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**THE ENLIGHTENMENT AND THE FINANCIAL CRISIS OF 2008: AN
INTELLECTUAL HISTORY OF CORPORATE FINANCE THEORY**

JAMES R. HACKNEY, JR.*

Professor powell paints a sweeping account of the relationship between the Enlightenment and law. I agree with the basic thrust of his argument, and I applaud his ability to make connections between the broad scope of intellectual history and developments in law.¹ I have previously written about the interconnection between philosophical ideals and the development of legal-economic theory as it particularly relates to tort law theory.² Through his extension of these ideas into other areas of law, Professor powell illustrates their wide implications.

As Professor powell highlights, one of the principal tenets of the Enlightenment is the belief in rationality and the focus on the individual as the emphasis of analysis.³ This individualistic ideal is the foundation of neoclassical economics, which I have previously detailed.⁴ It is also the foundation for modern finance theory, which ascended with neoclassical economics and has a close relationship with it both theoretically and institutionally.

Currently, given changes in scientific and philosophical views, these Enlightenment ideals have begun to come under assault. We see this in notions of uncertainty in quantum theory within science and in the neopragmatist turn in philosophy.⁵ Care needs to be taken, however, with regard to the implications of our post-Enlightenment times. The emergence of post-Enlightenment perspectives does not signal the end of Enlightenment

* Professor of Law, Northeastern University School of Law. I wish to thank all of the Childress Lecture participants, particularly john powell, for their stimulating insights that helped me shape this paper. I also want to thank the Childress Lecture organizers for sponsoring the event. Two of my colleagues at Northeastern, David Phillips and Dan Schaffer, provided valuable comments on earlier drafts of this Article. I also benefited from very thoughtful comments from Daniel Walkowitz at the Second Annual J.S. Intellectual History Conference.

1. See generally john a. powell & Stephen M. Menendian, *Remaking Law: Moving Beyond Enlightenment Jurisprudence*, 54 ST. LOUIS U. L.J. 1035 (2010).

2. JAMES R. HACKNEY, JR., UNDER COVER OF SCIENCE: AMERICAN LEGAL-ECONOMIC THEORY AND THE QUEST FOR OBJECTIVITY (2007).

3. ROY PORTER, THE ENLIGHTENMENT 2-3 (2d ed. 2001).

4. HACKNEY, *supra* note 2, at 145.

5. *Id.* at 121-28.

influences as a descriptive matter, nor should it, at least in my opinion, as a normative matter. Enlightenment ideals are and should play an important role in our quest for knowledge acquisition even in a post-Enlightenment world. I believe that it is better to state the role of the relationship between Enlightenment and post-Enlightenment ideas as being in a metaphorical conversation with each other. Enlightenment thought does and should play a continuing role in our quest for knowledge. Yet given the insights that we have developed since the Enlightenment, we must augment, and at times reconsider, forms of knowledge associated with the Enlightenment (including rationality). Ironically, Enlightenment ideals may put us in the best position to undertake this reevaluation given the Enlightenment's emphasis on empiricism.⁶ Modern finance theory provides a notable exemplar of my thesis regarding the Enlightenment and its relationship to the post-Enlightenment era. Further, these musings about finance theory, the Enlightenment, and post-Enlightenment thinking are not merely an academic exercise because finance theory has impacted world economies in profound ways—including the 2008 financial crisis.

Modern portfolio theory is the foundation upon which the edifice of corporate finance theory has been erected.⁷ The theory posits that a rational investor will invest in a diversified portfolio of securities—the mix of which will depend upon his or her tolerance for risk.⁸ There are many technical nuances associated with modern portfolio theory beyond the scope of this Article.⁹ It is telling, however, that Harry Markowitz, the originator of portfolio theory and widely regarded as the founder of modern corporate finance theory, in a discussion with budding finance students emphasized that they not only focus on the technical aspects of finance theory, but also consider philosophical issues.¹⁰ Markowitz specifically referenced Rene Descartes' *First Meditation*,¹¹ David Hume's *An Inquiry Concerning Human Understanding*¹² ("*Human Understanding*"), and Leonard Savage's *The*

6. powell & Menendian, *supra* note 1, at 1041 (describing the empirical hallmark of the Enlightenment).

7. Much of my description of corporate finance theory is derived from a more technical description in STEPHEN A. ROSS, RANDOLPH W. WESTERFIELD & JEFFREY JAFFE, *CORPORATE FINANCE THEORY* 261–87 (7th ed. 2005).

8. HARRY M. MARKOWITZ, *PORTFOLIO SELECTION: EFFICIENT DIVERSIFICATION OF INVESTMENTS* 6 (2d ed. 1991).

9. *Id.* at 37.

10. Interview by Steve Buser with Henny M. Markowitz at Rady School of Management at the University of California, San Diego (October 8, 2004) [hereinafter Markowitz Interview].

11. RENE DESCARTES, *First Meditation*, in *DISCOURSE ON METHOD AND MEDITATIONS* 95–101 (Penguin Classic 1998) (1641).

12. DAVID HUME, *AN ENQUIRY CONCERNING HUMAN UNDERSTANDING* 23 (Oxford Univ. Press 2007) (1748).

Foundations of Statistics.¹³ Each of these works exemplifies Enlightenment ideals in their own way.

The *First Meditation* sets up Descartes' starting point for philosophical analysis. He is very skeptical about his ability to know through the senses.¹⁴ Descartes appreciates the physical sciences (e.g., physics, astronomy, and medicine), but he is particularly attracted to the axiomatic sciences (e.g., arithmetic and geometry).¹⁵ Descartes's devotion to the idea of scientific discovery and the power of science may have been most important to Markowitz, though. The *First Meditation* is infused with an ethos that science holds the key to knowledge acquisition.¹⁶ This fixation with science is very much a hallmark of the Enlightenment, and it is evident in Markowitz's work and throughout the rest of corporate finance theory.

David Hume is a central figure of the Enlightenment, and a key component of Hume's thought is his emphasis on empiricism. In his *Enquiry Concerning Human Understanding*, Hume adopted a skeptical position regarding human knowledge acquisition and drew a distinction between demonstrative (logical) and probable (empirical) reasoning.¹⁷ Probable reason according to Hume is, by its very nature, uncertain, and it must be guided by both experience and from our inference from evidence (which Hume referred to as "custom").¹⁸ In his treatise, Hume put forth the philosophical basis for probability theory—the mathematical method of deriving inferences from experience.¹⁹ This method would later serve as the foundation for contemporary statistics.²⁰

According to Markowitz, Leonard Savage (who was Markowitz's statistics professor at the University of Chicago) taught him that "a rational agent acting under uncertainty would act according to 'probability beliefs' where no objective probabilities are known."²¹ This is indeed the lesson one would draw from Savage's classic, *The Foundations of Statistics*.²² Savage takes the foundation of statistics to be probability.²³ His theory is part of a movement that departs from the sort of historical intuitivism that focused on gathering and

13. LEONARD SAVAGE, *THE FOUNDATIONS OF STATISTICS* (Dover Publications 1972) (1954).

14. DESCARTES, *supra* note 11, at 96.

15. *Id.* at 98.

