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# Contrasting the Art of Economic Science with Pseudo-Economic Nonsense: The Distinction Between Reasonable Assumptions and Ridiculous Assumptions

Mark Klock\*

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## I. INTRODUCTION & MOTIVATION

It is perpetually astounding that in the field of financial markets writers can pass themselves off as experts merely by writing a lot, without regard to reason.<sup>1</sup> Writers purport to prove the ridiculous by uttering the incantation “equilibrium” which so thoroughly intimidates *econophobes* that they will believe absurd propositions.<sup>2</sup>

Criticism of outcomes determined in financial markets is not useful without proposing an alternative method for setting prices and allocating resources. Should we replace irrational financial markets with political decisions?

Hopefully, before getting this far into the paper, all readers are thinking, “Who would ask such a silly, rhetorical question?” Yet we continue to witness in the literature an alarming advance of arguments that market participants are not rational and that their decisions create social problems.<sup>3</sup> For example, Professor Jill Fisch recently wrote:

How should regulators determine if investors are not behaving rationally and what, if anything, should they do about irrational investor behavior? Standard economic analysis assumes that investors respond rationally to information, causing the market to incorporate that information into market prices. A growing behavioral

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1. Cf. Mark Klock, *Two Possible Answers to the Enron Experience: Will It Be Regulation of Fortune Tellers or Rebirth of Secondary Liability?*, 28 J. CORP. L. 69, 72 (2002) [hereinafter Klock, *Fortune Tellers*] (“Regulatory proposals for financial markets are often pushed by advocates who lack knowledge of the empirical facts because they lack knowledge of economic theory and statistical inference and may lack data as well.”).

2. Cf. Mark Klock, *Are Wastefulness and Flamboyance Really Virtues? Use and Abuse of Economic Analysis*, 71 U. CIN. L. REV. 181, 183 (2002) [hereinafter Klock, *Flamboyance*] (“The notion that law has suffered from the influence of too much economic analysis is . . . symptomatic of an irrational phobia . . .”); cf. *id.* at 186 (“[O]ne cannot persuasively dismiss economic arguments with a wave of the hand and a ritual incantation that economics is based on flawed assumptions and therefore wrong.”).

3. See Melvin Aron Eisenberg, *The Limits of Cognition and the Limits of Contract*, 47 STAN. L. REV. 211, 213 (1995) (“In fact, however, empirical evidence shows that actors characteristically violate the standard rational-choice or expected-utility model, due to the limits of cognition.”); Christine Jolls, Cass R. Sunstein & Richard Thaler, *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1488 (1998) (arguing that the predictions of economic theory are often wrong); Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CAL. L. REV. 1051, 1055–56 (2000) (“There is simply too much credible experimental evidence that individuals frequently act in ways that are incompatible with the assumptions of rational choice theory. It follows that the analysis of the incentive effects of legal rules based on such implausible behavioral assumptions cannot possibly result in efficacious legal policy, at least not in all circumstances.” (footnote omitted)); Robert A. Prentice, *The Case of the Irrational Auditor: A Behavioral Insight Into Securities Fraud Litigation*, 95 NW. U. L. REV. 133, 139 (2000) [hereinafter Prentice, *Behavioral Insight*] (“Although economic analysis has brought much value to the legal realm, its basic premise regarding the rational man is so deeply flawed that it has also brought much mischief.”).

economics literature questions this assumption—identifying biases, errors, and irrationalities in investor behavior and arguing that irrational investor behavior may lead the market to under- or over-react to information. The literature makes a convincing case for at least some level of investor irrationality. The problem, however, is identifying the appropriate response to investor irrationality. Should regulators attempt to protect investors from bad investment decisions that may be the result of irrational behavior?<sup>4</sup>

Obviously, anyone contemplating a non-market solution to the problems associated with markets must have an alternative framework in mind.<sup>5</sup> The only alternative system possible, however, is a political one, which is surely less stable than even the least efficient market.<sup>6</sup>

In this Article, I review several longstanding debates and provide new insights as to why proponents of “the new finance” and behavioral law and economics have arrived at misleading results. The first debate concerns the rationality of individuals.<sup>7</sup> Many commentators have argued that the economist’s assumption of the rational man is deeply flawed.<sup>8</sup> The second debate concerns whether financial markets price securities irrationally.<sup>9</sup> These debates are critically important in law.<sup>10</sup> Much of the development of law has been based upon development of economic theory.<sup>11</sup>

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4. Jill E. Fisch, *Regulatory Responses to Investor Irrationality: The Case of the Research Analyst*, 10 LEWIS & CLARK L. REV. 57, 59 (2006) (footnotes omitted).

5. Cf. Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551, 1552 (1998) [hereinafter Posner, *Rational Choice*] (criticizing critics of neoclassical economics for not providing an alternative rigorous theoretical framework).

6. See Robert D. Tollison, *Public Choice and Legislation*, 74 VA. L. REV. 339, 340 (1988) (“To the extent that one can draw a positive principle from Arrow, it is that democracy should yield capricious and unstable outcomes.”); cf. JAMES M. BUCHANAN & GORDON TULLOCK, *THE CALCULUS OF CONSENT* 291–92 (1962) (describing how political coalitions use government to the disadvantage of society).

7. See *infra* Part II.

8. See sources cited *supra* note 3.

9. See, e.g., Larry E. Ribstein, *Fraud on a Noisy Market*, 10 LEWIS & CLARK L. REV. 137, 138 (2006) [hereinafter Ribstein, *Noisy Market*] (“The field of behavioral finance has had a bull market, particularly since the millennial bubble and its popping. The literature not only shows many ways in which individuals make mistakes, but also indicates that markets as well as individuals may be irrational.”).

10. See Klock, *Flamboyance*, *supra* note 2, at 185 (explaining that misspecification of rationality has important implications for legal analysis).

11. See Terrence Chorvat, Kevin McCabe & Vernon Smith, *Law and Neuroeconomics*, 13 SUP. CT. ECON. REV. 35, 39 (2005) (“Just as neoclassical economics has helped to explicate human behavior to a significant degree, traditional law and economics scholarship has been able to aid the analysis of an enormous number of the legal problems in a fairly parsimonious way. The success of this

There is an endogenous relationship between the legal system and the economic system. The development of law is fostered by a strong economy, and a strong economy is fostered by a strong legal system.<sup>12</sup> Those who argue that economic theory is a largely inaccurate model of the world are seeking to change laws and policy that have developed based on economic insight.<sup>13</sup> This leads into a third debate about the role of markets and the role of government in the allocation of social resources.<sup>14</sup> Two particular elements are new in my review of this debate. First, there is new and recent commentary containing misleading examples that I will expose.<sup>15</sup> Second, recent research in finance has proven that more basic economic principles, such as budget constraints and market clearing, result in rational asset pricing even with irrational investors.<sup>16</sup> Models claiming to show that financial markets can systematically price assets incorrectly over indefinite periods in

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school of thought is undeniable.”).

12. See Bernard S. Black, *The Legal and Institutional Preconditions for Strong Securities Markets*, 48 UCLA L. REV. 781, 782–83 (2001). An endogenous variable is one that originates from within an economic model. For an explanation of the proper construction of an economic model, see *infra* note 30 and accompanying text.

13. Peter Smith argues, “[T]here is an increasingly large body of empirical work that suggests, at a minimum, that the assumption of the Court in *Basic*—that is, that investors are purely rational economic actors and that securities markets function efficiently—might be a new legal fiction.” Peter J. Smith, *New Legal Fictions*, 95 GEO. L.J. 1435, 1457 (2007) [hereinafter Smith, *Fictions*] (referring to *Basic Inc. v. Levinson*, 485 U.S. 224 (1988)). Smith defines new legal fictions as follows:

A court deploys a new legal fiction when (1) the court offers an ostensibly factual supposition as a ground for creating a legal rule or modifying, or refusing to modify, an existing legal rule; and (2) the factual supposition is descriptively inaccurate. In most cases, the premise is false because empirical research has demonstrated that it is false, although occasionally the factual supposition so conflicts with general knowledge and conventional wisdom that it can be characterized as a new legal fiction even without reference to empirical research. To be a new legal fiction, the court must offer the factual supposition as a (or the) basis supporting the court’s normative choice among competing possible legal rules.

*Id.* at 1441.

14. See, e.g., Robert C. Ellickson, *Bringing Culture and Human Frailty to Rational Actors: A Critique of Classical Law and Economics*, 65 CHI.-KENT L. REV. 23, 23 (1989) (suggesting that psychology and sociology have more to contribute to legal analysis than unrealistic economic theory); Jeffrey L. Harrison, *Class, Personality, Contract, and Unconscionability*, 35 WM. & MARY L. REV. 445, 468–79 (1994) (arguing that economic measures of efficiency and social welfare improvements lack moral legitimacy); Roy A. Schotland, *Unsafe at Any Price: A Reply to Manne, Insider Trading and the Stock Market*, 53 VA. L. REV. 1425, 1438 (1967) (arguing that the usefulness of economics is constrained by the supremacy of moral and legal reasoning); Lynn A. Stout, *The Unimportance of Being Efficient: An Economic Analysis of Stock Market Pricing and Securities Regulation*, 87 MICH. L. REV. 613, 708–09 (1988) [hereinafter Stout, *Economic Analysis*] (arguing that goals based on economic theory must be abandoned to promote alternative social objectives).

15. E.g., Lynn A. Stout, *Inefficient Markets and the New Finance*, 14 J. FIN. TRANSFORMATION 95, 97 (2005) [hereinafter Stout, *New Finance*] (stating that the assumption of perfect markets in the presence of heterogeneous expectations renders equilibrium impossible and providing a pseudo-economic model to illustrate the claim).

16. Mark Loewenstein & Gregory A. Willard, *The Limits of Investor Behavior*, 61 J. FIN. 231, 256 (2006).

the presence of irrational investors contain an implicit assumption of unlimited free credit which is a distorting, absurd assumption rather than an artistic, simplifying assumption.<sup>17</sup>

This Article is motivated by one commentator's "simple market" model claiming to "prove" an absurd result.<sup>18</sup> The model is inherently *not* economic because it contains a rather ridiculous assumption that takes it out of the realm of economics.<sup>19</sup> For a model to be part of the subject matter of economics, the decision makers *must make sacrifices*.<sup>20</sup> That is, they must choose between alternatives.<sup>21</sup> This is the sad reality that makes the subject of economics too unpleasant for some of us to confront.<sup>22</sup>

Professor Lynn Stout has made a few previous mistakes explaining economic theory and interpreting economic models.<sup>23</sup> In what I consider to be

17. *Id.*

18. Stout, *New Finance*, *supra* note 15, at 97–98 (proving that equilibrium is impossible in a perfect market with heterogeneous expectations).

19. Although she does not explicitly state so, Professor Stout's assumption of a perfect market is what economists refer to as a Walrasian market. See Kenneth D. Garbade & William L. Silber, *Dominant and Satellite Markets: A Study of Dually-Traded Securities*, 61 REV. ECON. & STAT. 455, 456 (1979) ("[T]he concept of a Walrasian auction [market] is implicit in many models of financial market equilibrium . . ."). Walras's Law requires the market to clear. See MAUREEN O'HARA, MARKET MICROSTRUCTURE THEORY 4 (1995) ("[T]he Walrasian auctioneer does not take any trading position, but serves only to redirect quantities from sellers to buyers."). Professor Stout's pseudo-market does not clear because her buyers and sellers have no budget constraints.

20. WALTER NICHOLSON, INTERMEDIATE MICROECONOMICS 3 (6th ed. 1994) ("[T]he problem of scarcity [of resources] is a universal one. Economic tools can help us understand the choices that necessarily arise in the face of such scarcity.").

21. See JOSEPH E. STIGLITZ, PRINCIPLES OF MICROECONOMICS 24 (2d ed. 1997) ("*Having more of one thing requires giving up something else. Scarcity is a basic fact of life.*").

22. This necessity for sacrifice could be a contributing reason why economics has been pejoratively labeled "the dismal science." See generally ROBERT L. HEILBRONER, THE WORLDLY PHILOSOPHERS: THE LIVES, TIMES, AND IDEAS OF THE GREAT ECONOMIC THINKERS 75–104 (6th ed. 1986) (titled chapter four "The Gloomy Presentiments of Parson Malthus and David Ricardo"); cf. Klock, *Flamboyance*, *supra* note 2, at 253 ("Perhaps commentators who wish to reevaluate the utility of economic analysis in law have a cognitive bias. Although they know life is full of difficult choices that must be made, they do not like to make them and do not like to have economists remind them of this basic fact.").

23. I will describe just two here. In one article, Professor Stout argued that an efficient stock market is not important to corporations because it raises their capital in negotiated transactions. Stout, *Economic Analysis*, *supra* note 14, at 643–44. In another article, Professor Stout incorrectly interpreted a finance professor's finding (that empirical evidence demonstrated that a line is less steep than predicted by theory) to mean that the empirical line showed a negative relationship where theory predicted a positive relationship. Lynn A. Stout, *How Efficient Markets Undervalue Stocks: CAPM and ECMH Under Conditions of Uncertainty and Disagreement*, 19 CARDOZO L. REV. 475, 488 & n.40 (1997) (misstating the writing of Edward R. Miller, *Risk, Uncertainty, and Divergence of Opinion*, 32 J. FIN. 1151, 1157 (1977)). For other documented mistakes, see Mark Klock, *Dead Hands—Poison Catalyst or Strength-Enhancing Megavitamin? An Analysis of the Benefits of Mana-*

her boldest fallacious assertion ever, she writes, “When we acknowledge disagreement while still assuming perfect markets, price-moving arbitrage of the sort assumed by many commentators becomes impossible. Indeed, *market equilibrium* becomes impossible.”<sup>24</sup> It is an understatement to label this assertion incorrect. The assertion is preposterous and reflects a misunderstanding about the definition of equilibrium, among other things. Equilibrium means that the status quo is stable, nothing more.<sup>25</sup> It need not be optimal; indeed, there need not be any market activity at all to achieve market equilibrium.<sup>26</sup> Moreover, a market failure can be market equilibrium.<sup>27</sup> Alternatively, well-functioning markets can also result in equilibrium. To motivate interest in the topic, I point out that when markets clear—supply equals demand—we have equilibrium.<sup>28</sup> Casual observation indicates that this routinely happens on a daily basis in the most liquid financial markets even in the presence of investor disagreement, and hence Professor Stout’s assertion that this is impossible is contradicted on its face by a vast amount of data.

Professor Stout outdoes herself in “proving” her fallacy with an example that rises to a new level of audaciousness in pseudo-economic model building:

[I]magine a simple market with only one security, stock issued by Widget Corporation at \$100 per share. Assume there are only two investors: Bull, who thinks Widget is worth \$101, and Bear, who thinks Widget [is] worth \$99. With no wealth limitations, transactions costs, or short sales restrictions, even this very modest disagreement makes an equilibrium price impossible. Bull will see the chance to buy “undervalued” Widget stock as a money machine, and will buy and buy until the supply of Widget stock is exhausted. The supply will never be exhausted, however, because Bear simultaneously sees a chance to make money by selling Widget short,

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*gerial Protection and the Detriments of Judicial Interference*, 2001 COLUM. BUS. L. REV. 67, 147–54 [hereinafter Klock, *Dead Hands*].

24. Stout, *New Finance*, *supra* note 15, at 97 (proving that equilibrium is impossible in a perfect market with heterogeneous expectations) (emphasis added).

25. See Mark Klock, *Unconscionability and Price Discrimination*, 69 TENN. L. REV. 317, 320 (2002) [hereinafter Klock, *Unconscionability*] (explaining economists’ concept of equilibrium); see also HAL R. VARIAN, *INTERMEDIATE MICROECONOMICS* 8 (1987) (explaining that equilibrium means that no changes in behavior will be observed).

26. See Mark Klock, *The SEC’s New Regulation ATS: Placing the Myth of Market Fragmentation Ahead of Economic Theory and Evidence*, 51 FLA. L. REV. 753, 778 (1999) (“Many securities do not trade that frequently, so prices adjust without being observed.”).

27. George A. Akerlof, *The Market for “Lemons”: Quality Uncertainty and the Market Mechanism*, 84 Q. J. ECON. 488, 490 (1970) (explaining conditions that can lead to an equilibrium in which no transactions occur at any price level).

28. Klock, *Unconscionability*, *supra* note 25, at 320.

and borrows and borrows it (presumably from Bull) to sell it short (again, to Bull). Bull and Bear thus place infinite bets against each other and no equilibrium emerges.<sup>29</sup>

There are many problems with this “market.” A model of a market, or anything else, requires at least one endogenous variable—a variable that is determined by the model.<sup>30</sup> Professor Stout’s model has all of the variables set exogenously—by her assumptions.<sup>31</sup> Her assumptions go well beyond the art of simplification and abstraction from reality.<sup>32</sup> Professor Stout creates her example market in such a manner that it is not permitted to function. Not only are her assumptions not real, they are not even theoretically possible.<sup>33</sup> The essence of my complaint with her “simple market” is that there is nothing economic about it. Nowhere in economics does the assumption of perfect markets include unlimited wealth. Selling short requires collateralized credit, and no one can short infinite amounts because no one can provide infinite collateral. Professor Stout’s version of law and economics is better termed law and pseudo-economic nonsense. All of economics is about *one* thing only—the allocation of resources under conditions of scarcity.<sup>34</sup>

29. Stout, *New Finance*, *supra* note 15, at 97–98 (emphasis added) (proving that equilibrium is impossible in a perfect market with heterogeneous expectations).

