted the establishment of limited partnerships, a development which was delayed in England and whose unavailability may have encouraged the development of equity-like interests in companies. See *id.*

89. In return for substantial amounts, the sovereign granted guilds the exclusive right to practice a particular trade or craft in specified locations. See BASKIN & MIRANTI, *supra* note 68, at 58. Trade guilds began incorporating as early as 1314. See CHATFIELD, *supra* note 65, at 79.

90. The Muscovy or Russia Company combined a state-granted monopoly on timber trade routes to Archangel with the sale of transferable shares. See ALLEN & GALE, *supra* note 15, at 11; BASKIN & MIRANTI, *supra* note 68, at 60; CHATFIELD, *supra* note 65, at 78.

91. The gestation and birth of what would become the modern corporation can be observed in the history of the East India Company. The early voyages of the East India Company were treated as individual ventures in which investors subscribed, and, if the voyage was profitable, received their principal and profit upon the voyage's conclusion. This process would soon become unwieldy as it became increasingly difficult to strictly segregate the accounts attributable to each individual voyage, so in 1613, the East India Company stopped selling shares in individual voyages, but sold four-year subscriptions.

first permanent joint-stock company, the Dutch East India Company, in 1602.⁹² What is believed to have been the first negotiable bond,⁹³ the "Grand Parti," was issued by the French government in 1555.⁹⁴ Unlike earlier bond-like instruments, the Grand Parti could be purchased by almost anyone, not just the large banking houses.⁹⁵ Secondary trading of securities was formalized with the opening of the Amsterdam Bourse in 1611,⁹⁶ and the negotiation of options⁹⁷ and futures contracts were conducted soon thereafter.⁹⁸ The first stock exchange in London specifically built for that purpose was opened in 1802.⁹⁹ However, in the United States, stock trading transactions were conducted literally on the streets of New York City prior to the creation of the New York Stock Exchange in 1817.¹⁰⁰ Convertible securities¹⁰¹ and preferred stock¹⁰² were developed and popularized in the seventeenth and eighteenth centuries.

Instruments that improved opportunities to mediate business risks became increasingly important in the modern period. "To arrive" contracts, or forward contracts, were used in Liverpool in the cotton trade in the 1780s,¹⁰³ and contracts for the future delivery of rice were traded in Japan in the seventeenth and eighteenth centuries.¹⁰⁴ However, what has come to be considered the first modern futures transaction is reported to have occurred in Chicago at the Chicago Board of Trade in 1865.¹⁰⁵

Although private markets and firms are thought to be the primary in-

Permanent capital stock was established in 1657. Shares became freely transferable at prices periodically established by the company. In 1661, the company began distributing dividends rather than divisions of profits and assets. See BASKIN & MIRANTI, *supra* note 68, at 69; CHATFIELD, *supra* note 65, at 79-80.

92. See WALMSLEY, *supra* note 86, at 3. Joint-stock companies are generally viewed as partnerships into which few corporate features are grafted, such as transferable shares. See BASKIN & MIRANTI, *supra* note 68, at 56; CHATFIELD, *supra* note 65, at 79.

93. Bonds are notable for their relative predictability. The traditional bond bears a fixed interest rate and matures on a date certain. See WALMSLEY, *supra* note 86, at 61.

94. See *id.* at 3.

95. Earlier bond-like instruments, for example, the French *rente* of the sixteenth century, were not characterized as loans but as the purchase and sale of streams of payments, in order to avoid church-imposed usury limitations. See *id.*

96. See ALLEN & GALE, *supra* note 15, at 13.

97. An option contract provides its holder with the right, but not the obligation, to purchase or sell a certain asset or commodity, on or before a stated date for a predetermined price. See Thomas E. Copeland & Hans R. Stoll, *Trading Markets*, in THE WG&L HANDBOOK OF FINANCIAL MARKETS 314-17 (Dennis E. Logue ed., 1995).

98. See ALLEN & GALE, *supra* note 15, at 13-14.

99. See *id.* at 13.

100. See *id.*

101. See ALLEN & GALE, *supra* note 15, at 12. If preferred shares can be viewed as debt-like equity, then convertible bonds can be seen as equity-like debt. Generally, the holder a convertible bond may, at her option, exchange it for a predetermined amount of common stock. See WALMSLEY, *supra* note 86, at 65.

102. See ALLEN & GALE, *supra* note 15, at 12.

103. See JERRY W. MARKHAM, THE HISTORY OF COMMODITY FUTURES TRADING AND ITS REGULATION 3 (1987).

104. See ALLEN & GALE, *supra* note 15, at 15.

105. See Pouncy, *supra* note 70, at 1629 n.17. See *id.* at 1628-29 (outlining a brief history of trading in commodity futures contracts in the United States).

novators, governments played a major role as well.¹⁰⁶ The period 1739 through 1815 in European history is notable for the virtual constancy of warfare,¹⁰⁷ which precipitated large increases in government borrowing.¹⁰⁸ The need to encourage participation in the government debt markets contributed to the development of innovative financial instruments.¹⁰⁹

The implementation of nineteenth century technology also contributed to the development of financial innovations. Income bonds, which paid interest only if earnings exceeded a stated sum, were issued by the Chesapeake and Ohio Canal Company in 1848.¹¹⁰ Railroad expansion was financed in part by car trust certificates, which were similar to modern equipment leases¹¹¹ — in exchange for an extension of credit to the railroad company, the purchaser received title of railroad cars and a stream of payments.¹¹² The development of commercial paper and warrants in the late nineteenth and early twentieth centuries essentially completed the range of basic financial instruments.¹¹³ Additionally, the increased specialization and professionalization of the bar also promoted financial innovation. Corporate lawyers used the products of traditional and mod-

106. See ALLEN & GALE, *supra* note 15, at 14. The English government also developed the *tondine*, which had features of a bond and an annuity enabling a group of purchasers, or a purchaser and his nominees, to receive a proportion of the instrument's return, the relative proportion increasing to each nominee with the death of co-nominees and the state's obligation ending with the death of the last survivor. See *id.* at 13.

107. See *id.* at 14. See also CHARLES P. KINDLEBERGER, *A FINANCIAL HISTORY OF WESTERN EUROPE* 9 (1984).

108. See ALLEN & GALE, *supra* note 15, at 14.

109. See generally MARKHAM, *supra* note 103. To pay its troops during the Revolutionary War, Massachusetts issued each of them

a two year note for three hundred seventy pounds at six percent to be paid in currency "in a greater or less Sum, according as Five Bushels of CORN for, Sixty-eight Pounds and four-seventh Parts of a Pound of BEEF, Ten Pounds of SHEEPS WOOL, and Sixteen Pounds of SOLE LEATHER shall then cost, more or less than *One Hundred and Thirty Pounds* current Money, at the then current Prices of said Articles."

Markham, *supra* note 72, at 6 n.14 (quoting WILLIAM G. ANDERSON, *THE PRICE OF LIBERTY: THE PUBLIC DEBT OF THE AMERICAN REVOLUTION* 135 (1983)). The effect of this note was to guarantee a set payment despite high levels of inflation. See *id.* at 5. Professor Markham characterizes the "Erlanger Bond," issued in Europe by Emile Erlanger and J. Henry Schroder & Co. for the Confederate States of America as "a derivative instrument whose complexity and financial elegance matches anything that exists today on Wall Street. . . . The Erlanger bond was a tri-valued derivative instrument. One such bond provided for payment at maturity of 100 pounds sterling, 2500 French francs, or 4000 pounds of cotton, at the purchaser's option." *Id.* at 7.

110. See ALLEN & GALE, *supra* note 15, at 15.

111. See *id.*

112. See *id.*

113. Modern financial instruments for the most part were issued by firms and financial institutions such as banks and exchanges and governments. Instruments issued by firms include: equity (equity holders are the owners of the firm and are responsible for conducting its affairs); bonds (a long-term obligation by the firm to make a series of fixed payments); convertibles (a bond that can be swapped for equity at a prespecified ratio or vice versa); preferred stock (a hybrid security that combines features of debt and equity); commercial paper (a short-term debt security issued by firms that can be easily traded); and warrants (a long-term call option on a firm's stock issued by the firm). See *id.* at 16.

ern financial innovation as components in the assembly of new instruments.¹¹⁴

3. *Contemporary Financial Innovation*

The second half of the twentieth century was ushered in by a period of significant geopolitical transformation and international coordination, which, in combination with other factors, effectively recreated the international financial arena. It is against this backdrop that the contemporary process of financial innovation developed and continues to operate.¹¹⁵

a. The Euromarkets

The birth of the euromarkets was influenced by post World War II geopolitics. By the late 1950s and early 1960s, China, the Soviet Union and East European nations had accumulated large U.S. dollar amounts, which, to avoid political risks, they chose not to keep in U.S. banks.¹¹⁶ When Britain banned the use of the pound to finance certain interna-

114. See generally Tufano, *supra* note 1. During the period 1830-1930, U.S. corporations introduced what Tufano characterizes as 23 major innovations in securities design, and a very large number of variations on such new basic themes. However, most of these "innovations" were essentially recombinations of the basic building blocks of corporate capital structure: equity, debt, preference, security, conversion and redemption. As such, they do not represent substantial departures from the first equity and debts issues 200 to 300 years earlier.

115. The 1940s and 1950s are not noted for the introduction of new financial products; however, this period marked the intensive use of traditional forms of business organization in novel ways. The use of holding companies and interlocking corporate structures was expanded into conglomerations. Conglomerations represented a new way of viewing the process of corporate management. Managers began to recognize that earnings could be bought. In theory, performance could be maximized and risk reduced by uniting many ostensibly heterogenous activities into one corporation. See BASKIN & MIRANTI, *supra* note 68, at 318. The result would be highly effective diversification as most business activities within the conglomerate bore entirely different risk profiles from each other. Additionally, such combinations were thought to permit the conglomerate to achieve the benefits of synergy, i.e., the efficiencies derived from: applying modern "management science;" keeping research and development applications, no matter how wide-ranging, in-house; creating tax and accounting advantages; and lowering capital costs. See *id.* at 275-76. It has been argued that conglomerates were built on two faulty premises. First, the anticipated benefits of management science did not materialize because firms were not prepared to commit the resources necessary to develop managerial staffs adequately versed in all aspects of the conglomerate businesses. Second, the primary exploitable synergy turned out to be that increased size enhanced the bargaining position conglomerates enjoyed in negotiating the credit markets. See *id.* at 279-80. However, it also is true that tax policy effectively retarded development of managerial synergies by the requirement that the net operating losses of an acquired firm could be used in the conglomerate's consolidated tax return only if the acquired firm retained business and managerial continuity. See *id.* at 280. Although conglomerate does not meet our definition of a financial innovation, it is important to the current discussion because it demonstrates the role that finance theory has played in the evolution of corporate forms. It is also important as a precursor to the mergers and acquisition frenzy during which finance was directed toward the speculative trading of corporate assets rather than the development of enterprise.

116. See BRIAN S. QUINN, *THE NEW EUROMARKETS* 35 (1975). See also George H. Windecker, Jr., Note, *The Eurodollar Deposit Market: Strategies for Regulation*, 9 AM. U. J. INT'L L. & POL'Y 357, 361 (1993).

tional third-party transactions, the dollars held by these governments in European banks, "eurodollars," became a new currency. Eurodollars were traded to meet the demand of British merchant banks for an alternative to the British pound, which could be used to finance international third-party transactions.¹¹⁷ The eurodollar market was strengthened by U.S. regulatory developments. In the United States, changes to tax policy designed to alleviate an unfavorable balance of payments positions made it difficult to use U.S. dollars to purchase foreign securities.¹¹⁸ Federal Reserve policy also operated to stem foreign investment by limiting the amount of foreign loans that could be made by U.S. banks and the interest rates banks could pay on loans.¹¹⁹ As a result of these regulatory policies, U.S. banks began borrowing eurodollars to finance foreign transactions.¹²⁰

During the 1960s, European banks also were able to attract domestic U.S. depositors because European banks were able to pay higher interest on deposits than U.S. banks.¹²¹ In the U.S., the Federal Reserve's Regulation Q limited the interest rates that could be paid on time deposits and prevented any interest from being paid on deposits of less than thirty days.¹²² The benefits the eurodollar provided eventually would lead to the development of "euro" currencies for all of the world's major domestic currencies.¹²³

The eurodollar and other eurocurrencies are financial innovations because they are new ways of providing one of the fundamental functions of the financial sector, mediums of exchange. Eurocurrencies, however, are national currencies detached from the system of monetary regulation and

117. "Euro" is attached to the name of a currency to differentiate between the currency circulating within its country of issue and the same currency circulating on deposit or on loan in a foreign market. See QUINN, *supra* note 116, at 34. See also Peter S. Smedresman & Andreas F. Lowenfeld, *Eurodollars, Multinational Banks, and National Laws*, 64 N.Y.U. L. REV. 733, 743-47 (1989).

118. See *infra* notes 283-88 and accompanying text. The 1964 Interest Equalization Tax, Pub. L. No. 88-563, § 4911(a), 78 Stat. 809 (1964), imposed a tax upon the purchase of foreign securities in an effort to stem an outflow of U.S. currency abroad. See Virginia K. Troia, *An Overview of the Eurobond Market*, 12 N.C. J. INT'L L. & COM. REG. 330, 330-31 (1987).

119. In 1965, the Federal Reserve "requested" that U.S. banks observe a ceiling on the amounts of loans made to foreign borrowers and to U.S. companies for the purpose of foreign investment. See *id.* at 332.

120. The eurodollar market was also supported by foreign exchange rates and controls, tax concerns, and interest rate differentials, which made it advantageous for foreign firms to maintain U.S. dollars in European banks. See QUINN, *supra* note 116, at 35.

121. See *id.*

122. See *id.* at 36. Additionally, The Federal Reserve Act, 12 U.S.C. § 461(b)(6), does not require banks to maintain reserves for deposits that are negotiated outside of the U.S. Before the promulgation of this requirement, the same result was achieved by means of a Federal Reserve Interpretation. See Smedresman & Lowenfeld, *supra* note 117, at 744 n.31.

123. See QUINN, *supra* note 116, at 36. The practice of banks accepting deposits in non-domestic currencies was not new, and had been engaged in by European banks during the 50 years preceding the escalation of this practice in the 1960s. However, the development of a wholesale market for such deposits represented an innovative practice in the process of financing international transactions using non-domestic currencies. See *id.*

currency control implemented by their nations of origin. Therefore, the development of eurocurrencies eroded national sovereignty. Decisions concerning a nation's money supply were no longer subject to the exclusive control of a nation's central banker. The activities of international currency traders would have to be factored into a nation's monetary policy.

By 1963, the eurobond market was also operational.¹²⁴ Bond issues generally are underwritten by domestic issuers, and are subject to the regulatory structure in place in the country of issue. Eurobonds generally are underwritten by non-domestic issuers, and are not subject to regulation by the country in whose currency the bonds are denominated.¹²⁵ Eurobonds permitted U.S. firms access to the capital markets without having to comply with the regulatory requirements imposed by the Securities Exchange Commission with respect to domestic issues.¹²⁶ The cost of floating a bond in the eurobond market, therefore, could be significantly lower than the costs incurred in the U.S. market.¹²⁷

Floating-rate notes (FRNs) were a further innovation of the Euromarkets. Generally, they are viewed as a hybrid instrument with the features of debt and the transferability of currency.¹²⁸ FRNs are issued by firms, state and local governments, as securities that pay interest at a rate tied to a standard floating interest rate such as LIBOR,¹²⁹ or U.S. Treasury securities rates,¹³⁰ i.e., rates that vary in response to changing market conditions.¹³¹ They have been issued in various currencies, frequently with convertibility features that permit the holder to switch the

124. See ALLEN & GALE, *supra* note 15, at 17; QUINN, *supra* note 116, at 27-30, 32-33.

125. See QUINN, *supra* note 116, at 27-30, 32-33.

126. See Finnerty, *supra* note 9, at 10.

127. See *id.*; WALMSLEY, *supra* note 86, at 39. The practice of issuing foreign currency denominated bonds in domestic markets was also not new. See Finnerty, *supra* note 9, at 18-29 for the origins of the eurobond market. However, earlier examples involved the participation of a limited number of participants and currencies. See *id.* at 18. For example, the floating of the 100 million French francs, baring indemnity loan in 1817, involved the non-domestic issue of a bond denominated in a foreign currency, but in essence constituted a loan from France to Russia. See *id.* Contemporary eurobonds were the first such instruments traded on a truly multinational market involving a large number of participants from a wide variety of jurisdictions. See *id.* at 18-19. The issuance of U.S. dollar denominated bonds by foreign syndicates for sale in non-U.S. markets represented a sharp departure from prior practice and a distinct market innovation. See *id.* However, as the eurobond market has developed, it has become increasingly difficult to distinguish between non-domestic foreign bond issues and eurobonds, particularly as U.S. corporations began to use the market as a source of capital, and changes in tax treatment made foreign issued U.S. dollar denominated bonds more attractive to U.S. residents. See QUINN, *supra* note 116, at 32-33.

128. See *id.* at 93.

129. "LIBOR" is an acronym for the London Interbank Offered Rate, based on the average three-month time deposit interest rate offered by a random selection of 12 of the top 20 banks in the London eurodollar market. See Thomas Schneeweis & Jot Yau, *Financial Futures Markets*, in THE WG&L HANDBOOK OF FINANCIAL MARKETS 383 (Dennis E. Logue ed., 1995).

130. See ALLEN & GALE, *supra* note 15, at 19; QUINN, *supra* note 116, at 93.

131. See Timothy W. Koch, *Municipal Securities*, in THE WG&L HANDBOOK OF FINANCIAL MARKETS 236 (Dennis E. Logue ed., 1995).

coupon payment from one currency to another.¹³² Others have been issued that permit the holder to choose from a menu of redemption currencies.¹³³

Eurobonds and floating-rate notes are financial innovations because they facilitate the intermediation function of the international capital markets. They also created a new system of exchange. Investors can use these instruments to convert one currency to another, again in ways that avoid the national regulatory structure of the currencies involved.

b. Swaps

In the 1960s, the international currency markets also witnessed the development of parallel loans,¹³⁴ back-to-back loans,¹³⁵ and their descendant, the currency swap.¹³⁶ As firms' operations became increasingly international, their foreign exchange requirements created new sets of problems and opportunities.¹³⁷ International banks were called upon to accommodate their customers' need to engage in increasingly sophisticated transactions involving foreign exchange. A significant concern was the ability of parent corporations to provide financial support to foreign subsidiaries. This need was often complicated by national government restrictions on foreign exchange transactions. The currency-collateralized loan was an existing method of meeting this need.¹³⁸ First, a firm placed its domestic currency on deposit in a domestic bank. That amount would then be used to collateralize a loan to the firm's foreign subsidiary made by the domestic bank's foreign branch in that branch's local currency.¹³⁹ These loans permitted firms to transfer surplus liquidity while simultaneously converting it from one currency to another, without violating domestic foreign exchange controls.¹⁴⁰ However, currency-collateralized loans subjected the international bank to foreign-exchange risk. Banks, therefore, had to hedge this foreign exchange exposure with countervailing transactions in their loan portfolios.¹⁴¹ U.K. merchant banks recognized it could be profitable and less complicated to remove themselves as participants in these transactions. Instead, they could broker such deals directly between firms with complementary foreign exchange requirements without the need for intervening banks.¹⁴² When the U.K. government imposed the dollar premium¹⁴³ on foreign exchange transac-

132. See ALLEN & GALE, *supra* note 15, at 19; QUINN, *supra* note 116, at 66-74.

133. See WALMSLEY, *supra* note 86, at 237-39.

134. See *infra* text accompanying notes 145-50.

135. See *id.*

136. See *infra* notes 151-58 and accompanying text.

137. The following discussion generally follows ALLEN & GALE, *supra* note 15, at 17.

138. See CARL R. BEIDLEMAN, FINANCIAL SWAPS 13 (1985).

139. See *id.*

140. See *id.* at 13-14.

141. See *id.* at 13.

142. See JOHN A.M. PRICE & SCHUYLER K. HENDERSON, CURRENCY AND INTEREST RATE SWAPS 1-2 (1984).

143. The dollar premium was introduced by the U.K. government to protect foreign exchange reserves by discouraging foreign investment. See *id.* at 1.

tions, bankers were provided with an additional incentive to develop the market for what would be characterized as parallel loans and back-to-back loans.¹⁴⁴

The parallel loan consists of two mirror-image loans between two parent firms in different countries to each others' foreign subsidiaries.¹⁴⁵ For example, a U.S. firm would lend dollars to a French firm's U.S. subsidiary, and a French firm would lend francs to a U.S. firm's French subsidiary. As a result of this transaction, each firm is able to transmute excess domestic currency into a desired foreign currency. A back-to-back loan could be used to accomplish the same foreign exchange objective between the principals directly. In a back-to-back loan, two firms make offsetting loans to each other using different currencies.¹⁴⁶

The utility of parallel loans and back-to-back loans was limited by the credit¹⁴⁷ and legal risks¹⁴⁸ they created. Parallel and back-to-back loans were created with documents that established two independent debtor-creditor relationships. Although the lawyers responsible for drafting these documents tried to ensure that they would create secured interests in the relevant jurisdictions, they were not always successful. Thus, if the laws of a jurisdiction prevented a party from perfecting its right to set-off upon the bankruptcy of its counterparty, the solvent party would still be obligated to perform. However, the solvent party could not expect counter-performance, and would be treated as an unsecured creditor with respect to its claims against the bankrupt party.¹⁴⁹ As a result, such trans-

144. The following is an example of the costs imposed on foreign exchange transactions by the dollar premium.

[I]f a U.K. company wanted to invest [sterling] 1,000,000 in the U.S. equity market, it had to buy the dollars necessary by selling pounds sterling for dollars in what was known as the dollar premium market. This meant that, if the premium was 20%, it would cost [sterling] 1,200,000 to invest the equivalent of [sterling] 1,000,000 in the U.S. equity market. Upon selling the securities acquired, only 75% of the proceeds of sale could be sold through the dollar premium market for pounds sterling, the remaining 25% having to be sold through the spot market, i.e., at the free market exchange rate prevailing on the day of sale for selling dollars for pounds sterling. Having initially to pay more for the U.S. investments and then having to surrender 25% of the premium (effectively a tax) acted as a disincentive for foreign investment.

Id. This provided a significant incentive to borrow funds to be invested abroad in the country where they were to be invested, which enhanced the value of the parallel loan market. *See id.*

145. *See ALLEN & GALE, supra* note 15, at 24; BEIDLEMAN, *supra* note 138, at 14; WALMSLEY, *supra* note 86, at 141; PRICE & HENDERSON, *supra* note 142, at 9.

146. *See PRICE & HENDERSON, supra* note 142, at 9. Although parallel loans and back-to-back loans could be used to accomplish the similar financial objectives, they did differ with respect to certain technical features, e.g., the right of offset. *See BEIDLEMAN, supra* note 138, at 19.

147. Credit risk is the risk of counterparty default. *See Romano, infra* note 152, at 21.

148. Legal risk refers to the possibility that a party to a transaction may attempt to avoid her obligations by finding a law that excuses her from performance. *See id.* at 52. *See, for example, Hazell v. Hammersmith, and Fulham London Borough Council*, 2 App. Ca. 1, 37 (1992), where the court ruled that municipalities lacked the legal capacity to enter into swap contracts, thereby voiding the municipalities obligations under a swap contract.

149. *See BEIDLEMAN, supra* note 138, at 21; PRICE & HENDERSON, *supra* note 142, at 10-11.

actions would only be engaged in with counterparties with the highest possible credit ratings. The existence of this legal uncertainty and the complicated documentation required to ameliorate such risks, coupled with the limited number of potential counterparties, limited the usefulness of these instruments.¹⁵⁰

Swaps were developed to achieve the financial goals of parallel loans and back-to-back loans in currency transactions more simply, with less credit and legal risk, and with more favorable accounting options.¹⁵¹ Swaps lessened counterparty credit risk by changing the nature of the transaction from two independent agreements to loan different currencies to one agreement to buy and sell different currencies. Swaps also conditioned performance on counterparty performance.¹⁵² Therefore, legal risk was minimized and a wider range of counterparties became available.