16. *See id.* at 95–101.

17. HUME, *supra* note 12, at 25–26.

18. *Id.* at 32.

19. *Id.* at 32–34.

20. J. Durbin, *Statistics and Statistical Science*, 140 J. ROY. STATIST. SOC., A 177, 185 (1987).

21. Harry M. Markowitz, *Foundations of Portfolio Theory*, Nobel Lecture, (December 7, 1990), in *ECONOMIC SCIENCES* 280 (World Sci. Pub. 1992).

22. SAVAGE, *supra* note 13.

23. *Id.*

condensing data, by replacing it with an emphasis on statistical inference through mathematical techniques and logical reasoning.²⁴ Savage frames this as being based on a “personalistic” view of probability, which he defines quite succinctly as follows:

Personalistic views hold that probability measures the confidence that a particular individual has in the truth of a particular proposition, for example, the proposition that it will rain tomorrow. These views postulate that the individual concerned is in some ways ‘reasonable,’²⁵

The reason that this probabilistic approach is necessary is that individuals must make decisions under uncertainty.²⁶ Savage builds up a “highly idealized theory of the behavior of a ‘rational’ person with respect to decisions.”²⁷ This is precisely the form of theory that underpins Markowitz’s portfolio theory.

In *Portfolio Selection*,²⁸ Markowitz articulates the following premises: First, uncertainty with regard to risk is the salient feature in thinking about how individuals make investment decisions.²⁹ Second, the investor is assumed to behave as the rational man would.³⁰ The rational man is perfect in the sense that he has access to all available information, makes no error in calculations, and has no biases.³¹ But he is not omniscient.³² If the rational man were all knowing, then the requirement of the first criterion, uncertainty, would not hold. Finally, the investor is risk averse.³³ He would prefer greater returns but less risk (uncertainty).³⁴

While portfolio theory is based on relatively sophisticated mathematics, the basic intuition is quite simple. Assume that an individual is looking for opportunities to invest. She could invest in a single asset, i.e., Company A stock. Portfolio theory demonstrates that the investor would necessarily be better off investing in a portfolio of securities.³⁵ If she invests in both Company A stock and Company B stock, she will be able to reduce her risk for

24. *Id.* at 2.

25. *Id.* at 3.

26. *Id.* at 6.

27. SAVAGE, *supra* note 13, at 7.

28. HARRY M. MARKOWITZ, *PORTFOLIO SELECTION* 205–07 (2d ed. Basil Blackwell 1991) (1959) [hereinafter MARKOWITZ, *PORTFOLIO SELECTION*] (a monograph length treatment of the path breaking ideas Markowitz had put forward in 1952 regarding portfolio selection); Harry M. Markowitz, *Portfolio Selection*, 7 J. FIN. 77, 77–91 (1952).

29. MARKOWITZ, *PORTFOLIO SELECTION*, *supra* note 28, at 206.

30. *Id.*

31. *Id.*

32. *Id.*

33. *Id.* at 6.

34. Stephen B. Cohen, *The Suitability Rule and Economic Theory*, 80 YALE L.J. 1604, 1608 (1971).

35. *Id.* at 1609.

any given level of return—assuming that the two stocks are not perfectly correlated (i.e., they do not react exactly the same to changes in the market). The reason for this is that since the two stocks react differently to market changes, they effectively hedge the risk of each other. This two-asset example is extended in portfolio theory to arrive at a very general claim: as an investor increases her holding of assets in a portfolio, she is able to eliminate virtually all individual asset risk (unsystematic risk) and is only left with market risk (systematic risk).³⁶ The upshot of this is that all rational and risk averse investors (again, a general assumption in corporate finance theory) will hold diversified portfolios.³⁷

An implication of portfolio theory is that the correct measure of risk is not the way in which an individual security reacts to market shifts but, rather, its contribution to the risk of a portfolio. A key move in finance theory is to assume that all individuals have the same estimates for the expected return, variance, and covariance of securities.³⁸ (Finance theorists refer to this assumption as the “homogeneous expectations” theory.³⁹) It is important to note that it is not necessary that all market actors are rational or indeed have homogenous expectations.⁴⁰ Indeed, most corporate finance theorists would concede that neither assumption is realistic.⁴¹ But the basic theories of corporate finance can be maintained under conditions in which the market acts “as if” these assumptions were true.⁴² If this is so, then there is one idealized optimal portfolio (in terms of mix of risky assets) that all individuals will hold. Logic would dictate that this optimal portfolio would reflect the market of risky assets—the market portfolio.⁴³ This is represented in a broad-based portfolio such as the Standard & Poor’s 500 (“S&P 500”).⁴⁴ While it is not possible to hold the S&P 500, there are financial products that are designed to mimic it. In addition, the fact that mutual funds make up a large part of investor holdings lends credence to the assumption that the market portfolio is a suitable proxy for the risky-asset portfolio. If an individual is less or more risk averse, she will either mix her risky assets (market portfolio) with non-

36. *Id.* at 1615.

37. *Id.*

38. ROSS ET AL., *supra* note 7, at 280.

39. *Id.*

40. *Id.*

41. *Id.*; see also William F. Sharpe, *Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk*, 19 J. FIN. 425, 433–34 (1964).