30. See ALPHA C. CHIANG, *FUNDAMENTAL METHODS OF MATHEMATICAL ECONOMICS* 9 (2d ed. 1974). Professor Chiang explains the proper construction of an economic model:

Properly constructed, an economic model can be solved to give us the *solution values* of a certain set of variables . . . . Such variables, whose solution values we seek from the model, are known as *endogenous variables* (originating from within). However, the model may also contain variables which are assumed to be determined by forces external to the model, and whose magnitudes are accepted as given data only; such variables are called *exogenous variables* (originating from without).

*Id.*

31. See Stout, *New Finance*, *supra* note 15, at 97 (fixing the price of Widget at \$100, the quantity that Bull wishes to buy at that price as infinite, and the quantity that Bear wishes to sell at that price as infinite).

32. See generally Klock, *Flamboyance*, *supra* note 2, at 188–94 (describing the simplifying and abstracting role of models and their assumptions).

33. I would have thought it obvious that one cannot borrow and sell short more stock than that which is actually in existence. But this is apparently not so, as is evidenced by the fact that other editors have also published Professor Stout’s completely exogenous Widget model. See Lynn A. Stout, *The Mechanisms of Market Inefficiency: An Introduction to the New Finance*, 28 J. CORP. L. 635, 642–43 (2003) [hereinafter Stout, *Mechanisms*] (earlier publication of Professor Stout’s exogenous simplified market model). I should also mention that Bull and Bear’s ability to create off-setting futures contract positions on Widget will be constrained to a finite amount due to their limited wealth and their inability to meet infinite margin requirements.

34. Klock, *Flamboyance*, *supra* note 2, at 187–88.



There is an *explicit* assumption in Professor Stout's simplified "economy" where both participants have access to infinite resources—she has *no wealth constraints* in her model.<sup>35</sup> This assumption is not artistic because it extracts the example from the realm of economics even though it is presented as an economic model.<sup>36</sup> If both investors have infinite wealth, they would have no incentive to trade regardless of their beliefs. They would not have to make *any* choices. They could have everything without sacrificing anything. Yet making choices is precisely the essence of economics.<sup>37</sup> The economist's standard assumption that investors prefer more to less is applied *only* where resources are scarce.<sup>38</sup> Infinity plus epsilon is not better than infinity.<sup>39</sup> It does not make any sense to talk about a world with no wealth constraints. It is not a simplifying assumption. It is an assumption that assumes away the problem. And when the problem has been assumed away, it is somewhat disingenuous to complain that there is no equilibrium solution to the problem. Professor Stout's argument is akin to arguing that when  $x=3$ ,  $x$  is not equal to 2 and no equality can exist between 2 and  $x$ . The logic is true, but only because the lone variable has been exogenously fixed at a value of 3. It is not a model. Professor Stout has created the ultimate irrelevant tautology—there is no equilibrium because she defined the market to not clear.

To illuminate the flaw in the story that Bull and Bear make infinite book against each other, consider an alternative situation. Suppose that Bear owns a used car which she values at \$9,900 and Bull values the car at \$10,100. Suppose that Bull purchases the car from bear for \$10,000 and happily believes that she has profited \$100 from the transaction. Bear also believes that she has profited by \$100. Is it reasonable to suppose that Bull would now lend the car to Bear and purchase it again for an additional \$10,000, making another \$100 profit? Of course not, but a practitioner of the "new finance" will contend that the used car example is different from the Widget hypothetical. But is it really? Suppose that Widget Corporation's sole asset is this very same car. Once Bull has purchased all of the stock of Widget at a bargain price, she owns the car outright. There is no more point in lending the stock to repurchase at the bargain price than there is in lending the car to

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35. See Stout, *New Finance*, *supra* note 15, at 97 (emphasis added); see also *supra* note 29 and accompanying text.

36. See, e.g., Frank P. Darr, *Unconscionability and Price Fairness*, 30 HOUS. L. REV. 1819, 1849 (1994) (arguing price norms should be set based on a community's sense of morality); see also sources cited *supra* note 14.

37. See STIGLITZ, *supra* note 21, at 24 (defining economics as the study of how choices are made, and observing that scarcity is the reason choices are inevitable).

38. See Klock, *Flamboyance*, *supra* note 2, at 243 ("One role of the 'more is preferred to less' assumption is nonsatiation—utility is never maximized.").

39. See THOMAS E. COPELAND ET AL., FINANCIAL THEORY AND CORPORATE POLICY app. D at 933 (4th ed. 2005) ("[L]im as  $X \rightarrow \infty$  of  $[(X+1)/X]=1$ .").

repurchase for another economic profit. This illustrates that although the value of financial securities depends on future cash flows, the value of financial securities cannot logically be detached from the underlying assets that generate those cash flows. Valuing uncertain future cash flows is difficult, and people can get so lost in the details that they forget about the fundamentals.

That Professor Stout's "simple market" is not an economic model is a fact, not an opinion. This type of pseudo-economics is troubling primarily because it is based not on differences of opinion but on invalid reasoning.<sup>40</sup> It is poor thinking. Lawyers are trained to hone their critical reasoning.<sup>41</sup> It appears that some writers can more easily get away with faulty arguments when those arguments are placed in an economic context because many people will not attempt to understand economics.<sup>42</sup> Perhaps this is to be expected because the necessity of making choices is unpleasant and economics is the dismal science.<sup>43</sup> But hope springs eternal.

To provide a bit of additional motivation for this paper, I note that Professor Stout's "New Finance" is creating harm in both courts and academic literature. The Bull and Bear hypothetical has actually been quoted in securities litigation in a federal district court.<sup>44</sup> Two other federal courts have also cited the hypothetical.<sup>45</sup> Additionally, I have identified no less than forty-eight non-self-citing works containing references to the paper.<sup>46</sup>

40. See Klock, *Flamboyance*, *supra* note 2, at 184 (describing how flawed economic analysis by legal commentators often translates into poor advocacy and poor reasoning).

41. See *id.* at 236 ("As lawyers we are trained . . . to persuasively argue . . . with the available evidence and law.").

42. See Mark Klock, *Mainstream Economics and the Case for Prohibiting Inside Trading*, 10 GA. ST. U. L. REV. 297, 319 (1994) [hereinafter Klock, *Mainstream Economics*] ("It is difficult to imagine that legal scholars would comment on extremely technical scientific or medical principles without either familiarizing themselves with the material or consulting with an expert. Yet legal scholars appear to have done this extensively with respect to the principles of economics.").

43. See Klock, *Flamboyance*, *supra* note 2, at 245 ("The objectionable element of economics for many commentators is that it presumes behavior is governed by an incentive system, which is the logical consequence of the fact that resources are scarce and choices must be made."); see also *supra* note 22 and accompanying text (explaining how economics came to be known as "the dismal science").

44. *In re PolyMedica Corp. Sec. Litig.*, 453 F. Supp. 2d 260, 272 (D. Mass. 2006) (quoting Stout, *Mechanisms*, *supra* note 33, at 642–43).

45. *In re PolyMedica Corp. Sec. Litig.*, 432 F.3d 1, 8 (1st Cir. 2005) (quoting Stout, *Mechanisms*, *supra* note 33, at 639); *Teamsters Local 445 Freight Div. Pension Fund v. Bombardier, Inc.*, No. 05-1898, 2006 WL 2161887, at \*6 n.73 (S.D.N.Y. Aug. 1, 2006) (quoting Stout, *Mechanisms*, *supra* note 33, at 639), *aff'd*, 546 F.3d 196 (2d Cir. 2008).

46. See, e.g., William O. Fisher, *Does the Efficient Market Theory Help Us Do Justice in a Time of Madness?*, 54 EMORY L.J. 843, 977 n.357 (2005). The articles were identified with a LexisNexis

This Article seeks to further dispel some common misconceptions about economic models with clear exposition as to how some economic rules of thumb have been oversimplified and applied out of context. Throughout this Article, examples of both poor models and better models are used to help communicate this point. Section II reviews the debate over whether individuals are rational.<sup>47</sup> Section III reviews the debate over whether markets are rational.<sup>48</sup> Section IV discusses the desirability of replacing market functions with political processes.<sup>49</sup> Section V provides an analysis of the roles assumptions play in the artistic aspect of economic science and how unreasonable assumptions can lead to what I call pseudo-economic nonsense.<sup>50</sup> A summary conclusion comprises Section VI.<sup>51</sup>

## II. THE RATIONAL MAN ASSUMPTION

The subject of economics is decision making under conditions of scarcity.<sup>52</sup> Economists are interested in the problem of choosing between alternatives—situations in which one must *sacrifice* one alternative in order to consume another alternative.<sup>53</sup> If an individual has no constraint, a circumstance which would allow her to consume everything without giving up anything, then the individual is very fortunate indeed and has no economic problem to confront. Unfortunately, none of us is in exactly that situation; few of us face a situation that could even be approximately described as having unbounded choices.<sup>54</sup> Even Bill Gates and Warren Buffett must choose between keeping their wealth and giving it away, and, in the latter case, they must again choose to which of many worthy charities they shall give.<sup>55</sup>

The observation that resources are scarce and choices must be made between alternatives—sacrificing some alternatives in order to attain others—is the starting point for economics.<sup>56</sup> Whenever these are not the conditions being described, two things can be said: first, we are not in the realm of eco-

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search on (Lynn w/2 Stout) AND (New w/1 Finance) and verified by examination.

47. See *infra* notes 52–115 and accompanying text.

48. See *infra* notes 116–194 and accompanying text.

49. See *infra* notes 195–272 and accompanying text.

50. See *infra* notes 273–328 and accompanying text.

51. See *infra* notes 329–335 and accompanying text.

52. NICHOLSON, *supra* note 20, at 3.

53. See STIGLITZ, *supra* note 21, at 24.

54. See Klock, *Flamboyance*, *supra* note 2, at 187–88 (“[I]t is an undisputed fact that resources are in fact finite.”).

55. See Audrey Hudson, *Buffett Gift Catapults Gates in Philanthropy*, WASH. TIMES, June 27, 2006, at A4 (reporting on choices Warren Buffett made before giving thirty billion dollars to the Gates Foundation and on choices the Foundation subsequently made about spending the money).

56. JACK HIRSHLEIFER, PRICE THEORY AND APPLICATIONS 14 (1976) (“The all-pervasive economic problem is that of *scarcity*.”).

nomics; second, we are not in the real world.<sup>57</sup> And so, when commentators describe economists as disconnected from the real world and subsequently pontificate about conditions of infinite resources, economists must impeach the credibility of those economic critics.

The task of impeaching the credibility of pseudo-economic model builders does not require defending against caricatures of economic man. The economist's rational man is often caricaturized as a selfish calculator of personal utility.<sup>58</sup> Although economists do, at times, postulate worlds inhabited by such people, this is done for expositional simplification in the presentation of a model. The truth is that economic methodology can be applied to people who are compassionate and emotional as well as to rats and pigeons, which are not likely to be better calculators of personal utility than people.<sup>59</sup>

Economists seek to do more than simply observe that choices must be made; they strive to make accurate predictions about how changing the environment will change the decisions.<sup>60</sup> For example, suppose a climate change causes oranges to become increasingly scarce and apples more plentiful. A reasonable prediction would be that as the price of oranges rises the price of apples will fall, causing people to buy more apples and fewer oranges.<sup>61</sup> In

57. See *id.* Professor Hirshleifer explains:

Not all desired things are available to individuals, the ultimate decision-making agents, when and as desired. Even if all desired physical commodities were present in unlimited quantities, we would not have enough time to enjoy them all. It is the fact of scarcity that forces us to make economic decisions, that is, to organize our efforts . . . .

*Id.*

58. See, e.g., Lynn A. Stout, *On the Proper Motives of Corporate Directors (Or, Why You Don't Want to Invite Homo Economicus to Join Your Board)*, 28 DEL. J. CORP. L. 1, 11 (2003) (portraying economic thinking as this caricature).

59. See EDWIN G. DOLAN IN COLLABORATION WITH DAVID E. LINDSEY, *BASIC ECONOMICS* 4–5 (3d ed. 1983) (stating that economics can be broadly humanistic and is about effective actions to achieve ends); JOHN H. KAGEL ET AL., *ECONOMIC CHOICE THEORY: AN EXPERIMENTAL ANALYSIS OF ANIMAL BEHAVIOR* 2 (1995) (“[T]he fact that, when put to the test, rats and pigeons conform to elementary principles of economic theory provides rather striking support for the theory and, indirectly, refutes the argument that the theory cannot be extended to nonmarket behavior . . .”).

60. See EUGENE SILBERBERG, *THE STRUCTURE OF ECONOMICS: A MATHEMATICAL ANALYSIS* 2 (1978). Professor Silberberg states: “Economics, first and foremost, is an *empirical science*. *Positive* economics is concerned with questions of *fact*, which are in principle either true or false. . . . Positive economics consists of propositions which are to be tested against facts, and either confirmed or refuted.” *Id.*

61. This prediction is reasonable because demand curves are downward sloping—meaning that people will want to purchase less of a commodity at a higher price. Under this hypothetical, oranges have become more expensive in relation to the number of apples that must be sacrificed in order to consume an orange. Cf. STIGLITZ, *supra* note 21, at 78 (“Candy bars and granola bars can also be considered substitutes, as the two goods satisfy a similar need. Thus, an increase in the price of granola bars makes candy bars relatively more attractive . . .”).

order to formally demonstrate this intuitive result, economists employ what is known as the model of utility maximization.<sup>62</sup> Within this model, individuals are assumed to have a utility function, and they are to select from the feasible alternatives the choices which maximize their utility.<sup>63</sup>

Historically, economists did conceive of utility as a measure of satisfaction.<sup>64</sup> Over time, however, it became clear that the conclusions drawn from economic models did not depend on this concept.<sup>65</sup> All that is required in modern economic theory is the expression of a preferred ordering of alternatives, without measuring satisfaction.<sup>66</sup> The utility function is merely a method of expressing the mapping of preferences into an ordered set, and any arbitrarily chosen utility function that preserves the ordering will lead to the same results.<sup>67</sup>

Moreover, it does not matter whether a person actually calculates her utility to see whether she has maximized it.<sup>68</sup> What matters is whether her behavior can be predicted by the utility maximization model.<sup>69</sup> To say that her behavior is determined by her mood of the moment does not aid in economists' efforts to predict actions and modify them.<sup>70</sup> Similarly, it is not important whether individuals are completely rational all of the time; what matters instead is whether market outcomes can be predicted based on the assumption of rationality.<sup>71</sup>

In order to actually apply this utility maximization model to descriptive statements and predictions about behavior, economists need to constrain the

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62. See generally HIRSHLEIFER, *supra* note 56, at 54–74 (providing a reasonably concise and accessible treatment of utility theory).

63. See *id.* at 58 (explaining that utility maximization means selecting the most preferred bundle of goods from among the available choices, and is equivalent to the rules of rational choice). For a discussion of the theory of rational choice, see *infra* notes 83–86 and accompanying text.

64. VARIAN, *supra* note 25, at 52.

65. *Id.* at 52–53.

66. *Id.* at 53.

67. *Id.* at 54–55.

68. See STEVEN M. SHEFFRIN, *RATIONAL EXPECTATIONS* 7 (2d ed. 1996) (“[E]conomic actors need only act as if they are maximizing utility or profits for [economists’] theories to work.”).

69. STIGLITZ, *supra* note 21, at 187; see also MILTON FRIEDMAN, *The Methodology of Positive Economics*, in *ESSAYS IN POSITIVE ECONOMICS* 3, 14–16 (1953); William F. Sharpe, *Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk*, 19 J. FIN. 434 (1964).

70. Cf. SILBERBERG, *supra* note 60, at 215 (“[T]he stupidity hypothesis, and the disequilibrium or slow adjustment hypotheses are consistent with all observable behavior, and therefore are unable to generate refutable implications. Anything in the world can be explained on the basis that the participants are stupid, or ill-informed, or slow to react, or are somehow in disequilibrium, without theories to describe the . . . alleged phenomena. These terms are metaphors for a lack of useful theory or the failure to adequately specify the additional constraints on consumers’ behavior.”).

71. See Klock, *Flamboyance*, *supra* note 2, at 187, 192 (explaining that economic models are just aids to the exploration and prediction of behavior, much as the scales of justice are an unrealistic model that nevertheless have utility in determining trial outcomes).

behavior of the function.<sup>72</sup> If economists were to conclude that people must make choices and those choices are made randomly, then economics would not provide a very satisfactory model of human behavior.<sup>73</sup> This would be akin to stating that people behave as they do and we have no idea how to explain it.<sup>74</sup> Ergo, economists make some simplifying assumptions about the utility function.<sup>75</sup> Three of these assumptions are considered the most general and least restrictive possible.<sup>76</sup> The first is that between any two choices, a person knows whether those choices are equivalent or not, and if not, she knows which is better.<sup>77</sup> That is, a person can state that A is preferred to B, or B is preferred to A, or that A and B are equivalent.<sup>78</sup> Simply stated, the first assumption is that the individual knows her own preferences.<sup>79</sup> The second and third assumptions demonstrate that preferences are both transitive and reflexive.<sup>80</sup> This means that if A is preferred to B, B is not preferred to A; and also that if A is better than B, and B is better than C, then A must be better than C.<sup>81</sup> The final assumption, that of reflexivity, also shows if two alternatives are identical, except that one has more of something in it, the one with more must be preferred to the one with less.<sup>82</sup>

These assumptions are the cornerstones of rational behavior for an economist.<sup>83</sup> Essentially, rationality merely requires some degree of consis-

72. See JOHN Y. CAMPBELL ET AL., *THE ECONOMETRICS OF FINANCIAL MARKETS* 475 (1997) (“[E]conomic theory is generally not specific about functional forms.”); KAGEL ET AL., *supra* note 59, at 3 (“[T]ests of the theories’ predictions are conditional on the validity of the functional form of the estimating equations.”); HENRI THEIL, *PRINCIPLES OF ECONOMETRICS* 542 (1971) (explaining that economic theory provides little guidance as to functional forms).