There is some debate about the appearance of the first swap transaction.¹⁵³ As the first swaps were created as proprietary instruments, publicizing information sufficient to document their existence as a new species of transaction would enhance their replicability.¹⁵⁴ It is therefore understandable that the engineers of the first swaps were hesitant to publicize the event.¹⁵⁵ However, in 1977, the market did learn of a 425,000,000 U.S. dollar/pound sterling swap,¹⁵⁶ and the 1981 currency swap between the World Bank and IBM brought this device out of the

150. See ALLEN & GALE, *supra* note 15, at 24; BEIDLEMAN, *supra* note 138, at 15; PRICE & HENDERSON, *supra* note 142, at 2.

151. See BEIDLEMAN, *supra* note 138, at 21; PRICE & HENDERSON, *supra* note 142, at 2. In earlier times, a swap took place with "a local trader paying the local debts of a foreign trader, in return for that foreign trader paying the local trader's debts in the foreign trader's home country." *Id.* at 1.

152. See PRICE & HENDERSON, *supra* note 142; WALMSLEY, *supra* note 86, at 142; Roberta Romano, *A Thumbnail Sketch of Derivative Securities and Their Regulation*, 55 MD. L. REV. 1, 50 (1996).

153. Walmsley reports "[t]he swap market began in the 1960s, with the introduction of currency swaps." WALMSLEY, *supra* note 86, at 25. Price and Henderson state, "[a]ccording to market sources, the first genuine swap was arranged in August 1976" PRICE & HENDERSON, *supra* note 142, at 3. Smith and Smithson argue for a later date, "a market for swaps did not exist in any meaningful sense until the 1980s." Finnerty, *supra* note 9, at 198. Marshall and Bansal conclude that "[t]he first currency swap was engineered in London in 1979." MARSHALL & BANSAL, *supra* note 4, at 316. Much of the disagreement appears to be a consequence of semantics, i.e., what constitutes a "true" swap.

154. Generally, an idea is not entitled to protection as intellectual property, although the author's expression of that idea may be entitled to such protection. So, for example, once the idea underlying a swap transaction has been made public, competitors may offer products based on the same idea, although the competitor will not be able to copy or create documents that are essentially derivative of copyrighted documents that created and memorialized the first transactions. See Peter K. Trzyna, *Legal Protections for Innovative Financial Products and Services*, in FINANCIAL ENGINEERING 687 (John F. Marshall & Vipul K. Bansal eds., 1992).

155. See PRICE & HENDERSON, *supra* note 142, at 3. See *infra* notes 157-63 and accompanying text. As swaps were designed to circumvent foreign exchange controls, publicizing their arrival would only accelerate potential regulatory reactions as predicted by the regulatory dialectic.

156. In April 1977, a financial "tombstone" appeared for the transaction, which was arranged by Continental Illinois Limited (now First Interstate Limited) on behalf of Consolidated Goldfields Limited. See PRICE & HENDERSON, *supra* note 142, at 3.

realm of obscurity. The example provided by IBM and the World Bank stimulated the market and encouraged potential users to explore the benefits of this device.¹⁵⁷ The swap market developed rapidly, particularly when bankers changed their role in engineering swaps from broker to dealer, serving as their customers' counterparties and hedging their exposures in the rapidly developing markets for financial futures and options.¹⁵⁸

Commodity swaps followed in 1986. They were used by commodity-producing entities to hedge their market risk on medium- to long-term contracts of precious metals, industrial metals and energy products.¹⁵⁹ Swaps based on commodity interests raised regulatory concerns for the Commodity Futures Trading Commission (CFTC).¹⁶⁰ The regulatory uncertainty created while the CFTC examined the jurisdictional question encouraged U.S. swap dealer operations to move off-shore.¹⁶¹

Equity swaps were introduced in 1989.¹⁶² In an equity swap, parties exchange an interest component based on a stated notional amount, for a stream of cash flows equivalent to the dividend payments on a number of

157. By the late 1970s, the World Bank was borrowing approximately \$8 billion annually to finance development projects in developing economies, using funds raised in various international bond issues. See MILLMAN, *supra* note 10, at 179. At the time, interest rates were approximately 8% in Switzerland, 12% in Germany and 17% in the United States. Although the World Bank would have preferred to borrow in Switzerland and Germany, its borrowing in those jurisdictions had reached the limits permitted by Swiss and German Law. IBM was then holding borrowed Swiss francs and German marks whose values, due to interest rate changes and the appreciation of the U.S. dollar, were much greater than IBM's basis in them. See PRICE & HENDERSON, *supra* note 142, at 4. In a transaction arranged by Solomon Brothers, IBM and the World Bank agreed to swap these obligations. See *id.* The World Bank would borrow in the U.S. market at 17%. IBM would service this debt and, in exchange, the World Bank would service IBM's Swiss franc and Deutsche mark debt. The result was that the World Bank was able to borrow in the U.S. markets, but pay interest at the rate charged in the Swiss and German markets, while IBM was able to recognize the profit it had earned on its Swiss franc and Deutsche mark holdings, and eliminate the risk of loss on these holdings should the exchange rates change. Because of its need for very large amounts of capital, the World Bank's adoption of swap financing has been very important in popularizing the device. See PRICE & HENDERSON, *supra* note 142, at 7. The World Bank reported that, in 1983, swaps enabled it to cut its overall cost of borrowing from approximately 10% to about 8.9%. See WALMSLEY, *supra* note 86, at 125. In 1981, the currency swap model was adapted to convert the character of adjustable and fixed-interest loans. See ALLEN & GALE, *supra* note 15, at 25; MARSHALL & BANSAL, *supra* note 4, at 316. The Student Loan Marketing Association ("Sallie Mae") was an early user of interest rate swaps to convert the interest rate character of its credit obligations. See *id.*; see also ALLEN & GALE, *supra* note 15, at 25; MARSHALL & BANSAL, *supra* note 4, at 316; PRICE & HENDERSON, *supra* note 142, at 4; WALMSLEY, *supra* note 86, at 125.

158. See MARSHALL & BANSAL, *supra* note 4, at 316-17; MILLMAN, *supra* note 10, at 179-80.

159. See ALLEN & GALE, *supra* note 15, at 26; MARSHALL & BANSAL, *supra* note 4, at 317.

160. See *infra* note 173. After the CFTC suggested that commodity swaps might be within its jurisdiction, much of the industry moved off-shore. The CFTC's swap exemption created a safe harbor, removing certain swap transactions from CFTC regulatory oversight. See *id.*

161. See MARSHALL & BANSAL, *supra* note 4, at 317.

162. See *id.*; JOHN F. MARSHALL & KENNETH R. KAPNER, UNDERSTANDING SWAPS 6 (1993).

shares of a stated corporation. The value of the shares is equal to the notional amount on which the interest payments are based. The party responsible for making the interest-based payments would also make payments to the counterparty, should the shares fall in value. The party responsible for making the dividend-based payments would also make payments to the counterparty, should the shares appreciate in value. Equity swaps permitted the counterparties to assume the positions of a leveraged purchaser of equity and the seller of equity, who has also financed the transaction, without buying any stock.¹⁶³

Swaps are used for their ability to convert one currency into another and, therefore, function as substitutes for money and credit. Swaps also have the ability to mediate a wide range of financial risks. Their use in the financial sector and financial firms has encouraged international transactions and changed the way in which risks are perceived by managers.

c. Securitization

Securitized instruments were designed to create a new market. By pooling federal government insured mortgages, the Government National Mortgage Association (GNMA or Ginnie Mae)¹⁶⁴ was able to create a new security¹⁶⁵ representing partial interests in such pools.¹⁶⁶ The ability to transform illiquid assets into securities that would be traded on secondary markets brought new capital resources to the underlying markets from which such new securities were derived.¹⁶⁷ The securitization of federally insured mortgages was designed to increase the supply of funds available to finance home purchases. The ability to securitize and

163. *See id.* The swap market has continued to develop to include, among other things, the use of swaps as components in the engineering of complex derivative instruments as risk management and financing solutions. *See id.* at 118-19. Swaps can be designed to contain "caps," an agreement under which the purchaser buys the right to payment, should a referenced rate exceed the "capped" rate; "floors," where the purchaser receives payment if the referenced rate falls below the "floor;" and both cap and floor, known as a "collar." Options on swaps can also be negotiated and provide a party with the option to enter into a specified swap at a predetermined future date. *See Romano, supra* note 152, at 47-48.

164. Congress authorized GNMA in 1968 as a governmental instrumentality within the Department of Housing and Urban Development. *See* 12 U.S.C. § 1717(a) (1994).

165. Such securitized interests are characterized as "pass-through" or "pay-through" interests. The underlying assets supporting pass through securities are held by a non-taxed trust. The trust's tax liabilities and the payment stream on the assets pass through to the securities' holders. Pay-through securities are debt issues collateralized by the underlying assets. In the pay-through situation, the pool is divided to support a number of securities with different risk characteristics. *See WALMSLEY, supra* note 86, at 227-29; ALLEN & GALE, *supra* note 15, at 29.

166. *See SHENKER & COLLETTA* at 1386 (source on file with author); WALMSLEY, *supra* note 86, at 231-32. The securitization process did not begin with GNMA. Shenker and Colletta report that mortgage-backed bonds were sold to the public prior to the turn of the century, and mortgage participation contracts secured by pooled mortgages were sold in the 1920s. *See generally SHENKER & COLLETTA, supra.* However, it appears that GNMA's mass securitization of consumer debt represented a significant departure from earlier practice.

167. *See id.* at 1383-84; WALMSLEY, *supra* note 86, at 22.

sell interests in mortgages permitted money from the conventional capital markets to return funds to lenders, enabling them to make more mortgage loans and encourage housing finance.¹⁶⁸ Eventually, mortgage-backed securities would be "stripped," or segregated into "tranches." Each tranche, consisting of distinct principal and interest instruments, could be traded separately of each other.¹⁶⁹ Ultimately, many different types of loans, including automobile loans and credit card receipts¹⁷⁰ would be securitized. Banks and other depository institutions would come to rely on securitization to offset the rising disintermediation experienced in the 1970s and 1980s.¹⁷¹

Securitization has established new markets in which formerly illiquid assets are traded for cash. It has created a new type of intermediated investment and a new venue for intermediation. It also represents the ability of the government to create financial innovations that support policy initiatives.

d. Financial Futures¹⁷² and Options

In 1972, futures on foreign exchange began trading on a division of the Chicago Mercantile Exchange (CME),¹⁷³ the International Monetary Market (IMM).¹⁷⁴ In 1973, the Chicago Board of Trade (CBOT) created the Chicago Board Options Exchange (CBOE) to trade standardized op-

168. See SHENKER & COLLETTA, *supra* note 166, at 1380-81.

169. See ALLEN & GALE, *supra* note 15, at 30. This change followed the enactment of the 1986 Tax Reform Act.

170. See ALLEN & GALE, *supra* note 15, at 30; SHENKER & COLLETTA, *supra* note 166, at 1369-73; WALMSLEY, *supra* note 86, at 241-45.

171. See ALLEN & GALE, *supra* note 15, at 30; SHENKER & COLLETTA, *supra* note 166, at 1388-91.

172. Financial futures contracts are generally contracts to deliver or take delivery of a financial instrument on a certain future date. More abstract financial futures, such as futures on equity indices do not, of course, envision a delivery component. Rather, they are settled in cash. See WALMSLEY, *supra* note 86, at 99. It is noteworthy, that the traditional distinction between a futures contract and a gambling contract was that the gambling contract ordinarily was settled in cash. See MILLER, *supra* note 14, at 10.

173. The Commodity Futures Trading Commission ("CFTC") is responsible for the regulation of all commodities and interests in commodities, including commodity futures, commodity options and options on commodity futures. Generally, with respect to exchange traded financial derivatives, the CFTC is authorized to designate contract markets, including exchanges, approve new contracts, regulate speculation by imposing speculative limits, register firms and individuals, and investigate and prosecute fraud, anti-competitive practices, and manipulation. See Commodity Exchange Act (CEA) § 2, 7 U.S.C. § 2 (1992); CEA § 4, 7 U.S.C. § 6 (1992); CEA § 5, 7 U.S.C. § 7 (1992). A number of entities and individuals are required to be registered with the CFTC in order to function the commodity futures industry. They include futures commission merchants, floor traders and floor brokers, commodity trading advisors and commodity pool operators, and associates of futures commission merchants, commodity pool operators, and commodity trading advisors. See CEA § 4, 7 U.S.C. § 6 (1992).

174. See ALLEN & GALE, *supra* note 15, at 17; WALMSLEY, *supra* note 86, at 99.

tions¹⁷⁵ on securities.¹⁷⁶ Interest rate financial futures were created in 1975, with a contract on Ginnie Mae mortgage-backed certificates traded on the CBOT.¹⁷⁷ The IMM introduced a futures contract on the ninety-one-day Treasury bill in 1976,¹⁷⁸ followed by a futures contract on the Treasury bond traded on the Chicago Board of Trade in 1977.¹⁷⁹ The 1980s saw the introduction of new financial futures based on stock market indices, three of which were introduced in 1982. The Kansas City Board of Trade created a contract based on the Value Line Stock Index.¹⁸⁰ The CME introduced a contract based on the S&P 500, and the New York Futures Exchange began trading a contract based on the New York Stock

175. Although options on equity securities and on other financial instruments were not a new development, earlier options were individually negotiated and constructed contracts. As such, there was no formal market on which options on financial instruments could be traded. The Chicago Board of Options Exchange (CBOE) created options with standard prices and expirations, thereby facilitating the development of a secondary market for these contracts. See WALMSLEY, *supra* note 86, at 149.

176. See ALLEN & GALE, *supra* note 15, at 17. The CBOT initially applied for permission to trade options in 1969, but permission was not granted by the Securities Exchange Commission until 1973. See MILLER, *supra* note 14, at 11. Options trading on the CBOE began with a limited number of call options, but options initially were not available. The CBOE was soon joined in trading options by the American Stock Exchange (1973) and the Philadelphia Stock Exchange (1975). See Joseph S. Rizzello, *The Development and Evolution of Derivative Products*, in THE HANDBOOK OF DERIVATIVES & SYNTHETICS 4 (1994). The SEC regulates options on equity securities and equity index options. See Securities Exchange Act of 1934 § 9, 15 U.S.C. § 78i (1994). Currency options are regulated by both the CFTC and SEC, depending on the regulator responsible for the exchange on which such options are traded. See Romano, *supra* note 152. However, a turf battle ensued when the CBOE sought to trade options on securitized instruments, GNMA certificates, see *supra* notes 164-171 and accompanying text, pursuant to authorization from the SEC. See Chicago Bd. of Trade v. SEC, 677 F.2d 1137 (7th Cir.), *vacated as moot*, 459 U.S. 1026 (1982). Despite a 1982 agreement between John Shad, then Chairman of the SEC, and Philip Johnson, then Chairman of the CFTC, which was ratified by Congress in the Futures Trading Act of 1982, Pub. L. No. 97-444, 96 Stat. 2294 (codified at 7 U.S.C. § 2(a)(i), (ii) and (iv) (1994)), conflict arose when the SEC sought to authorize trading of index participation contracts, derivatives with the characteristics of both securities and commodities, that were ultimately held to be within the jurisdiction of the CFTC. See Chicago Mercantile Exchange v. SEC, 883 F.2d 537, 548 (7th Cir. 1989), *cert. denied*, 496 U.S. 936 (1990). Ultimately, index participation contracts would be traded in Toronto. See Christopher C. Culp, *Stock Index Futures and Financial Market Reform: Regulatory Failure or Regulatory Imperialism?*, 13 GEO. MASON L. REV. 517, 581 (1991). The CFTC-SEC accord resolved these jurisdictional questions by maintaining the CFTC's exclusive jurisdiction over all futures contracts and extending such jurisdiction to options on futures contracts, while preventing the development of futures contracts on individual securities. The accord provided the SEC with exclusive jurisdiction over options on securities and options on stock indices. The accord also permitted the CFTC to regulate futures on stock indices subject to limitations and required it to consult with the SEC prior to designating any new contract market (i.e., for the trading of futures contracts on stock indices). The CFTC-SEC accord was enacted into law by the Commodity Futures Trading Act of 1992, Pub. L. 102-546, 106 Stat. 3606, 3628 (codified at 7 U.S.C. § 2a (1994)). See Thomas A. Russo & Marlisa Viniguerra, *Financial Innovation and Uncertain Regulation: Selected Issues Regarding New Product Development*, 69 TEX. L. REV. 1431, 1457-58 (1991).

177. See ALLEN & GALE, *supra* note 15, at 17.

178. See *id.*

179. See *id.*

180. See *id.*; WALMSLEY, *supra* note 86, at 118-19.

Exchange Composite Index.¹⁸¹ Off-shore, the London International Financial Futures Exchange began operation in 1982 with the trading of futures contracts on the eurodollar and the pound sterling, and additional futures and options contracts shortly thereafter.¹⁸² The 1980s also saw the propagation of exchanges throughout the world's developed and emerging financial centers. There are currently more than fifty-four organized futures and options exchanges.¹⁸³

The availability of exchange-traded financial futures and options contracts created new opportunities for risk intermediation and made those services available to the general public. These instruments increased the perception that all financial risks were manageable and decreased the fear of risk-taking. They also created new opportunities for speculation and for speculation disguised as hedging.

d. Money Market Instruments

Although various management techniques have been characterized as the products of financial innovation,¹⁸⁴ it is fairly clear that the desire to achieve optimal utilization of idle or excess cash was instrumental in the creation of innovative money market instruments and practices.¹⁸⁵ The development of money market instruments¹⁸⁶ began in the 1950s. It accelerated in 1961 with the establishment of a secondary market for large denomination certificates of deposit (CDs), and in 1966 with the issuance of retail market CDs.¹⁸⁷ Money market mutual funds permitted the investment of small amounts by retail customers (generally \$1,000 or more) in short-term money market instruments.¹⁸⁸ These instruments functioned as money substitutes, changing the structure of the market for deposits. They encouraged banking and thrift disintermediation and resulted in new regulatory policy for those industries.

This discussion of contemporary financial innovation examines a few of the innovations that have occurred in the second half of this century. However, it provides sufficient information to place the products of con-

181. See ALLEN & GALE, *supra* note 15, at 17; WALMSLEY, *supra* note 86, at 100. Within a year of their introduction, combined trading on the Kansas City Value Line contract, the S&P 500 contract, and the New York Stock Exchange Composite Index contract significantly exceeded the volume of trade on the New York Stock Exchange. See *id.* at 119.

182. Some of the additional financial futures contracts included foreign exchange contracts introduced on the IMM in 1972; gold contracts introduced on Comex and the IMM in 1974; GNMA contracts introduced on the CBOT in 1975; treasury bill contracts introduced on the IMM in 1976; treasury bond contracts and 90-day commercial paper contracts introduced on the CBOT in 1977; treasury bill contracts introduced on the IMM in 1978; 30-day commercial paper contracts introduced on the CBOT in 1979; Australian dollar contracts introduced on the IMM in 1980. See WALMSLEY, *supra* note 86, at 100.

183. See Rizzello, *supra* note 176, at 4.

184. See PODOLSKI, *supra* note 29, at 129.

185. See *id.*

186. The "money market" generally refers to wholesale borrowing and lending by financial institutions and major corporations. See *id.* at 119.

187. See WALMSLEY, *supra* note 86, at 3.

188. See PODOLSKI, *supra* note 29, at 123.

temporary financial innovation in proper context.¹⁸⁹ Each of the contemporary financial innovations discussed above can be understood as providing one of the fundamental services of the financial sector.¹⁹⁰ Each also has been identified as contributing to the number and magnitude of risks present in the contemporary financial sector. In particular, the financial derivatives discussed above are perceived as raising significant risks to sellers, users and the financial sector as a whole.

C. THE PROCESSES OF TRADITIONAL AND CONTEMPORARY FINANCIAL INNOVATION

Financial innovation occurs within financial systems. Financial systems are environments circumscribed by the character of the financial transactions occurring within them. They are also greatly influenced by social structures and systems and historic events. Therefore, financial innovations result from interactions of commercial needs, political realities, demographics (including income and resource distribution), technological capabilities, and ideological constraints.¹⁹¹ Traditional financial innovation occurred in a financial system geared to meet the commercial needs of agrarian- and trade-based economies. These were systems in which the state and religious organizations served as the primary financial institutions and, therefore, very few individuals or entities were concerned with finance. Most transactions were bilateral exchange or barter transactions and the need for a medium of exchange was rare.¹⁹² These systems also required only the rudiments of investment and risk intermediation as few individuals or entities had surplus capital resources.¹⁹³ Financial innovation occurred in traditional financial systems when social, technological, political or ideological change encouraged the development of new types of commercial transactions and business rela-

189. One scholar, speaking only as of 1990, was able to list approximately one hundred different contemporary financial innovations. See Finnerty, *supra* note 9, at 74-75.

190. The following chart lists contemporary financial innovations and the primary financial service each provides.

Contemporary Financial Innovation	Fundamental Financial Service Provided
Euromarkets	Medium of Exchange
Swaps	Risk Intermediation
Securitized Instruments	Intermediated Investment
Financial Futures and Option	Risk Intermediation
Money Market Instruments	Intermediated Investment

191. Financial innovation occurs within a given economic system, and although some features associated with innovation (e.g., the general frequency of innovation) may be germane across a variety of economic systems, the extent and character of innovation tends to be limited by the ideological underpinnings of the relevant economic system. See John T. Harvey, *Circular Causation and the Veblenian Dichotomy in the General Theory: An Introduction to Institutional Method*, 17 J. POST KEYNESIAN ECONOMICS 69, 73-74 (1994) (arguing that the frequency of technological innovations is inversely related to the extent to which allocation of resources is based on ideology).

192. See GOLDSMITH, *supra* note 48, at 13.

193. See *id.*

tionships. For example, political reconfigurations (i.e., the rise and fall of nation states and empires) were able to encourage or impede financial innovation. Trade became easier when public works projects improved the roads. Trade also became easier when empires enforced uniform systems of weights and measures and introduced uniform currencies. War as a function of expansion or defense made transportation more difficult, but the need for supplies it produced could make trade more profitable. Political reconfigurations also increased or decreased political stability. Perceptions of political stability could promote or deter savings, which in turn impacted investment and the tendency towards intermediation.¹⁹⁴

The processes that resulted in more or less complexity in societies were also among the forces that created incentives for the development and use of financial innovations.¹⁹⁵ For example, urbanization and population growth encouraged financial innovation. In antiquity, as in the present day, urbanization leads to greater party insecurity in financial transactions, as such transactions increasingly occur between and among strangers.¹⁹⁶ Loans secured by chattel mortgages became popular because they lessened concerns about dealing with strangers.¹⁹⁷ The development of chattel mortgages also limited the lender's transaction costs. The lender need only determine that the value of the pledged property, upon default, would compensate her for both lost principal and interest. It was therefore less important to expend resources to determine the farmer's agricultural track record, the fertility of her land, the health of her livestock, and the efficacy of her goods. Financial innovations also have a tendency to encourage further innovations. The introduction and use of the Roman monetary system in the first century B.C. enlarged the pool of potential trading partners by minimizing exchange and liquidity mismatch.¹⁹⁸ This promoted the expansion of the merchant and trading classes, which increased the number of people with surplus resources, for whom questions of finance would become significant. The further broadening of the financial elite would only increase the demands upon, and

194. Public works and military projects also increased the amount of financial innovation as direct taxation of citizens became necessary to finance some state activities. *See id.* at 32-33.

195. Complexity theory examines the dynamic processes of social systems and their tendency to develop increasingly complex structures to manage system change. *See* J.B. Ruhl & Harold J. Ruhl, Jr., *The Arrow of the Law in Modern Administrative States: Using Complexity Theory to Reveal the Diminishing Returns and Increasing Risks the Burgeoning of Law Poses to Society*, 30 U.C. DAVIS L. REV. 405, 411 (1997). Although complexity theory has been proposed as a theoretical construct to explain dynamical processes in the law, *see id.*, I use the term to evoke the basic teaching of complexity theory (i.e., as the number of variables in a system increases, the variables, at least initially, interact in ways that support the systems primary functions by creating increasingly complex structures to substitute for system components that can no longer perform necessary roles due to the systems' increased complexity). *See generally* DAVID WARSH, *THE IDEA OF ECONOMIC COMPLEXITY* 4, 24-26 (1984).

196. *See* GOLDSMITH, *supra* note 48, at 231.