42. See MILTON FRIEDMAN, *ESSAYS IN POSITIVE ECONOMICS* 21–22 (U. of Chi. Press 1953).

43. ROSS ET AL., *supra* note 7, at 280.

44. See, e.g., S&P 500, <http://www.standardandpoors.com/indices/sp-500/en/us/?indexId=spusa-500-usduf-p-us-l->.

risky assets (e.g., Treasury-bills) or borrow (leverage) to acquire more of the optimal risky asset portfolio.⁴⁵

It is difficult to overestimate the theoretical and practical significance of portfolio theory. It is the intellectual basis behind the proliferation of mutual funds. While investors had always instinctively diversified their asset holdings, Markowitz laid the foundation for a scientific/mathematical approach to building efficient portfolios and determining the efficient allocation of assets given an investor's risk/return preferences.⁴⁶ Portfolio analysis is theoretically simple. Constructing portfolios was computationally difficult, however, until there were adequate advances in computing skills that allowed investment managers to engineer efficient portfolios—hence, the explosion in the mutual fund business. Portfolio theory also served as the basis for core developments in corporate finance theory to follow.⁴⁷

The implication that investors will choose to hold a market portfolio was the central insight that led to the capital asset pricing model.⁴⁸ The capital asset pricing model provides a roadmap for calculating the expected returns (and thence, price) for any individual security.⁴⁹ It was developed by William Sharpe in 1964.⁵⁰ The theory was an extension of Sharpe's Ph.D dissertation that had been written under the tutelage of Markowitz.⁵¹

It is possible to measure the expected price fluctuation of an individual security against market portfolio price fluctuations.⁵² This measurement is referred to as β , or Beta, in finance theory.⁵³ An investor concerned with the riskiness of an individual security will take Beta as its measure given our assumption that all investors will choose to hold a market portfolio. Again, the reason why this is the case is that Beta is a measure of the riskiness of the asset in relationship to the market (i.e., the investor's market portfolio to which the asset will be added).⁵⁴ Beta is a commonly found statistic.⁵⁵ One can find the

45. Cohen, *supra* note 34, at 1609–10

46. See generally MARKOWITZ, PORTFOLIO SELECTION, *supra* note 28.

47. Jeffrey S. Glaser, Comment, *The Capital Asset Pricing Model: Risk Valuation, Judicial Interpretation, and Market Bias*, 50 BUS. LAW. 687, 689–70 (1995).

48. See *id.*

49. Sharpe, *supra* note 41, at 435–42.

50. *Id.* at 425.

51. William F. Sharpe, *Autobiography*, Nobelprize.org, http://nobelprize.org/nobel_prizes/economics/laureates/1990/sharpe-autobio.html.

52. See Peter V. Letsou, *Implications of Shareholder Diversification on Corporate Law and Organization: The Case of the Business Judgment Rule*, 77 CHI.-KENT L. REV. 179, 206 n.74 (2001).

53. *Id.*

54. *Id.*

55. See California State University, Fullerton, *Business Students' FAQs: Company Financial Information*, <http://guides.library.fullerton.edu/busifaq/financials.htm>.

Beta of any publicly traded company readily via the Internet.⁵⁶ There are a few intuitive steps between understanding Beta and calculating the expected return for an individual security. At a minimum, given that the security is a risky asset, an investor will demand that it return something greater than returns for risk-free assets.⁵⁷ (This is implied in the risk aversion assumption.) The measure of that “something greater” is represented in the capital asset pricing model:

$$R = R_f + \beta X(R_m - R_f),$$

where R is the expected return, R_f is the risk-free rate of returns, β is the measure of the riskiness of the asset in relationship to the market, and R_m is the return on the market portfolio.⁵⁸ The capital asset pricing model incorporates the assumptions that investors seek an efficient mix of risk and return—combining insights from portfolio theory and the belief that an individual investor acting in his or her self-interest drives markets towards efficiency.⁵⁹

The idea of market efficiency took prominent place in corporate finance with Eugene Fama’s articulation of the efficient market hypothesis in 1970.⁶⁰ An efficient market is implicit in the homogeneous expectations assumption underlying corporate finance theory.⁶¹ In order for the efficient market hypothesis to hold true, individual investors must act rationally.⁶² This does not mean that every individual must act rationally but that rationality predominates to an extent great enough such that pricing reflects rational decision-making. As discussed previously, the rationality assumption also survives if the market behaves “as if” rationality prevailed. One mechanism for this is arbitrage, where savvy investors invest in the market in such a way as to take advantage of irrational choices and subsequently force assets to efficient price levels. Another way in which the market can obtain a rational outcome in the face of irrationality is when irrational actors effectively cancel each other out. For example, if a similar number of investors both undervalue and overvalue an asset, the efficient price should theoretically prevail.⁶³

56. *Id.*

57. Cohen, *supra* note 34, at 1608.

58. ROSS ET AL., *supra* note 7 at 285.

59. *See supra* text accompanying notes 31–40 (discussing rationality assumptions).

60. *See* Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. AM. FIN. ASS’N 383 (1970) (setting forth the efficient market theory); *see also* Gill North, *Efficiency, Fairness & Irrationality: Incompatible or Complementary?*, 24 BANKING & FIN. L. REV. 311, 315 (2009).

61. *See supra* text accompanying notes 40–48 (discussing the homogeneous expectations theory).

62. North, *supra* note 60, at 315.

63. ROSS ET AL., *supra* note 7, at 354.

Fama proposed three forms of efficient markets: weak, semi-strong, and strong.⁶⁴ The weak version presupposes that all former price information is reflected in asset pricing.⁶⁵ The semi-strong definition requires that all public information (including past prices) be incorporated in pricing.⁶⁶ The strong version assumes that all information (public and private) is embedded in prices.⁶⁷ At the University of Chicago, (the university home of Savage, Markowitz, Sharpe, and Fama) researchers devoted a great deal of attention to conducting studies that would prove the efficient market hypothesis correct.⁶⁸ These “event studies” were based on analyzing price movements as related to information disclosure.⁶⁹ This empirical research seemed to support the efficient market hypothesis (particularly in its weak and semi-strong forms).⁷⁰ Corporate finance theorists make limited claims with regard to the three forms of the efficient market hypothesis; they claim that the theories stand for the proposition that one cannot gain an advantage in investing in the market because, depending on the form of the efficient market hypothesis, certain information is already reflected in prices.⁷¹ Regardless, the lore regarding efficient markets that has filtered into the popular conscience is that assets are appropriately priced and reflect underlying value.⁷²

The theoretical architecture of modern corporate finance theory fits well with free market ideology. It hardly comes as a surprise that most of the preeminent architects of corporate finance either found their institutional home at the University of Chicago or were heavily influenced by it.⁷³ Corporate finance was forged in the same University of Chicago crucible that produced some of our most prominent free market oriented neoclassical economists: Frank Knight, Milton Friedman, George Stigler, Gary Becker, and James

64. Fama, *supra* note 60, at 383.

65. *Id.* at 388.

66. *Id.*

67. *Id.*

68. See John H. Langbein, *The Uniform Prudent Investor Act and the Future of Trust Investing*, 81 IOWA L. REV. 641, 656 (1996); see also Henry Manne, *Remarks on the Lewis & Clark Law School Business Law Forum: Behavioral Analysis of Corporate Law: Instruction or Distraction?*, 10 LEWIS & CLARK L. REV. 169, 172 (2006).