73. Posner, *Rational Choice*, *supra* note 5, at 1552 (suggesting that a problem confronting behavioral law and economics scholars is that they have no theory).

74. See *id.* at 1560 (“If a theory cannot be falsified, neither it nor its predictions can be validated, for everything that happens is by definition consistent with the theory.”).

75. See VARIAN, *supra* note 25, at 35 (“Economists usually make some assumptions about the ‘consistency’ of consumers’ preferences. For example, it seems unreasonable—not to say contradictory—to have a situation where . . . the consumer strictly prefers the x-bundle to the y-bundle . . . and vice-versa.”) (second ellipsis in original).

76. See *id.* (“Some of the assumptions about preferences are so fundamental that we can refer to them as ‘axioms’ of consumer theory.”).

77. See *id.* The three fundamental axioms of consumer preferences are: completeness (hardly objectionable), reflexivity (trivial), and transitivity (problematic). *Id.*

78. See *id.* (describing the axiom of completeness).

79. *Id.*

80. See *id.* (describing the axiom of reflexivity as trivial and describing the axiom of transitivity).

81. *Id.* at 35–36.

82. See *id.* at 41–44 (discussing the concept of satiation and observing that the interesting region of preferences is the area of nonsatiation).

83. See HIRSHLEIFER, *supra* note 56, at 58 (“[T]he Laws of Preferences are really rules of ration-

tency in choices.<sup>84</sup> Consider an example in which a person who finds herself in a restaurant with a menu containing three selections only, all at the same price. If the person were to prefer the first selection to the second, and the second to the third, and the third to the first, her preferences would violate the assumption of rationality.<sup>85</sup> This person would be unable to make a selection because, given any decision, a better choice would always exist.<sup>86</sup> It does not seem altogether unreasonable to define such behavior as irrational and then assume it out of existence.

Yet many commentators are writing about a growing body of empirical evidence suggesting that people are not rational. These authors want policy makers to conclude that economic theory is flawed, and thus, law and policy based on economic theory is flawed. One legal scholar writes: "One of the most prominent conclusions of much of the law and economics literature seems to be that interference in the market needs some type of special justification."<sup>87</sup> This conclusion is also reflected in the economic literature of public finance.<sup>88</sup> Commentators, now armed with a body of literature on behavioralism, are using the label of irrationality to justify interference in the market. As Professor Ribstein observes, "The field of behavioral finance . . . challenges the efficient capital markets hypothesis that securities prices approximate fundamental asset values."<sup>89</sup>

I will collectively refer to those commentators, who argue that the most highly liquid U.S. capital markets are not efficient and do not well approximate fundamental value, as behavioralists. They draw heavily on literature that has come to be called "behavioral finance" and "behavioral law and economics."<sup>90</sup>

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al choice . . .").

84. See Posner, *Rational Choice*, *supra* note 5, at 1551 (noting that rationality merely requires behavior consistent with one's objective).

85. See Mark Klock, *Is it "The Will of the People" or a Broken Arrow? Collective Preferences, Out-of-the-Money Options, Bush v. Gore, and Arguments for Quashing Post-Balloting Litigation Absent Specific Allegations of Fraud*, 57 U. MIAMI L. REV. 1, 15 (2002) [hereinafter Klock, *Will of the People*] (describing the paradox of voting).

86. *Id.*

87. Terrence Chorvat et al., *Law and Neuroeconomics*, 13 SUP. CT. ECON REV. 35, 39 (2005) (citing RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 568 (5th ed. 1998)).

88. See RICHARD W. TRESCH, *PUBLIC FINANCE: A NORMATIVE THEORY* 4 (1981) ("[T]he competitive market economy is seen as the ideal economic system, so much so that competitive market failure is a necessary condition for public sector activity.").

89. Ribstein, *Noisy Market*, *supra* note 9, at 138.

90. The term behavioralist is perhaps inappropriate, but it has established permanence in the developing literature. For an expanded discussion of this terminology, see Gregory Mitchell, *Why Law and Economics' Perfect Rationality Should Not Be Traded for Behavioral Law and Economics' Equal Incompetence*, 91 GEO L.J. 67, 78–83 (2002) [hereinafter Mitchell, *Perfect Rationality*]. Professor Mitchell prefers the term "legal decision theorists" to behavioralists. See *id.* at 78.

One commentator summarily describes economic theory as a new legal fiction and criticizes courts' reliance on it.<sup>91</sup> Peter Smith summarizes the literature:

In the years since the Court relied on the efficient-capital-market hypothesis, however, scholars have increasingly cast doubt on the descriptive accuracy of the robust version of the theory. The theory is premised on traditional economic principles, including the principle that "all human behavior involves participants who seek to maximize their utility." In the last few decades, however, scholars of behavioral economics have endeavored to show that actual human behavior is characterized by "bounds" that limit the extent to which people actually and effectively pursue utility maximization. Scholars have applied behavioral economics to investor behavior in particular, finding many examples of investor irrationality. In addition, scholars in the field of behavioral finance, a subdiscipline of behavioral economics, have produced significant evidence that markets are affected by the biases that affect individual behavior. Empirical evidence has substantially undermined the strong version of the efficient-capital-markets hypothesis.<sup>92</sup>

Indeed, there are many examples in the literature of allegedly irrational behavior.<sup>93</sup> Among the most popular is overconfidence, which has been linked relationally to marriage decisions,<sup>94</sup> driving ability,<sup>95</sup> and investing ability.<sup>96</sup> Examples of overconfidence often come from surveys in which people claim to consider themselves better than average in some respect.<sup>97</sup>

91. Smith, *Fictions*, *supra* note 13, at 1456.

92. *Id.* at 1456–57 (footnotes omitted).

93. See, e.g., Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: The Problem of Market Manipulation*, 74 N.Y.U. L. REV. 630, 655 (1999) (listing multiple examples of unreasonably optimistic expectations about the future); Donald C. Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Misperceive Stock Market Investors (and Cause Other Social Harms)*, 146 U. PA. L. REV. 101, 139 (1997) (discussing "excessive optimism and overconfidence").

94. Lynn A. Baker & Robert E. Emery, *When Every Relationship Is Above Average: Perceptions and Expectations of Divorce at the Time of Marriage*, 17 LAW & HUM. BEHAV. 439, 440 (1993).

95. See Eisenberg, *supra* note 3, at 216 ("Nearly ninety percent of drivers believe they drive better than average.").

96. Brad M. Barber & Terrance Odean, *Boys Will Be Boys: Gender, Overconfidence, and Common Stock Investment*, 116 Q. J. ECON. 261, 262 (2001).

97. See Eisenberg, *supra* note 3, at 216–18 (listing multiple examples of this type of survey evidence).



Although there is some basis for arguing that people are overconfident, this conclusion must be treated with skepticism.<sup>98</sup> If all people assert they are better than average at driving a car, that does not necessarily mean they tend to overestimate their driving ability. One simple explanation might be that driving has different dimensions and people fixate on the dimensions they are good at and ignore the others. Also, the fact that most people state that they are better than average drivers would be entirely consistent with a tendency to underestimate the driving ability of others. Furthermore, this type of data regarding overconfidence could simply mean that people are bad at answering such questions, and thus might not give us any information about how people actually drive.<sup>99</sup> If overconfidence is really that extreme, why do we not observe more accidents and injuries?<sup>100</sup>

In order to state that overconfidence in answering survey questions translates into irrational behavior, two difficult tasks must be met. First, one must rule out alternative theories consistent with the same observation (e.g., that people simply underestimate others' ability rather than overestimate their own skill), and second, one needs to explain how the existing facts (that accident rates are not insanely high) fit within the theory.<sup>101</sup> Stated another way, using this survey data to argue that individuals systematically overestimate their skill requires us to assume that they are able to accurately estimate others' skill. Financial economists call this the joint hypothesis problem.<sup>102</sup>

Another weakness in the argument that some data is consistent with irrational behavior—and therefore we must abandon all conclusions of economics—is that it overlooks an impressive body of literature that suggests behavior can often be more rational than we might expect.<sup>103</sup> Studies of children, psychotics, and alcoholics indicate a strong tendency to make rational decisions.<sup>104</sup> Moreover, studies of animals, such as pigeons, rats, fish, indicate

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98. Klock, *Flamboyance*, *supra* note 2, at 227 (“It should . . . be noted that there are good reasons for treating survey evidence about behavior with skepticism. Even if the survey instrument is unbiased and respondents are truthful and know the true answer, the survey may elicit evidence about their average motivation rather than their marginal motivation.”).

99. See Marianne Bertrand & Sendhil Mullainathan, *Do People Mean What They Say? Implications for Subjective Survey Data*, 91 AM. ECON. REV. (PAPERS & PROC) 67, 71 (2001) (“[A] large experimental literature by and large supports economists’ skepticism of subjective questions.”).

100. *Cf.* Klock, *Flamboyance*, *supra* note 2, at 226 (“The problem with the story that people are rational in some decisions and not in others is that it is consistent with any observations and could justify any rule of law.”).

101. See *generally id.* at 220–36 (discussing the problem of differentiating between evidence against a theory of behavior and misspecification of the underlying objective function).

102. *Id.* at 205–06.

103. See *id.* at 222 (“[T]here are also an enormous number of studies suggesting that alcoholics, psychotics, children, and animals engage in rational economic behavior.”).

104. See HIRSHLEIFER, *supra* note 56, at 8 (citing T. Ayllon & N. H. Azrin, *The Measurement and Reinforcement of Behavior of Psychotics*, 8 J. EXPERIMENTAL ANALYSIS BEHAV. 357 (1965) (find-

they too will make rational decisions.<sup>105</sup> Indeed, it is irrational to abandon centuries of economic learning on the call of commentators who point at selected data sets while ignoring others. This disingenuous scholarship is a form of data mining, which involves sifting through large amounts of data to find a pattern and then cherry-picking the data that confirms the pattern found.<sup>106</sup>

It is always important to bear in mind that an economic model is very much like a map.<sup>107</sup> A map is a simplification of the world that necessarily distorts it.<sup>108</sup> For example, a Mercator map attempts to display the entire planet on a flat sheet by reducing some distortion in land mass (keeping the scale of land near the poles relatively the same as land near the equator) at the expense of introducing more distortion in other dimensions (e.g., the visually perceived distance between Greenland and Alaska).<sup>109</sup> Though presuming the world to be flat is a useful approximation for a street map user within a city, it might be a poor approximation for a submarine pilot navigating around the world.<sup>110</sup>

Generally speaking, exceptions to a rule probe the rule, but do not necessarily invalidate the usefulness of the rule.<sup>111</sup> As children, we learn “i” be-

ing psychotics work more for more incremental pay)); *id.* at 98–99 (noting that psychologists have found that alcoholics consume less alcohol as the price increases); *see also* Raymond C. Battalio et al., *A Test of Consumer Demand Theory Using Observations of Individual Consumer Purchases*, 11 W. ECON. J. 411 (1973) (psychotics purchase less when prices rise), *available at* <http://www.econlab.arizona.edu/~jcox/reading/testconsumer.pdf>.

105. *See* KAGEL ET AL., *supra* note 59, at 205 (pigeons and rats obey basic consumer choice theory); Clayton M. Hodges & Larry L. Wolf, *Optimal Foraging in Bumblebees: Why Is Nectar Left Behind in Flowers?*, 9 BEHAV. ECOLOGY & SOCIOBIOLOGY 41, 41 (1981) (finding bumblebees exhibit rational economic behavior); S.E.G. Lea, *The Psychology and Economics of Demand*, 85 PSYCHOL. BULL. 441 (1978) (surveying animal experiments in psychology related to economic behavior).

106. Michael C. Lovell, *Data Mining*, 65 REV. ECON. & STAT. 1, 1 (1983).

107. KARL E. CASE & RAY C. FAIR, *PRINCIPLES OF MICROECONOMICS* 10 (5th ed. 1999); *see also infra* note 290 and accompanying text.

108. CASE & FAIR, *supra* note 107, at 10–11.

109. *See* WEBSTER’S II NEW RIVERSIDE UNIVERSITY DICTIONARY 742 (1984) [hereinafter WEBSTER’S II].

110. Klock, *Flamboyance*, *supra* note 2, at 190.

111. Dana Ziker, *What Lies Beneath: An Examination of the Underpinnings of Dietary Supplement Safety Regulation*, 31 AM. J.L. & MED. 269, 282 n.102 (2005). Ms. Ziker explains:

The common expression “the exception proves the rule” is actually a misstatement of the original Latin “*exceptio probat regulam*,” which translates to the more logical sentiment “the exception probes the rule.” The Latin “*probare*,” a root for both the English words “prove” and “probe,” means to test or examine.

*Id.* (citing MERRIAM-WEBSTER’S NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED (3d ed. 1993)). Ziker also derives some of her support from Dr. Madsen Pirie. *Id.*

fore “e” except after “c” because, even though not always true, it is nevertheless useful. Similarly, the art of economic model building involves making assumptions that are useful.<sup>112</sup> This is inherently subjective, but it does not mean we cannot identify examples of good and bad model-building.<sup>113</sup> A good model assumes that individuals will make consistent choices.<sup>114</sup> However, making the assumption that people will borrow and lend infinite amounts of a stock in fixed supply in order to bet on rigid, fixed beliefs about the future when there is obvious uncertainty is not good model-building. One does not need to be a lawyer to know that drowning a woman to determine whether she is guilty of the crime of witchcraft is a poor method of assessing guilt.<sup>115</sup> Likewise, one need not be an economist to understand that a world devoid of wealth constraints, where *every* variable is predetermined, is a poor model for teaching anything about market equilibrium.

### III. FINANCIAL MARKETS

Commentators supporting the application of behavioral law and economics to financial markets make three broad arguments. The first is that because people are irrational, the markets in which people participate are necessarily irrational.<sup>116</sup> The second argument alleges the existence of empirical evidence suggesting that markets are not efficient in the sense that they do not incorporate all publicly-available information.<sup>117</sup> The third ar-

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Dr. Pirie explains his concept of the origin of the fallacy as follows:

The origin of the fallacy lies in the changing uses of language. The word “prove,” which is now taken to refer to establishing something beyond doubt, used to mean “test[.]”[.] Something would be “proved” to establish its quality; and this is the sense which has passed down to us in this fallacy. The exception puts the rule to test and, if it is found to be a valid exception, refutes it instead of proving it in the modern sense of the word[.]

MADSEN PIRIE, *HOW TO WIN EVERY ARGUMENT: THE USE AND ABUSE OF LOGIC* 63 (2006).

112. See Kenneth G. Dau-Schmidt, *Economics and Sociology: The Prospects for an Interdisciplinary Discourse on Law*, 1997 WIS. L. REV. 389, 397 (“The art of modeling or analysis is to know which abstractions one can make and still capture the essential elements of the problem, or in other words, which simplifying assumptions can be made and still preserve the essence of the problem for the purpose of the analysis.”).

113. Cf. *Jacobellis v. Ohio*, 378 U.S. 184, 197 (1964) (“I know [pornography] when I see it . . . .”) (Stewart, J. concurring). Justice Stewart’s often-quoted axiom helps to reconcile the benefit of establishing the boundaries of a good or acceptable model despite its inherent subjectivity.

114. See Mitchell, *Perfect Rationality*, *supra* note 90, at 69 (stating that the assumption of rationality is retained “for lack of a better alternative for prediction and policy analysis”).

115. See Clive A. Stafford Smith & Patrick D. Goodman, *Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?*, 27 COLUM. HUM. RTS. L. REV. 227, 231–32 (1996) (noting the modern satirical use of this medieval methodology).

116. See Stout, *Mechanisms*, *supra* note 33, at 638 (suggesting that capital markets are not efficient because not all market participants behave rationally).

117. See, e.g., David Hoffman, *The “Duty” To Be a Rational Shareholder*, 90 MINN L. REV. 537, 549 (2006) (“[I]mportant forms of human behavior are unlikely to be ‘washed out’ in the financial markets.”); Donald C. Langevoort, *Theories, Assumptions, and Securities Regulation: Market Effi-*

gument concedes that markets could be efficient in the sense of quickly incorporating all new information, but for the fact that markets inaccurately incorporate information.<sup>118</sup> I consider this third argument to be another strong example of pseudo-economic nonsense so I will dispense with it first, and quickly, before providing analysis of the first two arguments.