197. *See id.*

198. *See generally id.* at 36-42.

participation in, an increasingly complex financial system.¹⁹⁹

The modern period saw even greater financial complexity as banking became international. Computational methods and record keeping became standardized. Wealth, or at least financial prosperity, became more widely distributed, as did literacy, leisure and investment opportunities. Many financial innovations were designed to meet increasing popular interest in investing. Some of these innovations included new methods of organizing commercial activities to be financed by intermediated investment. Thus, an expanded interest in intermediated investment interacted with a uniform system of records and accounts and with more sophisticated thinking about finance and financial transactions made possible by accounting. The result was the debt and equity instruments typically associated with corporate finance. These instruments were tailored to provide an assortment of rights and liabilities. They grew in importance as the capital requirements of the industrial revolution began to drive the development of financial innovation.

The industrial revolution, accelerated the traditional prerequisites for innovation: population growth, urbanization, education, and faster and more reliable methods of communication and transportation. These developments, in turn, increased the need for capital, which was needed to more fully implement the new technological achievements. It also increased the need to mediate the risks associated with larger scale agricultural and commercial production. All of the participants in the financial sector, firms, financial institutions, markets and governments, began to rely more extensively on the public capital markets. This, in turn, led to the crafting of investment and risk intermediation vehicles to more closely meet the preferences of the investing public. As a result, by the end of the nineteenth century, corporate lawyers were able to use the standard tools of capitalization to produce new securities adapted to the investment opportunities resulting from new industrial technologies.²⁰⁰

Ultimately, traditional and modern financial innovation represent points on a continuum. In the West, societies gradually became more complex. They became larger, more specialized, more diverse, more prosperous, more technologically dependent, and less controlled by ideological authorities. Their financial systems responded to the same changes, becoming more sophisticated and complex. Nonetheless, the products of traditional and modern financial innovation only were new ways of meeting the basic functions of the financial sector. Therefore, the debt, equity, and risk-intermediation instruments created in the modern period remained largely understandable, if not recognizable, to the Mesopotamian merchant or the Athenian banker.

It has been argued, however, that the process of contemporary financial innovation represents a break in this continuum. This break or change in the process of financial innovation has been attributed to the

199. See generally *id.* at 36-59.

200. Tufano, *supra* note 1, at 94-95.

introduction and use of "financial science," or, more accurately, finance theory.²⁰¹

Finance theory owes its existence to the development of mathematical and economic concepts, which were unavailable until the twentieth century. Products based on the sophisticated quantitative methodologies made possible by finance theory supposedly make the products of contemporary financial innovation incomprehensible to the financial innovators of yesteryear. This argument rings untrue. The merchants of antiquity and early modern times would find the documents and mathematical models that represent contemporary financial innovations difficult, if not impossible, to understand. However, a deconstruction of such products into the fundamental services provided by the financial sector would reveal financial processes with which they are familiar or could understand with basic explanation.

It may be true that the products of contemporary financial innovation appear very different from their antecedents. Nonetheless, the process of contemporary financial innovation is, in essence, a financial system responding to a vastly expanded set of inputs. The contemporary financial system, unlike its predecessors, has expanded to truly global dimensions. Business organizations have grown larger and engage in a wide range of activities. They also have grown across national boundaries and time zones to operate continuously around the world. As a consequence, multinational firms experienced the need for new methods of accommodating their internal and external foreign exchange requirements. Firms and speculators sought to mediate the increasingly complex risks found in this new financial environment. Governments used the capital markets to implement various policies.

The products created to meet these needs reflect the complex organizational forms, capital requirements, and risks present in the contemporary financial system. They also reflect the resources provided by improved communications, transportation, and education. In this regard, the process of contemporary financial innovation is no different than its antecedents. Finance theory, as we shall see, does play a role in the acceptance and direction of the process of contemporary financial innovation. The role it plays, however, is similar to that played by the development of accounting theory early in the modern period. It creates a uniform vocabulary: the language of financial mathematics. It also inspires new ways of thinking about finance and financial relationships. However, it does not explain the perceived acceleration in the process of contemporary financial innovation. Rather, our complex contemporary financial environment generates new dynamical processes and new risks. In the next section, we shall see that heterodox economics examines the relationship between contemporary financial innovation and sectoral dynamics, and that orthodox economics does not.

201. See *supra* notes 7-8.

III. ECONOMIC THEORY

Before economics became a “science,”²⁰² it was philosophy, concerned with questions of “the good” for the individual and the nation.²⁰³ The Enlightenment reiterated classical concerns with individual worth, rights and freedoms. The filtering of enlightenment values,²⁰⁴ through the sieve of moral and economic philosophy, resulted in a school of thought that would conceptualize and analyze economic issues from the perspective of the individual actor.²⁰⁵ Issues of commerce and finance were separated from questions of theology, permitting the discussion of “the good,” without the palliative influences of Christian charity or neighborly responsibility. The values congealing from this new economic thinking would have their source not in the language of moral responsibility, but in the argot of the marketplace.

The existence of differences within the community of economic thought is longstanding. By the end of the seventeenth century, some philosophers and mathematicians were seeking the “natural laws” of economics. They searched for mathematical constructs like Newtonian mechanics, which, once implemented, operated naturally, oblivious to all human activity save observation.²⁰⁶ Some believed that human interference in such natural systems by means of government regulation would only impair the operation of a naturally self-regulatory order. However, other early economists were more concerned with the immediate and readily observable impact that gold stores, access to raw materials and foreign trade had on national well-being. They argued for state intervention in economic affairs to insure that policies which promoted the na-

202. The term “science” can be used in at least two different ways. First, the term is used by Kuhn to describe an overarching paradigm at whose center is a set of generally held core concepts to which most practitioners subscribe and that establishes the parameters of the “natural science” they investigate. See KUHN, *supra* note 16, at 10-12; see also E. Ray Canterberry & Robert J. Burkhardt, *What Do We Mean By Asking Whether Economics is a Science?*, in WHY ECONOMICS IS NOT YET A SCIENCE 15-22 (Alfred S. Eichner ed., 1983); see generally ALFRED S. EICHNER, WHY ECONOMICS IS NOT YET A SCIENCE 4 (1983). The term “science” also can be used in the logical-positivist sense of “knowledge-claims being tested against experience, of the various propositions not yet falsified constituting a logically coherent whole, and of the theory’s explanatory power steadily increasing over time.” EICHNER, *supra*, at 4. See Canterberry & Burkhardt, *supra*, at 17-22, for discussion of their conclusion that economics is a science in the Kuhnian sense, but is not a science in the logical-positivist sense.

203. See RICHARD R. WILK, ECONOMIES AND CULTURES 44-45 (1996).

204. See *id.* at 46-48.

205. See *id.* The Enlightenment was:

[a] loose, informal, wholly unorganized coalition of cultural critics, religious skeptics, and political reformers . . . but what is striking is their general harmony, not their occasional discord. The men of the Enlightenment united on a vastly ambitious program, a program of secularism, humanity, cosmopolitanism, and freedom, above all, freedom in its many forms—freedom from arbitrary power, freedom of speech, freedom of trade, freedom to realize one’s talents, freedom of aesthetic response, freedom, in a word, of moral man to make his own way in the world.

Peter Gay, *The Enlightenment*, in THE FREUD READER 3-4 (Peter Gay ed., 1966).

206. See WILK, *supra* note 203, at 44-45.

tional welfare were advanced.²⁰⁷ Eventually, a new paradigm based on the pursuit of individual self-interest with a minimum of governmental interference would emerge from the work of Adam Smith,²⁰⁸ David Ricardo,²⁰⁹ and their intellectual progeny.²¹⁰ Their theories would come to be commonly referred to as “neoclassical economics.”²¹¹

Neoclassical economics describes the economy as a state of equilibrium, in which the forces of supply and demand interact to achieve optimal allocation of society’s resources.²¹² The focus of neoclassical economics is on the decision-making activity of entrepreneurs, households and firms.²¹³ It assumes that economic decision-making is voluntary, informed and rational (i.e., utility maximizing).²¹⁴ The models used

207. *See id.*

208. Adam Smith argued that labor is the basic measure of value, which is determined by its supply and by disutility, and that individuals trade their labor in the market to achieve the highest price possible. The market will adjust prices to reflect value, resulting in prices for labor that adequately compensate the worker while generating the wealth that is the hallmark of national well-being and power. In Smith’s view, the universal exercise of individualistic self-interest free of politics, corruption, labor guilds, corporations and organized religion, would result in the best interests of the nation being achieved. *See id.* at 46-48; JÜRGEN NIEHANS, A HISTORY OF ECONOMIC THEORY 66-67, 69 (1990).

209. Ricardo emphasized the concept of equilibrium as the natural state of an economy free from interference. *See WILK, supra* note 203, at 48. Ricardo may be best remembered for the theory of comparative advantage which holds that, as a consequence of the general immobility of labor, nations that specialize in the production of goods for which it has a competitive advantage, i.e., the products it can produce most efficiently, trade will be mutually profitable and real wages will increase. *See PAUL A. SAMUELSON, ECONOMICS: AN INTRODUCTORY ANALYSIS* 673 (1973).

210. Samuelson traces the intellectual lineage of neoclassical economics from Adam Smith (1723-1790) to David Ricardo (1772-1823), to John Stuart Mill (1806-1873), to Leon Walras (1834-1910) and Alfred Marshall (1842-1924), to John Maynard Keynes (1883-1946). *See id.*

211. The term “classical economists” was created by Marx to encompass Smith, Ricardo, Mills and their predecessors. *See JOHN MAYNARD KEYNES, THE GENERAL THEORY OF EMPLOYMENT INTEREST AND MONEY* 3 n.1 (1965). The classical economists, including Marx, focused on the macroeconomy. The heirs to this tradition, in what came to be known as the marginalist period, focused on the microeconomy viewing the well-being of the nation-state as a consequence of the individual economic decision-making of entrepreneurs, households and firms. *See NIEHANS, supra* note 208, at 161. The term “neoclassical economics” reportedly was coined at the turn of the twentieth century by Thorstein Veblen, one of the founders of what became known as institutional economics. Veblen used the term to distinguish economists who advocated doctrinal continuity from those who did not. *See id.* at 163.

212. *See E. RAY CANTERBERRY, THE MAKING OF ECONOMICS* 92-95 (1976).

213. In neoclassical theory, the role of the consumer is of central importance in explaining price behavior. *See STANLEY BOBER, MODERN MACROECONOMICS* ix, 2 (1988). The road that led from classical economics to neoclassical economics required a change in track after the 1830s, from the macroeconomics of Smith and Ricardo, who were concerned with national economies, to a microeconomics that would make macro assumptions based on models of the behavior of individuals, households and firms. *See NIEHANS, supra* note 208, at 161.

214. The seed of the concept of the rational economic actor and how her actions drive the national economy is summarized by Smith as follows:

[E]very individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the publick [sic] interest, nor knows how much he is promoting it[, but] by pursuing his own interest he frequently promotes that of the society more effectively than when he really intends to promote it.

in neoclassical economics are based on transactions occurring in exchange (i.e., barter) markets, in which perfect competition prevails.²¹⁵ In these markets, goods are exchanged for goods, with money serving only as a neutral intermediary in the exchange.²¹⁶ Economic models based on exchange markets also assume gross substitution effects. The axiom of gross substitution states that the demand for good *A* will change only in response to a pricing differential between good *A* and a substitute product.²¹⁷ Exchange transactions also are envisioned as being costlessly reversible,²¹⁸ and as occurring in an ergodic environment,²¹⁹ in which there are no financial institutions.²²⁰ The market becomes the instrument of allocation, and individual self-interested economic decisions collectively achieve an optimal societal equilibrium.

Exchange-based market principles bear only a limited resemblance to contemporary financial transactions. Nonetheless, neoclassical theory argues that they adequately represent more complex economies.²²¹ Neoclassical economic models are not viewed as depictions of consensus reality, but as systems of generalizations.²²² Such a system describes the relationships among a range of stated variables. Therefore, analysis of changes in one or more of the variables can be used to predict changes in the other variables present in the system.²²³ Thus, neoclassical economists argue that orthodox economics should be judged "by the precision, scope and conformity with experience of the predictions it yields" and not by its models' objective similarity to the real world.²²⁴ However, the dif-

NIEHANS, *supra* note 208, at 69, (quoting ADAM SMITH, *THE GLASGOW EDITION OF THE WORKS AND CORRESPONDENCE OF ADAM SMITH* 2:454 (1976)).

215. Leon Walras redacted the economy into a primitive barter economy to demonstrate the existence of general equilibrium. The model used by Walras lacked capital-intensive production, capital assets and financial institutions, but under these assumptions he was able to demonstrate, using mathematical exposition, that a decentralized market economy should achieve equilibrium. See NIEHANS, *supra* note 208, at 211-13; HYMAN P. MINSKY, *STABILIZING AN UNSTABLE ECONOMY* 103 (1986). In 1954, Arrow and Debreu would create the proof of the existence of a competitive equilibrium for a Walrasian general equilibrium model, using mathematics so sophisticated that, thereafter, mathematical economics would require the ability of professional mathematicians. See NIEHANS, *supra* note 208, at 490-92.

216. See PAUL DAVIDSON, *POST KEYNESIAN MACROECONOMIC THEORY* 14 (1994).

217. Of course, the axiom of gross substitution does makes it difficult to explain increased demand across the range of substitute products (e.g., economic growth). See *id.* at 17; EICHNER, *supra* note 37, at 168-69; MINSKY, *supra* note 215, at 106.

218. For example, it is assumed that capital assets have perfect or near perfect resale markets, which makes the decision to invest in a capital asset as risk free and as reversible as an employment decision. See James R. Crotty, *Neoclassical and Keynesian Approaches to the Theory of Investment*, 14 *J. POST KEYNESIAN ECONOMICS* 483, 490-91 (1992).

219. In an ergodic environment, it is assumed that future market events can be predicted by analysis of past market events. See DAVIDSON, *supra* note 216, at 1.

220. See MINSKY, *supra* note 215, at 103.

221. See MILTON FRIEDMAN, *CAPITALISM AND FREEDOM* 14 (1971).

222. See MILTON FRIEDMAN, *ESSAYS IN POSITIVE ECONOMICS* 4 (1953).

223. See *id.*

224. *Id.* Friedman's views concerning the relationship of economic models to reality is not held by all neoclassical economists. See, e.g., CANTERBERRY, *supra* note 212, at 152.

ferences between the assumptions of neoclassical economics and the real world are difficult to ignore.

Models of economic equilibrium find analogies in Newtonian mechanics. However, economic equilibrium, as an instrument of orthodox economics, was freed from many of the complications associated with observations of equilibria in physical systems. Orthodoxy also endows equilibrium with certain normative values that physics does not. Neoclassical economists tend to equate economic equilibrium with optimality, a correlation not assumed in the physical sciences.²²⁵ Additionally, the physical sciences recognize two types of equilibria, static and dynamic. Equilibrium is static if the object, function or system in equilibrium is stationary. It is dynamic if the object, function or system in equilibrium is in motion.²²⁶ Neoclassical economics focuses on the maintenance of static equilibrium (i.e., a system at rest unless forced to respond to some exogenous shock), after which it achieves a new equilibrium, a new resting point.²²⁷ Dynamic equilibrium presumes the system moves over historic time along a path that is a predictable function of the relevant variables.²²⁸ Therefore, dynamic equilibrium is a more reliable representation of real processes. It also is more difficult to model.²²⁹ However, neoclassical economics increasingly came to value elegance of mathematical exposition despite the unrealistic assumptions such models required. Equilibrium's tendency towards a balance from which there is no further endogenous tendency to change became axiomatic.²³⁰ For many economists, the weaknesses inherent in these assumptions were brought into sharp focus by the persistent unemployment Britain encountered following World War I.

Although the 1920s were deemed to have "roared" in the United States as a period of prosperity and low unemployment, the experience in Britain was very different. During that period, Britain had an unemployment rate in excess of ten percent.²³¹ The problem of persistent unemployment challenged the neoclassical assumption of market equilibrium. According to orthodox theory, demand is adjusted by market forces to meet available supply, i.e., achieving full employment. Neoclassical economists argued that unemployment was a temporary problem of supply and would end when the market adjusted wages and prices to accommodate

225. See *id.* at 95-96.

226. See *id.* at 92.

227. See EICHNER, *supra* note 37, at 8.

228. See CANTERBERRY, *supra* note 212, at 92.

229. Legal scholars also have employed the concept of equilibrium in their attempts to achieve a stable and coherent jurisprudential construct of law and legal decision-making. See William N. Eskridge, Jr. & Philip P. Frickey, *Forward: Law as Equilibrium*, 108 HARV. L. REV. 26 (1994). See also Raj Bhala, *Equilibrium Theory, the FICAS Model, and International Banking Law*, 38 HARV. INT'L L. J. 1 (1997) (Professor Bhala attempts to apply equilibrium theory to the law of international banking).

230. See Basil J. Moore, *Monetary Factors*, in A GUIDE TO POST-KEYNESIAN ECONOMICS 121 (Alfred S. Eichner ed., 1979). Of course, not all neoclassical economists accept general equilibrium, preferring Marshall's partial equilibrium framework. See *id.*

231. See DAVIDSON, *supra* note 216, at 4-5.

increased labor supply.²³² Thus, in a labor market tending toward equilibrium, absent any wage or price inflexibility,²³³ in the long run, the wages paid for labor should come to rest at a point sufficiently low to guarantee full employment.²³⁴

John Maynard Keynes argued that the assumptions implicit in the neoclassical theory were impediments to a better understanding of how the economy worked. He argued that orthodox theory was unable to explain how the persistent unemployment experienced in the 1920s and 1930s came about or how it could be alleviated.²³⁵ Keynes, unlike the neoclassical thinkers, saw persistent unemployment, not as a problem of supply, but as a problem of demand that called into question the neoclassical axioms of gross substitution, neutrality of money, and equilibrium.²³⁶

The neoclassical explanations for persistent unemployment relied on the assumptions that the future (with respect to prices) is ergodic. Therefore, absent any exogenous shocks, it can be reliably predicted using past market data. Money and other non-producible financial assets behaved in the same way as any other "good."²³⁷ Consequently, economic actors (e.g., employers) could reliably predict their future earnings based on past market experience. With that information they could determine their ability to make current investment decisions (the hiring of labor and the purchase of capital assets). The fact that current decisions yielded future financial consequences was not important. Additionally, money and other goods were perfectly substitutable. Therefore, economic actors were indifferent as to whether they held goods or money. Thus, neoclassical theory maintained that there was a wage at which full employment could occur. The wage would be determined by the market and employers could have confidence that future profits would be available to pay such wages.²³⁸

Keynes's theories suggested that economic actors do not live in an ergodic world, but rather a world in which the future is entirely uncertain.²³⁹ In such a world, economic actors are hesitant to commit all of their "future earnings" to present investments. They recognize that pre-

232. *See id.* at 8.

233. For example, union-negotiated labor contracts were claimed to have introduced wage inflexibility by demanding the wage rate be set at a rate too high to sustain full employment. *See id.* at 27.

234. *See id.* at 4-5.

235. *See id.* at 6-7. Although Keynes did not state the specific neoclassical assumptions his view displaced, the differences between his analysis and that which preceded him clearly indicates which assumptions were being called into question. *See id.*

236. *See id.* at 27.

237. *See* JOHN MAYNARD KEYNES, *THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY* 173-74 (1936).

238. The neoclassical explanation for unemployment during the 1920s and 1930s was based on Say's Law, which in essence holds that producers and manufacturers will always be able to find sufficient demand for any output produced by workers. Therefore, as supply creates its own demand; there is no impediment preventing very low unemployment. *See* DAVIDSON, *supra* note 216, at 14-15.

239. *See* KEYNES, *supra* note 237, at 148-49.

dictions of both future earnings and future liabilities are unreliable.²⁴⁰ Faced with the unknowability of the future, economic actors view money differently from the way they view other goods. Money is a liquid store of value that can be used to satisfy contractual commitments if earnings fail to meet, or liabilities exceed predictions.²⁴¹ Therefore, economic actors will use money and other non-producible financial assets to obtain the security that comes from liquidity. However, the assets used to maintain liquidity will not be available for investment in non-liquid capital or labor. Thus, uncertainty and the fact that money is not neutral can result, irrespective of the flexibility of wages and prices, in endogenous involuntary unemployment.²⁴²

Some economists viewed Keynes's theories as a sharp departure from neoclassical economics presenting a new general explanation of employment, interest and money. Some of the former would follow Keynes's lead toward a new heterodox economics.²⁴³ Others viewed Keynes as merely suggesting a special case model of the short-run consequences of rigid wages.²⁴⁴ A somewhat less extreme view acknowledged that Keynesian insights represented a significant refinement of neoclassical principles. These economists would incorporate their reading or misreading of Keynes into the neoclassical tradition, creating what has come to be known as the neoclassical synthesis,²⁴⁵ or the new orthodoxy.²⁴⁶ The neoclassical synthesis, with its emphasis on extrapolation from microeconomics processes, would come to view the process of contemporary financial innovation very differently than post-Keynesian theory, with its focus on real world dynamics.

240. See DAVIDSON, *supra* note 216, at 20-22; KEYNES, *supra* note 237, at 168-69.

241. See *id.*

242. See DAVIDSON, *supra* note 216, at 27-29.

243. A few of those who gravitated towards the new heterodox economics include: Joan Robinson, Sidney Weintraub, Nicholas Kaldor, Alfred Eichner, Hyman Minsky, Richard Kahn, Athanasios Asimakopulos, Michal Kalecki, Paul Davidson, Victoria Chick, Sheila Dow, and Philip Arestis.

244. See NIEHANS, *supra* note 208, at 355. Niehans goes so far as to claim, "[b]y and large, mainstream economics, fifty years after the *General Theory*, is probably not much different from what it would have been if Keynes had not insisted on becoming a famous theorist." *Id.* at 356.

245. Samuelson is thought to have been instrumental in the development of the neoclassical synthesis by his translation of Keynesian principles into mathematical expressions. This attached it to generally accepted neoclassical thought. See EICHNER, *supra* note 37, at 9-10. Along with World War II, the Keynesian approach of stimulating economic growth with massive government expenditures and deficits is credited with reversing the mass unemployment of the great depression. See SAMUELSON, *supra* note 209, at 845. Keynesian-based policy instruments such as wage and price controls were in place in the United States until the 1970s. See Ellen E. Sward & Rodney F. Page, *The Federal Courts Improvement Act: A Practitioner's Perspective*, 33 AM. U. L. REV. 385, 393 n.51 (1984).

246. Joan Robinson is credited with characterizing the neoclassical synthesis as "bastard Keynesianism." See Paul Davidson, *What Revolution? The Legacy of Keynes*, 19 J. POST KEYNESIAN ECON. 47 (1996).

IV. CONTEMPORARY FINANCIAL INNOVATION AS AN ECONOMIC PROCESS

This section of the Article will focus on the explanations of contemporary financial innovation proposed by orthodox and heterodox economists. This discussion will create a foundation from which we shall explore the reasonableness of the policy implications presented by such explanations.

A. NEOCLASSICAL THEORY

Scholars and commentators writing from the neoclassical perspective have approached the process of contemporary financial innovation from several vantage points and have characterized the process in different terms.²⁴⁷ Generally, neoclassical thought views contemporary financial innovation as a reaction on the part of entrepreneurs, firms, and financial institutions to exogenous environmental changes.²⁴⁸ Such environmental changes create opportunities to design new, better, or less expensive ways to provide the exchange, investment intermediation, and risk intermediation functions performed by the financial sector. Environmental changes reconfigure the cost-benefit analysis associated with a particular financial service, thereby creating changes in the opportunity set. Therefore, exogenous environmental changes provide incentives for economic actors to innovate in order to profit from the changes or to minimize their adverse impact.²⁴⁹ Orthodoxy concludes that these environmental changes and their financial consequences are responsible for initiating the process of contemporary financial innovation.²⁵⁰ Neoclassical scholars and commentators have listed a number of factors including regulation, taxation, market volatility, competition, technology, etc., which in combination are believed to have instigated the process of contemporary financial innovation.