69. Jonathan R. Macey et al., *Lessons From Financial Economics: Materiality, Reliance, and Extending the Reach of Basic v. Levinson*, 77 VT. L. REV. 1017, 1026 (1991).

70. *Id.* at 1028–29.

71. Merritt B. Fox, *The Legal Environment of International Finance: Thinking About Fundamentals*, 17 MICH. J. INT’L L. 721, 724–25 (1996) (reviewing HAL S. SCOTT & PHILIP A. WELLONS, *INTERNATIONAL FINANCE: TRANSACTIONS, POLICY, AND REGULATIONS* (1995)).

72. See William S. Blatt, *Minority Discounts, Fair Market Value, and the Culture of Estate Taxation*, 52 TAX L. REV. 225, 227 (1997).

73. See Kenneth G. Elzinga, *Law and Economics: Is there a Higher Law?*, 36 PEPP. L. REV. 507, 510 (2008) (describing the University of Chicago as the “taproot of the law and economics movement” and the scholars with roots at the institution).

Buchanan to name only a select few.⁷⁴ Four of these economists received the Nobel Prize for Economic Science, as did Markowitz and Sharpe.⁷⁵ Fama's efficient market hypothesis (and, by extension, the capital asset pricing model) imply that there is no need for government intervention to adjust prices since the market is efficient.⁷⁶ The market and its individual rational actors are, after all, the best organizers of economic activity. Prices are the market's signal to its individual rational actors. F.A. Hayek argued that price serves as the coordinating device for organizing an economy in an influential article entitled *The Use of Knowledge in Society*.⁷⁷ Hayek was an inspirational figure for Chicago school economists, and his classic, *The Road to Serfdom*, serves as a foundational text for the contemporary conservative movement.⁷⁸

A critical implication for the belief in market efficiency and the informational role of prices is that there should not be bubbles (artificially high prices) in markets. This belief held sway through such tumultuous economic times as the 1980s real estate boom and collapse that led to the savings and loan crisis, as well as the boom in the high-tech ("dot-com") industry in the 1990s.⁷⁹ Of course, each of these bubbles burst even while the theory of free markets continued to gain political prestige.⁸⁰ The confidence in free markets was even further bolstered in the financial industry because of the scientific patina placed on it in light of corporate finance theory.⁸¹

This belief in the free market—particularly in the finance industry—contributed to a host of deregulatory moves in the last few decades of the twentieth century that arguably set the stage for the 2008 financial crisis. The major deregulatory decision was to repeal the Glass-Steagall Act.⁸² The Glass-Steagall Act, a product of post-Great Depression financial reform, severely limited the ability of commercial banks to engage in the insurance and securities business.⁸³ Glass-Steagall was repealed in 1999 with the passage of

74. *Id.* In fact, Milton Friedman was on Markowitz's dissertation committee. Cheng-Few Lee, *Markowitz, Miller, and Sharpe: The First Nobel Laureates in Finance*, 1 REV. QUANTITATIVE FIN. & ACCT. 209, 214 (1991).

75. Lee, *supra* note 74, at 209.

76. Alon Brav & J.B. Heaton, *Market Indeterminacy*, 28 J. CORP. L. 517, 528 (2003).

77. F.A. Hayek, *The Use of Knowledge in Society*, 35 AM. ECON. REV. 519, 526 (1945).

78. See F.A. HAYEK, *THE ROAD TO SERFDOM* (1944).

79. Erik F. Gerding, *Laws Against Bubbles: An Experimental-Asset-Market Approach to Analyzing Financial Regulation*, 2007 WIS. L. REV. 977, 979 (2007).

80. See Joseph M. Schwartz, *Democracy Against the Free Market: The Enron Crisis and the Politics of Global Deregulation*, 35 CONN. L. REV. 1097, 1098–99 (2003).

81. *Id.*

82. See Barbara Crutchfield George et al., *The Opaque and Under-Regulated Hedge Fund Industry: Victim or Culprit in the Subprime Mortgage Crisis?*, 5 N.Y.U. J.L. & BUS. 359, 365 n.25 (2009).

83. *Id.* at 386.

the Gramm-Leach-Bliley bill.⁸⁴ It is perhaps fitting that the major figure behind the legislation, then Senator Phil Gramm (R-Texas), was a free market economist and former professor.⁸⁵ The impetus for its repeal was a merger by the then-named Citicorp (now Citigroup) with Travelers Group (an insurance company).⁸⁶ The merger violated Glass-Steagall, and it would have been dissolved if nothing were done to relax regulations.⁸⁷ In addition to the prudential concern of having to possibly unwind one of the major mergers in United States history, which reflected the general expansionary direction of the financial industry, the belief in free markets had so permeated political thinking that Glass-Steagall seemed like an unnecessary regulatory artifact of the New Deal era.⁸⁸ After all, if markets responded well and seemed to support the creation of financial companies that acted as “one-stop shops” for all financial services needs, the popular conception of efficient markets would imply that this was the proper course. Government intervention to stave off such financial conglomeration could only produce inefficiencies. Gramm-Leach-Bliley, signed into law by President Clinton, was part of the general deregulation ethos that transformed not only the United States but also countries around the globe.⁸⁹

Milton Friedman was very much the intellectual nova for this free market movement.⁹⁰ He wrote paradigmatic conservative texts such as *A Monetary History of the United States*,⁹¹ *Capitalism and Freedom*,⁹² and *Free to Choose*,⁹³ as well as doing technical economics. All the while, the economics department, business school, and law school at the University of Chicago were continuing to produce and promote an ever growing number of academic stars in the fields of economics and finance whose technical acumen was matched,

84. *Id.* at 385–86.

85. See United States Congress, Biographical Directory of the United States Congress, Gramm, William Philip (Phil) Biographical Information, http://bioguide.congress.gov/scripts/bio_display.pl?index=g000365.

86. Robert W. Dixon, Note, *The Gramm-Leach-Bliley Financial Modernization Act: Why Reform in the Financial Services Industry Was Necessary and the Act's Projected Effects on Community Banking*, 49 DRAKE L. REV. 671, 676 (2001).

87. *Id.*

88. *Id.*

89. George et al., *supra* note 82, at 387. See also DANIEL YERGIN, *THE COMMANDING HEIGHTS: THE BATTLE BETWEEN GOVERNMENT AND THE MARKETPLACE THAT IS REMAKING THE MODERN WORLD* (1998).