If a market is efficient with respect to an information set, it means that the expected value of an uncertain outcome conditional on that information set is correct.<sup>119</sup> To state that the market could incorporate the information but does so inaccurately is like stating that an unbiased estimate can be biased.<sup>120</sup> This argument is nonsense. I believe that commentators have succeeded in publishing such statements because those commentators have cast their statements within large amounts of economic jargon, which intimidates econophobes into not analyzing the logic of the statement.<sup>121</sup> Commentators have advanced this story with seemingly plausible hypotheticals. For example, one securities regulation scholar writes:

Suppose that investors are, in fact, not always rational and instead suffer from some degree of behavioral biases. Investors of such offerings are simply unable to handle factual and forward-looking information. Overconfidence and the availability bias may lead such investors to overweigh the importance of such information. Bounded rationality may limit the ability of investors to look

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*ciency Revisited*, 140 U. PA. L. REV. 851, 853–56 (1992) (suggesting that strong claims of market efficiency are in doubt); James Lindgren, *Telling Fortunes: Challenging the Efficient Markets Hypothesis by Prediction*, 1 S. CAL. INTERDISC. L.J. 7, 12–18 (1992) (addressing the shortcomings in precious studies of market theory and the inefficiency of the markets in responding to new information); Smith, *Fictions*, *supra* note 13, at 1456–57 (“[S]cholars . . . have produced significant evidence that markets are affected by the biases that affect individual behavior.”).

118. Frederick C. Dunbar & Dana Heller, *Fraud on the Market Meets Behavioral Finance*, 31 DEL J. CORP. L. 455, 498 (2006) (“[I]nformational efficiency does not mean that a stock price will correctly incorporate all relevant information.”).

119. Klock, *Mainstream Economics*, *supra* note 42, at 299, 300–01.

120. See Mark Klock, *Finding Random Coincidences While Searching for the Holy Writ of Truth: Specification Searches in Law and Public Policy or Cum Hoc Ergo Propter Hoc?*, 2001 WIS L. REV. 1007, 1017 [hereinafter, Klock, *Random Coincidences*] (explaining the concept of unbiasedness).

121. The problem can also be attributed, in part, to commentators who write about a field in which the terminology has a technical meaning. I do not deny that it is plausible (although unlikely) that investors could react to an announcement that a hypothetical stock trading at \$50 has received a tender offer for \$75 by driving the price down to \$40. But it is not reasonable to argue that the new price incorporates the information, just incorrectly. Logically speaking, incorporating information inaccurately is equivalent to ignoring valuable information and not incorporating it. I believe most logicians should understand this even without training in economics.

closely at all the mandatory disclosure items once given other factual and forward-looking information.<sup>122</sup>

This language is loaded with possibilities that cannot be tested.

My point is that if markets *systematically* underreact or overreact to news, then they have not impounded all of the information because the systematic portion is an identifiable part of the information.<sup>123</sup> If one wants to hypothesize that markets react to news randomly, that individual would be hard pressed to support such a proposition because it cannot be empirically tested.<sup>124</sup> The logical flaw with this reasoning is that commentators are hypothesizing about what investors, absent any constraints, might believe and then using plausible, unconstrained beliefs to demonstrate inconsistency. These hypothetical inconsistencies are not possible in a market setting because a market is necessarily constrained by what economists call “adding up” constraints, or Walras’ Law.<sup>125</sup> “Evidence” that the market did not accurately evaluate the information always comes in the form of the price on an earlier day in history that was very different from the price on a later day in history.<sup>126</sup> This is clearly not a *ceteris paribus* comparison, and it is not possible to infer irrationality from such observations.<sup>127</sup>

Accurate valuation of common stock is difficult.<sup>128</sup> In the simplest of cases, such valuation depends on future cash flows, the riskiness of those

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122. Stephen J. Choi, *Behavioral Economics and the Regulation of Public Offerings*, 10 LEWIS & CLARK L. REV. 85, 112–13 (2006).

123. See generally Klock, *Mainstream Economics*, *supra* note 42, at 299–302 (providing careful exposition of the relation between information and market efficiency).

124. See SILBERBERG, *supra* note 60, at 10 (“A theory which says that it will either rain or not rain tomorrow is no theory at all.”).

125. *Id.* at 521; see also Loewenstein & Willard, *supra* note 16, at 237–39 (explaining Walras’s Law).

126. See Robert E. Hall, *Struggling to Understand the Stock Market*, 91 AM. ECON. REV. (PAPERS & PROC) 1, 2 (2001) (Richard T. Ely Lecture given at the 2001 annual meeting of the American Economic Association); see also Donald C. Langevoort, *Taming the Animal Spirits of the Stock Markets: A Behavioral Approach to Securities Regulation*, 97 NW. U. L. REV. 135, 141 (2002). Professor Langevoort presents the following passage as evidence against market efficiency:

126. See *infra* notes 329–335 and accompanying text.

The Sunday, May 3, 1998 edition of the *New York Times* carried a front-page story about EntreMed, a biotechnology company with licensing rights to an exciting medical breakthrough. As a result of this conspicuous media attention, EntreMed’s stock price rose dramatically and stayed at the higher valuation, as did (to a somewhat lesser degree) the prices of related biotech stocks. What is puzzling about this phenomenon is that the *Times* article contained absolutely no “new news”: everything in it had already been said, albeit with less prominence, in earlier stories in the *Times* and in widely respected scientific publications.

*Id.* at 140.

126. See *infra* notes 329–335 and accompanying text.

127. Hall, *supra* note 126, at 2.

128. See IVO WELCH, A FIRST COURSE IN CORPORATE FINANCE 2 (2008) (explaining why esti-

cash flows, the market price of risk, and expected inflation.<sup>129</sup> Each of these things is uncertain and must therefore be estimated.<sup>130</sup> It is not irrational for people to have different estimates or to constantly reassess and revise these estimates.<sup>131</sup> Small changes in beliefs about the future can cause large changes in the present.<sup>132</sup> When future cash flows depend on something as tenuous as what people believe regarding whether, when, and who finds a patentable cure for cancer, the fluctuations in value can be large without any obvious or simple reason.<sup>133</sup> But the fact that people make and change their forecasts of the future does not mean that dramatic price increases and decreases are the result of irrational investors.<sup>134</sup>

I can offer another historical example. On August 3, 1981, a thirty-year U.S. treasury bond that had been purchased in May of 1980 for \$100,000 could be sold for \$70,937.50.<sup>135</sup> This is a remarkably large drop in a relatively short period on a security for which the time and amount of the payments are known precisely and with certainty.<sup>136</sup> I was teaching introductory economics at Boston College in 1981, and I am certain that no one at that time suggested that investors had been pricing bonds irrationally in 1980. It is therefore remarkable to me that, in the twenty-first century, legal commentators are claiming that the price drop in the value of exceptionally uncertain future cash flows in 2000 is evidence that investors were irrational in 1999.<sup>137</sup>

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ating value is important and difficult). See generally Klock, *Fortune Tellers*, *supra* note 1, at 94–100 (discussing conceptual measurement issues in estimating the fair market value of a financial asset).

129. Klock, *Fortune Tellers*, *supra* note 1, at 99.

130. *Id.*

131. See Hall, *supra* note 126, at 2.

132. See *id.* at 1 (“Some types of corporate property, especially the types held by high-tech companies, have values that are exquisitely sensitive to the future growth of the cash they generate.”).

133. See Klock, *Fortune Tellers*, *supra* note 1, at 100 (explaining that knowledge capital has become a larger component of the economy and leads to greater estimation uncertainty and stock value volatility).

134. See Hall, *supra* note 126, at 10–11 (using eBay and Amazon as examples).

135. See WALL ST. J., Aug. 4, 1981, at 52.

136. See WILLIAM F. SHARPE ET AL., INVESTMENTS 108 (6th ed. 1999) (“A useful first step in understanding security valuation is to consider riskless securities, which are those fixed-income securities that are certain of making their promised payments in full and on time. . . . [T]he obvious candidates for consideration as riskless securities are the securities that represent the debt of the federal government.”).

137. See Robert A. Prentice, *The Inevitability of a Strong SEC*, 91 CORNELL L. REV. 775, 781 (2006); see also Fisher, *supra* note 46, at 847 (“During the bubble, the market professionals imposed no such rationality, and in fact the market acted irrationally, with stock prices far away from fundamental values.”); Henry T. C. Hu, *Faith and Magic: Investor Beliefs and Government Neutrality*, 78

I now return to the first of these commentators' arguments, that because individuals are not rational, markets are necessarily irrational. There are two problems with this line of reasoning. The first is that it assumes a false fact. As I noted previously, a large body of literature reporting on the study of rats, pigeons, and other animals shows that those animals make rational economic decisions.<sup>138</sup> Other literature demonstrates that children, psychotics, alcoholics, and prisoners all make rational economic decisions.<sup>139</sup> Moreover, Richard Posner has demonstrated that even things ordinarily not the subject matter of economics are still governed by economic rules and rational economic behavior.<sup>140</sup> As one example, Judge Posner demonstrates that homosexual activity increases when the price of heterosexual sex rises.<sup>141</sup> The evidentiary history of people behaving rationally is long and strong, whereas evidence that people are irrational is short-in-coming and flawed.<sup>142</sup>

One legal scholar and accomplished psychologist has written extensively on the topic of behavioral law and economics' claim that rationality is not real. Professor Gregory Mitchell states:

[T]he greater realism of behavioral law and economics is more illusion than reality. In fact . . . the equal incompetence assumption is not faithful to the empirical data on judgment and choice and, moreover, cannot lay claim to empirical validity superior to that of the perfect rationality assumption. Behavioral law and economics bases its model of bounded rationality on a very limited set of empirical data and draws unsupported conclusions about human nature from this partial data set. Behavioral law and economics scholars simplify and overgeneralize findings on human cognition and rationality to make these findings seem simultaneously important and simple enough to be incorporated into legal policy. Remarkably, despite the amazing breadth and boldness of many of the em-

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TEX L. REV. 777, 785–86 (2000) (describing nearly unbelievable stock volatility in the technology sector in the late 1990s).

138. See *supra* note 105 and accompanying text.

139. See *supra* note 104 and accompanying text.

140. Richard A. Posner, *The Economic Approach to Homosexuality*, in *SEX, PREFERENCE, AND FAMILY: ESSAYS ON LAW AND NATURE* 173, 173–74 (David M. Estlund & Martha C. Nussbaum eds., 1997) (“The more intense a person’s sexual appetite is, the more he will value sexual activity over other activities, while the structure of his sexual preferences will affect the value he attaches to different forms and objects of sexual activity and also to a variety of . . . sexual partners.”).

141. *Id.* at 174.

142. See Gregory Mitchell, *Taking Behavioralism Too Seriously? The Unwarranted Pessimism of the New Behavioral Analysis of Law*, 43 WM. & MARY L. REV. 1907, 1911 (2002) [hereinafter Mitchell, *Unwarranted Pessimism*] (“Simply put, the empirical research does not support the dire pronouncements of legal scholars regarding the human capacity for irrational behavior. Just as troubling as the overreaching claims about human cognition that these scholars make is their uncritical acceptance by others.”).

pirical claims made by advocates of behavioral law and economics, the validity of these empirical claims has largely gone untested within the legal academy.<sup>143</sup>

Given that behavioral law and economics advocates have misunderstood economic theory and taken statistical evidence out of context, it should not be surprising that they have also overgeneralized results taken from the psychology literature.

Much of the evidence supporting the behavioralists' contention that people are not rational is based on survey evidence.<sup>144</sup> It is well-known that survey evidence regarding hypothetical choices is not reliable.<sup>145</sup> Ask a worker whether she wants a one hundred dollar increase in pay or a one hundred dollar increase in her employer's contribution to her health insurance and she might well reply that she wants both choices.<sup>146</sup> But give her a deadline by which to select one of the two choices or forfeit the hundred dollars and she will meet that deadline.<sup>147</sup> One study conducted by economics professors at The George Washington University found that reliance on student surveys led to inaccurate predictions about students' actual behavior.<sup>148</sup>

In response to the well-known criticism of survey data, behavioralists have been conducting more experiments in order to analyze real decisions rather than hypothetical decisions.<sup>149</sup> This methodology has unavoidable

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143. Mitchell, *Perfect Rationality*, *supra* note 90, at 72.

144. See generally Klock, *Flamboyance*, *supra* note 2, at 227–35 (describing several surveys purporting to expose irrationality in the general human population).

145. See *id.* at 232 (“[S]urvey data is as notoriously unreliable as eyewitness testimony.” (footnote omitted)); *id.* at n.368 (“Anyone who believes that surveys provide good measurements should consider the fact that Michael Moore, who gained fame for his portrayal of the coldness of corporate decision making in *Roger and Me*, reported that thirty-eight percent of all Americans believe that most serial killers are not all that bad.” (citing THE AWFUL TRUTH (New Video Group 2000))).

146. See Posner, *Rational Choice*, *supra* note 5, at 1575 (“If you give a worker childbirth coverage, she'll like it (endowment effect); but if you don't give it to her, she'll dislike it (more precisely, won't want to pay for it in lower wages).”).

147. *Cf. id.* at 1569 (observing that women given insurance are more likely to have more children and more expensive medical treatment, taking whatever they can get at no additional cost).

148. See Anthony M. Yezer, Robert S. Goldfarb & Paul J. Poppen, *Does Studying Economics Discourage Cooperation? Watch What We Do, Not What We Say or How We Play*, 10 J. ECON. PERSP. 177, 177 (1996) (“In fact, the evidence in this paper implies that even if undergraduate students of economics display uncooperative behavior in specialized games or surveys, their ‘real-world’ behavior is actually substantially more cooperative than that of their counterparts studying other subjects.”).

149. See, e.g., Jonathan E. Alevy, Michael S. Haigh & John A. List, *Information Cascades: Evidence from a Field Experiment with Financial Market Professionals*, 62 J. FIN. 151, 152 (2007) (experimenting with real decisions rather than hypothetical choices).



problems of its own—experiments exploring behavior necessarily alter behavior.<sup>150</sup> People who are being watched behave differently than when they are not being watched.<sup>151</sup> This is the basis for complaints about videotaping in public. Such criticism is essentially what economists call the Lucas-critique after Nobel Laureate Robert Lucas.<sup>152</sup> As I explained in a previous paper:

One of Lucas's fundamental insights was a criticism of economic policy based on statistical estimates of economic models. This criticism is widely known as the Lucas-critique. The criticism is that policy decisions that are made by estimating a model and then investigating how a change in government policy will affect important variables of interest is fundamentally flawed because if people are rational (which in Lucas's terms means forward-looking), changes in government policy will effect a change in behavior, or, in other words, a change in the structural model.

. . . What this means is that choices that are revealed at different points in time cannot be used to assess the rationality of the choices because behavior will change in response to changing conditions.<sup>153</sup>

Professor Mitchell provides additional criticism of these experiments, after observing that the subjects of experiments are not random and that behavior cannot be generalized across cultures<sup>154</sup> nor across situational differences.<sup>155</sup> Behavioral law and economics scholars draw misleading conclusions from these experiments, causing Professor Mitchell to conclude:

For whatever reason, many legal scholars use insufficient care and precision in their interpretations and uses of psychological research on judgment and decision making. Consumers of this growing literature should thus look very skeptically on the claims being made and should resist the contention that the cognitive-miser mod-

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150. Klock, *Flamboyance*, *supra* note 2, at 225.

151. See Alvin E. Roth, *Introduction to Experimental Economics*, in THE HANDBOOK OF EXPERIMENTAL ECONOMICS 3, 70 (John H. Kagel & Alvin E. Roth eds., 1995) (observing skepticism of experiments because subjects will speculate as to the purpose of the experiments).

152. Klock, *Flamboyance*, *supra* note 2, at 224.

153. *Id.* at 224–25 (footnotes omitted).

154. See generally Mitchell, *Perfect Rationality*, *supra* note 90, at 147–56 (explaining why “[c]ulture often exerts a strong influence on judgments and decisions.”).

155. See generally *id.* at 105–19 (discussing the importance of situational differences on thought and behavior).

el being offered by these scholars is more complete and accurate than the rational-actor model.<sup>156</sup>

Finally, it must be noted that any given set of facts can likely be explained by alternate theories.<sup>157</sup> Rationality in its essence means that people behave in a manner consistent with their objectives.<sup>158</sup> As economists, we do not judge whether their objectives are rational.<sup>159</sup> Individual objectives are governed by individual preferences and tastes.<sup>160</sup> When we see behavior that appears to be irrational, we cannot conclude that it is irrational unless we can conclusively eliminate alternative explanations.<sup>161</sup> A likely alternative explanation for seemingly irrational behavior is that we do not know the individual's true objective.<sup>162</sup> To demonstrate that people are not rational, we need to see men, who want to make holes deeper, filling those holes with dirt, or hungry women spending hours in a restaurant without eating because they constantly change their menu selection.

Notwithstanding the fact that people are rational, the notion that irrational individuals leads to an irrational market is flawed. This belief is probably rooted in the fact that theoretical proofs of market efficiency often begin with a set of assumptions that includes rational individuals.<sup>163</sup> The assumptions of a proof are always sufficient conditions to establish the result.<sup>164</sup> But they need not be required conditions.<sup>165</sup> In other words, a rational financial market does not require rational individual investors.<sup>166</sup> An

156. Mitchell, *Unwarranted Pessimism*, *supra* note 142, at 2020.

157. See SILBERBERG, *supra* note 60, at 10 ("It is always possible that a new theory will be developed which will explain a given set of events.").

158. Posner, *Rational Choice*, *supra* note 5, at 1551.

159. See VARIAN, *supra* note 25, at 35–36 (economists' assumptions about preferences relate to consistency, not reasonableness); see also *supra* notes 75–82 and accompanying text.

160. Klock, *Flamboyance*, *supra* note 2, at 251.

161. See *id.* at 253–54 (explaining that even if our data reject the hypothesis that individuals are acting against their self-interest, it is possible that we have incorrectly defined their self-interest).