1. Neoclassical Economic Scholarship

Miller is frequently cited for the proposition that the process of contemporary financial innovation begins with changes in taxation and regu-

247. See Finnerty, *supra* note 9, at 69.

248. See Flood, *supra* note 15, at 4. Environmental changes leading to financial innovations are treated, for the most part, as if they always occur exogenously to the financial sector, even though that characterization is not always accurate. *See id.* It may be more accurate to view environmental changes as involving factors external to the entrepreneur, firm or financial institution, over which the economic actor has no direct control, but whose consequences change the relevant opportunity set. *See* MARSHALL & BANSAL, *supra* note 4, at 19. There are also internal factors, particularly in the firm setting, which can encourage innovation even though the firm may have some control over such factors. *See id.*

249. See Flood, *supra* note 15, at 4.

250. See Finnerty, *supra* note 9, at 70-73.

latory policy.²⁵¹ In Miller's view, the U.S. tax code creates distinctions between different types of income. These distinctions create incentives for innovators to create securities whose purpose is to transmute a highly taxed form of income into one that generates a lower tax burden.²⁵² Successful innovations will achieve tax savings or lower the cost of regulatory compliance.²⁵³ However, according to Miller, a financial innovation that merely reduces tax liability or the costs of compliance is unlikely to be a significant innovation. Most innovations designed for those purposes will initiate a countervailing reaction from the regulatory or tax authorities, which negates the innovation's purpose. Kane has characterized this process as the "regulatory dialectic."²⁵⁴ This process is a continual struggle between regulators and the regulated in which regulatory policy is confronted with financial innovation designed to circumvent the policy. Regulatory policy is then adjusted to counteract the circumventive innovation, which, in turn, induces another innovative response.²⁵⁵ This process is also known as Goodhart's Law, which concludes that "basing a policy upon a recognized statistical relationship will bring about a policy-induced change in the relationship."²⁵⁶ In Miller's view, a significant financial innovation will persist despite regulatory efforts to counteract its effect.²⁵⁷ Therefore, contemporary financial innovation is a dance between the regulator and the regulated.

Kane, however, has recognized that regulatory inspired financial innovation is not limited to avoidance reactions. Innovators will also engage in what Kane has characterized as shape-shifting innovation.²⁵⁸ Firms that engage in shape-shifting innovation are unregulated or minimally regulated firms that exist on the periphery of a highly regulated industry. An example is the development of money market and other mutual funds in the mid-1970s.²⁵⁹ Money market funds were designed by non-banking firms to compete with banks and savings associations in the market for deposits. During the 1970s, United States banking policy prevented banks from paying interest on demand deposits and the amount of inter-

251. "The major impulses to successful financial innovation over the past twenty years have come, I am saddened to have to say, from regulation and taxes." MILLER, *supra* note 14, at 460.

252. *See id.* at 461.

253. *See id.*

254. *See* Edward J. Kane, *Microeconomic and Macroeconomic Origins of Financial Innovation*, in FINANCIAL INNOVATION 5-6 (William L. Silber ed., 1975). For a detailed discussion of the regulatory dialectic and its role in the implementation of regulatory policy and in perpetuating cycles of financial innovation, see Edward J. Kane, *Accelerating Inflation, Technological Innovation, and Decreasing Effectiveness of Banking Regulation*, 3 J. FIN. 355 (1981).

255. *See id.*

256. PODOLSKI, *supra* note 29, at 190.

257. *See* MILLER, *supra* note 14, at 4. Miller offers the zero coupon bond as an example of a financial innovation that persisted despite regulatory efforts to negate its desired tax consequences. *Id.*

258. *See* Kane, *Origins*, *supra* note 254, at 3-4.

259. *See id.* at 11-12.

est that could be paid on savings accounts was strictly regulated.²⁶⁰ This regulatory structure created an opportunity for non-bank intermediaries whose activities were not within the jurisdiction of banking regulators. Non-bank intermediaries created money market and mutual fund accounts that mimicked, as closely as possible, the attributes and characteristics of demand accounts and savings deposits.²⁶¹ In an era of high inflation, the ability of non-bank intermediaries to pay interest at rates exceeding those available in banks and savings associations provided a strong competitive advantage. Non-bank intermediaries experienced significant growth as their shape-shifting accounts accelerated disintermediation in the banking and thrift industries.²⁶²

As a matter of analysis, Silber disagreed with those theories that view regulation as the primary motivation for contemporary financial innovation.²⁶³ Focusing on the firm, Silber argued that contemporary financial innovation resulted from financial constraints encountered by the firm.²⁶⁴ He also concluded that the source of the constraints, whether self-imposed or dictated by the markets, was irrelevant.²⁶⁵ Self-imposed constraints could include, for example, target rates of growth for certain assets or portfolio liquidity requirements.²⁶⁶ Market-imposed constraints include increased economic risk, such as the risk of increased inflation.²⁶⁷ Nonetheless, Silber recognized that the most abrupt environmental changes faced by a firm, and therefore the most significant constraints encountered, were changes in the regulatory environment²⁶⁸ or changes in the cost of adhering to a regulatory constraint.²⁶⁹ Thus, regulation

260. *See id.* at 14.

261. *See id.*

262. Kane recognized that the incentives to engage in any form of financial innovation are influenced by three environmental factors: technological change, interest and inflation rate volatility, and pre-existing patterns of financial regulation which affects a firm's ability to adapt to change. *See id.* at 7-8, 11-12.

263. *See id.* at 64-65. Silber's analysis of contemporary financial innovation isolated three exogenous environmental factors that may lead to financial innovation: "(1) factors that alter the size and/or composition of surplus and deficit units, such as an increase in total savings or shifts in the composition of real expenditures; (2) technological progress. . . ; and (3) changes in risks or attitudes towards risk . . ." Silber, *supra* note 49, at 56.

264. Silber argued that firms are likely to engage in financial innovation when faced with any of the following situations:

- (a) imposition of regulatory constraints; (b) exogenous decreases in its rate of growth; (c) an exogenous increase in the variability of major items in its balance sheet; (d) a change in the competitive nature of the markets facing the firm; (e) sharply rising yields on the assets in the firm's portfolio; and (f) a technological breakthrough that has the potential of significantly altering the opportunity set or cost functions of the firm.

Id. at 69.

265. *See id.* at 65.

266. *See id.*

267. *See id.* at 5.

268. *See id.* at 67.

269. For example, although interest rate ceilings were long-standing features of banking and savings regulation, adhering to them became increasingly expensive for banks in the late 1970s as interest rates available from other investments rose to rates in excess of those a depository institution was permitted to pay. *See id.*

again emerges as the primary motivation for financial innovation.

Finnerty's review of the neoclassical literature isolated at least eleven categories of factors that contribute to the development of the process of contemporary financial innovation. Those factors include:

- (1) tax asymmetries . . . ; (2) transaction costs; (3) agency costs; (4) opportunities to reduce . . . or to reallocate risk . . . ; (5) opportunities to increase an asset's liquidity; (6) regulatory or legislative change; (7) level and volatility of interest rates; (8) level and volatility of prices; (9) academic . . . advances in financial theories; (10) accounting benefits; and (11) technological advances and other factors.²⁷⁰

Finnerty's categories can be reduced to a simpler topology consisting of basic environmental factors that encourage innovation.²⁷¹ Finnerty's eleven categories can be collapsed into three categories: (1) regulation; (2) finance theory and its applications; and (3) technology. This is consistent with Miller, Kane, and Silber's analyses as well. Although they did not focus on the significance of finance theory and technology, those factors were assumed in their analyses.²⁷²

Therefore, regulation, finance theory and technology are offered as the causes of contemporary financial innovation. However, regulation emerges as the most important factor. Additionally, those regulations that have the most immediate impact on economic decision-making are the ones most likely to be implicated in the process of contemporary financial innovation.

a. Regulation

The term "regulation" includes national, supra-national, and self-regulation. The more obvious categories of regulation include taxation, financial market regulation (including markets for equity, debt, foreign exchange, deposits, etc.), and legislation. However, the term should be read to include central bank activities, treaties, and other international agreements. Changes in international regulatory structures are cited by neoclassical scholars as one of the principle environmental factors contributing to the acceleration of contemporary financial innovation. Therefore, the Bretton Woods Articles of Agreement²⁷³ ("Bretton Woods Agreements") will be discussed to demonstrate the influence of regulation in the process of contemporary financial innovation.

270. Finnerty, *supra* note 9, at 72-73.

271. For example, Finnerty lists transaction costs and opportunities to reallocate risk as factors that encourage contemporary financial innovation. That conclusion is true. However, such transaction costs and risk reallocation become important when some other factor has made previously unattainable reductions in transaction costs possible. Likewise, a change comes about that makes previously insignificant risks matters of greater concern. Most of Finnerty's factors are not environmental changes, but responses to environmental changes. *See id.*

272. *See id.*

273. *See* Bretton Woods Agreements Act of 1945, Pub. L. No. 79-171, as amended, 22 U.S.C. § 286 *et seq.* (1995).

The collapse of the fixed foreign exchange rate system, created by the Bretton Woods Agreements, ushered in what has been characterized as an unprecedented period of volatility in foreign exchange and interest rates.²⁷⁴ In 1944, following two years of negotiation, forty-four nations became signatories to the Bretton Woods Agreements.²⁷⁵ The goal of these agreements was to establish a stable system of foreign exchange at predictable rates.²⁷⁶ The Bretton Woods Agreements established the International Monetary Fund (IMF).²⁷⁷ The role of the IMF was to promote trade by stabilizing foreign exchange. The IMF also made loans to countries to help correct trade imbalances, or other economic problems that might result in currency devaluation.²⁷⁸

Before World War II, international monetary and trade relations frequently resembled warfare. Countries competitively devalued their currencies to make their exports more desirable in international commerce.²⁷⁹ Countries established multiple exchange rates in an effort to prevent speculation on their currencies.²⁸⁰ They also established protectionist tariff policies to protect domestic industries.²⁸¹ Under the Bretton Woods Agreements, foreign exchange rates were fixed relative to the U.S. dollar, which was convertible into gold at rates established by the IMF.²⁸²

However, the system did not anticipate certain problems. Defections occurred soon after its creation, with Canada's decision to float its dollar in 1950.²⁸³ The U.S. dollar's convertibility to gold led to currency speculation. The use of U.S. dollars and British pounds to adjust member nations' balance-of-trade positions resulted in balance of payments deficits for the United States and the United Kingdom.²⁸⁴ In the late 1950s, Britain imposed capital mobility restrictions to control its growing balance of

274. See *infra* notes 283-96 and accompanying text.

275. The signatories to the Bretton Woods Agreements included: the United States, the United Kingdom, Canada, France, the Soviet Union, Australia, New Zealand, South Africa, India, Belgium, Czechoslovakia, Denmark, Greece, Luxembourg, the Netherlands, Norway, Poland, Yugoslavia, China, the Philippines, Egypt, Ethiopia, Iran, Iraq, Liberia, Bolivia, Brazil, Chile, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. See THE BRETTON WOODS-GATT SYSTEM: RETROSPECT AND PROSPECT AFTER FIFTY YEARS 13-14 (Orin Kirshner ed., 1996).

276. See GEORG SCHILD, BRETTON WOODS AND DUMBARTON OAKS: AMERICAN ECONOMIC AND POLITICAL PLANNING IN THE SUMMER OF 1944 109 (1995).

277. The Bretton Woods Agreements also established the International Bank for Reconstruction and Development (popularly known as the "World Bank"), and the International Trade Organization. See *generally id.* The World Bank was designed to promote rebuilding and redevelopment in the wake of World War II. See *id.*

278. See *generally id.*

279. See Jeanne Asherman, *The International Monetary Fund: A History of Compromise*, 16 N.Y.U. J. INT'L L. & POL. 235, 238 (1984).

280. For example, countries would establish one foreign exchange rate that was used for and favored international trade, and another foreign exchange rate that applied to and discriminated against capital transactions. See *id.*

281. See *id.* at 238-39.

282. See Balvinder S. Sangha, *Financial Derivatives: Applications and Policy Issues*, BUS. ECON., Jan. 1, 1995, at 46-47.

283. See MILLMAN, *supra* note 10, at 79.

284. See Asherman, *supra* note 279, at 266.

payments deficit. These restrictions provided the impetus for the creation of the eurodollar market.²⁸⁵ However, the IMF was able to exercise little influence over the eurodollar market²⁸⁶ and increased currency speculation resulted.²⁸⁷ Throughout the 1960s, demand for U.S. dollars strengthened the dollar to the point that U.S. exports became less competitive on world markets. This further exacerbated the U.S. balance of payments deficit.²⁸⁸ The increasing U.S. balance-of-payments deficit and the U.S. government's decision to print money to finance the Vietnam War resulted in a weakened U.S. dollar. Nonetheless, the U.S. dollar remained convertible to gold at \$35 per ounce.²⁸⁹ The result was a run on gold, as holders of U.S. dollars converted them into gold.²⁹⁰ The United States tried to persuade IMF member nations with trade surpluses to share responsibility for correcting the imbalances in international trade.²⁹¹ However, in August 1971, President Nixon announced that gold and foreign currencies would no longer be exchanged for U.S. dollars.²⁹² Although the Group of Ten of the Organization for Economic Cooperation and Development (G.10) attempted to realign their currencies' par values in a manner consistent with the goals of the Bretton Woods Agreements, they were unsuccessful, and by March 1973, the members of the G.10 began to float their currencies.²⁹³

As a supra-national regulatory authority, the IMF was able to set foreign exchange at fixed parities to the U.S. dollar, with occasional adjustments to correct disequilibria.²⁹⁴ With the collapse of the fixed exchange rate system, the world currencies were established by the opinions of international currency traders. Floating exchange rates led to increased foreign exchange and interest rate volatility and illustrated the incompleteness of the markets for risk mediation.²⁹⁵ Financial institutions, i.e., commodity futures exchanges and investment bankers, began to design products that could be used to mediate these risks. Thus, the market for

285. *See id.*

286. *See id.* at 267.

287. *See id.* at 276.

288. *See id.* at 268-61.

289. *See id.* at 276-77; MILLMAN, *supra* note 10, at 90-94.

290. *See* Asherman, *supra* note 279, at 277.

291. *See id.*

292. *See id.* at 276-77; *see also* MILLMAN, *supra* note 10, at 90-94; QUINN, *supra* note 116, at 108; DAVIES, *supra* note 67, at 521-22.

293. The Group of Ten (G.10) met in December 1971 and agreed to realign their currencies, but by then it was too late for the fixed exchange system. The G.10 (Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, and United States) was initially organized to coordinate the lending decisions of the International Monetary Fund, but expanded its functions to consider general issues of economic policy and coordination. *See* George H. Windecker, Jr., *The Eurodollar Deposit Market: Strategies for Regulation*, 9 AM. U. J. INT'L L. & POL'Y 357, 382 (1993); Hal S. Scott, *The Competitive Implications of the Basle Capital Accord*, 39 ST. LOUIS U. L. J. 885 (1995). The loss of dollar convertibility did not destroy the IMF, but reoriented its role regarding foreign exchange towards surveillance and providing advice while continuing its lending function. *See* DAVIES, *supra* note 67, at 518.

294. *See id.* at 517.

295. *See* BODIN ET AL., *infra* note 409.

financial futures and options on currencies and interest rate sensitive securities came into being as a result of regulatory changes that altered the opportunity set for exchanges.²⁹⁶

b. Finance Theory

Finance theory plays a central role in the neoclassical explanations of the process of contemporary financial innovation. Finance theory provides the theoretical foundation for the design of new financial products and processes. It also provides the "scientific," (or logical and reliable rationales) for the use of the products of contemporary financial innovation.²⁹⁷

The development of finance theory to a point sufficient to support and advance contemporary financial innovation occurred in four major steps: the efficient capital market hypothesis; modern portfolio theory; the M&M theorem on optimal capital structure; and the Black-Scholes option pricing theory. In concert, these theories provide financial engineers with a methodological foundation upon which to design the products of contemporary financial innovation.

i. Efficient Capital Market Hypothesis

The efficient capital market hypothesis²⁹⁸ is based on the failure of investigators to isolate any systematic correlation in security price move-

296. See *supra* text accompanying note 498-502.

297. Finance theory, particularly when it is cast as "financial science" also serves a legitimization function by intimating some of the presumptions that accompany "science" in our society, i.e., the products of contemporary financial innovation can be trusted because they have their origins in "financial science," a dispassionate set of information and information processing protocols whose processes ostensibly are free from external ideological and political influence. In a society in which science is deemed largely competent to fulfill most of the functions traditionally associated with religious belief systems, coupling finance with science provides this supposed discipline with claims to clinical truth if not certainty. *But see* PAULOS MAR GREGORIOS, *THE HUMAN PRESENCE* 32 (1987).

Today, no scientist can deny that a high measure of indeterminacy persists at the micro level of reality. . . . Science, in discovering this indeterminacy, has now begun to shed its overconfidence about its being able to know all there is to know. The monopoly of knowledge which it previously claimed is today called in question.

Id. See also PHILIP SHERRARD, *THE ECLIPSE OF MAN AND NATURE: AN ENQUIRY INTO THE ORIGINS AND CONSEQUENCES OF MODERN SCIENCE* (1987).

298. The efficient capital market hypothesis resulted from the work of Louis Bachelier, Alfred Cowles III and Maurice Kendall. Bachelier published *The Theory of Speculation* in 1900. Bachelier determined that securities prices moved randomly and could be plotted mathematically using the random motion of atomic particles, i.e., Brownian motion. See MILLMAN, *supra* note 10, at 204; Cunningham, *supra* note 26, at 546. Cowles, an investor, performed a longitudinal study of the recommendations of financial services, the securities transactions of major insurance companies, the recommendations of investment advisory publication and *Wall Street Journal* editorials and concluded in his article, *Can Stock Market Forecasters Forecast?*, 1 *ECONOMETRIA* 309 (1933), that the market, as a whole, generally had outperformed the forecasters and that a random series of forecasts was generally as good as the work of the professional forecasters. See generally PETER L. BERNSTEIN, *CAPITAL IDEAS, THE IMPROBABLE ORIGINS OF MODERN WALL STREET* 29-38 (1992). Kendall's work reiterated Bachelier's conclusion that successive prices for securities and commodities follow a random pattern. See Maurice Kendall, *The Analysis of Economic*

ments over time.²⁹⁹ Security price changes follow a random walk uncorrelated to their price histories.³⁰⁰ This was interpreted as evidence for the conclusion that security prices fully reflect all public information about a security.³⁰¹ The competition for profits makes the market efficient, and it should not be possible to achieve above-normal returns based on information the market has already impounded.³⁰² If future price changes could not be reliably predicted, it became increasingly important to develop efficient methods of transferring any risks with the potential to negatively impact profitability.³⁰³

ii. Modern Portfolio Theory

Modern Portfolio Theory had its foundation in the work of Harry Markowitz, who concluded that investing is a function of the interplay between risk and return. Therefore, the rational utility maximizing investor would select a portfolio that produced the best possible rate of return given the investor's risk preferences.³⁰⁴ The efficient portfolio was a properly diversified portfolio, designed to minimize variance for a selected level of return by balancing the risk profiles of the portfolio's assets.³⁰⁵ However, all risk cannot be eliminated by diversification.³⁰⁶ Therefore, portfolios consisting of assets with highly negative activity correlation coefficients, i.e., assets whose risk characteristics are triggered by different considerations, should maximize return at the selected level of risk.³⁰⁷

iii. The M&M Theorem

In 1958, Franco Modigliani and Merton Miller developed a theorem of optimal capital market structures. Assuming perfect markets³⁰⁸ and the

Time Series, Part I: Prices, 96 J. ROYAL STAT. SOC'Y 11 (1953); BASKIN & MIRANTI, *supra* note 68, at 11.

299. See BASKIN & MIRANTI, *supra* note 68, at 11.

300. See generally BURTON G. MALKIEL, *A RANDOM WALK DOWN WALL STREET* (1990).

301. See Cunningham, *supra* note 26, at 559-60.

302. See *id.* at 560; Hazen, *supra* note 26, at 987; Lowenstein, *supra* note 26, at 925.

303. See Finnerty, *supra* note 9, at 20.

304. See Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77, 77 (1952); BASKIN & MIRANTI, *supra* note 68, at 11; BERNSTEIN, *supra* note 298, at 41-48.

305. Niehans, *supra* note 49, at 476.

306. Specifically, *beta*, or systemic market risk, is the risk that cannot be overcome by diversification; whereas unsystemic market risk is risk that is related to a specific firm and can be eliminated by portfolio diversification. See Robert Teitelman, *The Revolt Against Free-Market Finance*, INSTITUTIONAL INVESTOR, June 1992, at 42.

307. See BASKIN & MIRANTI, *supra* note 68, at 12. Modern Portfolio Theory was elaborated into the Capital Assets Pricing Model ("CAPM"), which, under the assumptions of perfect markets, homogeneous expectations, and costless short sales, would explain the relationship between risk and securities prices as a linear equilibrium relationship between risk and return. See *id.* (citing John Litner, *The Valuation of Risk, Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets*, 47 REV. ECON. & STAT. 13, 13 (1965)); BASKIN & MIRANTI, *supra* note 68, at 12.

308. See Cunningham, *supra* note 26, at 559. The perfect market heuristic assumes a homogeneous commodity, a large number of fully informed participants with equal access

absence of taxes, a firm's debt-capital ratio is irrelevant to the firm's value. Instead, its value consists solely of the income stream flowing from the firm's assets.³⁰⁹ Although individual investors may improve their portfolio's performance by hedging, hedging will not improve a firm's value. A firm's value is independent of the way it is financed.³¹⁰ Firms do not live under the assumptions of the Modigliani and Miller theorem. However, the model has been credited with the greater willingness for firms to assume the higher levels of debt associated with contemporary corporations.³¹¹

iv. Option Pricing Theory

Fischer Black and Myron Scholes produced the Black-Scholes option pricing theory in 1973.³¹² The Black-Scholes model used five variables to derive option prices for equities: the stock price, the variance on the stock price, the option's exercise price, the time to maturity, and the risk-free interest rate.³¹³ In addition to providing pricing solutions for simple put and call options, Black and Scholes argued that their model also could be used to value complex contingencies. Such contingencies could include redeemable or convertible debt securities, or the impact of a merger or acquisition on a firm's equity.³¹⁴ The ability to measure and price complex risk would encourage the development and refinement of instruments and markets in which risk could be bought and sold.³¹⁵

c. Technology

Technological innovations in communications and information management have had a significant impact on the development of the process of contemporary financial innovation. Advances in telecommunications made the world smaller, enabling a trader to transact globally, made capital more mobile and information more accessible, and reduced the time period between which information is created and its effects are exper-

to the market and the ability to borrow at the market rate. The participants act rationally and incur no transaction costs. *See id.*

309. *See* Franco Modigliani & Merton H. Miller, *The Cost of Capital, Corporation Finance and the Theory of Investment*, 48 *AM. ECON. REV.* 261, 261-64 (1958); BASKIN & MIRANTI, *supra* note 68, at 16; Niehans, *supra* note 49, at 472.

310. *See* Dwight M. Jaffee, *The Impact of Financial Futures and Options on Capital Formation*, 4 *J. FUTURES MKTS.* 417, 435 (1984).

311. *See* MINSKY, *supra* note 215, at 101.

312. *See* Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 *J. POL. ECON.* 637 (1973).

313. *See* Clifford W. Smith, Jr., *Option Pricing: A Review*, in *THE HANDBOOK OF FINANCIAL ENGINEERING* 256-57 (Clifford W. Smith, Jr. & Charles W. Smithson eds., 1990). The Black-Scholes model was premised on the following market assumptions: no penalties for short sales, no taxes or transaction costs, the market operates continuously, the risk-free interest rate is a constant, the stock prices are continuous, and the option can only be exercised upon expiration. *See id.*

314. *See* Richard Roll, *What Every CFO Should Know About Scientific Progress in Financial Economics: What Is Known and What Remains to Be Resolved*, 23 *FIN. MGMT.* 69, 70-71 (Summer 1994); Smith, *supra* note 314, at 257.

315. *See* MILLMAN, *supra* note 10, at 24.

enced. Additionally, the availability of the number crunching capability provided by advances in computer technology made use of sophisticated financial models practical.³¹⁶

2. *The Neoclassical Explanation*

Relying on changes in regulation, finance theory and technology, neoclassical theory is able to generate the following explanation of the development of contemporary financial innovation.

Contemporary financial innovation begins with a change in regulatory or tax policies that restructures the opportunity set for entrepreneurs, firms and financial institutions. For example, the collapse of the Bretton Woods Agreements resulted in a shift from fixed to floating exchange rates. Floating exchange rates increased volatility in exchange rates, interest rates and multinational corporate earnings.³¹⁷ Such increased volatility created a need for products and processes that firms and financial institutions could employ to mediate these risks.³¹⁸ Commodity futures exchanges were quick to develop products to permit the trading of undesired exchange and interest rate risks. However, there were a number of limitations to exchange traded instruments, particularly their lack of flexibility.³¹⁹ Additionally, transactions executed on U.S. exchanges could provide no real assurances of confidentiality.³²⁰ Exchange traded instru-

316. For example, the first set of calculations required to apply Markowitz's portfolio selection theory is described as follows:

First, the investor has to calculate the expected returns and the covariances for all the securities under analysis. To analyze only 50 securities, as many as 1,225 separate calculations are required; by the time the universe of stocks to be analyzed reaches 2,000—not an unrealistic number for large bank trust departments or major investment advisory organizations—the calculations required reach 2,003,000.