90. Patricia Sullivan & Carlos Lozado, *Economist Touted Laissez-Faire Policy*, WASH. POST, Nov. 17, 2006, at A01.

91. MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, *A MONETARY HISTORY OF THE UNITED STATES 1867–1960* (1963).

92. MILTON FRIEDMAN, *CAPITALISM AND FREEDOM* (1962).

93. MILTON FRIEDMAN & ROSE FRIEDMAN, *FREE TO CHOOSE: A PERSONAL STATEMENT* (1980).

often times, by their political conservatism.⁹⁴ The second wave of finance theorists would take corporate finance to new technical heights and penetrate the core of Wall Street.

The genesis of this technical development goes back to the initial question raised by Markowitz: How do we deal with risk under conditions of uncertainty? But the next generation would take the question a step further: How do we master risk? The answer would lie in options. In their most basic form, options (also known as derivatives) come in two types: calls and puts.⁹⁵ A call gives the holder a right to buy an asset at a designated price for a contractually agreed upon period of time.⁹⁶ A put grants the holder the right to sell an asset for an agreed upon price during a specified time frame.⁹⁷ Derivatives such as put and call options can be sliced, diced, and configured in endless ways to create particular risk characteristics.⁹⁸ They provide investors with a vehicle to precisely manage risks. A key breakthrough in finance theory was the derivation of a formula for valuing options—the famous Black-Scholes model, which was put forward by Fischer Black and Myron Scholes in 1973.⁹⁹ Black-Scholes expands upon the foundation of the capital asset pricing model. Like portfolio theory, Black-Scholes had the benefit of having practical applications.

From the Black-Scholes “simple” equation for valuing standard options, the field now referred to as “financial engineering” would develop, in which all manner of securities are created to manage and structure risk.¹⁰⁰ Financial engineers (also referred to as “quants”) are scientists (mathematicians, physicists, computer scientists, etc.) who are recruited to Wall Street to create

94. See Elzinga, *supra* note 73, at 511 (discussing University of Chicago-produced economists’ influence on law and economics); M. Todd Henderson, *The Influence of F.A. Hayek on Law: An Empirical Analysis*, 1 N.Y.U. J.L. & LIBERTY 249, 264 (2005) (discussing the influence of several Nobel Prize winning economists of the “Chicago School”); Sanford M. Jacoby, *Economic Ideas and the Labor Market: Origins of the Anglo-American Model and Prospects for Global Diffusion*, 25 COMP. LAB. L. & POL’Y J. 43, 49 (2003) (describing the University of Chicago as “the center of neoclassical conservatism”).

95. Michael Parkinson, *Option Pricing: The American Put*, 50 J. BUS. 21, 24 (1977).

96. *Id.*

97. *Id.*

98. Peter H. Huang & Michael S. Knoll, *Corporate Finance, Corporate Law and Finance Theory*, 74 S. CAL. L. REV. 175, 184–85 (2000).

99. Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637, 640–45 (1973). Black and Scholes have both received the Financial Engineer of the Year award from the International Association of Financial Engineers. Press Release, Richard Roll Selected as the Recipient of the 2009 IAFE/Sungard Financial Engineer of the Year Award, PR NEWswire (Dec. 16, 2009), <http://www.prnewswire.com/news-releases/richard-roll-selected-as-the-recipient-of-the-2009-iafesungard-financial-engineer-of-the-year-award-79410062.html> (listing previous winners).

100. Huang & Knoll, *supra* note 98, at 184–85.

exotic financial instruments.¹⁰¹ It is a highly technical enterprise utilizing very abstract mathematical concepts. These engineers create instruments ranging from synthetic options to other complex derivatives.

A legendary example of the application (and pitfalls) of option-hedging strategies is Long Term Capital Management (LTCM).¹⁰² Two of the titans of corporate finance theory, Myron Scholes and Robert Merton were among the leading lights of LTCM.¹⁰³ LTCM's founder, John Meriwether, was a trendsetter in recruiting and training scientists to become financial engineers.¹⁰⁴ With the advent of exponentially more powerful computing, financial arbitrage would become the province of science.¹⁰⁵ LTCM utilized a financial device referred to as portfolio insurance to hedge market risks, made bets based on financial models that predicted when certain assets in the market were mispriced, and generally created complicated derivatives as a product for customers wishing to manage risks.¹⁰⁶ Unfortunately, the firm was highly leveraged and the equations utilized in its models did not adequately account for a dramatic downturn in the credit markets in 1998.¹⁰⁷ This led to the collapse of the firm.¹⁰⁸ Only intervention by the Federal Reserve, led by chairman Alan Greenspan, staved off widespread financial calamity in the wake of LTCM's downfall.¹⁰⁹ Of course, this may sound familiar given our current crisis.

LTCM was only a sneak preview of what was to come regarding the explosion of complex securities created through financial engineering. With regard to understanding the financial crisis of 2008, the instruments at the core of the crisis were collateralized debt obligations (CDOs) and credit default swaps (CDSs).¹¹⁰ Collateralized default obligations are large pools of risky assets that are packaged together and sold to investors (frequently in slices

101. See ROGER LOWENSTEIN, *WHEN GENIUS FAILED: THE RISE AND FALL OF LONG-TERM CAPITAL MANAGEMENT* 10–12 (2000). These scientists are frequently recruited from our most prestigious scientific institutions such as MIT and Harvard. *Id.*

102. Leah Nathans Spiro, *Dream Team*, *BUS. WK.*, Aug. 29, 1994, at 52.

103. *Id.* at 50. In fact, Robert Merton was another recipient of the Financial Engineer of the Year award. Press Release, *supra* note 99.

104. Spiro, *supra* note 102, at 54.

105. *Id.*

106. *Id.*; see generally LOWENSTEIN, *supra* note 101 (detailing the demise of LTCM); Darren Pain & Jonathan Rand, *Recent Developments in Portfolio Insurance*, 48 *BANK ENG. Q. BULL.* 37, 37–46 (2008) (discussing portfolio insurance concepts).

107. Anthony Bianco, *Outsmarting the Market*, *BUS. WK.*, Jan. 22, 2007, at 61.

108. *Id.*

109. Franklin R. Edwards, *Hedge Funds and the Collapse of Long-Term Capital Management*, 13 *J. ECON. PERSP.* 189, 201–02 (1999).