162. *Id.* at 222.

163. *Id.* at 202.

164. *Id.*

165. *Id.*

166. Richard Roll argues that even if individual people behave irrationally, markets can behave as if everyone is rational, and he effectively draws on an example of how illogical behavior by termites results in an organized colony. 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, 72–73 (1994). The same argument is made with more formality and rigor by Mark Rubinstein. Mark Rubinstein, *Rational Markets: Yes or No? The Affirmative Case*, 57 FIN. ANALYSTS J. 15, 15 (2001). Professor Rubinstein writes:

With the recent flurry of articles declaiming the death of the rational market hypothesis, it

admissible confession with corroborating facts is sufficient to establish guilt, but it is not necessary. Likewise, a strong assumption might be sufficient to establish the validity of a theory under unrealistic conditions, but it could still be unnecessary for the theory to hold under realistic conditions.

Indeed, the most common form of irrational behavior that behavioralists point to—overconfidence in ability—intuitively leads to a hyper-rational market.<sup>167</sup> That is, a hyper-rational market is more accurate than a market without overconfident investors because the overconfidence results in overinvestment of resources in an effort to collect information.<sup>168</sup> The intuition is appealing, but the case has been persuasively set forth in Professor Rubenstein’s careful and thoughtful article.<sup>169</sup>

As to the second argument, that empirical research shows markets to be inefficient, I must admit that there is some empirical evidence that has been interpreted as evidence of systematically incorrect asset pricing.<sup>170</sup> These are purported anomalies.<sup>171</sup> Asset pricing anomalies are not necessarily proof that the market is inefficient.<sup>172</sup> They are puzzles that warrant further exploration.<sup>173</sup> One of the more famous anomalies is known as the “small firm effect.”<sup>174</sup> The story behind this anomaly is that small equity capitaliza-

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is well to pause and recall the very sound reasons this hypothesis was once so widely accepted, at least in academic circles. Although academic models often assume that all investors are rational, this assumption is clearly an expository device not to be taken seriously. What is in contention is whether markets are “rational” in the sense that prices are set as if all investors are rational. Even if markets are not rational in this sense, abnormal profit opportunities still may not exist. In that case, markets may be said to be “minimally rational.” I maintain that not only are developed financial markets minimally rational, they are, with two qualifications, rational. I contend that, realistically, market rationality needs to be defined so as to allow investors to be uncertain about the characteristics of other investors in the market. I also argue that investor irrationality, to the extent that it affects prices, is particularly likely to be manifest through overconfidence, which in turn, is likely to make the market “hyper-rational.”

*Id.*

167. Donald Langevoort explains that “there is an increasing body of empirical evidence that directly supports investor overconfidence as an important trait.” Langevoort, *supra* note 126, at 147.

168. Rubenstein, *supra* note 166, at 20 (investors overinvest in collecting information).

169. See generally *id.* at 15–29 (explaining financial market anomalies as consistent with rational markets).

170. See STEPHEN A. ROSS ET AL., *ESSENTIALS OF CORPORATE FINANCE* 343 (4th ed. 2006) (“The record on the efficient-market hypothesis is extensive, and in large measure it is reassuring to advocates of the efficiency of markets.”).

171. See Ray Ball, *The Theory of Stock Market Efficiency: Accomplishments and Limitations*, in *THE REVOLUTION IN CORPORATE FINANCE* 2, 14–15 (Joel M. Stern & Donald H. Chew, Jr. eds., 3d ed., 1998) (describing the development of anomalies in the efficiency literature).

172. *Id.*

173. *Id.* at 15.

174. BURTON G. MALKIEL, *A RANDOM WALK DOWN WALL STREET* 249–51 (7th ed. 1999) (describing the tendency of small stocks to outperform large stocks in the past, but questioning whether the relationship is causal, or whether it might even be an artifact of errors in risk measurement or sample selection procedures).

tion (market price multiplied by outstanding shares) firms appear to earn higher rates of return than large equity capitalization firms, after adjusting for risk.<sup>175</sup> An alternative explanation suggests that the risk-adjustment process is systematically biased for small firms.<sup>176</sup>

Many stories could be told to explain why this might be the case. For example, I hypothesize that small firms suffer more corporate governance risk than large firms because they are not as closely scrutinized. Risk-adjustment methods used by financial economists will not capture this because risk adjustment is based on historically observed covariances between assets, and corporate governance crises for small firms are isolated events that often result in the firm being taken over, taken private, or failing altogether, and thus disappearing from the data.<sup>177</sup>

Other pricing anomalies, such as the “momentum effect” and the “reversal effect,” have gathered great attention in recent years and are proudly waved by the behavioral fans.<sup>178</sup> The stories of these two anomalies are similar, but incompatible.<sup>179</sup> The momentum effect finds that successful securities continue to do well, and the reversal effect finds that recent losers tend to outperform recent winners.<sup>180</sup> The documented evidence supporting these anomalies has been interpreted as suggesting small amounts of predictability in stock returns.<sup>181</sup>

The simplified presentation of asset-pricing models that one might find in an undergraduate or M.B.A. text states that market efficiency implies changes in returns will be unpredictable.<sup>182</sup> Typically omitted from this academic presentation is the fact that this prediction assumes a constant market price of risk over time.<sup>183</sup> Unless one has been immersed in sufficient quan-

175. *Id.* at 249–50.

176. *Id.* at 251.

177. See ROSS ET AL., *supra* note 170, at 348 n.18 (explaining the role survivorship bias could have in the small firm effect).

178. See Tarun Chordia & Lakshmanan Shivakumar, *Momentum, Business Cycle, and Time-varying Expected Returns*, 57 J. FIN. 985, 985 (2002) (“A growing number of researchers argue that time-series patterns in returns are due to investor irrationality and thus can be translated into abnormal profits.”).

179. See Robert Connolly & Chris Stivers, *Momentum and Reversals in Equity-Index Returns During Periods of Abnormal Turnover and Return Dispersion*, 58 J. FIN. 1521, 1521 n.1 (2003) (defining these anomalies in quantitative terms as opposites).

180. *Id.*

181. See ROBERT J. SHILLER, *IRRATIONAL EXUBERANCE* 4 (2d ed. 2005) (suggesting that as a result of irrational investors we can predict a drop in the stock market).

182. See, e.g., RICHARD A. BREALEY ET AL., *PRINCIPLES OF CORPORATE FINANCE* 337 (8th ed. 2006).

183. See Hall, *supra* note 126, at 4 (changing risk premiums causes predictability in stock re-

titative methodology to be prepared to read and comprehend the academic literature on asset pricing, one is likely to miss the importance of this simplifying assumption.<sup>184</sup> Modest predictability is easily explained by small changes in risk premiums over time.<sup>185</sup> Risk premiums are likely to change over time because of either changes in beliefs about the future or changing demographics that affect tastes for immediate consumption and savings.<sup>186</sup> Rational beliefs about the future are loosely constrained, and changing one's belief about what will happen next year cannot be judged to be irrational.<sup>187</sup> Changing demographics that impact cultural preferences for more or less savings relative to current consumption are also immune from a judgment of irrationality.<sup>188</sup>

In a comment on Professor Robert Prentice's claim of bringing together "twenty-five years' worth of discipline-specific behavioral research in order to demonstrate that a behavioral approach is dramatically more descriptive [but not necessarily more predictive] of reality than the widely-accepted law and economics approach,"<sup>189</sup> Professor Mitchell writes:

When the empiricist rhetoric of behavioral law and economics is compared to the full body of empirical data from which this rhetoric flows, we are left with an unremarkable point made by behavioral law and economics and a remarkable observation about behavioral law and economics. That is, behavioral law and economics stresses that conventional law and economics utilizes an empirically false model of behavior—a point already acknowledged within law and economics and championed years ago in regard to positive economics by Milton Friedman, one of the primary methodological influences on law and economics. Yet behavioral law and economics seeks to replace this model with its own empirically false model of behavior.<sup>190</sup>

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turns).

184. See CAMPBELL ET AL., *supra* note 72, at 80 (explaining that thirty years ago predictability in returns would have been considered a rejection of rationality, but the modern financial economics literature has taught us that predictability can be caused by rational factors such as time-varying parameters associated with changing business conditions).

185. Hall, *supra* note 126, at 4.

186. See Klock, *Fortune Tellers*, *supra* note 1, at 72 (suggesting "that the parameters ruling the financial world are . . . time-varying and sensitive to demographic changes").

187. See Hall, *supra* note 126, at 2 ("[R]ational beliefs about probabilities are only loosely constrained in a nonstationary world.").

188. See Mitchell, *Perfect Rationality*, *supra* note 90, at 154–55 (reporting on studies of cross-cultural differences in the overconfidence bias and finding strikingly different results across cultures).

189. Prentice, *Behavioral Insight*, *supra* note 3, at 135.

190. Mitchell, *Perfect Rationality*, *supra* note 90, at 74.

Some readers might argue that I treat market efficiency as a tautology by arguing that asset pricing anomalies are perceived and not real, and by placing the burden of disproving market efficiency conclusively on the behavioralists. This is incorrect. Market efficiency is not a tautology. It contains a refutable proposition that no mechanical trading rules will systematically generate superior risk-adjusted returns after transactions costs.<sup>191</sup> But when many tests fail to refute the proposition and a few selected tests reject the proposition less than dramatically, one should critically evaluate the test methodology.<sup>192</sup> Behavioralists who argue that efficient markets are a legal fiction or that the efficient market hypothesis has been proven false have clearly not met the burden of such strong claims. Alternatively, many behavioralists make the weaker claim that market efficiency is controversial and could be false, which also effectively undermines the law's reliance on market efficiency.<sup>193</sup> To those who might be persuaded by this seemingly reasonable claim, I argue that logic—not blind faith—provides a compelling reason to believe that publicly traded U.S. equities are priced efficiently. The essence of the efficient market hypothesis is that there are no abnormal returns (economic profits) to gathering information on mispriced securities. In other words, if there is unclaimed money lying around that can be picked up without effort and without loss of integrity, people will take it until it is gone.<sup>194</sup>

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191. See Stephen F. LeRoy, *Efficient Capital Markets and Martingales*, 27 J. ECON. LIT. 1583, 1584 (1989) (“[T]he doctrine of capital market efficiency contains the assertion that . . . there are no profitable trading rules.”).

192. See generally Klock, *Random Coincidences*, *supra* note 120, at 1007–1065 (discussing the invalidity of classical statistical methodology when performed in the context of a search).

193. See, e.g., David A. Westbrook, *Corporation Law After Enron: The Possibility of a Capitalist Reimagination*, 92 GEO. L.J. 61, 112 n.300 (2003) (“Robust versions of the efficient capital markets hypothesis (‘ECMH’) have always been controversial, and support for them has waned in recent years. Indeed, Enron’s stratospheric rise and fall—the Enron bubble—itsself calls ECMH into question.”); see also Jeffrey N. Gordon, *What Enron Means for the Management and Control of the Modern Business Corporation: Some Initial Reflections*, 69 U. CHI. L. REV. 1233, 1240 (2002) (“Enron disturbs the efficient market hypothesis.”); Langevoort, *supra* note 126, at 136 (“[F]aith in the EMH among economists has been weakening for some time.”).

194. Cf. Stephen A. Ross, *The Interrelations of Finance and Economics: Theoretical Perspectives*, 77 AM. ECON. REV. (PAPERS & PROC) 29, 32 (1987) (“The intuition underlying the efficient market theories is the intuition of the lack of arbitrage [in a competitive equilibrium].”).

#### IV. THE CALCULUS OF CONSENT; ARROW'S IMPOSSIBILITY THEOREM; AND HOVENKAMP'S CRITIQUE

##### A. *The Harm in Substituting Market Outcomes with Political Decisions*

What harm could be caused if the law were to lose its reliance on the efficient market hypothesis as many behavioralists advocate? Many commentators believe that this would result in a dismantling of current federal securities laws.<sup>195</sup> I agree with this because the primary vehicle for redress of securities fraud is the class action, which requires the fraud-on-the-market theory to establish reliance.<sup>196</sup>

Economic prosperity requires two preconditions that cannot be created overnight: 1) a well-developed legal system that clearly defines and enforces property rights, including intangible property; and 2) highly liquid financial markets that enable capital to flow freely.<sup>197</sup> Economic prosperity for the nation benefits even the less fortunate with no wealth directly invested in the financial markets.<sup>198</sup> With poorly functioning markets, the costs of raising capital are high, investment is unprofitable, and employment and tax revenue are low.<sup>199</sup>

One cornerstone of the foundation of economic prosperity in the United States has been our federal securities laws, first enacted in 1933 and 1934, which are focused on policing fraud in the marketplace for securities.<sup>200</sup> Fraud destroys markets.<sup>201</sup> Historically, U.S. markets have flourished under a philosophy of full and fair disclosure that has been promoted by attaching financial liability to the introduction of fraudulent statements into the mar-

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195. See, e.g., Dunbar & Heller, *supra* note 118, at 532 (arguing that the market is not efficient at times, and so the presumption of reliance on market price in securities class actions should be rejected); Ribstein, *Noisy Market*, *supra* note 9, at 139 (“[B]ehavioral finance supports significant narrowing of the fraud on the market theory.”).

196. See *Basic Inc. v. Levinson*, 485 U.S. 224, 242 (1988) (“Requiring proof of individualized reliance from each member of the proposed plaintiff class effectively would have prevented respondents from proceeding with a class action, since individual issues then would have overwhelmed the common ones. The District Court found that the presumption of reliance created by the fraud-on-the-market theory provided ‘a practical resolution to the problem . . . .’”).

197. See Black, *supra* note 12, at 782–83.

198. Klock, *Fortune Tellers*, *supra* note 1, at 75.

199. *Id.*

200. MARC I. STEINBERG, *SECURITIES REGULATION* 1 (4th ed. 2004).

201. See, e.g., Akerlof, *supra* note 27, at 500 (arguing that in markets in which trust is important, “informal unwritten guarantees are preconditions for trade and production” and “[w]here these guarantees are indefinite, business will suffer . . . .”); Klock, *Fortune Tellers*, *supra* note 1, at 77 (“Fraud increases the informational asymmetry and cannot only cause the market to function poorly, but it can cause the market to cease to exist altogether.”).

ketplace.<sup>202</sup> But in order to maintain a cause of action under federal securities laws, private plaintiffs must establish reliance on the fraudulent statement.<sup>203</sup> As a practical matter, this is routinely established by demonstrating that the plaintiff made transactions in the public market at the market price under the theory that in an efficient market the price incorporates all available information (and misinformation).<sup>204</sup> Now, commentators are calling this theory a legal fiction, claiming that our public equity markets are not efficient and those who invest in public corporations are not rational.<sup>205</sup> Acceptance of such assertions without critical analysis of the basis for making them could greatly damage our ability to deter fraud in the marketplace under the existing regulatory framework.

The direct federal securities law problem created by behavioralists' arguments—making it impossible to establish reliance under the existing law—could be addressed with a legislative response that involves creating other avenues of redress for defrauded investors, at least in theory. There are two far greater problems that fall out of the behavioralists' mischief. The first is that such action constitutes a direct campaign of total war on the underlying, fundamental philosophy that has served U.S. financial markets so well since 1933.<sup>206</sup> The second problem is implicit. If we are not going to let financial markets allocate resources, those decisions must be made by some alternative.<sup>207</sup> The only alternative is the political market, and it is well-known that the political market is highly irrational.<sup>208</sup>

The fundamental philosophy of federal securities law is one of nonpaternalism—full and fair disclosure of all material information to a reasonable investor for publicly traded securities.<sup>209</sup> Under this philosophy, the role of the law is to drive fraud out of the marketplace, protect the integrity of the

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202. Klock, *Fortune Tellers*, *supra* note 1, at 77.

203. *Ray v. Citigroup Global Mkts. Inc.*, 482 F.3d 991, 995 (7th Cir. 2007).

204. *See Basic Inc. v. Levinson*, 485 U.S. 224, 246 (1988). The Court explains acceptance of the theory: "The [fraud-on-the-market] presumption is also supported by common sense and probability. Recent empirical studies have tended to confirm Congress' premise that the market price of shares traded on well-developed markets reflects all publicly available information, and, hence, any material misrepresentations." *Id.* (emphasis added).

205. Smith, *Fictions*, *supra* note 13, at 1456.

206. *See STEINBERG*, *supra* note 200, at 1 (stating that Congress expressly considered and rejected merit regulation in favor of an honest market approach).

207. *Cf. Posner, Rational Choice*, *supra* note 5, at 1575 ("Dare we vest responsibility for curing irrationality in the irrational?").

208. *See Klock, Will of the People*, *supra* note 85, at 46–48 (describing instability problems with political processes).

209. *See STEINBERG*, *supra* note 200, at 1.



market, and promote investor confidence.<sup>210</sup> It is this philosophy that led to the prosecution of insider trading as a violation of law subject to both civil and criminal penalties.<sup>211</sup> Although the illegality of insider trading was once controversial, it is now settled law that has been so successful in fueling growth in the U.S. economy that it has been thoroughly copied around the globe.<sup>212</sup> A formal mathematical treatment of investor confidence in the marketplace was published in the *American Economic Review* in 1990 by Lawrence Ausubel.<sup>213</sup>

The formal economic argument that supports a prohibition of insider trading is complicated.<sup>214</sup> The arguments are complicated because they rely on secondary effects that occur in a general equilibrium where there is endogenous feedback across different markets.<sup>215</sup> The simplest exposition that I can provide is that insider trading reduces the *ex ante* expected returns of outside investors.<sup>216</sup> This shift in the payoff to investment lowers the amount of capital that investors will be willing to supply in the market,<sup>217</sup> which in turn raises the cost of capital to corporations and lowers the profitability of investment.<sup>218</sup> Aggregate capital investment is thereby lower for the economy, resulting in a consequent reduction in income, employment, and overall social welfare.<sup>219</sup>

Although the illegal nature of insider trading is settled, the question of who can enforce it against whom still has many fuzzy answers.<sup>220</sup> The Pri-

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210. SEC v. Zandford, 535 U.S. 813, 819 (2002).