BERNSTEIN, *supra* note 298, at 64.

317. See ELI BARTON, GORDON M. BODNER, ADITYA KAUL, EXCHANGE RATE VARIABILITY AND THE RISKINESS OF U.S. MULTINATIONAL FIRMS: EVIDENCE FROM THE BREAK DOWN OR THE BRETTON WOODS SYSTEM (1994).

318. Corporate managers believed that their security prices and earnings would be more predictable, or at least less variable, if they were better able to manage the exchange and interest rate risks their firms encountered. As Professor Hu has demonstrated, this impulse on the part of managers stems from their perception that their personal and class well-being is dependent on the stability of corporate value and earnings. Managers who distinguish the corporation from its shareholders will tend to hedge, even though finance theory teaches that hedging will not impact the value of the corporation. See Hu, *supra* note 6, at 1014-24.

319. Until recently, exchange traded futures' contractual terms were fixed by the exchange, the only term that was not built into the contract was the price. In February 1993, the Chicago Board of Trade began trading what are called FLEXible EXchange ("FLEX") option contracts, which allowed market participants to have some of the flexibility offered by OTC contracts. See William Barclay, *FLEX Options: A New Generation of Derivatives*, in THE HANDBOOK OF DERIVATIVES & SYNTHETICS 48 (Klein & Lederman eds., 1994). The exchange permitted FLEX options to be customized as to choice of strike price, choice of expiration date, style of exercise, and the choice of index value at expiration. See *id.* at 50.

320. Knowledgeable market observers could determine, based on a transaction or series of transactions, the principal on whose behalf the contracts were being purchased or sold.

ments offered the advantage of the clearinghouse function, which serves to insulate transactors from counterparty credit risk.³²¹ However, the need for confidential hedging protocols, finely tuned to a specific firm's risk portfolio, created an incentive to develop new risk-shifting instruments.

Initially, investment bankers were hesitant to meet this apparent market demand. The financial solutions firms sought would contain option components, or other complex contingent claims on assets. Although many risk shifting techniques were susceptible to reliable pricing, before Black-Scholes, writing an option was fraught with risk. Options, by their nature, provide the buyer with large potential gain while placing only the option premium at risk. The writer of the option, however, would be required to assume the risk of the buyer's potential gain. If a portfolio of options was not priced accurately to compensate the writer for the portfolio of risks assumed, the writer faced the risk of eventual financial catastrophe. The work of Black-Scholes enabled option writers to more accurately measure the risks assumed and compensate themselves for it. When the benefits of option pricing theory are combined with the ability to use computers to process the necessary information efficiently, the stage was set for the marketing of swaps and other OTC financial derivatives, which increased the efficiency and flexibility of the capital allocation process.³²²

As neoclassical thought maintains a microeconomic orientation, the risks it recognizes as flowing from contemporary financial innovation are risks involving the users of financial innovations. Risks, such as credit risk, market risk,³²³ liquidity risk,³²⁴ legal risk, and operating risk,³²⁵ are hazards that impact the parties to a transaction involving contemporary financial innovations. These risks generally are viewed as manageable. The parties may organize and memorialize their transactions in ways that minimize or eliminate such risks.

321. A clearinghouse is "an adjunct to a futures exchange through which transactions executed on the floor of the exchange are matched, settled and guaranteed." The clearinghouse is responsible for a continuing assessment and collection of margin and providing for orderly delivery, when appropriate. See FUTURES INDUSTRY INSTITUTE, INTRODUCTION TO THE FUTURES AND OPTIONS MARKETS 51 (1994).

322. Bernstein reports that, within six months of the publication of the Black-Scholes option pricing theory, "Texas Instruments took a half-page advertisement in the Wall Street Journal to say 'Now you can find the Black-Scholes value using our . . . calculator.'" BERNSTEIN, *supra* note 298, at 227.

323. Market risk is the risk that the market (prices or values established in a relevant market) will move away from the prices or values anticipated.

324. Liquidity risk is the risk that, at the time of sale, there will be insufficient liquidity in the relevant market to sell an asset quickly or close to its fundamental value. See Bernard J. Karol, *An Overview of Derivatives as Risk Management Tools*, 1 STAN. J. L. BUS. & FIN. 195, 205 (1995).

325. Operating risk is the risk that products or processes will not be managed properly, resulting in a loss of profit or other anticipated benefits. See Helen A. Garten, *Regulatory Growing Pains: A Perspective on Bank Regulation in a Deregulatory Age*, 57 FORDHAM L. REV. 501, 531 (1989).

The risk that has generated the most concern has been systemic risks resulting from financial derivatives transactions. Systemic risks are the risks capable of precipitating a systemic crisis.³²⁶ A systemic crisis is “a disturbance that severely impairs the working of the financial system and at the extreme, causes a complete breakdown in it.”³²⁷ The concern with the threat of systemic crises stem from two sources. The reciprocal obligations of participants in a highly concentrated market³²⁸ make such a market very susceptible to disruption upon the failure of a major participant.³²⁹ As a consequence of linkages between a relatively small number of participants, a domino effect could result in which the default or insolvency of one participant could in turn trigger losses among its counterparties.³³⁰ Additionally, the failure of a federally insured market participant might have severe consequences for the federal deposit insurance fund, potentially shifting such participant’s losses to the taxpayers—an eventuality that is not unprecedented.³³¹

3. *The Neoclassical Explanation Considered*

The neoclassical explanation of the process of contemporary financial innovation views the process as an attempt to develop ways to more efficiently provide the fundamental services of the financial sector. This explanation is consistent with the conclusion that the process of contemporary financial innovation is the same as the earlier process of financial innovation. When regulatory policies raise costs or limit opportunities, financial innovation occurs. Innovators use finance theory and technology to create new products and services that avoid the burdens imposed by regulation, or use loopholes or gaps in regulatory policy to

326. See Andrew Cornford, *Some Recent Innovations in International Finance: Different Faces of Risk Management and Control*, 30 J. ECON. ISSUES 493, 497 (1996).

327. *Id.*

328. For example, in 1991, 50 U.S. banks wrote the overwhelming majority of interest rate and currency swaps. However, eight banks of the fifty wrote 86% of the OTC interest rate derivatives and 88% of the OTC currency derivatives. See CHARLES W. SMITHSON, CLIFFORD W. SMITH, C.D. SYKES WILFORD, *MANAGING FINANCIAL RISK* 80 (1995).

329. See J. Christopher Kojima, *Product-Based Solutions to Financial Innovation: The Promise and Danger of Applying the Federal Securities Loans to OTC Derivatives* 33 AM. BUS. L.J. 259, 274 (1995).

330. This was the scenario looming upon the collapse of the Bank of New England in 1991, at which point it became necessary to close out \$36 billion in off-balance sheet, primarily derivatives, activity. As the Bank of New England’s exposure was wound down over a period of weeks, the possibility remained that the Federal Reserve would be called upon to assume the Bank of New England’s open positions to prevent the shock that would result from its wide-scale default. However, that did not become necessary as the Bank of New England was able to close out its derivatives positions without the Federal Reserve’s assistance. See Craig Torres, *Dangerous Risks: How Financial Squeeze was Narrowly Avoided in “Derivative” Trade*, WALL ST. J., June 18, 1991, at A1. In addition to the savings and loan and commercial banking crises of the late 1980s, a number of other systemic threats, events that pose the potential to erupt into systemic crises, have punctuated recent economic history. Examples include the default in the London Metals Market in 1985, the near failure of the Hong Kong Futures exchange in 1987, the October 1989 market break, and the failure of Barings Bank in 1995. See Cornford, *supra* note 326, at 497-500.

331. See Sangha, *supra* note 282, at 51.

their advantage. Thus, from the neoclassical perspective, contemporary financial innovation corrects those flaws that regulation has introduced into the market. In fact, as in the case of shape-shifting innovation and the deposits markets, contemporary financial innovation points the way to a deregulated future in which products and services compete freely across former regulatory boundaries. However, as will be discussed in the next section of this Article, the neoclassical view of the process of contemporary financial innovation is incomplete.

First, the neoclassical explanation relies on finance theory both to provide the theoretical underpinning of new instruments and processes and to fortify them with the imprimatur of science.³³² The reliance of neoclassical thought on finance theory is based on the concept of efficient capital markets. However, scientific support for the efficient capital markets hypothesis is evaporating.³³³ The efficient capital market hypothesis assumes that information the market uses to arrive at securities prices is based on rational expectations of asset values. Professor Langevoort has argued that "noise," i.e., information unrelated to rational expectations of asset values, also is incorporated by the market and is reflected in securities prices.³³⁴ If the market is unable to distinguish between rational trading and "noise," then securities prices need not reflect fundamental value and the capital market's ability to allocate resources to their best use is unreliable.³³⁵ Professor Cunningham has argued that market behavior is more accurately reflected by non-linear models generated by chaos theory, which relegates rationality and efficiency to less significant roles in market dynamics.³³⁶ Thus, the scientific basis of finance theory is less secure, and its use in the process of contemporary financial innovation raises additional risks not addressed by neoclassical theory. As the other foundational financial hypotheses are based on the assumption of market efficiency, they are also subject to question.

More importantly, the models generated by finance theory lack the reliability of the fundamental models of science. Fundamental models reflect cause and effect relationships and can be used to draw reliable

332. See, e.g., Hu, *Swaps*, *supra* note 1, at 337. "[T]his process of financial innovation now has many of the features associated with the process of technological innovation seen in recent decades in biotechnology, computer, and other science-based enterprises. The features which epitomize science-based enterprises are becoming applicable to major financial institutions." See *id.*

333. See Cunningham, *supra* note 26, at 571-81 (demonstrating that tests of market efficiency based on non-linear models reveal evidence of underlying patterns inconsistent with the random walk model).

334. See Langevoort, *supra* note 26, at 855. Noise trading may be engaged in by ill-informed traders or traders who are using a decisional heuristic other than rationality. See Cunningham, *supra* note 26, at 566.

335. See Cunningham, *supra* note 26, at 566-67.

336. Chaos theory or non-linear dynamics generally holds that there is a pattern underlying the apparent randomness of physical events and that chaotic systems, like capital markets, are non-random and are influenced by endogenous rather than exogenous events. See *id.* at 547, 602.

conclusions about dynamic process.³³⁷ Most financial models are either phenomenological models or statistical models.³³⁸ Phenomenological models are "as if" models that reach conclusions by analogizing from known phenomena to the unknown.³³⁹ As such, they offer interpretations rather than predictions.³⁴⁰ Statistical models are used to find correlations between variables when a dynamic process is not fully understood.³⁴¹ Therefore, these models can generate answers, but such answers have no necessary relationship to cause and effect.³⁴² Additionally, fundamental models seek to understand deep truths (meaning the nature of reality). It appears very unlikely that the economic activity of human beings will be found to operate consistent with immutable laws. At best, financial models *may* provide useful information, but that result is not certain.³⁴³

The second reason the neoclassical view of the process of contemporary financial innovation is incomplete is that it views technology in instrumental terms. From the instrumental perspective, technology creates new opportunities by permitting information to be processed more quickly and in more sophisticated ways. It lowers costs, permitting the products of financial innovation to become more widely available. However, technology, by contributing to the complexity of the financial sector, can influence a variety of sectoral processes. Technology can impact a market's competitive dynamics, as well as its susceptibility to operational risks. The neoclassical explanation recognizes, but understates, the significance of technology in understanding sectoral dynamics.

Finally, the assumptions underlying neoclassical theory limits and biases the explanations offered by orthodoxy. The assumptions of exchange-based trading, rationality, an ergodic environment, gross substitution, and the fungibility of money bear limited resemblance to the real world. Thus, variables outside of the assumptions of the neoclassical model may be at work, influencing sectoral dynamics, but unobserved or unaccounted for.

The assumptions underlying neoclassical theory also limit its understanding of the risks presented by financial innovation. The only risks

337. See Emanuel Derman, *Valuing Models and Modeling Value*, J. PORTFOLIO MGMT., Spring 1996, at 2.

338. See *id.*

339. See *id.* at 3-4.

340. See *id.* at 4.

341. See *id.* at 3-4.

342. See *id.*

343. See *id.* at 6. See also Friedrich A. Von Hayek, *The Pretense of Knowledge*, 79 AM. ECON. REV. 3, 4 (1989).

Unlike the position that exists in the physical sciences, in economics and other disciplines that deal with essentially complex [social] phenomena, the aspects of the events to be accounted for about which we can get quantitative data are necessarily limited and may not include the important ones. . . . in the social sciences often that is treated as important which happens to be accessible to measurement [sic].

Id.

given serious consideration are default risks and their consequences. The impact of less dramatic events are not considered. The long-term consequences of a financial sector in which the meaning and consequences of debt are viewed very differently than they were a generation ago is also disregarded. The largest change resulting from the process of contemporary financial innovation is the way it has changed our belief in our ability to fully manage risks. The risks created by a belief in perfect risk management also are obviated by neoclassical theory.

The Article will now examine heterodox theory. It will determine whether the analysis it offers is able to more completely explain the process of contemporary financial innovation and the risks this process may present to the financial sector and the economy.

B. HETERODOX THEORY

Many post-Keynesian thinkers acknowledge the elegance and forceful logic of the axioms of neoclassical theory. However, they find it fails to address much of what they perceive to be the real world economic problems confronted by contemporary economies.³⁴⁴ Post-Keynesians believe that economic issues cannot be understood without reference to the role of money, uncertainty and the irreversibility of time.³⁴⁵

Post-Keynesians are not generally thought of as a cohesive group. However, most would acknowledge four essential differences between their viewpoint and that of neoclassical theory. First, post-Keynesians reject equilibrium as the natural state or tendency of the economy. Instead, they interpret economic history as depicting an economy expanding continuously over time. They also find the economy subject to biases and imbalances that cannot be corrected solely by market forces.³⁴⁶ Thus, for example, the invisible hand of neoclassical theory was unable to correct the chronic unemployment of the Great Depression, whose remediation required government intervention. Second, the post-Keynesian system acknowledges that contemporary economies employ sophisticated credit and financial institutions.³⁴⁷ Financial institutions and the economy both use and respond to money, which affects unemployment, output and economic decision-making.³⁴⁸ The tendency of economic actors to prefer liquidity further highlights the importance of credit and money in contemporary economies.³⁴⁹

344. See EICHNER, *supra* note 37, at 3-4. Post-Keynesians believe that income distribution, class conflict, economic growth, and inflation to be economic questions that are better understood by observation than by abstraction from models and pre-industrial exchange-based systems. See J.E. KING, CONVERSATIONS WITH POST KEYNESIANS 11 (1995); DAVIDSON, *supra* note 216, at 1.

345. See DAVIDSON, *supra* note 216, at 17; King, *supra*, note 344, at 11.

346. See EICHNER, *supra* note 37, at 12-13.

347. See *id.* at 14.

348. See DAVIDSON, *supra* note 216, at 17.

349. See *id.* at 18; *supra* notes 319-38 and accompanying text. The neoclassical theory, with its origins in exchange transactions, treats money as any other commodity—one

Third, post-Keynesian thought recognizes that markets are not perfectly competitive because some firms and institutions have the ability to exercise market power. Large corporations and trade unions in well-organized industries may have the ability to exercise oligopolistic tendencies that distort the anticipated relationship between supply and demand under perfect competition.³⁵⁰ Finally, post-Keynesians focus their efforts on the behavior of actual economies in calendar time. They examine the conditions of such economies' experience, as opposed to extrapolating to the real world from models of hypothetical market conditions.³⁵¹

The post-Keynesian paradigm envisions a system in which income distribution can be restructured without fear of decreased productivity. They believe that competitive markets should mediate automobile colors and hemline lengths, but not the availability of housing or the amount of unemployment.³⁵² Moreover, they view such a system as being attainable without extreme transformation of the basic societal institutions.³⁵³

1. Critique of Rationality

Heterodox theory questions the positioning of rational self-interest as the core stimuli of all economic decision-making. The rationality heuristic requires that decision-making occur in an ergodic environment in which economic actors have homogeneous expectations. They also must have complete and accurate information concerning the consequences of all potential decisions and the ability to costlessly reverse any decision.³⁵⁴ However, economic actors tend to have heterogeneous expectations.³⁵⁵ They typically lack precognition as well as the ability to disregard calendar time in the way that costless reversibility assumes.³⁵⁶ Unlike the predictions that can be made concerning the throw of dice or the flipping of coins, future economic events are non-probabilistic. Each economic event is intrinsically unique with respect to its relationship to a constantly changing tableaux because each event takes places at a different point in time.³⁵⁷

At best, economic actors engage in what Keynes characterized as conventional decision-making. They form their expectations concerning the outcomes of their actions on their belief that their assessment of current economic conditions is correct; the future will be very much like the past,

whose availability will have an impact on inflation, but not on real production. See EICHNER, *supra* note 37, at 14.

350. See *id.* at 15-16.

351. See *id.* at 16. Post-Keynesians also believe that growth and income distribution in which both respond to the rate of investment, as opposed to the neoclassical view, which would attribute growth and income distribution, as between labor and profit, to price and price movements. See *id.* at 12.

352. See MINSKY, *supra* note 215, at 101.

353. See EICHNER, *supra* note 37, at 17.

354. See Crotty, *supra* note 218, at 486-87.

355. See Cunningham, *supra* note 26, at 596.

356. See Crotty, *supra* note 218, at 488-89; Stout, *supra* note 26, at 55.

357. See Don Goldstein, *Uncertainty, Competition, and Speculative Finance in the Eighties*, 29 J. ECON. ISSUES 719 (1995).

and popular sentiment is more likely than not to be correct.³⁵⁸ Additionally, economic actors utilize a range of different decisional heuristics. Some of the heuristics used can lead to biases that result in decisions that vary systematically from those predicted by rational self-interest.³⁵⁹

Rejection of the rationality heuristic results in a very different view of contemporary financial innovation. First, heterodox thinkers do not view contemporary financial innovation as a rational response to exogenous changes. Rather, it is seen as a result of the interaction of endogenous changes in the financial sector. These force new products and processes upon actors as a financial survival mechanism. They may also seduce the actor with the new when the basis upon which conventional decision-making was supported collapses.

Second, rationality as a basis for economic decision-making assumes the existence of a collected body of shared knowledge. Economic actors have access to decades, if not generations, of information concerning their options and the consequences of such options.³⁶⁰ This information allows individual actors to respond to familiar experiences with relative confidence.³⁶¹ However, the basis for rational decision-making collapses in the face of a previously unexperienced event.³⁶² The implementation of the innovative is an event outside of normalcy, a "special function."³⁶³ It is analogized to the difference between "making a road and walking along it."³⁶⁴ The two activities require very different sets of skills and are based upon different motivations. Thus, the path from the customary to the innovative requires something outside of everyday experience. In Schumpeterian terms, it requires "leadership," a need that emerges and a type of individual that advances when new possibilities arise.³⁶⁵

358. See Steve Keen, *Finance and Economic Breakdown: Modeling Minsky's "Financial Instability Hypothesis,"* 17 J. POST KEYNESIAN ECON. 607, 608-09 (1995).

359. See Richard H. Thaler, *Behavioral Economics*, MSER REPORTER, Fall 1993, at 8-9; see generally Lola L. Lopes, *Psychology and Economics: Perspectives on Risk, Cooperation, and the Marketplace*, 45 ANN. REV. OF PSYCH. 197 (1994). However, it has been argued that economic rationality does not require the conscious rationality of individuals. Rather, an overarching market rationality emerges from choices mediated by rules of conduct embedded in the operation of financial institutions. See *id.*

360. See JOSEPH A. SCHUMPETER, *THE THEORY OF ECONOMIC DEVELOPMENT* 84-85 (1983).

361. See *id.* at 84.

362. The Austrian School of Economics has suggested that the distinctions drawn between the effects of rationality and uncertainty in market processes are too extreme. While acknowledging that everything is subject to change, the Austrian view is that the changes that actually occur are rarely so different from the anticipated range of outcomes as to negate the predictive ability of theories based on the rationality decisional heuristic. See Israel M. Kirzner, *Market Process Theory: In Defence of the Austrian Middle Ground*, in *THE MEANING OF MARKET PROCESS: ESSAYS IN THE DEVELOPMENT OF MODERN AUSTRIAN ECONOMICS* 4-6 (1992). See generally Schwartzstein, *supra* note 38 (examining key concepts of the Austrian School of Economics).

363. See SCHUMPETER, *supra* note 360, at 86-87.

364. *Id.* at 85.

365. See *id.* at 87-88. "The specific problem of leadership arises and the leader type appears anywhere new possibilities present themselves." *Id.* at 88.

In the context of contemporary financial innovation, the "leader" is a manager. "Leadership" is the ability to substitute the traditional or conventional data set for one which incorporates new information about changes occurring in the sector and achieve a new result. New information not only includes information that would fit into the calculus of a rational utility maximizer, such as changes in technology. Rather, the heterodox literature indicates a number of sources of endogenous change, which may change the opportunity set in ways that will persuade managers to embrace innovation. Such changes include: structural changes altering the competitive dynamics of a market or markets; class specific information concerning the expectations, rewards and punishments associated with managerial performance; the supply, demand or function of sectoral instruments, such as money; and information concerning change in generally held perceptions of sectoral dynamics.

Therefore, the rise of contemporary financial innovation is not simply attributed to entrepreneurial efforts to profit. Nor is it explained by changes in regulation, finance theory and technology. Heterodox theory views contemporary financial innovation as a response to the interaction of endogenous changes in the financial sector. Contemporary financial innovation begins with coercive competition among firms and financial institutions. Such competition changes the basis of conventional decision-making and generates new dynamic processes. Contemporary financial innovation provides products to enhance perceptions of managerial performance and shareholder value that may have been tarnished by the effects of coercive competition.³⁶⁶ At the root of the rise in competition are technological changes, which reorder markets and change competitive dynamics.³⁶⁷

2. *Technology*

Heterodox thinkers argue that technological changes can destroy traditional sources of profitability. The wide-scale implementation of wire price quote services, wire transfer technology, twenty-four-hour trading, and program trading have been instrumental in changing the dynamics of deposit and other investment intermediation markets.³⁶⁸ These changes have enhanced the mobility of capital both within and across national borders, and they also have changed the standards by which managerial performance is evaluated.³⁶⁹ In the heterodox view, the competition-enhancing changes that technology introduced has been a chief factor in the advent of contemporary financial innovation. Additionally, the financial

366. See Michael Carter, *Financial Innovation and Financial Fragility*, 23 J. ECON. ISSUES 779, 785 (1989).

367. See *id.* at 787.

368. See *id.* at 786.

369. See *id.* at 786-87; see also Imad A. Moosa, *A Note on Capital Mobility*, 63 S. ECON. J. 248 (1996) (observing that empirical work frequently understates the magnitude of capital mobility as a result of the interaction of conceptual, methodological and econometric issues).

innovations resulting from technological changes have created an endogenous feedback loop that accelerates both the pace and the magnitude of contemporary financial innovation.³⁷⁰

Although changes induced by technology are a necessary component of contemporary financial innovation, they are not the sole cause. Rather, technological changes both induce and cooperate with other sectoral processes to make contemporary financial innovation and the diffusion of its products appear inevitable.

3. *Competition Under Uncertainty*

Heterodox thinkers emphasize that conventional expectations of risk and return are developed without appreciation of the consequences of uncertainty on conventional decision-making. Conventional decision-making under uncertainty can yield meaningful models of future economic conditions as long as they are based on meaningful conceptions of the fundamentals.³⁷¹ When conventional expectations about the composition and behavior of the fundamentals clash with objective experience, the basis for conventional decision-making evaporates. At that point, new conceptions of the fundamentals arise, and with them, new views of market dynamics. However, the fundamentals are also a product of conventional decision-making under uncertainty and respond to the give-and-take of changes in information, market movements, investor behavior and economic events in much the same way.³⁷²

In the heterodox view, the nature and extent of the competitive pressures experienced by firms are components of conventional expectations concerning the firm's prospects and value. When market structures change in ways that greatly intensify competitive pressures, producing a negative impact on firm profitability, a shift in the basis of conventional decision-making can also occur. Firms may be coerced by such competition to develop or adopt innovative financial products and processes to enhance profitability, and with it, estimations of corporate and manage-

370. Endogenous in the sense of feeding back upon itself through its interactions with market and secular events. See Goldstein, *supra* note 357, at 93.