110. Michael Simkovic, *Secret Liens and the Financial Crisis of 2008*, 83 *AM. BANKR. L.J.* 253, 262 (2009).

with designated risk characteristics).¹¹¹ As the real estate boom of the late 1990s skyrocketed to incredible heights into the new millennium, real estate assets (particularly residential real estate) became one of the biggest markets for CDOs.¹¹² The essential logic, following Markowitz's insight regarding portfolio diversification, was that since these bundles of assets derived from numerous sources, such as home buyers who had taken out mortgages, diversification would hedge against risk. Moreover, sophisticated investors could purchase CDSs that acted as a form of insurance against the CDOs either to hedge their own stake in mortgage backed CDOs, or to hedge against the prospect that the real estate market would collapse.

The seller of the CDS would promise a payout if the CDO value dipped below a certain level.¹¹³ Trillions of dollars were tied up in this market.¹¹⁴ Implicit in this idea was a belief that the real estate market would not collapse and, even if it did, CDOs were diversified assets and thus not overly risky bets.¹¹⁵ Unfortunately, this logic (bringing back memories of LTCM) failed to take into account a central lesson of portfolio theory: systematic risk cannot be diversified away.¹¹⁶ Just as the market LTCM created collapsed once the credit markets improbably failed, the CDO/CDS market plummeted.¹¹⁷ Once real estate prices began to adjust to their "correct" levels, home buyers who had over-leveraged themselves with the assistance of unsound lending practices could no longer maintain the refinancing cycle that had kept the housing bubble afloat.¹¹⁸ The CDO/CDS market became so large because not only could investors hedge their bets on CDOs by purchasing CDSs, but because they could also buy CDSs without owning CDOs.¹¹⁹ Similar to a put option, investors effectively shorted the real estate market by betting that it would lose value.

This activity elevated the risk to all investors, including financial institutions. In the collapse of 2008, this risk was not limited to hedge funds

111. James Crotty, *Structural Causes of the Global Financial Crisis: A Critical Assessment of the 'New Financial Architecture,'* 33 CAMBRIDGE J. ECON. 563, 566 (2009).

112. *Id.* at 567.

113. William K. Sjostrom, Jr., *The AIG Bailout*, 66 WASH. & LEE L. REV. 943, 947-48 (2009). American Insurance Group ("AIG") was a prominent example of CDS sellers. *Id.*

114. Crotty, *supra* note 111, at 569.

115. Felix Salmon, *Recipe for Disaster: The Formula that Killed Wall Street*, WIRED, Mar. 2009, at 77, 112.

116. Roger W. Reinsch et al., *Trust Your Broker?: Suitability, Modern Portfolio Theory, and Expert Witnesses*, 17 ST. THOMAS L. REV. 173, 178 (2004).

117. See Bianco, *supra* note 107, at 61; Crotty, *supra* note 111, at 570, 573.

118. Hannah Fairfield, *In the Shadow of Foreclosures*, N.Y. TIMES, Apr. 6, 2008, at BU4; see also JOINT CTR. FOR HOUSING STUDIES OF HARV. U., *THE STATE OF THE NATION'S HOUSING 2* (2008).

119. Richard D. Cudahy, *The Coming Demise of Deregulation II*, 61 ADMIN. L. REV. 543, 550 (2009).

like LTCM.¹²⁰ The risk spread to our most staid financial institutions—banks.¹²¹ In particular, some of our major banks such as Citibank and Bank of America were tied up in the CDO/CDS market.¹²² The deregulatory push that opened the way for banks to engage in risky securities activities through various sorts of relationships—ultimately culminating in the repeal of Glass-Steagall—set the stage for the current crisis by allowing financial institutions to expand their size and scope of risk.¹²³ The lack of supervision over derivatives¹²⁴ fueled the options frenzy in particular. In 2000, the U.S. Congress, led by Senator Phil Gramm, passed the Commodity Futures Modernization Act,¹²⁵ which President Clinton signed into law.¹²⁶ As a result, CDSs and other derivatives were unregulated and allowed to proliferate. This further fueled the housing bubble.¹²⁷ Again, the pervasive free market ethos and popular belief in an efficient market supported deregulation, and it allowed banks and other large institutions to assume more risk than ever before.

The existence of asset bubbles directly contradicts the finance theory assembled out of the University of Chicago. Bubbles only occur when asset prices are artificially high and then pop when forces reveal that they have been overpriced.¹²⁸ According to the efficient market ideology, this should not occur outside of extremely improbable events. Nonetheless, Fama actually documented the fact that, historically, there have been stock swings that are wildly disproportionate to expected events.¹²⁹ While stocks prices exhibit the classic bell-shaped curve, they are not normally distributed and have “long tails,” which represent greater than expected odds of large upswings and downswings.¹³⁰ In fact, Fama found that stock fluctuations expected to occur once every 7000 years actually occurred once every three to four years.¹³¹

120. Kenneth C. Johnston et al., *The Subprime Morass: Past, Present and Future*, 12 N.C. BANKING INST. 125, 129–30 (2008).

121. *Id.* at 130.

122. Eamonn K. Moran, *Wall Street Meets Main Street: Understanding the Financial Crisis*, 13 N.C. BANKING INST. 5, 83 (2009).

123. Crutchfield George et al., *supra* note 82, at 387.

124. Moran, *supra* note 122, at 42.

125. Commodity Futures Modernizations Act, 15 U.S.C. § 77b-1 (2006).

126. Eric Lipton, *Gramm and the 'Enron Loophole'*, N.Y. TIMES, Nov. 14, 2008, <http://www.nytimes.com/2008/11/17/business/17grammside.html>.

127. *See* Moran, *supra* note 122, at 33 (noting that in order to fuel the market for securitized assets, banks increasingly cared less about the credit worthiness of the homebuyer and more about their ability to acquire new mortgages and bundle them into securities).

128. Eugene F. Fama, *Behavior of Stock-Market Prices*, 38 J. BUS. 34, 38 (1965).

129. *Id.* at 36.

130. *Id.* at 49.

131. *Id.* at 50.

These observations reportedly led Fama to be circumspect about his former student Myron Scholes' endeavors with LTCM.¹³²

Of course, historically, asset bubbles, like the 1929 stock crash and subsequent depression, have wreaked havoc on financial markets.¹³³ University of Chicago adherents credited the failure of government monetary policy for the Great Depression, among other macroeconomic ills. Friedman discussed this and other monetary policy matters in *A Monetary History of the United States*.¹³⁴ The Federal Reserve primarily used monetary policy to manage the economic fallout of bubbles.¹³⁵ Greenspan, a free market adherent, was loath to place the blame for asset bubbles on markets.¹³⁶ Government did not need to directly regulate economic activity.¹³⁷ The Federal Reserve could ease the crunch caused by bubble phenomenon by pumping money into the economy and making sure that the economic carnage was localized. This strategy limited the 1990s dot-com disaster and the fallout from the collapse of LTCM.¹³⁸ Monetary policy is the favored conservative recipe for macroeconomic policy because it does not require an expansion of government programs.¹³⁹ In assessing the causes of the most recent financial crisis, Phil Gramm, now vice chairman of UBS Investment Bank, has argued that its origins can be found in loose monetary policy and government intervention in the housing market.¹⁴⁰

132. LOWENSTEIN, *supra* note 101, at 71–72.

133. NIALL FERGUSON, *THE ASCENT OF MONEY: A FINANCIAL HISTORY OF THE WORLD* 160–61 (2008).

134. *Id.* at 300.