211. U.S. v. O'Hagan, 521 U.S. 642, 646 (1997).

212. Frank B. Cross & Robert A. Prentice, *The Economic Value of Securities Regulation*, 28 CARDOZO L. REV. 333, 336 n.10 (2006).

213. Lawrence M. Ausubel, *Insider Trading in a Rational Expectations Economy*, 80 AM. ECON. REV. 1022, 1037 (1990).

214. Presumably, if the economic arguments were simple, Henry Manne—who embraces the use of economics—would not have continued to maintain his more than forty years of opposition to prohibitions on insider trading, notwithstanding the worldwide rejection of his views. See Henry G. Manne, *Insider Trading: Hayek, Virtual Markets, and the Dog that Did Not Bark*, 31 J. CORP. L. 167, 168 n.5 (2005) (“I do not consider the SEC’s ‘official’ line on insider trading, that it destroys the confidence of investors and thus lessens both liquidity and investment, to have serious merit. Apart from being a nearly unfalsifiable proposition, it is devoid of the scantest economic or empirical content. It has, however, been enormously important in the propaganda campaign the SEC has waged for years to demonize insider trading.”). It appears as if Dean Manne has not yet read Professor Ausubel’s work.

215. See Klock, *Mainstream Economics*, *supra* note 42, at 305 (“[Insider trading] can only properly be analyzed in a general equilibrium model.”).

216. *Id.* at 307.

217. *Id.* at 335.

218. *Id.*

219. *Id.*

220. See, e.g., Joan MacLeod Heminway, *Martha Stewart Saved! Insider Violations of Rule 10B-5 for Misrepresented or Undisclosed Personal Facts*, 65 MD. L. REV. 380, 407 (2006) (stating that there are significant unanswered questions about important interpretive issues under Rule 10b-5); Jacob M. Kantrow, Note, *Dura Pharmaceuticals, Inc. v. Broudo: Not Really a Loss Causation Case*,

ivate Securities Litigation Act erected some procedural barriers against private plaintiffs, and rulings by the U.S. Supreme Court have also raised obstacles.<sup>221</sup> Also, it is virtually impossible to bring a class action without relying on the fraud-on-the-market hypothesis, which in turn relies on the validity of the efficient market hypothesis.<sup>222</sup> Private plaintiffs must establish reliance on false or misleading statements.<sup>223</sup> This is typically done indirectly by arguing first, that the market is efficient meaning that the market price impounds all publicly available information; and second, that false and misleading statements were in the marketplace.<sup>224</sup> Arguing that the market is inefficient breaks the causal chain that is required to maintain a cause of action.<sup>225</sup> The behavioral assault on neoclassical economics, specifically on the assumption that individuals can coherently express their own preferences through their choices, is an immediate threat to the paradigm of investor sovereignty.<sup>226</sup>

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67 LA. L. REV. 257, 274 (2006) (stating that there is an important unanswered question about the survival of private actions for price manipulation after the Private Securities Litigation Reform Act).

221. See generally Douglas M. Branson, *Running the Gauntlet: A Description of the Arduous, and Now Often Fatal, Journey for Plaintiffs in Federal Securities Law Actions*, 65 U. CIN. L. REV. 3, 3–41 (1996) (describing the procedural hurdles created by the Private Securities Litigation Reform Act of 1995). See also Richard W. Painter, *Responding to a False Alarm: Federal Preemption of State Securities Fraud Causes of Action*, 84 CORNELL L. REV. 1, 2–13, 32–35 (1998) (describing the difficulties that plaintiffs in securities cases face after enactment of the Private Securities Litigation Reform Act of 1995 and Securities Litigation Uniform Standards Act of 1998).

222. See Bradford Cornell & James C. Rutten, *Market Efficiency, Crashes, and Securities Litigation*, 81 TUL. L. REV. 443, 443–44 (2006) (“In *Basic Inc. v. Levinson*, the United States Supreme Court made it easier for plaintiffs alleging securities fraud under section 10(b) of the Securities Exchange Act of 1934 and Securities and Exchange Commission (SEC) Rule 10b-5 to prove the essential element of reliance. The Court held that under the so-called fraud-on-the-market theory, a plaintiff who purchased securities on an ‘open and developed’ market can be presumed to have relied on the integrity of the market price and in that way to have relied, indirectly, on allegedly false or misleading public statements of the defendants.”) (footnotes omitted).

223. Securities Exchange Act of 1934 § 10(b), codified at 15 U.S.C. § 78j(b) (2000); Rule 10b-5, 17 C.F.R. § 240.10b-5 (2000).

224. See *Basic Inc. v. Levinson*, 485 U.S. 224, 246 n.24 (1988) (“We need not determine by adjudication what economists and social scientists have debated through the use of sophisticated statistical analysis and the application of economic theory. For purposes of accepting the presumption of reliance in this case, we need only believe that market professionals generally consider most publicly announced material statements about companies, thereby affecting stock market prices.”).

225. Elizabeth Chamblee Burch, *Reassessing Damages in Securities Fraud Class Actions*, 66 MD. L. REV. 348, 358–59 (2007) (explaining that the efficient market theory provides the basis for reliance and causation).

226. Klock, *Dead Hands*, *supra* note 23, at 159–60 (suggesting that paternalistic protection against irrational behavior interferes with personal freedom to make investment decisions).

Indeed, Stephen Choi has argued that protecting investor confidence should not be the goal of the SEC in the presence of investor irrationality.<sup>227</sup> He has further argued that regulatory responses could benefit irrational investors.<sup>228</sup> This argument implicitly assumes that there is some social benefit in protecting irrational investors. The term irrational is loosely defined for this section. I am not challenging our longstanding tradition of protecting children and other mentally incapacitated members of society. The term irrational, as used by Choi and others, does not refer to people who have intransitive preferences. Instead, it refers to people who systematically make bad decisions.<sup>229</sup> At some point we have to honestly consider whether people who are merely lazy and careless are worthy of being protected from their laziness and carelessness.<sup>230</sup> Yes, lazy and careless people deserve protection from fraud, but not from their own carelessness.<sup>231</sup> If someone has revealed that his well-being matters so little to him that he will not provide even himself with an ordinary duty of care, it is unreasonable to divert scarce resources to protecting these low-value assets.<sup>232</sup> If there is such a compelling reason to use our federal securities laws and policies to provide protection to people who make bad decisions, why do we not have federal legislation mandating motorcycle helmets on interstate highways?<sup>233</sup>

Our philosophy of letting people make their own choices, absent fraud and without judging those choices, has served our financial markets and economic prosperity well.<sup>234</sup> This philosophy not only promotes confidence in the market, but it also promotes responsibility for choices.<sup>235</sup> An analogy

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227. See Stephen J. Choi, *Behavioral Economics and the Regulation of Public Offerings*, 10 LEWIS & CLARK L. REV. 85, 85 (2006) (questioning whether the SEC goal of protecting investor confidence is justified).

228. See *id.* at 128 (“Not all investors are rational and some of the less rational investors may suffer from participating in the markets.”).

229. See Ribstein, *Noisy Market*, *supra* note 9, at 139–40 (discussing investor irrationality in terms of investor “mistakes” and “judgment errors”).

230. Klock, *Dead Hands*, *supra* note 23, at 133 (“Protecting individuals from bad decisions has detrimental effects. It reduces their incentive to make good decisions . . . [and] lowers the payoff associated with educating and informing oneself and researching and analyzing potential investments . . .”).

231. Klock, *Fortune Tellers*, *supra* note 1, at 76–80 (making a case for protecting individuals against fraud but not providing protection against poor decisions).

232. See Stephen J. Choi & A. C. Pritchard, *Behavioral Economics and the SEC*, 56 STAN. L. REV. 1, 6 (2003) [hereinafter Choi & Pritchard, *Behavioral Economics*] (“Markets deal harshly with fools; our cynical side worries that government affords a safe haven.”).

233. I believe that most of us consider driving a motorcycle at a high rate of speed without a helmet to be unreasonably dangerous. But because the behavioralists assert that we are all irrational, perhaps we are wrong about the unreasonableness of this activity.

234. See Klock, *Fortune Tellers*, *supra* note 1, at 109 (“We should . . . return to the regime [of providing aiding and abetting liability for less than full disclosure] that served our markets so well . . .”).

235. *Id.* at 79.

is provided by simple issues concerning traffic safety. As young children, we learn to look both ways before crossing the street, and to cross at designated places.<sup>236</sup> If someone were to place so little value on their own personal safety that they would walk into traffic without looking, should we protect them by painting more crosswalks?<sup>237</sup> If so, where is the line drawn? Should all boulevards be designated one hundred percent crosswalks? It should be obvious that there are costs associated with such “remedies” for the problem of individual carelessness. In 2001, I wrote:

[N]egligent investors deserve no protection, and such protection creates a moral hazard problem. The level of rational ignorance is increased as inattentive investors can attempt to renegotiate bad outcomes in court after the fact. Investors can make uninformed decisions, or make excessively risky gambles, in the belief that they may seek protection after the fact in the event of a bad payoff.

Suppose, hypothetically, that government could protect individuals from making bad decisions. . . . If we assume that the government has an opportunity to reverse one bad decision made at one time by one individual and thereby make that individual better off at that point without changing anything else, then we may reach one conclusion. But if we recognize that by protecting individuals from bad investment decisions we influence future behavior, we may reach a different conclusion.<sup>238</sup>

Professor Hoffman suggests that my approach is tantamount to imposing a duty on shareholders to be rational.<sup>239</sup> This is an overstatement. Shareholders do not owe a duty to behave rationally; they simply must live with the consequences of imprudence.<sup>240</sup>

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236. See Centers for Disease Control and Prevention, KidsWalk-to-School: Pedestrian Safety, [http://www.cdc.gov/nccdphp/dnpa/kidswalk/pedestrian\\_safety.htm](http://www.cdc.gov/nccdphp/dnpa/kidswalk/pedestrian_safety.htm) (last visited Oct. 19, 2009) (emphasizing the importance of teaching children pedestrian safety).

237. But see GLORIA OHLAND, TRINH NGUYEN & JAMES CORLESS, DANGEROUS BY DESIGN: PEDESTRIAN SAFETY IN CALIFORNIA, SURFACE TRANSPORTATION POLICY PROJECT 21–22 (Sept. 2000), <http://www.transact.org/ca/design/Dangerous%20by%20Design.pdf> (discussing California’s policy of removing pedestrian crosswalks so that pedestrians will not have a “false sense of security”).

238. Klock, *Dead Hands*, *supra* note 23, at 132–33 (footnotes omitted).

239. Hoffman, *supra* note 117, at 538 (“In reality, courts hold purchasers of securities to something similar to a duty of care. Courts require investors to . . . be *economically rational*.”) (footnote omitted).

240. See Klock, *Dead Hands*, *supra* note 23, at 144 (“Shareholders should not be treated as children who have given their money to their parents. Shareholders are in a cooperative arrangement

Behavioralists hold the mistaken belief that irrational behavior is the result of incompetence to behave rationally, whereas trained researchers in psychology actually understand that people are capable of choosing to make rational decisions in appropriate situations with appropriate incentives.<sup>241</sup> In the words of Professor Mitchell:

Legal scholars increasingly rely on a behavioral analysis of judgment and decision making to explain legal phenomena and argue for legal reforms. The main argument of this new behavioral analysis of the law is twofold: (1) All human cognition is beset by systematic flaws . . . that . . . lead to predictable irrational behaviors and (2) these widespread and systematic nonrational tendencies bring into serious question the assumption of procedural rationality underlying much legal doctrine. . . . Careful scrutiny of the psychological research reveals greater adherence to norms of rationality than that implied by the legal behavioralists, and the methodological and interpretive limitations on this psychological research make extrapolation from experimental settings to real world legal settings often inappropriate. . . . [L]egal scholars should exercise greater care and precision in their uses of psychological data to avoid advocating further legal reforms based on flawed understandings of psychological research.<sup>242</sup>

Opponents to the idea of accepting market outcomes as efficient consistently fail to address an important void in the behavioral movement.<sup>243</sup> If the market process is not going to be used to allocate resources because it is inefficient, what efficient process for allocating resources is to replace it? Arguing that markets are inefficient and not to be trusted is not constructive unless the advocate of market inefficiency has an alternative proposal for

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with the directors and, in addition to voting, can review vast amounts of mandatory disclosure material. If they choose not to do so, that is their decision.”).

241. See Mitchell, *Perfect Rationality*, *supra* note 90, at 77. Professor Mitchell, who is a law professor with a Ph.D. in Psychology, provides the following passage which summarizes the relevant, peer-reviewed research:

[There is] a growing body of empirical research demonstrating that individuals vary widely, and predictably, in their propensities to act rationally. In other words, this research tells us that cognitive biases do *not* affect us all with uncanny consistency. . . . [D]epending on the characteristics of the individual and the system of thought activated in a particular decisionmaking situation, the behavior of different groups of individuals and the behavior of the same individual over time may vary considerably, from perfect rationality to seeming irrationality.

*Id.* at 86–87 (footnote omitted).

242. Mitchell, *Unwarranted Pessimism*, *supra* note 142, at 1907.

243. See Mitchell, *Perfect Rationality*, *supra* note 90, at 77 (“An empirical critique can only go as far as its data goes.”).

improving upon the process.<sup>244</sup> If market outcomes cannot be accepted because the market is not efficient, then implicitly there must be an alternative process that is an improvement. I submit that the only possible alternative is a political process, and that nothing could be more inefficient than political decisionmaking.<sup>245</sup> Just imagine allowing courts, legislative commissions, and executive agencies to determine the suitability of investments, set prices, and regulate returns on pharmaceutical corporations! The Soviet Union tried this approach and failed miserably.

I am not arguing that markets are perfect. There are many well-known instances of market failure that call for market intervention.<sup>246</sup> But these situations call for intervening in a manner that allows the market to function better.<sup>247</sup> The harm caused by a monopoly can be eliminated by breaking up

244. *Id.* (“[The behavioral law and economics movement] presently offers little helpful guidance about how to amend prevailing assumptions. So long as the behavioral analysts of law engage in the same sort of empirically suspect armchair analysis, unfalsifiable theorizing, and overgeneralization that they criticize economic analysts of law for engaging in, behavioral law and economics should be considered nothing more than an equally theoretical but more pessimistic version of law and economics.”).

245. Professor Kenneth J. Arrow received a Nobel Prize in 1972 for formally proving that it is impossible to construct a collective social voting mechanism that simultaneously satisfies minimal conditions for justice (e.g., one person, one vote) and provides a rational ordering of social choices (e.g., if A is preferred to B and B to C, then C is not preferred to A). See Kathy Sawyer, *A Paradox of Majority Politics*, WASH. POST, Oct. 9, 1995, at A3. It is now well-known that rational individual preferences cannot be aggregated to achieve a rational social preference ordering without imposing socially unacceptable constraints such as dictatorship. See, e.g., IAIN MCLEAN, *PUBLIC CHOICE 25* (1987) (“[T]here are deep problems with all procedures of getting from many preferences to one decision.”). There is vast literature spanning many disciplines (including ethics, philosophy, economics, sociology, psychology, and political science) on the fundamental incompatibility between voter sovereignty and rational collective choice. For an accessible description of this incompatibility, see ALFRED F. MACKAY, *ARROW’S THEOREM: THE PARADOX OF SOCIAL CHOICE: A CASE STUDY IN THE PHILOSOPHY OF ECONOMICS 1–12* (1980). This multidisciplinary literature is highly cited within the legal literature. See, e.g., Cheryl D. Block, *Truth and Probability—Ironies in the Evolution of Social Choice Theory*, 76 WASH. U. L.Q. 975, 975–81 (1998); Saul Levmore, *Parliamentary Law, Majority Decisionmaking, and the Voting Paradox*, 75 VA. L. REV. 971, 985 (1989) (“The paradox is surely one of the best known insights or topics in the social sciences.”).

246. See Klock, *Unconscionability*, *supra* note 25, at 354 (“There are situations in which markets fail to function well.”).

247. See *id.* at 356–57. Consider the following:

Regulations that are designed to restore the proper functioning of a market that has been impaired by a specifically identified problem are more effective. Two examples of more successful regulations relating to markets are the securities laws and antitrust laws. For instance, fraud and deception can destroy markets, but the federal securities laws are designed to keep fraud out of and protect the integrity of the market, without stepping into the paternalistic area of deciding what is suitable for investors. Similarly, collusion in markets can lower output and raise prices, but the antitrust laws are designed to deter these effects without deciding how much should be produced and what prices should be charged.

the monopolist into competitors.<sup>248</sup> The lemons problem caused by asymmetric information can be mitigated with adequate penalties for fraud and mandatory disclosure requirements.<sup>249</sup> However, those behavioral commentators who argue that individuals are not rational decision makers do not have a corresponding fix for the market.<sup>250</sup> Rather, they are implicitly arguing to replace market functions with an alternative.