371. The fundamentals are "those factors most important to the maximization of market participants' individual utility functions." John T. Harvey, *Long-Term Exchange Rate Movements: The Role of the Fundamentals in Neoclassical Models of Exchange Rates*, 30 J. ECON. ISSUES 509, 511 (1996). See also DONALD W. MOFFAT, *ECONOMICS DICTIONARY* 135 (2d ed. 1983). The fundamentals are the factors rational economic actors rely on in decision-making designed to increase, for example, their individual worth. The collective activity of such economic actors in an efficient capital market should result in prices following a random walk, and as the market prices fully reflect available information, it should be impossible for traders to earn *excess returns due to speculation*. Nonetheless, review of the empirical work of short-term exchange rate price movements found variability that appeared unrelated to changes in the fundamentals, the information on which rational traders base their trading decisions. See Mark P. Taylor, *The Economics of Exchange Rates*, 33 J. ECON. LITERATURE 13, 29-30 (1995). A proposed explanation for these departures from theory is the existence of "speculative forces at work in the foreign exchange market which are not reflected in the usual menu of macroeconomic fundamentals." *Id.* at 30 (citation omitted).

372. See Crotty, *supra* note 218, at 487-88; Goldstein, *supra* note 357, at 724.

rial performance.³⁷³ Once firms begin to develop or use innovative products and processes, other firms in the relevant market will be coerced by the prospect of losing market share or being blocked from entering a new market by first movers.³⁷⁴ As a result, they too will embrace innovative products and processes, even if they lack information concerning the risks and reliability of such innovations.³⁷⁵ Prior to the shift in the basis of conventional decision-making resulting from increased competition, taking such actions on incomplete information would have appeared unreasonable.³⁷⁶

4. *Asymmetric Reward Structure*

Heterodox scholars also argue that contemporary financial innovation is encouraged by the ways that managers make decisions. Managers, faced with shrinking profits or new expanding markets, can make one of at least two choices. They can embrace the new, and develop or use innovative financial products, or they can rely on some other more traditional course of action. Managers will base their decisions on their perception of the course of action most likely to simultaneously enhance shareholder value, while demonstrating managerial competence. However, despite neoclassical notions of costlessly reversible transactions, managers know that a mistake may be injurious to the well-being of the corporation, its shareholders, and managerial careers. Therefore, managers recognize that their decisions will not be evaluated solely on their merits. Rather, a manager's decision will be evaluated based on whether it is consistent with, or departs from, conventional decision-making and popular sentiment, and rewarded asymmetrically in a manner consistent with conventional decision-making.³⁷⁷

For example, a manager might determine that using certain derivative instruments created, rather than ameliorated, certain risks. Therefore, she would refuse to invest in such instruments despite the fact that most of her managerial peers in comparable firms were doing so. In the short-term, such a manager is likely to be replaced with a member of the prevailing herd. Assume, however, that despite her better judgment, the manager follows the lead of her peers. She invests and ultimately suffers the significant losses that her peers also experience. Despite the losses suffered, she and her peers will not be punished severely. However, one who fails to jump on the bandwagon when the herd's instincts prove to be correct will be punished severely.³⁷⁸

373. See Goldstein, *supra* note 357, at 725-26.

374. See Peter Tufano, *Financial Innovation and First-Mover Advantages*, 25 J. FIN. ECON. 213, 230-34 (1989) (observing that first-movers benefit from primacy by capturing and retaining market share, even after the introduction of competing products).

375. See MINSKY, *supra* note 215, at 119.

376. See *id.*

377. See Goldstein, *supra* note 357, at 726.

378. See *id.* This process can also be viewed as a function of coercive competition, i.e., the prospect of missing a profitable opportunity coerces action in the face of incomplete information.

Thus, “[d]ecision makers facing great pressures to act, but with truly uncertain prospects, will tend to move as a herd.”³⁷⁹ They prefer to accept the risk of being wrong and losing money along with everyone else to what appears to be the greater risk of being wrong and losing money alone.

5. *Money and Credit*

Heterodox thinkers also recognize the role of credit and money as a component of the process of contemporary financial innovation. Heterodox theory does not treat money as if it were gold, a commodity. Rather, it recognizes that the principles applicable to an economy using commodity money (e.g., gold) are very different from the ones encountered in a credit money system.³⁸⁰ In a commodity money system, the money supply will vary with the degree of success of gold mining or production ventures. In such a system, it is not inappropriate to treat the supply of money as exogenous to the financial sector.³⁸¹ However, money is not an ordinary commodity.³⁸² The money supply is created endogenously by

379. *Id.*

380. See King, *supra* note 344, at 8. Neoclassical theory generally holds that output and price are determined by the forces of aggregate supply and aggregate demand, so that escalating prices, as indicia of inflation, may be moderated by a properly publicized change in monetary policy lowering the quantity of money available, or the interest rates at which it is available. See *id.* at 3-6. This view appears reasonable as long as money is defined as currency. However, it is fairly clear that assets other than currency have some of the characteristics of money. The task of defining money has yielded various formulations over the years. Money has been viewed, *inter alia*, simply as the sum of currency, demand deposits and time deposits, and less simply as the sum of the relative “moneyness” of a variety of assets. For a description of the various ways money has been defined for the purpose of monetary policy, see *id.* at 60-74. If money, contrary to the neoclassical approach, is more than currency and its close substitutes, but includes a wide variety of other financial assets as well, then attempts to control aspects of the economy by controlling the growth of the money supply, or interest rates, will be of questionable efficacy unless the relevant authorities have the ability to control the creation and growth of all assets with some of the primary characteristics of money. To some professional, as opposed to academic economists, this task has been considered all but meaningless. For example, “to all except perhaps the most indigent of economic actors, the money stock—in contrast to oil and credit, is a meaningless abstraction.” Podolski, *supra* note 29, at 223 (citation omitted). “[T]he concept of the ‘money supply’ is a ‘meaningless anachronism’—a legacy of gold.” *Id.* (citation omitted). In addition to definitional difficulties concerning what should be considered money, neoclassical theory maintains that the supply of money is important, but not its demand, or the supply and demand of credit. See MINSKY, *supra* note 215, at 112; Wolfson at 192 (source on file with author). Moreover, the supply of money is treated as being exogenous to the financial sector. See MINSKY, *supra* note 215, at 112.

381. See MINSKY, *supra* note 215, at 112.

382. The orthodox assumptions about the nature of money: blind neoclassical analysis to the impact that the demand for money and credit generate. Neoclassical analysis also fails to recognize that the power to create money and credit is not the sole province of central bankers. To the contrary, some heterodox economists have concluded that “almost everywhere in the developed world, the power to create money lies almost entirely in the private sector” with private banks. Victoria Chick & Sheila C. Dow, *Regulation and Differences in Financial Institutions*, 30 J. ECON. ISSUES 517 (1996). In keeping with an exchange model of economic activity, neoclassical theory treats money as if it were commodity money, a specie that the sovereign has sole authority to mint. See *id.* at 521.

the demand for money and credit.³⁸³

Firms and financial institutions encountering regulations that place restrictions on access to money will innovate to meet their credit and cash requirements. The eurocurrency market is a good example of this reaction as financial institutions created the eurodollar in response to restrictions on foreign access to British pounds.³⁸⁴ The process of contemporary financial innovation by producing assets with some of the characteristics of money has "decreased the capacity of the authorities to influence monetary conditions by changing the general level of interest rates," and by doing so, the growth of the money supply.³⁸⁵ Therefore, from the heterodox perspective, neoclassical monetarism had the unanticipated result of limiting the ability of central bankers to control the growth of the money supply.³⁸⁶

C. FINANCIAL INSTABILITY HYPOTHESIS

The heterodox view of contemporary financial innovation as a function of competitive changes and changes in perceptions of sectoral dynamics comes together in Hyman Minsky's financial instability hypothesis. Minsky concluded that the rise of contemporary financial innovation is a stage in the development and retreat of cyclical fragility and, occasionally, instability in the financial sector.³⁸⁷ According to Minsky, financial innovation occurs near a point between the upward and downward legs of an instability cycle. Its introduction into this cycle ultimately exacerbates the downward leg, i.e., the rise of fragility and potential instability.³⁸⁸

Minsky begins his analysis at the point at which the economy is growing at a rate sufficient to achieve and maintain full employment.³⁸⁹ Corporate borrowers and institutional lenders are risk adverse. Therefore, firms have low debt-to-equity ratios, and lenders attach a high risk premium on loans to corporate borrowers.³⁹⁰ Economic prosperity continues and the secular consensus regarding the fundamentals, particularly regarding risk, begin to change. The result is less risk aversion on the

383. Therefore, changes in the money supply are a reflection rather than a cause of changes in the real sector. *See id.*

384. *See* PODOLSKI, *supra* note 29, at 208; *supra* notes 116-33 and accompanying text. The eurodollar market also lowered participants' transaction costs, which in part explains its persistence after foreign lending restrictions were removed. *See* PODOLSKI, *supra* note 29, at 208.

385. PODOLSKI, *supra* note 29, at 222 (emphasis omitted).

386. *See* Timothy A. Canova, *The Transformation of U.S. Banking and Finance: From Regulated Competition to Free-Market Receivership*, 60 BROOK. L. REV. 1295, 1310-14 (1995).

387. *See generally* Hyman P. Minsky, *Financial Innovations and Financial Instability: Observations and Theory*, in FINANCIAL INNOVATIONS: THEIR IMPACT ON MONETARY POLICY AND FINANCIAL MARKETS 25-28 (1984) [hereinafter FINANCIAL INNOVATIONS].

388. *See id.* at 27.

389. *See* Keen, *supra* note 358, at 611. In evaluating the health of the U.S. economy in 1983, Minsky posited six percent unemployment as the full employment rate. *See* MINSKY, *supra* note 215, at 299.

390. *See* Keen, *supra* note 358, at 611.

part of borrowers and lenders, a lower risk premium, and higher corporate debt-to-equity ratios.³⁹¹ The increased availability of finance encourages firms to increase both productive and speculative investment.³⁹² In this environment of prosperity and ready credit, prior conservative estimations of asset values are readjusted using more optimistic assumptions. Asset prices tend to move upward as a result of what Minsky characterized as “balance-sheet adventuring.”³⁹³ This period of euphoric expectations leads to increased investment, improved corporate earnings, and lower unemployment.³⁹⁴ These conditions validate the recent use of speculative finance³⁹⁵ and the maintenance of higher debt-to-equity ratios.³⁹⁶ However, the rise of debt-to-equity ratios results in less liquidity. Firms go to the debt market, which is now responding to increased demand, with higher interest rates.³⁹⁷ Still, euphoric expectations persist despite rising interest rates and the increasing inelasticity of the demand for credit.³⁹⁸

“Ponzi financiers” begin speculating in corporate assets and ownership claims, promoting mergers and acquisitions while incurring debt, which becomes increasingly difficult to service.³⁹⁹ Eventually, assets will have to be sold to service debt, at which point, demand threatens to decrease asset values premised on balance sheet adventuring to more realistic levels. Financial innovations that permit the maintenance of high asset values, thereby increasing the finance available based on such asset values, will be introduced.⁴⁰⁰ At this point, innovations specifically designed to increase asset values will enter the market.⁴⁰¹ In the short term, such

391. *See id.*

392. *See id.*; Wolfson, *supra* note 380, at 335.

393. *See Keen, supra* note 358, at 611; MINSKY, *supra* note 215, at 42.

394. *See MINSKY, supra* note 215, at 42.

395. Minsky viewed the resort to borrowing for the purpose of servicing existing debt as speculative finance. *See id.* Others have referred to this practice as compensatory spending. *See Robert Pollin, Destabilizing Finance Worsened this Recession*, CHALLENGE, Mar.-Apr. 1992, at 17, 18; Wolfson, *supra* note 380, at 336 (discussing necessitous borrowing).

396. *See MINSKY, supra* note 215, at 42. The rise in speculative mergers and acquisitions in the 1980s can be described in Minskian terms. In the early 1980s, the market value of corporations in relation to their net worth was depressed, and corporations could be purchased at a market value, which represented a fraction of such corporations' net worth. As a consequence, firms increased their borrowings to finance acquisition of existing corporations, which led by the early 1990s to firms paying, on average, 44% of pre-tax earnings to service debt. *See Pollin, supra* note 395, at 19. Such interest payments were approximately twice as much as firms' average interest payments in the 1960s and 1970s. *See id.*

397. *See Keen, supra* note 358, at 611-12.

398. *See id.* at 612.

399. *See id.* *See generally* Pollin, *supra* note 395, at 18-19.

400. *See FINANCIAL INNOVATIONS, supra* note 387, at 27.

401. An example of such an innovation would be the segmentation of a security into a number of potential cash flows. *See Robert A. Jarrow & Maureen O'Hara, Primes and Scores: An Essay on Market Imperfections*, 44 J. FIN. 1263 (1989). In the 1980s, primes and scores were introduced. *See id.* at 1264-66. These securities represented the various components of traditional equity instruments. *See id.* at 1263. They divided voting rights, rights to dividends, and the appreciation rights, which ordinarily accompany an equity security, among two separate securities. *See id.* Jarrow and O'Hara studied situations where corporate equity was divided into separately traded securities and concluded that the sum

financial innovation will increase profits by maintaining the appearance of prosperity and encouraging new investment.⁴⁰² Ultimately, however, financial innovation will be unable to generate the profits necessary to service debt. Firms will attempt to sell assets to service debt, and the asset market will become flooded. Investment subsequently collapses and the economy is forced into either debt-deflation (i.e., depression) or price inflation.⁴⁰³ In Minsky's scenario, instability can be averted by governmental intervention. The central banker in the role of lender of last resort will need to introduce sufficient bridge liquidity to prevent the collapse of depository institutions and the destabilizing effect that would have on the economy.⁴⁰⁴

Minsky developed his financial instability hypothesis, in part, as an explanation for the Great Depression, and, therefore, its application to less dramatic events can appear stretched.⁴⁰⁵ Nonetheless, his basic observation concerning the role of financial innovation in the development of financial instability is supported by historical investigations of financial manias and panics.⁴⁰⁶ Moreover, empirical studies have associated changes in asset values and volatility with the introduction and use of certain financial innovations.⁴⁰⁷ Thus, in the heterodox tradition, Minsky's

of the new components exceeded the value of the solitary equity security. *See id.* at 1263-64. Additionally, securitized instruments will accomplish this function.

402. *See* FINANCIAL INNOVATIONS, *supra* note 387, at 28.

403. *See* Keen, *supra* note 358, at 614-15.

404. *See* MINSKY, *supra* note 215, at 43-44. However, Minsky felt that the central banker could not simultaneously control the money and act as lender of last resort. *See* FINANCIAL INNOVATIONS, *supra* note 387, at 37-38. Other economists do not find such dual roles necessarily incompatible. *See* Allan H. Meltzer, *Discussion*, in FINANCIAL INNOVATIONS: THEIR IMPACT ON MONETARY POLICY AND FINANCIAL MARKETS 42, 44 (1984).

405. Minsky's analysis of the role of financial innovation in the development and progress of financial fragility and instability focuses on innovations by financial institutions, primarily banks and other depository institutions and firms. *See* FINANCIAL INNOVATIONS, *supra* note 387, at 38-39. It is unclear to what extent the role of financial innovation by governments and non-depository financial institutions, such as exchanges, either deepens or mitigates the development of fragility. It appears reasonable to conclude that governmental financial innovation designed, for example, to strengthen the savings industry, such as the securitization of government-insured mortgages, will play a role in the cycle similar to that of innovations by banks and savings associations themselves. However, additional work in Minsky's theory appears necessary with regard to other governmental financial innovations, such as index-linked securities. Additionally, financial innovations by exchanges seem aimed most directly at increasing the volume of exchange transactions and, therefore, increasing profitability for the exchanges and its members. Although exchange-traded derivative instruments clearly play a significant role in the tendency towards increased debt positions, their development, as opposed to their use, does not seem compensatory.

406. *See* CHARLES P. KINDLEBERGER, MANIAS, PANICS, AND CRASHES 38-40 (1978), where, without stating that Minsky's model proves valid in all circumstances, the author identifies the objects of speculation associated with periods of increasingly euphoric expectations and the role such objects of speculation played in the progress from euphoria to instability. *See also* Brenda Spotton, *Financial Instability Reconsidered: Orthodox Theories Versus Historical Facts*, 31 J. ECON. ISSUES 175, 181-83 (1997), in which Professor Spotton associates the development of financial instability both with financial and technological innovation.

407. For example, studies have demonstrated that the introduction of an exchange-traded option on an equity security results in an increase (approximately two percent) in

hypothesis provides a model for viewing the role of the process of contemporary financial innovation and its consequences for the sector and the economy.

D. THE HETERODOX EXPLANATION

The heterodox view of financial innovation—not as an end in itself, but as a symptom or indication of certain sectoral dynamics—produces the following explanation.

Generally, contemporary financial innovation is a response to rising fragility and instability within the financial sector.⁴⁰⁸ The recent history of the United States' banking and thrift industries provides a ready example of this process from the supply perspective. However, similar forces were at work in the real sector, providing a demand-based impetus for the development of contemporary financial innovation as well.⁴⁰⁹

The banking industry was faced with increased competition resulting from the shape-shifting innovations of non-banking intermediaries.⁴¹⁰ Additionally, traditional sources of profitability for commercial and investment banks became less reliable. Since the Great Depression, banking regulation determined the amount of interest that could be paid on time deposits and prevented the payment of interest on demand deposits.⁴¹¹ Mutual funds, money market funds, insurance companies, pension funds and other non-bank intermediaries were not subject to such interest payment limitations. These firms created innovative accounts that competed successfully in the deposit market with banks and other regulated depository institutions.⁴¹² This process of disintermediation cut into

the equity security's price and a decrease in the security's volatility. See Jennifer Conrad, *The Price Effect of Option Introduction*, 44 J. FIN. 487, 488, 497 (1989) (noting permanent change). Similar findings appear in Jerome Detemple & Phillip Jorion, *Option Listing and Stock Returns: An Empirical Analysis*, 14 J. BANKING & FIN. 781, 800 (1990) (noting that the effects fade over time) and in Wi Saeng Kim & Colin M. Young, *The Effect of Traded Option Introduction on Shareholder Wealth*, 14 J. FIN. RESEARCH 141 (1991) (finding that early call option listings improve the wealth of underlying security holders). But see Kenneth S. Bartunek, *Option Delisting of Stocks That Continue Trading: An Examination of Welfare Effects*, 31 FIN. REV. 565, 581 (1996) (finding that option delisting had a small negative impact on the underlying equity security, i.e., on stocks with an average price of \$15.02, delisting results in a price drop of \$0.07). Additionally, delisting resulted in no significant volatility effects. See *id.* at 580-81.

408. In this context, financial fragility is used as a measure of the vulnerability of the system to financial instability. See Wolfson, *supra* note 380, at 347. Financial instability is the actual occurrence of a problem or problems, which threaten disruption of one or more of the basic functions of the financial sector. See *id.*

409. See ELI BODIN ET AL., EXCHANGE RATE VARIABILITY AND THE RISKINESS OF U.S. MULTINATIONAL FIRMS: EVIDENCE FROM THE BREAKDOWN OF THE BRETTON WOODS SYSTEM, (Weiss Center, Wharton School, Working Paper No. 94-6, Aug. 1994), where the authors argue that the collapse of the Bretton Woods fixed-rate foreign exchange system precipitated an unprecedented period of exchange rate, interest rate, and corporate earnings volatility.

410. See *supra* text accompanying note 63.

411. From 1933 until 1979, the Federal Reserve used Regulation Q to establish the maximum interest rates payable on time deposits. See Canova, *supra* note 386, at 1297-98.

412. See Goldstein, *supra* note 357, at 729. Although Congress considered the problem of disintermediation, it declined to bring the innovative accounts within the jurisdiction of

the traditional sources of deposits and interacted with a simultaneously occurring erosion in commercial banks' core business of commercial and industrial lending.

Corporations increasingly began to float their own commercial paper, bypassing commercial banks and taking their short-term financing needs directly to the capital markets. For example, in 1973, the share of the short-term corporate debt market held by the ten largest New York banks was 19.2%. By 1984, that amount had fallen to 11.7%.⁴¹³ Commercial banks sought to replace this traditional source of profitability with higher-risk and, therefore, higher-return loans, for example, in the less-developed countries market,⁴¹⁴ and commercial real estate, as well as by developing non-lending sources of earnings, including the marketing of innovative financial products.⁴¹⁵ Thus, increased competition resulted in a shift in market participants' perceptions. Loans were made that would have previously been considered unsound. Bankers retreated from relationship-oriented business to a transaction orientation driven by short-term profitability.⁴¹⁶ The asymmetric reward mechanism encouraged the rapid dissemination of the new version of the fundamentals throughout the industry: Managers followed the crowd, understanding that tactic to be personally beneficial, irrespective of its ultimate impact on their institutions.

Commercial bankers advocated deregulation as a way to enhance their competitive position.⁴¹⁷ However, deregulation ultimately increased competition by permitting thrifts and other federally regulated savings institutions into the commercial lending market.⁴¹⁸ Thus, financial innovation by non-banks forced coercive competitive pressures on commercial banks. This contributed to increased industry fragility and ultimately to the last decade's crisis in the banking and thrift industries.⁴¹⁹

Investment banks also saw their traditional sources of profitability dwindle as issuers began to rely more on private placements and shelf-

Regulation Q. See *Money Market Mutual Funds: Hearings on Oversight on the Supervision and Regulation of Money Market Mutual Funds and the Effects of the Funds on Financial Markets Before the Subcomm. on Financial Institutions of the Senate Comm. on Banking, Housing and Urban Affairs*, 96th Cong. 493, 493-95 (1980).

413. See Goldstein, *supra* note 357, at 729.

414. The search for new customer bases ultimately would lead commercial banks to finance poorer credit risks, highly leveraged mergers and acquisitions, and commercial real estate. See *id.* at 729-30. The consequences of these ventures were instrumental in precipitating the commercial banking crisis of the late 1980s.

415. See *id.*

416. See *id.* at 729.

417. The enactment of the Depository Institutions Deregulation and Monetary Control Act of 1980, Pub. L. No. 96-221, 94 Stat. 132 (1980) was considered a great success by private banking interests. See Canova, *supra* note 386, at 1315-16. The Act liberalized interest rate ceilings pending their eventual phase-out, preempted state mortgage rate ceilings, and permitted the use of negotiable order of withdrawal accounts, i.e., interest-bearing checking accounts issued by savings associations. See *id.*

418. See WHITE, *supra* note 20, at 72-81.

419. See Goldstein, *supra*, note 357, at 728-29.

registration.⁴²⁰ The rise in the influence of the institutional investor community enabled corporate chief financial officers to bypass public issues and have their securities placed privately with institutional investors. This greatly decreased investment bankers' earnings.⁴²¹ Additionally, in 1982, the SEC promulgated Rule 415,⁴²² which permitted large blocks of securities to be underwritten and sold as subunits over a two-year period, rather than all at once.⁴²³ In addition to making securities registration less expensive to the issuer, this practice encouraged competitive bidding for underwriting services each time a block of securities was taken "off the shelf".⁴²⁴ As a result, investment bankers turned more to trading, mergers and acquisitions, consulting and marketing OTC derivatives as risk management protocols.⁴²⁵ Again, financial fragility flowing from increased competition spurred the resort to contemporary financial innovation, frequently without due attention to the legal risks and operational risks they created.

E. HETERODOX RISKS

Heterodox thought views the main risks presented by contemporary financial innovation as the effect it has on conventional perceptions of sectoral dynamics, its tendency to encourage greater risk taking, and its propensity to effect monetary expansion, limiting the ability of monetary authorities to use money as a policy tool in the control of the economy.

1. Greater Risk Taking

The availability of interest rate derivatives encourages the belief that interest rate risk can be perfectly hedged.⁴²⁶ In a period of euphoric expectations and falling corporate earnings, firms assume greater debt even in the face of interest rate inelasticity. The assumption of greater debt is based on the belief in the existence of perfect dynamic hedges and finance theory's conclusion that the value of a firm is independent of how it is financed.⁴²⁷ Firms also believe that assets whose values have been inflated by "balance sheet adventuring" or supported by financial innovations will be able to generate cash flows sufficient to service such debt.⁴²⁸ Correlatively, financial institutions absorb more risk in their portfolios

420. *See id.* at 730.