135. Arthur E. Wilmarth, Jr., *The Dark Side of Universal Banking: Financial Conglomerates and the Origins of the Subprime Financial Crisis*, 41 CONN. L. REV. 963, 1005 (2009) (explaining the Federal Reserve Bank's response to various bubbles under Greenspan).

136. See Alan Greenspan, FRB Chairman, Testimony before the House Comm. on Fin. Servs., Jul. 18, 2001, *reprinted in* 87 Fed. Res. Bull. 588, 592 (“Too often people are prone to recurring bouts of optimism and pessimism that manifest themselves from time to time in the buildup or cessation of speculative excesses.”).

137. See Wilmarth, Jr., *supra* note 135, at 1005–06 (describing that, under Greenspan, the Federal Reserve policy in 2002 was to lower interest rates so people could refinance and use the money to stimulate the economy, as opposed to directly intervening).

138. *Id.* at 1005.

139. See H. Laurence Miller, Jr., *On the “Chicago School of Economics,”* 70 J. POL. ECON. 64, 65–66 (1962) (noting that the Chicago school, including Friedman, is attributed for advocating limited government and for disfavoring government intervention such as “occupational limitations, price controls, and public transfers in kind such as public housing as a matter of course”); see also Edward Nelson, *Milton Friedman and U.S. Monetary History: 1961–2006*, 89 FED. RES. BANK ST. LOUIS REV. 153, 154, 161 (2007) (describing how Friedman agreed with the Eisenhower Administration's decision to not aggressively stimulate the aggregate demand to fight inflation and Friedman's general disdain for spending during an inflationary period).

140. Phil Gramm, Editorial, *Deregulation and the Financial Panic: Loose Money and Politicized Mortgages Are the Real Villains*, WALL ST. J., Feb. 20, 2009, at A17. Examples of

The widespread impact on financial institutions, particularly banks, rendered the Federal Reserve ineffective in the face of the disaster. No matter how much money the Federal Reserve pumped into the economy or how cheaply it made money available, financial firms did not trust each other enough to lend to one another (or others), and the wheels of credit creation ground to a halt.¹⁴¹ Firms failed to trust one another because the CDO/CDS market had become so pervasive that it impacted a significant portion of major financial institutions.¹⁴² Everyone was at risk. This problem was compounded by the impossibility of determining how much risk any individual institution carried, since the underlying risky assets (the CDOs and CDSs) are so complex.¹⁴³ Financial engineers had created instruments that were so complicated that no one, even the creators of the products, could appropriately value them. We had a bubble, but we could not truly appreciate its size and consequence. Rationality and the worship of science had hit the wall in finance.

One group of corporate finance theorists did pay particular attention to bubbles and did not view them as mirages.¹⁴⁴ Behavioral economics challenges the basic tenet of corporate finance theory—market rationality.¹⁴⁵ The claim of behavioralists is not that we are all irrational but that market players may have biases sufficient to undermine the rationality assumption, undermining the efficient market hypothesis in corporate finance.¹⁴⁶ We need look no further to find irrational behavior than to the pastime of casino gambling. It is obviously not an even money proposition—it is by definition irrational—because casinos would not make a profit otherwise. Yet, it is a thriving business along with state lotteries, which is, of course, another losing proposition for players. Moreover, deviations from rationality are not necessarily random and thus do not necessarily cancel one another out.¹⁴⁷ Behavioralists point to certain deviations from rationality that may be

government intervention include lending benchmarks for Fannie Mae and Freddie Mac, and Community Reinvestment Act requirements that financial institutions make best efforts to lend to under-served communities. *See id.*

141. *See Moran, supra* note 122, at 71–76 (describing the closing of various credit channels and the federal response).

142. *Id.* at 71.

143. *Id.* at 40.

144. *See, e.g.,* ROBERT J. SHILLER, *IRRATIONAL EXUBERANCE*, at xviii–xix (2d ed. 2005) [hereinafter SHILLER, *IRRATIONAL EXUBERANCE*].

145. ANDREI SHLEIFER, *INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE* 23–24 (2000).

146. *Id.*

147. *Id.* at 12 (citing Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristic and Biases*, 185 *SCIENCE* 1124 (1974)); Robert J. Shiller, *Stock Prices and Social Dynamics*, 2 *Brookings Papers Econ. Activity* 457–98 (1984), *reprinted in* MARKET VOLATILITY 7, 41 (3d ed. 1991).

systemic.¹⁴⁸ Investors may routinely draw conclusions from insufficient data because the bias of “representativeness” leads them to believe that the last outcome is necessarily representative of the next.¹⁴⁹ The flip side of this is that individuals may be too conservative to adjust to changed conditions.¹⁵⁰ Both of these phenomena (representativeness and conservatism) can lead to bubbles.¹⁵¹

The phenomenon of bubbles is a chief piece of evidence in the behaviorists’ critique of mainstream corporate finance theory.¹⁵² In 1981, Robert Shiller, a leading behavioral economist, wrote an influential article for the *American Economics Review* entitled “Do Stock Prices Move Too Much to Be Justified by Subsequent Changes to Dividends?”¹⁵³ It was a direct assault on the efficient market hypothesis.¹⁵⁴ The article was based on an analysis of swings in the U.S. stock market since the 1920s in an effort to determine whether such swings could be explained by expected future dividends.¹⁵⁵ The answer was no, undercutting the efficient market hypothesis that information is accurately reflected in prices.¹⁵⁶ The stock market crash of 1987—yet another bubble—lent further credence to the growing dissent of behavioralists.¹⁵⁷ In 2000, Shiller wrote his bestselling book *Irrational Exuberance*, arguing that the stock market, which had been experiencing historic highs at the time, was actually overpriced, and the bubble was due to pop.¹⁵⁸ The market began a rapid descent shortly thereafter.¹⁵⁹ Shiller based his prediction on a chart that showed average stock prices relative to earnings since the nineteenth century.¹⁶⁰ Inordinately high peaks on the chart corresponded negatively with future stock prices.¹⁶¹ Shiller made similar predictions regarding the most

148. See, e.g., Tversky & Kahneman, *supra* note 147, at 1131.

149. *Id.* at 1124–27.