If courts cannot accept the valuation of the financial market as the best estimate available, then they can replace that valuation with a formula written by a legislature or commission or an opinion formed by an elected or politically appointed judge.<sup>251</sup> How could this possibly improve the accuracy of the valuation?<sup>252</sup> No matter how wrong the valuations of the financial market are, they are the best available and should be embraced as democracy is embraced for being the best available political system notwithstanding its many inherent flaws. We decide issues politically when decisiveness is more important than accuracy:

Public choice theory suggests that institutions develop for reasons. The motivation behind the plurality rules method of voting is not promotion of society's preferred choices. This follows from the fact that no voting system produces a consistent set of choices. Indeed, the most reasonable argument which has ever been made in defense of our voting system is that it is no worse than any alternatives.

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*Id.* (footnotes omitted).

248. *Id.*

249. *Id.*

250. Indeed, they cannot have a fix because they do not have a model of behavior—they are anti-theoretical and unscientific. See Posner, *Rational Choice*, *supra* note 5, at 1552. As Judge Posner writes:

JST don't actually tell us what "behavioral economics" means. But implicitly they define it negatively: It is economics minus the assumption that people are rational maximizers of their satisfactions. Its relation to standard economics is thus a bit like the relation of non-Euclidean to Euclidean geometry, though with the important difference that non-Euclidean geometry is as theoretically rigorous as Euclidean geometry, whereas behavioral economics is, as we shall see, antitheoretical.

*Id.*

251. *Cf.* *Old Colony Bondholders v. N.Y., N.H. & H.R. Co.*, 161 F.2d 413, 450 (2d Cir. 1947) (Frank, J., dissenting in part) ("If . . . the Commission is sustained in this case, and, accordingly, behaves similarly in future cases, then its conduct will indeed be a mystery. Its so-called "valuations" will then be acceptable, no matter how contrived. In that event, it would be desirable to abandon the word "valuation"—since that word misleadingly connotes some moderately rational judgment—and to substitute some neutral term, devoid of misleading associations, such as "[v]aluation," [sic] or, perhaps better still, "woosh-woosh." . . . Then no one would be foolish enough to believe that the figures in a Commission plan necessarily have anything to do with deliberation, but everyone would know that the figures [and conclusions] might well have been the product of . . . mystagogues.") (footnotes omitted).

252. *Cf.* Choi & Pritchard, *Behavioral Economics*, *supra* note 232, at 5 ("[I]f everyone suffers from cognitive defects, doesn't that also include the commissioners and staff of the SEC?").

Given that our system of voting (or any system of voting) does not exist to promote the best social choices, we must look elsewhere for its motivating factors. We vote because it is an acceptable method for making a decision about who will govern, and then we move on. We recognize that there is no socially acceptable method of making the best decisions. Therefore, rather than seeking efficiency in the decisions, we, as a society, seek efficiency in the process. There is value in quickly settling disputes, making decisions, and moving on.<sup>253</sup>

### B. *Arrow's Impossibility Theorem and Hovenkamp's Critique*

There is a large body of literature documenting the inherent instability of political decision making.<sup>254</sup> Economists refer to this field as public choice.<sup>255</sup> Public choice economists have demonstrated numerous problems with collective decision-making.<sup>256</sup> To a social reformer, the most feared tool of the public choice economist is Kenneth Arrow's Impossibility Theorem.<sup>257</sup> Professor Arrow, who received a Nobel Prize for his work, formally proved that a democratic system in which voters have equally weighted votes and independent preferences cannot produce a rational preference ordering.<sup>258</sup> Although Arrow's work involves complex math, the conclusion

253. Klock, *Will of the People*, *supra* note 85, at 16–17 (footnotes omitted).

254. See sources cited *supra* note 245.

255. DENNIS C. MUELLER, PUBLIC CHOICE II 1 (1989) ("Public choice can be defined as the economic study of nonmarket decision making, or simply the application of economics to political science.").

256. It is well-known that rational individual preferences cannot be aggregated to achieve a rational social preference ordering without imposing socially unacceptable constraints such as dictatorship. See, e.g., MCLEAN, *supra* note 245, at 25 ("[T]here are deep problems with all procedures of getting from many preferences to one decision."). A commonly-given example of this is the fact that there is nothing inconsistent with a majority preferring A to B, another majority preferring B to C, and another preferring C to A. See, e.g., *id.* at 25–27. This implies that there is no such thing as a "best policy" for the government because there is no platform that another platform cannot beat. See *id.* at 103. Mechanisms like plurality voting, or institutional devices such as the electoral college, can serve to break this cycle and reach a decision, albeit an unstable one, because efficiency demands that a decision be made rather than endure an infinite filibuster.

257. See Herbert Hovenkamp, *Arrow's Theorem: Ordinalism and Republican Government*, 75 IOWA L. REV. 949, 949 (1990) ("Arrow's theorem is perhaps the most fearsome tool the public choice theorist owns. True believers can use it to prove, at least to their own satisfaction, that legislative bodies (or groups of voters in general) almost never produce policies that represent the public choice in any meaningful way.").

258. Professor Arrow's work suggests that the means cannot be justified by the goal of reaching society's preferred decision because such a concept cannot exist. Professor Arrow gives the following interpretation of his theorem:



can be summarized succinctly and is highly intuitive—when more than two choices exist, election markets are highly unstable.<sup>259</sup>

A simple example involving three voters can be used to illustrate the problem.<sup>260</sup> Suppose that one person prefers X to Y and Y to Z, another prefers X to Z and Z to Y, and the third prefers Y to Z and Z to X. In this scenario, two thirds of the voters will prefer X over Y, two thirds will prefer Y over Z, and two thirds will prefer Z over X. Any election outcome will depend on the sequence of voting and will be unstable in the sense that an alternative outcome will be preferred by a majority of the voters.<sup>261</sup> Interestingly, this problem was recognized long ago by an Oxford University faculty member who observed how difficult it was for the faculty body to make internally consistent decisions and how much time was spent fighting over procedure rather than substance.<sup>262</sup>

Some have attempted to argue that Arrow's Theorem overstates the irrationality of political decisions.<sup>263</sup> Professor Herbert Hovenkamp has argued that intransitivity and instability are overstated because Arrow's proof assumes independence of preferences.<sup>264</sup> Hovenkamp contends that people will cooperate and allow the strong preferences of others to outweigh their own weak preferences.<sup>265</sup> There are two weaknesses in Professor Hovenkamp's analysis, however. The first is that it allows for cooperation without allowing for vindictiveness. If coalitions of voters are vindictive, then logrolling is even more likely. The second is that Hovenkamp does not allow for lexicographical preferences. A lexicographical preference is one in which more (or less) of one thing dominates all other bundles regardless of

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If we exclude the possibility of interpersonal comparisons of utility [weighing some votes more than others], then the only methods of passing from individual tastes to social preferences which will be satisfactory and which will be defined for a wide range of sets of individual orderings are either imposed or dictatorial.

KENNETH J. ARROW, *SOCIAL CHOICE AND INDIVIDUAL VALUES* 59 (2d ed. 1963).

259. See Dennis C. Mueller, *Public Choice in Perspective*, in *PERSPECTIVES ON PUBLIC CHOICE* 5–6 (Dennis C. Mueller ed., 1997). Professor Mueller states:

But the conditions under which majority rule produces an equilibrium with three or more possible outcomes, or the restriction that there be only two possible outcomes, seem so restrictive that many public choice scholars have not concluded that all problems of preference aggregation can be solved by relying on the simple majority rule to make collective decisions. For all its attractive properties, the majority rule does not throw off the shadow cast by Arrow's theorem.

*Id.*

260. Klock, *Will of the People*, *supra* note 85, at 15.

261. *Id.*

262. *Id.* This was an independent discovery. The earliest credit is given to Jean-Charles de Borda in 1781. *Id.* at 14 n.77.

263. See Hovenkamp, *supra* note 257, at 949–50 (arguing that legislative voting mechanisms work better than “Arrow's theorem would admit”).

264. *Id.* at 952.

265. *Id.*

what else is contained.<sup>266</sup> In other words, the individual is not willing to make any trade or compromise.<sup>267</sup> Given that many political issues are highly emotional and contentious, where individuals on both sides are unwilling to consider compromise, logrolling is much more likely than what Professor Hovenkamp suggests. Highly charged issues such as abortion, capital punishment, creationism in the classroom, homosexual marriage, and animal rights serve as emotional battlefields where people hold strong and uncompromising beliefs, and thus are willing to vote against other groups' issues in retaliation for those groups' lack of support for their own.<sup>268</sup>

I conclude this section with the simple observation that the "calculus of consent does not obey the laws of algebra."<sup>269</sup> Although in society's collective judgment A is preferred to B and B is preferred to C, A is not necessarily preferred to C.<sup>270</sup> Not only do free markets perform remarkably well, their alternatives perform remarkably miserably.<sup>271</sup> As I have previously noted:

What the public choice literature teaches us is the following. There is no constitutional system for collectively determining social preferences that results in efficient and rational decisions and provides political equality and decisiveness. It might be that we do not impose any significant voter qualification requirements such as competence because our real interest lies solely in the act of making decisions, not in the decisions themselves. Making decisions that enable government to get on to the business of governing is the only possible purpose elections can serve.<sup>272</sup>

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266. A dictionary orders words lexicographically. Words that begin with the letter "a" come before words that begin with the letter "b" without regard to what follows. See WEBSTER'S II, *supra* note 109, at 689.

267. See *id.*

268. See David Nakamura, *Resignation's Reverberations: Thornton's Move Creates Local, State Intrigue*, WASH. POST, Oct. 13, 1999, at M07 (suggesting that, in certain instances, local politicians hold grudges and retaliate on other issues when given the chance).

269. Klock, *Fortune Tellers*, *supra* note 1, at 79.

270. Indeed, the concept of a socially preferred ordering does not exist. See LAURENCE H. TRIBE, *AMERICAN CONSTITUTIONAL LAW* 12 n.6 (2d ed. 1988) (noting that Arrow's theorem suggests that there is no hope of meaningfully constructing majority will).

271. See Tollison, *supra* note 6, at 340 ("To the extent that one can draw a positive principle from Arrow, it is that democracy should yield capricious and unstable outcomes.").

272. Klock, *Will of the People*, *supra* note 85, at 49 (footnote omitted).

## V. THE ARTISTIC USE OF REASONABLE ASSUMPTIONS IN ECONOMIC SCIENCE

### A. *Social Sciences, Scientific Methodology, and Art*

It is obvious that economics is a social science because the subject of economics is the study of human behavior.<sup>273</sup> Economics is about how people choose between alternatives and how changing the alternatives (incentives) will affect their choices.<sup>274</sup> Whether or not economics can claim to be a science was once debated.<sup>275</sup> The issue was arguably resolved when the Nobel committee established the Nobel Prize in Economic Science in 1968.<sup>276</sup> The economist's claim to being a scientist comes from the discipline's commitment to a methodology which is scientific.<sup>277</sup>

Science attempts to avoid normative judgments.<sup>278</sup> Science creates refutable propositions based on theories and then uses data to refute or support the theory.<sup>279</sup> A theory, supported or disproven by facts, is an attempt to explain observable phenomena.<sup>280</sup> An example of a theory is the economist's law of demand, which in essence is an explanation about how people will behave in the face of changing prices.<sup>281</sup> The explanation given is that when the price of an item increases, meaning that people must sacrifice more of other commodities in exchange for the item sought, people will consume less of that item due to the higher price. As this theory follows the scientific approach, it could potentially be refuted by observed data. Now contrast this economic theory with the assertion that everyone should have free health-

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273. See COPELAND ET AL., *supra* note 39, at 45 ("Economics is the study of how people and societies choose to allocate scarce resources and distribute wealth among one another and over time.").

274. Klock, *Flamboyance*, *supra* note 2, at 188.

275. Thomas S. Ulen, *A Nobel Prize in Legal Science: Theory, Empirical Work, and the Scientific Method in the Study of Law*, 2002 U. ILL. L. REV. 875, 880 n.16 ("There is, of course, a great deal of controversy about whether economics is really a 'science' . . .").

276. Cf. DONALD N. MCCLOSKEY, KNOWLEDGE AND PERSUASION IN ECONOMICS 56 (1994) ("The question [whether economics is a Science] should be retired. It was meaningful only in a brief period in the middle of the twentieth century, and now it merely serves to show that the person asking it has not read anything in science studies since 1955 and does not believe that biology, evolution, and geology are sciences.").

277. See, e.g., D. Bruce Johnsen, Daubert, *The Scientific Method, and Economic Expert Testimony*, 9 KAN. J.L. & PUB. POL'Y 149, 151 (1999) ("I'll argue that economics follows the scientific method in the same style as physics. Economics is an empirical method of solving disputes.").

278. See FRIEDMAN, *supra* note 69, at 3-7.

279. See Richard A. Posner, *The Jurisprudence of Skepticism*, 86 MICH. L. REV. 827, 836-37 (1988) (discussing the scientific process).

280. SILBERBERG, *supra* note 60, at 7.

281. See STIGLITZ, *supra* note 21, at 91 (using the law of supply and demand to explain how prices are determined in competitive markets).

care, which is a normative judgment that cannot be refuted by observed data and is not capable of being tested through scientific analysis.

Professor Eugene Silberberg provides a succinct explanation of the role of theory in science:

It is always possible that a new theory will be developed which will explain a given set of events. Hence, theories are in principle, as a matter of logic, unprovable. They can only be confirmed, i.e., found to be consistent with the facts. The more times a theory is confirmed, the more strongly we shall believe in its postulates, but we can never be sure that it is true.

What types of theories are useful in empirical science, then? The only theories that are useful are those which might be wrong, i.e., might be refuted, but are not refuted. A theory which says that it will either rain or not rain tomorrow is no theory at all. It is incapable of being falsified, since the predicted "event" is logically true. A theory which says that if the price of gasoline rises, consumption will either rise or fall is similarly useless and uninteresting, for the same reason. The only theories which are useful are those from which refutable hypotheses can be inferred.<sup>282</sup>

It is often noted that economists are frequently wrong when forecasting the future, whereas physicists and chemists can make much more precise calculations about the phenomena they study.<sup>283</sup> This criticism reflects a common misconception about the accuracy of other sciences.<sup>284</sup> For example, engineers use precise equations to calculate the strength of materials for their structures, and yet, even after they incorporate safety factors of fifty percent or more into their calculations, those structures still collapse on occasion.<sup>285</sup> Anyone who follows weather forecasts knows that predicting the future is inherently difficult.<sup>286</sup> Indeed, the inaccuracy of economists' forecasts does not render their methods unscientific.

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282. SILBERBERG, *supra* note 60, at 10 (footnote omitted).

283. *But see* Johnsen, *supra* note 277, at 151 (stating that an economist's prediction about what will happen to a fifty dollar bill on a table (it will disappear) is more accurate than a physicist's prediction (it will remain at rest)).

284. HIRSHLEIFER, *supra* note 56, at 5.

285. *Id.*

286. *See* Klock, *Fortune Tellers*, *supra* note 1, at 77 ("First, financial decisions are decisions about the future, and it is impossible to assess in the present whether a decision about the future is accurate. We cannot verify tomorrow's weather forecast today.") (footnote omitted); Samuel C. Thompson, Jr., *A Lawyer's Guide to Modern Valuation Techniques in Mergers and Acquisitions*, 21

In contrast with science, art involves an appeal to aesthetic tastes.<sup>287</sup> Artists tend to develop a unique style, largely resulting from their choice of subject matter, composition, and medium. Still life with oil and canvas might work well for some artists and their subjects but poorly for others. Similarly, the artistic element of economics is in choosing assumptions that make for an aesthetically pleasing trade-off between reality and abstraction.<sup>288</sup> The goal is to abstract the salient features of reality without becoming mired in minutiae.<sup>289</sup> Again, recall the analogy of a roadmap; replication of every detail might make the map more realistic, but such detail also renders the map less useful. Arguably, a map that preserves only the salient features of the roads, while omitting minutiae, is easier to navigate.<sup>290</sup>

Science and art are not mutually exclusive methods of communication; it is possible to blend the two together. Where science emphasizes a methodology of comparing data with theories, art emphasizes an appeal to aesthetics. This can readily be seen when one contemplates the teaching of science. Science is science, but teaching is an art.<sup>291</sup> Science can either be taught sloppily and in an unpleasant manner, or it can be taught neatly with a pleasant demeanor. Just as teachers apply different, creative approaches to the

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J. CORP. L. 457, 462 (1996) (stating that "valuation is an inexact science").

287. One definition of art is: "Conscious arrangement or production of sounds, colors, forms, movements, or other elements in a way that affects the aesthetic sense . . ." WEBSTER'S II, *supra* note 109, at 127. One definition of aesthetic is: "Of or relating to the sense of the beautiful." *Id.* at 82. The old adage "Beauty is in the eye of the beholder," underscores the personal and subjective nature of art.

288. See Dau-Schmidt, *supra* note 112, at 397 ("The art of modeling or analysis is to know which abstractions one can make and still capture the essential elements of the problem, or in other words, which simplifying assumptions can be made and still preserve the essence of the problem for the purpose of the analysis.").

289. See *id.* ("Every model or analysis of a problem is necessarily an abstraction from reality, ignoring some complication of life to focus on others."); see also JAMES M. HENDERSON & RICHARD E. QUANDT, MICROECONOMIC THEORY 2 (2d ed. 1971) ("The more general theories are fruitful because they contain statements which abstract from particulars and find elements which many situations have in common. Increased understanding is realized at the cost of the sacrificed detail.").