421. *See id.*

422. 17 C.F.R. § 230.415 (1997).

423. *See* Goldstein, *supra* note 357, at 730.

424. *See id.* at 730-31.

425. *See id.* at 731.

426. However, uncertainty in dynamic economic systems makes the ability to accurately and reliably compose dynamic hedges difficult, if not unlikely. *See* McClintock at 17 (source on file with author). Well-constructed hedges should hold as long as the fundamentals underlying decision-making remain stable, but when the fundamentals change, as they have a tendency to do over time, the assumptions on which such hedges are constructed can disintegrate. *See id.*

427. *See supra* notes 304-11 and accompanying text.

428. *See* Pollin, *supra* note 395, at 18-19.

than they would have prior to the introduction of interest rate derivatives. Lenders rely on their ability to effectively hedge high-risk positions, maintenance of which would have been unlikely during periods of less optimistic expectations.⁴²⁹ Moreover, the asymmetric reward structure encourages the diffusion of such strategies throughout the sector.

There are clear examples of increased risk-taking on the part of financial institutions in the 1980s as traditional sources of profitability faded and euphoric expectations permitted the absorption of increasingly risky assets into lenders' portfolios. For example, as the savings and loan crisis was developing in the mid to late 1980s, a number of savings and loan institutions (S&Ls) resorted to "risk-controlled arbitrage." This financial innovation was a package of complex hedging products designed to allow thrifts to lock in profits on investments in securitized mortgage instruments.⁴³⁰ The promoters of risk-controlled arbitrage claimed that their hedging protocol would preserve the spread between the investment yield on the securities and deposit cost regardless of the direction of interest rate movements.⁴³¹ However, built into these hedging packages was the assumption that both long-term and short-term interest rates would always move in the same direction.⁴³² When short-term rates rose and long-term rates fell, the hedges collapsed, and Franklin Savings Association lost approximately \$424 million. Commentators compared the herd-like resort to such exotic financial derivatives by S&Ls as tantamount to a "mass psychosis."⁴³³ The "scientific" bases of financial derivatives and the erosion of traditional sources of profitability helped to push conventional decision-making to increasingly irrational positions.

2. *Increased Speculation*

Risk-controlled arbitrage is also an example of the concern of heterodox economists that contemporary financial innovation encourages increased levels of speculative activity at the expense of productive enterprise.⁴³⁴ Keynes observed that speculation is "the activity of forecasting the psychology of the market," while enterprise is "the activity of forecasting the prospective yield of assets over their whole life."⁴³⁵ Contemporary financial innovations and, in particular, financial derivatives provided investors with the belief that they could take speculative positions that would be insulated from losses by these new products and

429. See Carter, *supra* note 366, at 784; WALMSLEY, *supra* note 86, at 14.

430. See Charles McCoy, *Bad Bets: Many Big S&L Losses Turn Out to Be Due to a Financial Gamble*, WALL ST. J., Aug. 9, 1991, at A1. Such S&Ls included Far West Federal Bank in Oregon and Franklin Savings Association in Kansas. See *id.*

431. See *id.*

432. See *id.*

433. See *id.*

434. Derivatives trading appears to encourage speculation generally because it enables investors to take large speculative positions at relatively low cost, and the prospects of higher speculative yields tend to divert investment from productive to speculative uses. See Jaffee, *supra* note 310, at 417; Stout, *supra* note 26, at 66.

435. KEYNES, *supra* note 211, at 158.

processes. Institutional investors have increasingly resorted to short-term speculating in the financial markets rather than long-term investing. This practice also is attributed to the sophisticated hedging protocols provided by contemporary financial innovation. Institutional investors conclude that they can reliably capture the higher yields of speculation with the risk control provided by financial derivatives.⁴³⁶ Since the early 1980s, the turnover rate of institutional investors in the equity markets have accelerated dramatically.⁴³⁷ Despite the efficient capital market hypothesis, institutional investors, by their trading turnover, appear to believe that frequent trading enables them to beat the market. Additionally, the asymmetric reward structure encourages the diffusion of activity based on this view throughout the sector.⁴³⁸ Keynes posited that the capital markets operate as effective resource allocators only when the predominant activity is investment as opposed to speculation.⁴³⁹ The increased speculation encouraged by contemporary financial innovation have lead some to argue that the capital resource allocation process has been converted into a casino, in which real growth suffers at the expense of short-term speculation.⁴⁴⁰

3. *Monetary Consequences*

In heterodox thought, money is a special form of property and not an ordinary commodity.⁴⁴¹ The ability of contemporary financial innovation and financial derivatives, in particular, to create new assets with some of the attributes of money impacts the ability of central bankers to use monetary controls of effect economic policy. In fact, any attempt to exert regulatory control over money is likely to generate a circumventive, innovative response, yielding money substitutes that obviate the efforts of the regulators and results in monetary expansion.⁴⁴² Unfortunately, monetary expansion has been associated with increased risk of financial instability and crisis.⁴⁴³ In a period of euphoric expectations, assets with a high degree of liquidity are created as innovative money substitutes. They facilitate the expansion of credit and debt and frequently direct excess liquidity towards speculative ventures.⁴⁴⁴

436. See Hazen, *supra* note 26, at 997 n.45 (quoting Felix G. Rohatyn, *Institutional "Investor" or "Speculator,"* WALL ST. J., June 24, 1988, at A18).

437. See Goldstein, *supra* note 357, at 732-33.

438. See *id.* at 733.

439. See Harvey, *supra* note 371, at 8.

440. Neoclassical scholars generally conclude that increased speculation is not a major concern "as long as all speculative losses are borne privately." See also Kojima, *supra* note 329, at 279. However, even if all losses are borne privately, the impact of such losses on, for example, mutual fund holders and eventual pension fund recipients, could conceivably spill over as investors and pensioners find themselves with inadequate resources with which to face retirement.

441. See McClintock, *supra* note 426, at 14.

442. See *supra* text accompanying notes 380-86.

443. See KINDLEBERGER, *supra* note 406, at 59-65.

444. See Spotton, *supra* note 406, at 191-92.

F. THE HETERODOX EXPLANATION CONSIDERED

The orthodox and heterodox explanations for the rise of contemporary financial innovation suggest different processes and significantly different consequences. However, the heterodox view presents an explanation that resonates with recent financial sector history. The rise of contemporary financial innovation occurred simultaneously with a realignment of the deposits markets, which placed competitive pressures on banks and other depository institutions. Banks responded by developing new lines of business, including higher-risk loans and the development and marketing of financial innovations. Financial innovations gained wide acceptance, even though they were poorly understood. Their diffusion throughout the sector encouraged speculation and greater levels of risk taking, and would result in unprecedented financial losses for highly sophisticated firms.

The heterodox understanding of the consequences of contemporary financial innovation indicates that this process presents significant risks to the financial sector. Financial derivatives may pose the greatest risk because of their ability to alter perceptions of sectoral dynamics. Therefore, the ability of regulatory policy to contain all the unintended consequences of financial derivatives will be examined, as will the structure of the regulatory system.

G. REGULATION OF CONTEMPORARY FINANCIAL INNOVATION— FINANCIAL DERIVATIVES

In the United States, financial derivatives are regulated by a web of regulations and policies emanating from federal and state agencies, federal and state courts, as well as self-regulatory bodies.⁴⁴⁵ The regulatory approach continues the pattern established for the regulation of securities and commodity futures.⁴⁴⁶ Specifically, most regulatory efforts are directed toward the control of fraud and anti-competitive market practices

445. Standard-setting agencies also play a role in the regulation of financial derivatives by determining how such holdings and transactions involving such products are treated for accounting purposes, as the nature of the accounting treatments available can play a significant role in the design, as well as the decision to enter into transactions involving financial derivatives. The regulations, judicial opinions, and self-regulatory conventions of some international jurisdictions will also be factored into the decision-making process of dealers and users in determining how these and other products of contemporary financial innovation should be designed, marketed, and used both in the United States and abroad.

446. Modern U.S. regulation of the commodity futures markets can be traced back to the passage of the Futures Trading Act of 1921, ch. 86, 42 Stat. 187 (1921) and, after it was declared unconstitutional, the subsequent enactment of the Grain Futures Act, ch. 369, 42 Stat. 998 (1922). These enactments were designed to address the fairly regular introduction of anti-competitive practices to the floors of the commodity futures exchanges. See Pouncy, *supra* note 70, at 1635-40. Although Congress would act in 1936 with the passage of the Commodity Exchange Act, ch. 545, 49 Stat. 1491 (1936) and again in 1974 with the passage of the Commodity Futures Trading Commission Act of 1974, Pub. L. No. 93-463, 88 Stat. 1389 (1975) to improve the regulation of these markets by creating larger agencies with ostensibly greater enforcement powers and responsibilities, the concerns animating regulatory efforts have for the most part remained the same.

and the maintenance of minimum standards of financial integrity for market participants.⁴⁴⁷ Thus, regulation tends to address the neoclassical concern with the potential for the development of systemic threats. Regulatory efforts to ensure the financial integrity of individual market participants through the use of capital adequacy and similar financial requirements should prevent defaults that could precipitate systemic threats. However, this pattern of regulation does little to address the heterodox concerns with greater risk taking, increased speculation and diminished monetary control. In fact, the regulatory pattern appears to magnify the degree to which both neoclassical and heterodox concerns may be created.

First, the regulatory pattern pays little attention to the potential of the process of contemporary financial innovation to generate products and processes specifically designed to support increased levels of risk taking, the promotion of increased speculation, and the creation of credit and money substitutes.⁴⁴⁸ Although regulators have become concerned with the potential for firm and financial institution defaults to trigger secular disturbances, they have not been as concerned with the consequences of increased risk taking within the sector. Additionally, the division of regulatory authority along institutional lines has permitted the development of credit and money substitutes under the jurisdiction of financial mar-

447. The banking regulators, the Federal Reserve, and the Office of the Comptroller of the Currency have implemented the capital adequacy guidelines, contained in the 1988 report of the Basle Committee on Banking Regulations and Supervisory Practices of the Bank for International Settlements ("Basle Accord"). Capital adequacy requirements reflect regulatory concern that financial institutions maintain an adequate "cushion" of capital, the arithmetic difference between assets and liabilities, to protect depositors, and in the case of federally insured banks and savings associations, the insurance fund, in the event of a liquidity shortfall. See Enrico Colombatto & Jonathan R. Macey, *A Public Choice Model of International Economic Cooperation and the Decline of the Nation State*, 18 *CARDOZO L. REV.* 925, 935 (1996). The impetus for the development of international capital adequacy standards is reported to have come from the U.S. and the U.K. banking communities who feared that their implementation of new bilateral capital adequacy standards would put their markets at a competitive disadvantage. See *id.* at 938; John C. Deal et al., *Capital Punishment: The Death of Limited Liability for Shareholders of Federally Regulated Financial Institutions*, 24 *CAP. U. L. REV.* 67, 73 (1995). The Basle Accord, among other things, addresses the concern that off-balance sheet transactions in OTC derivatives may subject financial institutions to credit risks for which they are not required to maintain reserves, as well as concerns that such risks, given the high concentration of OTC financial derivatives business in banks and banking subsidiaries, might present systemic threats to the industry. The Basle Accord promoted the implementation of risk-based capital adequacy standards in which a financial institution's credit risk exposure is adjusted by a credit conversion factor and a risk factor (determined by the creditworthiness of the counterparty) to arrive at an amount that is added to the financial institution's other risk adjusted assets. This amount is compared to the bank's capital to determine whether adequate capital reserves exist. The Basle Accord was modified in 1994 to propose the recognition of the effect of netting provisions, for capital computation purposes. See *id.*, Colombatto & Macey, *supra*, at 935-37.

448. Professor Hazen has identified the tendency of financial derivatives to promote injurious speculation and has proposed that all financial derivatives be subject to an enhanced economic purpose test. See Hazen, *supra* note 26, at 1029-31. Professor Hazen would require regulators to balance a new derivative instrument's beneficial economic impact against potential negative speculative impact and approve those instruments that provide an economic benefit without promoting excess speculation. See *id.* at 1031.

kets rather than banking regulators. There has been greater emphasis on the collection of information concerning the financial integrity of individual market participants. However, this information has not influenced prospective regulatory efforts, but instead is used to contain problems caused by products after adverse consequences have resulted from their introduction.

Additionally, the regulatory pattern interacts with the process of contemporary financial innovation and stimulates the development of products to defeat regulatory jurisdiction. As the regulatory pattern is characterized by regulatory competition and regulatory overlap, compliance with the requirements of multiple regulators necessarily raises costs without significantly diminishing the legal risk of mischaracterization.⁴⁴⁹ Therefore, if regulation can be avoided or a particular regulator selected, the costs of regulatory compliance should decrease. Additionally, the risk that a product or process may be mischaracterized in a way that places it within the regulatory jurisdiction of an undesirable regulator also is diminished. Therefore, the current regulatory structure has and will continue to vector contemporary financial innovation toward the most desirable regulators or towards products that are least susceptible to regulation.⁴⁵⁰ This situation presents the prospect of increasingly sophisticated and specialized products. The risks presented by these products also will increase as the impetus to be first to the market will result in their deployment with incomplete information.

Thus, the heterodox explanations of the rise of contemporary financial innovation raises significant concerns that are not addressed by neoclassical thought. As neoclassical thought has provided the regulatory paradigm for the financial sector, the concerns of heterodoxy are overlooked in that arena as well.

This Article will now examine examples of the legal scholarship's analysis of the process of contemporary innovation. This review suggests that some of the concerns of heterodoxy are considered by legal scholars, but their analysis is limited by their use of the analytical tools provided by orthodoxy.

V. LEGAL SCHOLARSHIP AND CONTEMPORARY FINANCIAL INNOVATION

The legal scholarship examining the origins and consequences of contemporary financial innovation, and, in particular, derivative financial instruments, is firmly embedded in the neoclassical tradition. There are,

449. See John C. Coffee, Jr., *Competition Versus Consolidation: The Significance of Organizational Structure in Financial and Securities Regulation*, 50 *BUS. LAW.* 447, 453-57 (1995) (discussing the theory of regulatory competition).

450. It is possible that the most innocuous regulator will also be the most efficient. However, if the examples of the CFTC and SEC are any guidance, the more innocuous regulator, the CFTC, achieved that reputation as a result of its less aggressive enforcement policy, which is believed to have resulted, particularly in its early years, from industry capture. See generally Markham, *supra* note 72.

nonetheless, significant differences in the extent to which this scholarship wholeheartedly embraces the neoclassical explanations of the rise of contemporary financial innovation. There also are differences in the way risks are perceived and characterized.⁴⁵¹ One view suggests that the origins, character, and usages of financial derivatives create risks that are not suggested in the development, diffusion and use of traditional and modern financial instruments.⁴⁵² Another view concludes that financial derivatives are not unlike other instruments of corporate finance and, as such, present no real additional risks or concerns.

The first view is articulated by Professor Hu, who has identified through his scholarship several apparent risks and concerns presented by financial derivatives that are not generally created by other financial instruments.⁴⁵³ Professor Macey, however, has concluded that the risks presented by financial derivatives are not significantly different from the risks of other modern securities traded in the capital markets.⁴⁵⁴

Professor Hu has identified a species of unique risk, i.e., information failure, the possibility that financial innovators and end-users will fail to make appropriate investment in information. Therefore, they will not fully appreciate the risks associated with the use and diffusion of financial derivatives throughout the economy.⁴⁵⁵ Although Professor Hu's analysis of information failure does not employ heterodox theory, it does suggest an impatience with some of the weaknesses of neoclassical thought.

Professor Hu attributes the failure of financial innovators to make adequate investment information to three principal causes.⁴⁵⁶ First, Hu identified inappropriability, the inability of the innovator to capture all of the value of her investment in information. The innovator limits her investment information to avoid financing the production of information that

451. However, legal scholarship is increasingly recognizing the limitations of neoclassical theory as a basis for analysis and policy formulations. See generally Cunningham, *supra* note 26, at 547-51; Lowenstein, *supra* note 26, at 925-28; Hazen, *supra* note 26, at 987-89.

452. See Henry T.C. Hu, *Misunderstood Derivatives: The Causes of Information Failure and the Promise of Regulatory Incrementalism*, 102 YALE L. J. 1457 (1993).

453. See *id.*; see also Henry T.C. Hu, *Illiteracy and Intervention: Wholesale Derivatives, Retail Mutual Funds, and the Matter of Asset Class*, 84 GEO. L. J. 2319 (1996).

454. See Jonathan R. Macey, *Derivative Instruments: Lessons for the Regulatory State*, 21 J. CORP. L. 69, 71 (1995).

455. See Hu, *supra* note 452, at 1463-64. See also Hu, *supra* note 453, at 2324, where Professor Hu discusses the risks presented by asset class illiteracy, which can be viewed as an additional form of information failure. Professor Hu also has a risk presented to shareholder value by inappropriate use of financial derivatives to hedge corporate risks. See Hu, *supra* note 6, at 1016. The potential inappropriateness of hedging is suggested by the conclusion of finance theory that, given certain assumptions, hedging does nothing to increase corporate value as individual shareholders can engage in hedging on their own if they so desire. See *id.* at 1016-17.

456. Although Professor Hu's focus is on the role of banks as innovators, much of his analysis is applicable to other financial innovators as well. See Hu, *supra* note 452, at 1462. Banks, through the availability of federally insured deposit insurance, present a somewhat different set of risks as financial innovators than other financial institutions and financial firms, but the availability of deposit insurance does not significantly impact the generalization of Professor Hu's analysis to financial innovators.

may become available to her competitors.⁴⁵⁷ Second, Professor Hu argues that information failure results from cognitive bias, the operation of decisional heuristics, which may lead to underestimation or misinterpretation of risks.⁴⁵⁸ Third, Professor Hu has identified agency-principal conflicts, which promote a tendency among agents to understate risks to the principal when the behavior involved could provide high rewards to the agent.⁴⁵⁹ These factors are offered as the causes of information failure. However, it appears that these factors do not fully explain how normal levels of risk adversity are overcome to permit decision-making under incomplete information.

Although the possibility of inappropriability seems plausible,⁴⁶⁰ Professor Hu places the development and diffusion of financial derivatives in an ergodic environment. In such an environment, additional expenditures on information would appear to ameliorate some of the operational risks financial derivatives may create. In an ergodic environment, such information is assumed to exist. Additionally, if the information is produced, it is believed that the additional information increases the ability to reliably predict future events. Innovators will *know* how their products will function in real world applications, and the risks they may be expected to generate. Heterodox thought, however, assumes a decisional environment of uncertainty. In this environment, investment in additional information may not produce a proportional improvement in risk comprehension and reduction. Given the limitations of phenomenological and statistical modeling, it is unlikely that any model of the risks and consequences of financial derivatives will be able to make consistently accurate predictions. The interpolations and extrapolations offered by financial models may vary significantly from reality. Thus, Professor Hu's proposal for a mechanism to generate and share information throughout the sector may not generate the benefits of risk reduction anticipated.

The existence and operation of decisional heuristics other than rationality is consistent with heterodox theory. Professor Hu argues that decision-makers ignore low probability events,⁴⁶¹ underestimate the occurrence of events for which they have no ready associations,⁴⁶² and overemphasize views that are based on personal expertise while deemphasizing views of other professions.⁴⁶³ The operation of these biases might explain why decision-makers would ignore legal risks. Such risks

457. *See id.* at 1481-82.

458. *See id.* at 1487-88.

459. *See id.* at 1492-94.

460. *But see* Tufano, *supra* note 374, at 213. Professor Tufano's study determined that the first firm to create and market an innovative product maintains a market share advantage over firms that enter the market later and charge less. *See id.* at 230-34. Thus, although first-movers may be concerned with investing information that will enable competitors to duplicate their efforts, they tend not to lose substantial market share as a result of subsequent competition.

461. *See* Hu, *supra* note 452, at 1488.

462. *See id.* at 1490.

463. *See id.* at 1491.

were thought to rarely arise, and the views of financial experts about their likelihood were given greater weight than the views of legal experts. These cognitive biases do not fully explain the decision to forgo information about a product's operation in the real world. The decision to market a product with incomplete information is more likely to result from real or perceived business pressures, or the influence of other information with the ability to coerce action. Heterodoxy suggests that the asymmetrical reward structure may encourage decision-making on incomplete information. Managers of financial innovation design who jump on the bandwagon, even when they are unsure of its ultimate destination, find career safety in the fact that their peers are operating on the same information base, whether adequate or inadequate. Those who expend the time and effort to undertake investigations not commenced by their peers may create a delay in product development, which may result in lost market share or market entry preclusion.⁴⁶⁴ The post-marketing discovery of unanticipated risks may be perceived as creating a lower probability of adverse career consequences than the career consequences flowing from a missed opportunity.

The agent-principal conflict identified by Professor Hu occurs in a historical context in which commercial and investment banks faced increased competition and the erosion of traditional sources of profitability.⁴⁶⁵ In this context, the agency-principal conflict may be seen as a further manifestation of the agent's awareness of the asymmetrical reward structure. Professor Hu suggests that "the more an agent can suppress the apparent risk undertaken without arousing the principal's suspicions, the better the agent will look."⁴⁶⁶ Thus, such an agent will have an incentive to withhold information likely to impede her desire to engage in activity whose risks are unknown or underappreciated by her colleagues and superiors. However, if the agent is acting in an environment of increasingly unrealistic expectations concerning future earnings, the agent's "suppression" of potentially adverse information may be the only way to achieve the productivity results her peers are achieving with similar innovations in comparable firms. Again, the need to move with the herd may, in this instance, be characterized as the agent's placing her interest and/or her class interest above the interest of the principal.

Professor's Hu's analysis of these risks leads him to the conclusion that a balance can be achieved between the potentially devastating consequences presented by the financial derivatives markets and the great advantages they offer.⁴⁶⁷ However, he suggests that the ability of regulators to achieve this balance is unlikely, and characterizes regulatory efforts as resembling the blind leading the nearsighted.⁴⁶⁸ In other words, financial

464. See *supra* text accompanying note 374.

465. See *supra* text accompanying notes 373-76.

466. Hu, *supra* note 452, at 1492.

467. See *id.* at 1503-05.

468. "If the puzzle is why banks know so little, then the dilemma is how can regulators, who know even less, be effective. How can the blind guide the nearsighted?" *Id.* at 1463.

innovators do not always know enough about the products they are marketing and therefore, regulators must know even less. This analysis leads Professor Hu to advocate an incremental approach to the development of regulatory initiatives to require disclosure of information on the production of "systemic" risks.⁴⁶⁹ Incrementalism, he argues, should preserve the vitality of the process of financial innovation by avoiding the imposition of inappropriate regulatory burdens. However, it also will allow a useful market to function while its regulators' understanding of contemporary financial innovation's dynamics and consequences matures.⁴⁷⁰

Professor Macey views the rise in the production and diffusion of financial derivatives as another example of the benefits and risks of highly leveraged transactions.⁴⁷¹ Professor Macey relies on the "functional approach" to financial innovation to support this conclusion. The functional approach views contemporary financial innovation as attempts to develop new products to deal with fundamental problems of corporate finance.⁴⁷² However, the functional approach argues that products that provide functionally equivalent financial services should be regulated in the same way.⁴⁷³ Thus, this approach suggests that derivative instruments should be analyzed to determine their functions, how they are being used, and what they seek to achieve as instruments of corporate finance. Professor Macey has identified four objectives that financial derivatives are designed to accomplish. Financial derivatives are designed to achieve risk management, to lower transactions costs, to protect bondholders and other fixed claimants from shareholder opportunism, and to achieve the revenue maximization offered by leverage.⁴⁷⁴ However, Professor Macey concluded that the only function that creates any significant risk is revenue maximization through leverage. Therefore, derivative instruments should be approached and regulated as are other highly leveraged transactions in non-derivative markets.⁴⁷⁵

469. *See id.* at 1496. Professor Hu recognizes that incrementalism need not lead to a conservative result, but has the potential to yield drastic consequences. *See id.* at 1496 n.233 (quoting Charles E. Lindblom, *Still Meddling, Not Yet Through*, 39 PUB. ADMIN. REV. 517, 520 (1979)).

470. *See id.* at 1495-96. *See also* Hu, *Swaps*, *supra* note 1, at 413-16 (Hu calls for an incremental approach in shifting between competing methods of regulating bank capital adequacy standards).

471. *See* Macey, *supra* note 454, at 82.