150. Ward Edwards, *Conservatism in Human Information Processing*, in *FORMAL REPRESENTATION OF HUMAN JUDGMENT* 17, 17–18 (Benjamin Kleinmuntz ed., 1968).

151. See SHILLER, *IRRATIONAL EXUBERANCE*, *supra* note 144, at 152–55, 256 (noting that representativeness and conservatism can lead to overconfidence which, in turn, can lead to bubbles).

152. See, e.g., Robert J. Shiller, *Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?*, 71 *AM. ECON. REV.* 421, 422 (1981) [hereinafter Shiller, *Stock Prices Move*]; SHLEIFER, *supra* note 145, at 154–78.

153. Shiller, *Stock Prices Move*, *supra* note 152, at 421.

154. See SHLEIFER, *supra* note 145, at 16–17 (describing the article and its import); Shiller, *Stock Prices Move*, *supra* note 152, at 421–22.

155. Shiller, *Stock Prices Move*, *supra* note 152, at 421–22.

156. *Id.* at 421, 433–34.

157. See SHLEIFER, *supra* note 145, at 20.

158. SHILLER, *IRRATIONAL EXUBERANCE*, *supra* note 144, at 203–09.

159. *Id.* at xii.

160. *Id.* at 6 fig. 1.1.

161. See *id.*

recent financial crisis based on historical charts that chronicled real estate prices.¹⁶² Shiller argued that the real estate market was overinflated.¹⁶³ Shiller's brand of empiricism based on historical trends is precisely the type of inductivism scorned by Leonard Savage.

The methodological approach of behavioralists has some resonance with Professor Powell's description of post-Enlightenment ideas. Powell argues that advances in science—in particular, the fundamental insight of quantum theory that phenomena at the quantum level are observer dependent—compel us to have a more perspectivist view and avoid the pitfall of single viewpoint analysis.¹⁶⁴ This view is reflected in the behavioralists' belief that we have to have a broader conception of human psychology than the rational actor assumption that drives the Chicago school of finance theory and the tendency of behavioralists to take history seriously.¹⁶⁵ Professor Powell highlights the point of perspectivism in drawing a connection between the post-Enlightenment era and the concept of implicit bias in the field of mind science.¹⁶⁶ He references Marvin Minsky's argument for recognition of the complexity of the mind as opposed to engaging in Enlightenment reductionism.¹⁶⁷ Recognition of complexity in mind sciences reveals biases similar to those discussed by behavioral corporate finance theorists.¹⁶⁸

In a sense, the financial collapse of 2008 (the most severe fallout from an asset bubble since the stock market crash of 1929, which led to the Great Depression) opens up space for looking beyond the Enlightenment beliefs that serve as the foundation for modern finance theory. This is evident in the increased attention to behavioral economics.¹⁶⁹ It is also manifest in the steady stream of historically-oriented popular books chronicling the current collapse

162. *See id.* at 11–27 (suggesting that, based on historical information on home prices in the United States and in certain sample cities, the psychological factors of participants in the housing market lead to volatility and that high home prices in certain cities may decrease and eventually fall over a course of years).

163. *See* SHILLER, *IRRATIONAL EXUBERANCE*, *supra* note 144, at 11–27 (analyzing U.S. home prices relative to building costs, population, and interest rates, and home prices in sample cities, and suggesting that the price increase of homes at the end of the 1990s and beginning of the 2000s was the result of psychological factors among market participants rather than rational economic forces).

164. Powell & Menendian, *supra* note 1, at 1064–67.

165. Shiller explicitly incorporates “economics, psychology, demography, sociology and history” in his analysis, as well as traditional and behavioral finance. SHILLER, *IRRATIONAL EXUBERANCE*, *supra* note 144, at xviii.

166. Powell & Menendian, *supra* note 1, at 1064–67.

167. *Id.*

168. *See, e.g.*, SHILLER, *IRRATIONAL EXUBERANCE*, *supra* note 144, at 58 (discussing the role the “wishful thinking bias” played in the housing bubble).

169. *See, e.g.*, RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE* (2008) (advocating use of behavioral economics in a variety of policy areas).

as well as past financial calamities.¹⁷⁰ The story of the rise of behavioral economics also points to the resilience of Enlightenment ideals, however. The very scientific ethos that inspired Markowitz and those who followed him in developing modern finance theory also motivates behavioral finance theorists.¹⁷¹ While Chicago-school corporate finance theorists count Nobel Prize winners among their membership, so do behavioralists—namely Daniel Kahneman, who led the way in integrating cognitive psychology insights into neoclassical economic theory.¹⁷² As Kahneman's work on prospect theory (evaluating biases under different scenarios) illustrates, behavioral economists and finance theorists are dealing with the same issue that first motivated Markowitz and has propelled finance theory—how do we make decisions under the cloud of uncertainty?¹⁷³ Behavioralists take a broader view of knowledge acquisition and how to approach this fundamental question.¹⁷⁴ In broadening our lens, we should not lose sight of the fact that we owe a great debt to the Enlightenment ethos that places such a heavy emphasis on the acquisition of knowledge. It is an Enlightenment inheritance that we should continue to appreciate and cherish—while remaining vigilant with regard to its limitations. It may very well be the key to propelling us forward in the post-Enlightenment era.

170. See, e.g., FERGUSON, *supra* note 133.

171. Markowitz has come to recognize that the rational actor model may need tweaking and the consideration of behavioral economics. Markowitz Interview, *supra* note 10.

I think it is perfectly reasonable for people to ask what about the real behavior of investors as distinguished from rational behavior. I do not necessarily subscribe to each article by the behavioral economists, but I think it is a reasonable activity to pursue. I am especially interested in simulations that involve asynchronous time, which means that time does not go by steady increments necessarily and need not be continuous, but can advance to the most imminent event of various kinds. If you make assumptions about how people in the market behave, and put those assumptions inside the simulation, you can see whether behavioral theories at the micro level add up to observable market behavior.

Id.

172. See, e.g., Tversky & Kahneman, *supra* note 147, at 263 (critiquing expected utility theory and proposing a new model of decisionmaking under risk, based primarily on observations of certain widespread tendencies in human judgment).

173. See, e.g., *id.*

174. See *supra* text accompanying notes 151–56.