290. Consider the following excerpt from a popular text:

Because all models simplify reality by stripping part of it away, they are abstractions. Critics of economics often point to abstraction as a weakness. Most economists, however, see abstraction as a real strength.

.....

Like maps, economic models are abstractions that strip away detail to expose only those aspects of behavior that are important to the question being asked. . . .

But be careful. Although abstraction is a powerful tool for exposing and analyzing specific aspects of behavior, it is possible to oversimplify. . . .

The key here is that the appropriate amount of simplification and abstraction depends upon the use to which the model will be put. To return to the map example: You don't want to walk around San Francisco with a map made for drivers—there are too many very steep hills!

CASE & FAIR, *supra* note 107, at 10–11.

291. JOSEPH AXELROD, THE UNIVERSITY TEACHER AS ARTIST 9–10 (1973).

teaching of science, so it is with economists and their economic models. Making assumptions is an economist's artistic choice that can either enhance an understanding of the salient features of economic decision-making or distort reality to the point that the conclusions bear no resemblance to what actually happens in our universe.<sup>292</sup> Assuming the scales of justice must be supported by the ground does not help us to understand what happens in a courtroom any more than assuming that market participants have exogenous beliefs about the future and unlimited wealth helps us to understand what happens in a market.

### B. *Assumptions, Models, and New Research on Old Finance*

Assumptions play an important role in all models whether the models are legal, economic, or other types.<sup>293</sup> For example, the abstract legal construct of the scales of justice implicitly assumes that evidence can be weighed and that a reasonable person can make a determination as to where the preponderance lies, or whether the standard of clear and convincing evidence or beyond reasonable doubt has been met.<sup>294</sup> However, the quality of a model is not evaluated by the accuracy of the assumptions but by the accuracy of the predictions.<sup>295</sup> Commentators who assert that a model is wrong merely because the assumptions are wrong misunderstand the role of assumptions.<sup>296</sup> Good assumptions simplify the analysis while yielding accurate predictions, and either draw attention to what is important or what is unimportant.<sup>297</sup> Poor assumptions provide misleading predictions or mask

292. See SILBERBERG, *supra* note 60, at 7 (explaining that assumptions are the link between theory and real objects, and as such they must be observable and realistic in order to create valid theoretical tests).

293. See *id.* at 11 ("A model becomes a theory when assumptions relating the theoretical constructs to real objects are added.")

294. See generally Klock, *Flamboyance*, *supra* note 2, at 188–94 (discussing nonexistent things with useful applications in reality, such as Euclidean lines, imaginary numbers, and the scales of justice).

295. See SHEFFRIN, *supra* note 68, at 34–35 (explaining that theoretical constructs are not real facts nor phenomena to be explained, just incorrect simplifications made to facilitate analysis).

296. See FRIEDMAN, *supra* note 69, at 14 ("To be important, therefore, a hypothesis must be descriptively false in its assumptions . . .").

297. As an example, consider the following comment on a famous, unrealistic model:

Proposition I, holding the value of a firm to be independent of its capital structure (that is, its debt/equity ratio) is accepted as an implication of equilibrium in perfect capital markets.

. . . Less clear, however, is the empirical significance of the MM value-invariance Proposition I in its original sphere of corporation finance.

. . . [T]he view that capital structure is literally irrelevant or that "nothing matters" in

what is important.<sup>298</sup> The art of good model-building lies in the ability to assume well.<sup>299</sup>

Some commentators criticize economic models containing predictions they do not like by criticizing the basic assumptions in an unconstructive manner.<sup>300</sup> Other commentators accept economic models with predictions they do like without contemplating the sensibility of the underlying assumptions.<sup>301</sup> I suggest that the most useful approach is to seriously evaluate how the underlying economic assumptions matter.<sup>302</sup> Constructive criticism of the assumptions will advance an argument more persuasively than either blind reliance or ad hominem attacks.<sup>303</sup>

The primary model that motivated this paper claimed that equilibrium is not possible in the simultaneous presence of investor disagreement and perfect markets.<sup>304</sup> That model explicitly assumed that the investors had no wealth constraints.<sup>305</sup> Countless other commentators have claimed that markets consistently and persistently misprice information substantially and have invoked economic models with equally unreasonable assumptions.<sup>306</sup>

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corporate finance, though still sometimes attributed to us . . . is far from what we ever actually said about the real-world applications of our theoretical propositions. Looking back now, perhaps we should have put more emphasis on the other, upbeat side of the "nothing matters" coin: showing what *doesn't* matter can also show, by implication, what *does*.

Merton H. Miller, *The Modigliani-Miller Propositions After Thirty Years*, 2 J. ECON. PERSP. 99, 99-100 (1988).

298. See SHEFFRIN, *supra* note 68, at 34 (discussing how assumptions are always simplifying and therefore incorrect, but must be close enough to essential elements of reality to provide good predictions).

299. See Klock, *Flamboyance*, *supra* note 2, at 193 ("Selecting the trade-offs to be made is the art of model building . . .").

300. See, e.g., David Campbell, *The Relational Constitution of Contract and the Limits of 'Economics'*: Kenneth Arrow on the Social Background of Markets, in CONTRACTS, CO-OPERATION, AND COMPETITION 307, 307-08 (Simon Deakin & Jonathan Michie eds., 1997) ("The characteristic sociological shortcoming of neoclassical economics is that its methodological commitment to assumptions of individual utility maximization has overall prevented it from developing a plausible philosophic anthropology of the economic agent, and, consequently, from appreciating the social constitution of economic action."); *id.* at 308, 326 (calling economic analysis of law repugnant and policy prescriptions morally disgusting).

301. For example, Henry Manne likes the assumption that outside investors will not adjust their supply of capital in response to a lower price for capital. See Manne, *supra* note 214, at 168 n.5.

302. Another manner of putting this is to suggest that consumers of economic models should ask questions about whether removing an assumption will change a conclusion or whether removing an assumption will obfuscate an understanding of the mechanism that makes the model work.

303. See Klock, *Mainstream Economics*, *supra* note 42, at 319 ("[M]ost commentators who disagree . . . have reacted by lashing out at the entire economics profession or ignoring the economic arguments altogether. A better response would be to examine [the] underlying assumptions and reasoning and to criticize the economics of [the] arguments.").

304. Stout, *New Finance*, *supra* note 15, at 97.

305. *Id.*

306. See, e.g., Dunbar & Heller, *supra* note 118, at 531 ("Since the initial acceptance, criticism of

Professors Loewenstein and Willard explain that basic principles of economics, such as limited liability, collateralized credit, and market clearing, restrict the properties of asset prices regardless of investors' behavior.<sup>307</sup> Limits on the properties of asset prices are demonstrated in a model using only market clearing and budget equations with virtually no assumptions regarding investors' behavior.<sup>308</sup> In the words of Loewenstein and Willard:

The economic intuition of our results is longstanding, clear, and compatible with more general neoclassical models of full rationality that are built on the same behavior-independent principles that we study. Simply put, investor behavior can be important for equilibrium asset prices, but only within certain limits that apply universally to all assumptions about investor behavior.<sup>309</sup>

In other words, in the presence of budget constraints and market clearing, there are limits on the properties of asset prices that hold under either the assumption of rational investors or the assumption of irrational investors.<sup>310</sup> Professors Loewenstein and Willard demonstrate that researchers who have introduced models with noise traders and demonstrated the possibility of large and persistent deviations of asset prices from fundamental value also introduced other implicit assumptions, such as unlimited riskless

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the efficient market hypothesis has only grown larger. What began as a study of a few anomalies or instances where the theory did not perform well has grown to a well-developed alternative school of thought that has both theoretical underpinnings and empirical research in its support.”); Jill E. Fisch, *Measuring Efficiency in Corporate Law: The Role of Shareholder Primacy*, 31 J. CORP. L. 637, 672 (2006) (“[S]tock price is a poor measure of firm value. Even in a market that is relatively informationally efficient, it is unlikely that market prices reflect fundamental value.”); Erik F. Gerding, *The Next Epidemic: Bubbles and the Growth and Decay of Securities Regulation*, 38 CONN. L. REV. 393, 400 (2006) (“[B]ehavioral finance draws upon extensive research in behavioral psychology and economics to demonstrate that investors do not act with perfect rationality. Moreover, behavioral finance has documented both statistical evidence of mispricings in securities . . . .”); Ronald J. Gilson & Reinier Kraakman, *The Mechanisms of Market Efficiency Twenty Years Later: The Hindsight Bias*, 28 J. CORP. L. 715, 717 (2003) (claiming that behavioral finance has displaced market efficiency); Troy A. Paredes, *Blinded by the Light: Information Overload and Its Consequences for Securities Regulation*, 81 WASH. U. L.Q. 417, 483 (2003) (“Extensive studies show sustained mispricings and inefficiencies in capital markets . . . .”).

307. Loewenstein & Willard, *supra* note 16, at 232.

308. *Id.* at 256.

309. *Id.* at 257.

310. *Id.* at 232.



credit.<sup>311</sup> They further show that the implicit assumptions—not investor irrationality—drive the mispricing result.<sup>312</sup>

Loewenstein and Willard's important research is motivated by models that contain implicit assumptions taking them out of the realm of reality.<sup>313</sup> Perhaps the most salient feature of a credit economy is limited liability.<sup>314</sup> Given the finite term of human life, it is impossible to conceive of a world without limited liability. The necessary existence of limited liability urges limits on credit. In reality, individuals cannot choose portfolios that are not feasible and cannot borrow unlimited amounts without collateral.<sup>315</sup> These assumptions are critically important.<sup>316</sup> Loewenstein and Willard write:

We argue that many properties of asset prices can be derived without reference to specific assumptions about investor rationality, given minimal and natural assumptions about limited asset liability, market clearing, and limited storage withdrawals. Our paper does not provide a defense for either investor rationality or nonrationality. . . . [I]f one believes that limited asset liability, market clearing, and limited storage withdrawals are reasonable economic assumptions, then one must regard the implied properties of asset prices as inviolable since they are independent of investor rationality.

. . . .  
The conclusions of this paper are built on the idea that certain economic principles limit the properties of asset prices independent of investor behavior, and that the limits implied by limited asset liability, market clearing, and limited withdrawals from the storage technology have been inadequately appreciated. Models that deviate from these assumptions risk offering misleading economic insights, no matter how tantalizing such insights may seem.<sup>317</sup>

The formal mathematical proofs of their conclusions can be found in their publication.<sup>318</sup>

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311. *Id.* at 231–32.

312. *Id.* at 256.

313. *See id.* at 249 (“We now show that DSSW’s explanations of asset pricing puzzles critically depend on the ability of investors to withdraw unreasonably large amounts of consumption from storage.”).

314. *See* Frank H. Easterbrook & Daniel R. Fischel, *Limited Liability and the Corporation*, 52 U. CHI. L. REV. 89, 89–90 (1985) (“Limited liability is a fundamental principle of corporate law . . . . Limited liability is not unique to corporations. Indeed it is the rule.”) (footnote omitted).

315. *See* STIGLITZ, *supra* note 21, at 35 (explaining the concepts of budget constraints and opportunity sets).

316. *See* Loewenstein & Willard, *supra* note 16, at 249.

317. *Id.* at 232, 256.

318. *Id.* at 245–47, 256.

This relatively recent and careful research received the Smith-Breeden Prize in 2006.<sup>319</sup> The prize is given to the most influential new paper published in the field of finance.<sup>320</sup> The research painstakingly analyzes the claims of theoretical model builders who have built models in which prices can persistently and substantially deviate from their fundamental values and have *claimed* that this result is due to the presence of irrational investors.<sup>321</sup> For example, De Long, Shleifer, Summers, and Waldman claimed:

Because the unpredictability of noise traders' future opinions deters arbitrage, prices can diverge significantly from fundamental values even when there is no fundamental risk. Noise traders thus create their own space. All the main results of our paper come from the observation that arbitrage does not eliminate the effects of noise because noise itself creates risk.<sup>322</sup>

What the new research of Professors Loewenstein and Willard has *conclusively proven* is that the result was driven by poor assumptions about limited liability, market clearing, and budget constraints and *not* the result of investor irrationality.<sup>323</sup> Limited liability, market clearing and budget constraints necessarily result in prices being anchored to their fundamentals *even when* investors are not rational.<sup>324</sup>

This conclusion contains a lesson for all consumers of economic theory—conclusions are always driven by the assumptions.<sup>325</sup> Professor Jack Hirshleifer notes: “Scientific analysis involves the construction of theories or models, which are always, at best, simplified pictures of reality. They can be regarded as idealizations in which irrelevant or unsystematic peculiarities are stripped away to permit concentration upon the dominant features of the situation for the purpose at hand.”<sup>326</sup> If the assumptions are rea-

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319. *Limits of Investor Behavior*, 8 RESEARCH@SMITH 12 (2007).

320. Richard C. Green, *Report of the Editor of The Journal of Finance for the Year 2002*, 58 J. FIN. 1729, 1732 (2003).

321. Loewenstein & Willard, *supra* note 16, at 256–57.

322. J. Bradford De Long, Andrei Shleifer, Lawrence H. Summers & Robert J. Waldmann, *Noise Trader Risk in Financial Markets*, 98 J. POL. ECON. 703, 705 (1990).

323. *See* Loewenstein & Willard, *supra* note 16, at 256.

324. *See id.*

325. *Cf.* Klock, *Flamboyance*, *supra* note 2, at 252 (“Our goal should be to have informed debates in which commentators understand the strengths and weaknesses of their arguments in order to make their case, rather than uninformed debates in which conclusions from experts are cited without an appreciation for the tenacity of the assumptions underlying them.”).

326. HIRSHLEIFER, *supra* note 56, at 55.

sonable—such as assuming that individuals would prefer more wealth to less, *ceteris paribus*—then the conclusions might be reasonable as well.<sup>327</sup> But if the assumptions are unreasonable—such as the assumption that investors can borrow without limit—then the conclusions are likely to be misleading, even though they are correct given the assumptions.<sup>328</sup> Certainly it can be difficult to spot unreasonable implicit assumptions in a highly mathematical proof. But when a scholar claims that the issuance of Widget shares at \$100, which Bull values at \$101 and Bear values at \$99, proves that no equilibrium can exist without wealth constraints, it should be apparent to any critical thinker that the example is a trivial tautology and proves absolutely nothing of practical significance to the real world.

## VI. CONCLUSION

Pseudo-economic nonsense should not be confused with “voodoo economics.”<sup>329</sup> The second term involves plausible, albeit unlikely, theories.<sup>330</sup> The first term refers to ideas that are facially invalid.

The most frightening part of this story is not that a highly educated and respected scholar would use a pseudo-economic model in which *all* of the variables are exogenously set to *prove* a result. The most frightening part of this story is that multiple editors and readers apparently did not recognize the absurdity of the claim that no equilibrium can emerge under certain conditions when *every* variable in the model is given exogenously. The widget example was published in 2003 in *The Journal of Corporation Law* and presumably read, but apparently no one pointed out the problem to the author because it was used again in 2005 in *The Journal of Financial Transformation* and also posted on the internet. Presumably no one would knowingly want a blunder of this magnitude to circulate so widely. We should also be careful to recognize that even scholars with advanced formal training in economics are prone to develop misleading conclusions when their models incorporate implicit assumptions that are not reasonable, such as unlimited liability and unlimited credit. The prize-winning research of Loewenstein and Willard proves that the results of models in which financial assets systematically deviate from their fundamental values are the result of unreasonable implicit assumptions and not the result of allowing for irrational inves-

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327. See SILBERBERG, *supra* note 60, at 7 (explaining why assumptions should be realistic).

328. See *id.* at 11 (explaining that a model can be logically valid but not conform with real data).

329. Voodoo economics is the term George H. W. Bush coined for the supply-side economics that Ronald Reagan bought into. Editorial, *Referendum on Reaganomics, Supply-side Legacy Hangs Over the Budget Crisis*, SEATTLE TIMES, Oct. 17, 1990, at A8.

330. *Cf. id.* (“[V]oodoo economics’[] maintained that lowering taxes on the rich would promote savings and investment. To be sure, certain parts of the economy were flooded with cash, but even that limited prosperity was bought with crushing debt.”).

tors.<sup>331</sup> When the unreasonable assumptions are removed and we require binding budget constraints, limited liability, and markets to clear, prices will remain anchored to their fundamental value regardless of whether investors are irrational or not.<sup>332</sup>

This claim does not prove that markets are efficient. Indeed, it is likely that some markets are not efficient.<sup>333</sup> Theories cannot be proven in science.<sup>334</sup> They can only provide refutable propositions that can be tested with the inherent goal of resulting in either rejection or non-rejection.<sup>335</sup> Nevertheless, the logic and intuition of market efficiency is so compelling that we should require an extremely high threshold of strong and credible contrary evidence before rejecting the existing evidence that the U.S. market for liquid and publicly traded equity impounds all publicly available information. When individuals claim to have shown that this market is not efficient, the assumptions of the theoretical models and statistical tests ought to be scrutinized by commentators and policy makers with a great deal more care than has been used by either the behavioralists or the practitioners of the “new finance.”

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331. Loewenstein & Willard, *supra* note 16, at 256.

332. *Id.*

333. Cornell & Rutten, *supra* note 222, at 448.

334. SILBERBERG, *supra* note 60, at 10.

335. *Id.*