472. For example, the conflicts between stockholders and bondholders in the last century led to three ostensibly equivalent "innovations:" voting trusts, bond covenants, and preferred stocks. *See* Macey, *supra* note 454, at 72 (quoting Peter Tufano, *Securities Innovations: A Historical and Functional Perspective*, 7 J. APPLIED CORP. FIN. 90 (1995)). The problem with this example and this analysis generally is that it characterizes, as innovations, securities that were already hundreds of years old or that simply repackage well-known rights and liabilities. *See supra* text accompanying notes 65-85. Thus, this analysis tells us little about the causes of the rise of contemporary financial innovation.

473. Thus, portfolio insurance, exchange-traded put options, and explicit guarantees by insurers are functionally identical because they all seek to achieve risk management and they all can be used to manage the same types of risks. *See* Macey, *supra* note 454, at 72.

474. *See id.* at 72-79.

475. *See id.* at 82. Professor Macey specifically rejects Professor Hu's concern with the risks created by information failure. *See id.* at 86.

Viewing financial derivatives transactions as highly leveraged transactions, Professor Macey argues that the transactions create two risks. He identifies these risks as "localized risk" and "systemic risk." Localized risk, such as market risk and credit risk, is the "risk that each firm faces when it makes a derivatives trade."⁴⁷⁶ Systemic risk is the "risk that derivatives losses will not be localized, but instead will spread to firms, individuals, and institutions that are not in a position either to benefit from profitable trading activity or to avoid loss."⁴⁷⁷ Professor Macey concludes that the existence of localized risk does not justify regulation because the consequences of this risk will be borne by the individual firm. Therefore, firms will have great incentives to control such risks.⁴⁷⁸

Heterodox thinkers view the use of highly leveraged instruments differently. They would observe that the tendency to employ high levels of leverage is an indication of firm fragility or a decision to divert investment from productive enterprise to speculation. A rise in the level of speculative activity is suggestive of growing sectoral fragility as well. Professor Macey recognizes the difficulty in distinguishing between transactions involving financial derivatives entered into for hedging purposes and transactions in which such instruments are used to take speculative positions, and the possibility of undertaking large speculative positions disguised as hedging transactions.⁴⁷⁹ Professor Macey contends that the difficulty in distinguishing between speculative and hedging positions is a reason to restrain the impulse towards regulation. He argues that any effort to regulate the speculative use of financial derivatives would limit their availability for legitimate hedging purposes as well.⁴⁸⁰ However, this argument would result in increasing levels of speculation in the sector, diverting resources from enterprise and potentially increasing sectoral fragility.

The heterodox view indicates that risks may prove more difficult to localize than Professor Macey suggests. Market risk, for example, can expand into systemic threats if a large number of firms or financial institutions have taken positions in the market that expose them to the same market risks.⁴⁸¹ The use by savings and loan institutions of "risk controlled arbitrage," for example, spread a firm-specific market risk across an important segment of the financial sector. This risk materialized into substantial losses when the market moved in ways unanticipated by this strategy.⁴⁸² Although the progress from market risk to loss generated by this particular financial innovation did not in itself create the savings and loan crisis, it played a role in the collapse of a number of institutions and

476. *Id.* at 82.

477. *Id.* at 84.

478. *See id.* at 82.

479. *See id.*

480. *See id.*

481. *See* Cornford, *supra* note 326, at 497.

482. *See supra* text accompanying note 331.

in the magnitude of the losses ultimately suffered.⁴⁸³

Credit risks, although localized in Professor Macey's view, also have the ability to develop into systemic threats. For example, modern portfolio theory provided a theoretical basis for the rise in securitized debt. This theory encouraged the belief that loan pooling (i.e., diversification) minimized the need of the ultimate purchaser of a securitized instrument to have detailed analyses of the default risks presented by the individual loan components of securitized instruments.⁴⁸⁴ The lenders who originate loans and then sell them for pooling and securitization have much less incentive to fully assess the credit risks presented by loans whose ultimate benefits and risk will be purchased by others.⁴⁸⁵ Moreover, in an environment of euphoric expectations, prudential standards of lending may relax, resulting in the production and ultimate securitization of riskier loans than would have been originated in periods of more realistic expectations.⁴⁸⁶ Ordinarily, diversification will provide the risk reduction that pooling should create. However, in times of economic downturns, with increased rates of mortgage and personal loan defaults, the credit risks contained in securitized instruments also have the ability to generate systemic threats as anticipated cash flows become unreliable and their holders begin to experience liquidity shortfalls.⁴⁸⁷ Therefore, as heterodox economists have observed, what Professor Macey characterizes as localized risks nonetheless have the potential to contribute to the development of systemic threats in which losses are not internalized but distributed more widely throughout the sector and the economy.⁴⁸⁸

As with localized risks, Professor Macey views the development of systemic risks as unlikely. He argues that the potential of market linkage and the high concentration of financial derivatives activities among a relatively small number of entities developing into systemic risk is overstated. Thus, the potential for systemic risk should not require any additional regulatory response. The low potential for systemic risk means that these products should be regulated like functionally similar, highly leveraged transactions.⁴⁸⁹ That assessment is not an unreasonable one when the analysis is limited to neoclassical concepts of market dynamics

483. *See id.*

484. *See* Michael J. Carter, *Financial Innovation and Financial Fragility*, 23 J. ECON. ISSUES 779, 788-89 (1989). Despite the difficulty ultimate purchasers have in assessing the true risks presented by securitized instruments, a belief in the effects of diversification and the guarantees provided by the federal government for many of these securities will encourage their purchase. *See id.* at 789.

485. *See id.* Although these securitized instruments generally have very high credit ratings, such ratings tend to be more a function of the guarantees provided by federal agencies than of an independent assessment of risk. *See id.*

486. *See id.*

487. Liquidity risk is another localized risk with the ability to progress to a systemic threat, and it could be argued that the 1987 market break is an example of individual liquidity failures expanding to systemic proportions. *See* PRESIDENTIAL TASK FORCE ON MARKET MECHANISMS, REPORT OF THE PRESIDENTIAL TASK FORCE ON MARKET MECHANISMS (1988) 30-36 [hereinafter Task Force].

488. *See* Cornford, *supra* note 326, at 497.

489. *See* Macey, *supra* note 454, at 84, 91-92.

and the unlikely threat of widespread default.⁴⁹⁰ However, if the risks presented by concentration and market linkage are examined in an environment characterized by existing fragility and potential instability, the potential for catastrophe remains remote, but appears less implausible. Heterodox thought maintains that the rise in contemporary financial innovation serves to sustain unrealistically high asset values and correspondingly high levels of debt. In an environment in which greater risk-taking has become the norm, a shift in the consensus view of the fundamentals resulting from the failure of a major player in the sector retains the capacity to evoke a sectoral disturbance. Most scenarios in which systemic risk develops into a significant crisis appear somewhat fanciful. However, an appreciation of all of the processes that might produce such events is constrained by uncertainty, as are the most sophisticated models of the development of such an occurrence.⁴⁹¹ Professor Macey recognizes that “[t]here are unintended consequences in the financial markets just as there are unexpected events and unintended consequences from regulation,” but he argues that such problems cannot be addressed prospectively.⁴⁹² Regulation will always be too late.⁴⁹³ If, as heterodox thought suggests, Professor Macey has underappreciated the nature and the magnitude of the risks presented, then the need for prospective regulatory intervention appears advised.

A. THE LIMITS OF ORTHODOXY

The views of Professors Hu and Macey are illustrative of the approach of most legal scholars and commentators writing from the perspective of economic orthodoxy on the policy implications of the process and products of contemporary financial innovation.⁴⁹⁴ Their focus is on the potential of this process and its products to precipitate crisis or other

490. See, e.g., Ludger Hentschel & Clifford W. Smith, Jr., *Risk and Regulation in Derivative Markets*, 7 J. APPLIED CORP. FIN. 16 (1994) (defining systemic risk as the risk of “widespread default in any set of financial contracts that can be linked to default in derivatives”). The development of a systemic threat does not require actual default to create sectoral panic. Shifts in perception concerning the likelihood of default or illiquidity may play a role in the development of systemic threats such as banking panics and runs.

491. For example,

a run of bad news: the spectacular failure of a widely admired LBO; the forced merger of a big Wall Street firm “after a poorly supervised trader lost \$500 [million] by failing to hedge a complex position in the newly developed foreign-mortgage-backed securities market;” a bad wheat harvest; a Stalinist backlash in Russia; an angry trade dispute with Japan

has been offered as a scenario with the potential to prompt a radical reexamination of the fundamentals and a downward confidence spiral culminating in a severe recession. *Until the Next Crash*, ECONOMIST, Sept. 19, 1992, at 41, 45; see also MARTIN FELDSTEIN, *THE RISK OF ECONOMIC CRISIS* (1991).

492. Macey, *supra* note 454, at 90.

493. See *id.* at 90-91.

494. Although Professor Hu’s analysis demonstrates a recognition of the weaknesses of the neoclassical perspective, it nonetheless analyzes the process and its products from neoclassical economics’ microeconomic orientation while limiting its reliance on the existence of an ergodic environment and the operation of the rationality heuristic.

substantially adverse economic events.⁴⁹⁵ Therefore, the concern prompted by the introduction and use of financial derivatives is with the possible role such instruments may play in triggering defaults by firms or financial institutions. Of particular concern are those defaults with the potential to generate systemic disturbances that may impede the ability of the financial system to perform its basic functions. The orthodox approach limits its concern to a few environmental factors and firm specific discrete events.⁴⁹⁶ Heterodox thinkers are more concerned with process (i.e., dynamic interactions) than with discrete events. They interpret the behavior of the sector as more complex than the aggregated behavior of its participants. Additionally, their analysis of dynamics and welfare is insulated from the deterministic assumptions of rationality and equilibrium. The heterodox view, with its focus on actual markets and actual events in historic time, presents a more accurate reflection of contemporary financial innovation and other financial and economic processes.

Therefore, heterodox arguments that contemporary financial innovation interacts with ongoing sectoral processes to produce changes in sectoral dynamics that are potentially more significant than the possible default of individual firms or institutions should be taken more seriously. The law and legal scholarship should examine the implications of this conclusion. For example, legal scholarship has failed to critically examine the relationship between the processes of traditional and contemporary financial innovation. But more importantly, it has not thoroughly appreciated the role of regulation and regulatory structure in accelerating financial innovation; and it has largely overlooked the propensity of contemporary financial innovation, and its interactions with changes in perceptions of sectoral dynamics, to encourage greater risk taking and increased speculation. In short, the law and legal scholarship's reliance on orthodox models of financial sector behavior prevents an accurate understanding of the rise of contemporary financial innovation and the risks it presents to the financial sector and the economy at large. Therefore, the policy guidance provided by legal scholarship is suspect.

B. FINANCIAL INNOVATION ACROSS TIME

Legal scholarship views our age as unique and views the process of contemporary financial innovation as new and different from the historical processes that resulted in the development of traditional and modern financial instruments and processes. Much has been made of the role of technology and finance theory in the rise of contemporary financial innovation; and it has been suggested that modern finance theory, standing alone, distinguishes the contemporary process from its antecedents. Heterodoxy, however, suggests that we focus not on factors and events as much as on processes and interrelationships. The process of financial innovation occurs within financial systems that utilize available resources to

495. See Hu, *supra* note 452; Macey, *supra* note 454.

496. See *supra* notes 251-52 and accompanying text.

meet the system's needs for financial services. As societies become more complex, their resources change and the need for financial services also changes to reflect increased societal and financial complexity. Although the process of contemporary financial innovation is similar to its antecedents, the financial system in which the contemporary process is occurring is marked by unprecedented complexity, both with respect to its components and their interactions. There is simply more of almost everything, and therefore greater opportunities for both anticipated and unanticipated interactions, as well as intended and unintended consequences. Thus, the heterodox concern with process would suggest that the process of contemporary financial innovation may be controlled, to the extent that is deemed desirable, by decreasing the complexity of the financial system.⁴⁹⁷ To a society that is wedded to progress, such a suggestion must seem somewhat alarming. However, to the extent that contemporary financial innovation encourages sectoral tendencies toward fragility and instability, some efforts directed toward minimizing inadvertent sources of financial complexity may help focus the innovation process towards products and services that encourage enterprise, rather than products and services that disguise and facilitate speculation. One source of inadvertent complexity may be the nature and structure of the regulatory systems within whose jurisdictions financial innovations fall.

C. REGULATORY STRUCTURE

The example provided by financial derivatives demonstrates the impact that inadvertent complexity resulting from a specific regulatory structure can have on the process of financial innovation. Although neoclassical thought generally credits regulation as a source of financial innovation, this view does not lead to the conclusion that less regulation would result in less innovation. Rather, less regulation may permit the character and direction of innovation to be driven by forces more directly related to productive enterprise and societal welfare.

The example of financial derivatives suggests that much of the efforts of contemporary financial innovation have been inordinately influenced by the structure of the present regulatory system. For example, the shape-shifting interventions of the money market and mutual fund industries must be credited with a significant role in banking and thrift disintermediation, increased competition in the deposits markets, and, therefore, with a significant role in the resulting crisis in the thrift industry. These innovations were made possible by a regulatory structure based along relatively narrow institutional lines. Additionally, part of the impetus for the creation of exotic financial innovation in the late 1980s and early 1990s was the desire to avoid the jurisdiction of product-based regulators, the CFTC and the SEC. The adverse consequences of the development and diffusion of products and services designed with regula-

497. See *FINANCIAL INNOVATIONS*, *supra* note 387, at 27.

tory avoidance in mind, and the use of such products with incomplete information resulted in a torrent of significant losses by users of all levels of sophistication.⁴⁹⁸ A more coherent regulatory structure in which regulatory competition and overlap are minimized would eliminate much of the financial innovation directed towards regulation avoidance and jurisdiction selection. Additionally, greater regulatory coherence would lessen the ability of innovators to attempt to profit from the opportunities created by regulatory inefficiency, expressed, for example, in simultaneous regulation along both product and institutional lines.

Regulatory inefficiency and the inadvertent complexity it introduces into the financial system may be minimized in a number of ways. Two options that deserve additional study are the consolidation of regulatory authority over the markets impacted by contemporary financial innovation and the creation of a presumption of regulation, which would attach to all products and services created by contemporary financial innovation.

If financial market regulation is predicated on a presumption that all financial products that perform one or more of the fundamental services of the financial sector⁴⁹⁹ are subject to regulation, the tendency of the process of contemporary financial innovation to be vectored toward the avoidance of regulation, or towards the capture of gratuitous benefits from regulatory inefficiency, will be diminished. Moreover, a presumption of regulation may, in fact, change the process of contemporary financial innovation by encouraging innovators to incorporate prevailing regulatory considerations into the design and marketing of their products. A presumption of regulation also would create incentives for the creation and disclosure of information concerning the operation and risks of new products specifically for the use of regulators. Innovators could come to view the education of regulators as part of the process of contemporary financial innovation, recognizing that investing resources in this effort ultimately should lower the cost of regulatory compliance while increasing regulatory familiarity with the most recent developments in this area. Increased regulatory competence will free both regulators and sectoral participants from the need for incrementalism and create the possibility of crafting genuinely forward-looking regulation for this arena. The presumption of regulation should also decrease the tendency of financial innovation to serve as a medium that disguises financial fragility and thereby encourages sectoral instability as participants seek speculative rather than enterprise based earnings. Further research should, *inter alia*, examine the relationship between such a presumption and the widely

498. See generally Becker & Yoon, *supra* note 24.

499. Or more precisely, all financial products and services that constitute new and better ways of providing the fundamental services of the financial sector, which increase the opportunity set for sector participants and lower transaction costs; or, those new instrumentalities and processes that facilitate the provision of the fundamental services of the financial sector. See *supra* text accompanying notes 254-72.

held belief in the value, if not superiority, of the private ordering of financial transactions.

Of course, the call for regulatory consolidation is not new.⁵⁰⁰ Despite the ostensible benefits of a centralized regulatory structure, there are strong historic and political rationales for the persistence of regulatory competition and overlap. The recent calls for the elimination of regulatory competition in financial markets regulation, as a result of the concerns prompted by large derivatives losses, has been met by well-financed resistance from some segments of the relevant business community.⁵⁰¹ However, additional research is necessary to determine whether the forces of technology and globalization will render the potential benefits of regulatory consolidation illusory. It is reasonably clear that the forces of technological innovation have so integrated the global financial markets that regulatory consolidation in the United States would, in all probability, fail to significantly ameliorate the risks presented by contemporary financial innovation by the reduction of innovations designed to either avoid or take advantage of the current regulatory structure.⁵⁰² Innovators may establish operations in those international jurisdictions that would permit the creation and marketing of financial innovations that are geared toward the jurisdictional preferences among international designers and users of financial innovations. U.S. markets may have the advantages offered by relative stability and historic performance, but in an environment in which it is believed that every risk can be hedged, many market participants seeking to replace traditional sources of profitability or to enhance the value of capital assets will continue to seek products that claim to meet those needs, wherever they are available. The international consequences of regulatory consolidation in the U.S. could well create a more complex global financial marketplace in which the risks presented by contemporary financial innovation could be amplified. More research should be devoted to these areas, as it is clear that the nature and structure of the regulation of financial derivatives has played, and will continue to play, a role in the direction of contemporary financial innovation.

500. The call for regulatory consolidation began with the jurisdictional squabbles between the CFTC and the SEC. *See supra* note 176 and accompanying text. It continued after the market break of 1987, after which the Brady Commission recommended the creation of a single regulatory agency to regulate the capital and risk-mediation markets. *See* Task Force, *supra* note 488, at 59-63. The Chicago Mercantile Exchange proposed the merger of the CFTC, the SEC, the banking agencies, and banking and securities industries insurance funds, among other entities, into one agency that could then create a level playing field for all market participants. *See* CHICAGO MERCANTILE EXCHANGE, MODEL FOR FEDERAL REGULATION (1993). Bills have also been introduced in Congress to achieve some form of regulatory consolidation in the financial markets. *See supra* note 24.

501. *See* John C. Coffee, Jr., *Competition Versus Consolidation: The Significance of Organizational Structure in Financial and Securities Regulation*, 50 *BUS. LAW.* 447, 473-81 (1995).

502. *See id.* at 481.

D. PERCEPTIONS AND SECTORAL DYNAMICS

Perhaps the greatest insight provided by heterodoxy is the role that perceptions of sectoral dynamics play in the rise and development of the process of contemporary financial innovation. Perceptions concerning sectoral dynamics have both influenced and been influenced by the process of contemporary financial innovation. However, legal scholarship is only beginning to appreciate the inadequacies of the neoclassical synthesis and to fully explain the interaction between psychological factors and market dynamics. In contrast, heterodoxy places significance on the interactions between market processes and the perceptions of market participants without limiting its understanding of human decision-making by poorly fitting decisional heuristics. For example, changes in perceptions of sectoral dynamics accompanied the introduction of financial futures and options contracts. These products provided market participants with false assurances of liquidity, as well as reason to believe that these products' ability to hedge certain market and credit risks made greater risk-taking a safer proposition than it had previously been. This view was encouraged by the characterization of financial derivatives as the products of financial science. The impact of the asymmetrical reward structure on managerial decision-making and the role of conventional decision-making under uncertainty helped this changed view of sectoral dynamics permeate the financial sector. Therefore, managers' decision-making biased them toward the belief that the products of financial innovation could be used to counter the impact of increased competition and decreased earnings.

Although these processes are observable, the question becomes how to incorporate the teachings of heterodox thought—concerning the role that changes in perceptions of market dynamics—into policy. Additional study of the role played by changes in perceptions of sectoral dynamics should provide greater clarity on the interaction of decisional heuristics, real world market processes, and insight into the ability of the current regulatory structure to counteract sectoral tendencies toward fragility as a result of changed perceptions.

Ultimately, the teachings of heterodoxy may sufficiently expand our knowledge and comprehension base enabling changes to the financial system that encourage productive welfare and enterprise enhancing financial innovation, while minimizing the ability of financial innovation to increase sectoral difficulties. Although heterodoxy offers much in the way of sophisticated models and analysis, all legal scholarship examining financial innovation should be mindful of its basic teachings. First, we live in a complex financial system in which financial institutions are present and money is important. Therefore, contemporary financial innovation cannot be reduced to a reaction to changes in regulation or regulatory policy. Although the current regulatory structure, in conjunction with the regulatory dialectic will increase the tendency toward financial innovation, those factors only explain part of the process, and, in particular, do

not fully explain the impact of regulatory structure in influencing the direction of financial innovation. Second, our examination of financial innovation across time corroborates the heterodox conclusion that the process of contemporary financial innovation differs from its antecedents only in degree, and then only because it occurs in a much more complex financial environment. However, over the last half century, increasingly large numbers of highly specialized products of contemporary financial innovation have begun interacting in a financial sector of unprecedented size, scope and sophistication. It seems reasonable to conclude that these products may interact with sectoral dynamics and historical trends (corporate earnings trends for example), potentially amplifying financial fragility and instability. These products achieve this result by providing a rationale for the absorption of increased risk, while disguising the move from productive enterprise to speculative investment. However, it seems as reasonable to conclude that this melange may produce dynamic processes for which there are no presently existing models. Finally, our reliance on economic orthodoxy as an adequate basis upon which to construct research, policy and law may not be justified. Legal scholarship is expanding beyond the confines of economic orthodoxy, although primarily with a reformist attitude. More is needed. The world of economics necessarily provides a much wider variety of tools for research and analysis than any one region of that world could provide. We should be more willing to take advantage of this bounty.

VI. CONCLUSION

Orthodox and heterodox explanations of the rise of contemporary financial innovation focus on the same essential factors, but assign them different weights and different roles in their respective interpretations of the processes that produced contemporary financial innovation. Although recognizing that increased competition is an ingredient in the creation of contemporary financial innovation, neoclassical theory places primary significance on regulation and finance theory. Orthodoxy looks for its explanation in changes to the regulatory environment. These changes created opportunities to apply advances in financial theory to create new instruments or processes in the effort to escape regulatory inefficiency and increase profitability.

Heterodox theory acknowledges that regulation and finance theory have played an important role in the development of contemporary financial innovation, but places its focus on the role those factors play in generating increased competition and financial fragility. Regulatory changes, or the responses of economic actors to regulatory structures, have resulted in significant changes in market dynamics and in increased market contestability. They have induced innovation on the part of some firms to mimic highly regulated products and services while remaining outside the domain of regulatory authorities. They also have promoted financial innovation as a way to regain reliable sources of profitability.

Finance theory also precipitated change in perceptions of sectoral dynamics and changes in perceptions concerning the fundamentals, in particular, the willingness of economic actors to acquire increasingly high levels of debt.

It is through an examination of the policy implications of these two approaches that their distinctions are drawn into sharper contrast. Neo-classical thought teaches that policy intervention, in the form of regulatory or self-regulatory responses in the financial markets, should be based on the desire to improve the efficiency of market processes by correcting perceived market imperfections that, for example, raise cost, lower transacting freedom, or otherwise produce socially undesirable results.⁵⁰³ At the least, policy intervention by regulation or self-regulation also should address the heterodox concern that sectoral processes have the ability to unfavorably impact the entire economy.⁵⁰⁴ However, the heterodox perspective further suggests that policy intervention should not limit its focus to improving the efficiency of market functions. Although contemporary financial innovation in heterodox thought is associated with increased speculation and rising instability, it also recognizes that innovation has the potential to achieve significant increases in welfare.⁵⁰⁵ Economic theory is concerned with the production and distribution of resources, goods and services.⁵⁰⁶ Innovation, including financial innovation, has the potential to increase the size of the pot consisting of resources, goods, and services, thereby increasing total welfare.⁵⁰⁷ Thus, heterodox thinkers are concerned that the welfare enhancements resulting from productive financial innovation be distributed between wages and profits not only to promote efficiency,⁵⁰⁸ but equity as well.⁵⁰⁹ If heterodox theory, as further scholarship in this area may indicate, has the ability to promote a more equitable economy, then it is in the interest of legal scholarship to explore these ideas as a part of its basic commitment to justice.

503. See RICHARD J. PIERCE, JR., *ECONOMIC REGULATION: CASES AND MATERIALS* 1 (1994).

504. See Kuprianov at 2 (on file with author).

505. See Silber, *supra* note 49, at 1.

506. See *id.*

507. See *id.*

508. The heterodox notion of efficiency includes both allocative efficiency and stability efficiency, recognizing that systems that promote efficient resource distribution may promote instability as well. See MINSKY, *supra* note 215, at 296.

509. See *id.*