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Re: Comments on the Report on Review of Disclosure Requirements in Regulation S-K

Mr. Keith Higgins
Director, Division of Corporation Finance
Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549-1090

Dear Mr. Higgins:

I am a law professor at Temple University Beasley School of Law. I research, teach, and write in the areas of corporate law and securities regulation. This comment letter is provided in response to the solicitation by the Securities and Exchange Commission (the "Commission") for comments on the Commission's Report on Review of Disclosure Requirements in Regulation S-K issued in December 2013, as required by the JOBS Act (the "Report").

I am supportive of the Commission's recent efforts to review and improve securities disclosure requirements. I urge continuing attention and work to enhance disclosure requirements to better protect investors and aid issuers in our capital markets. In particular, I would like to highlight two broad issues for the Commission's consideration that are detailed at length in the referenced and attached studies:

1. Disclosures relating to securities risk such as the "Risk Factors" disclosures required pursuant to Regulation S-K Item 503(c) can be greatly improved by better highlighting the relative likelihood and relative impact of the disclosed risks. Such disclosures can better account for the dynamic nature of risk and the behavioral tendencies of investors to the benefit of issuers and investors alike. (*See* Tom C.W. Lin, *A Behavioral Framework for Securities Risk*, 34 SEATTLE UNIVERSITY LAW REVIEW 325 (2011)).[1]

[1] *A Behavioral Framework for Securities Risk*, 34 SEATTLE U. L. REV. 325 (2011) is available at: http://ssrn.com/abstract=2040946.

2. Efforts aimed at reforming securities disclosure requirements should give particular focus to methodologies that can best adapt and update old disclosure practices to a new marketplace that is more complex and more technologically-driven. Such efforts should contemplate ways to leverage new information technology to create a better, more workable disclosure framework that moves beyond "Plain English" disclosures towards a framework that includes more types of disclosed information and more mediums of disclosure. (*See* Tom C.W. Lin, *The New Financial Industry*, 65 ALABAMA LAW REVIEW 567, 599-603 (2014)).[2]

I appreciate the opportunity to participate in this process, and would be happy to discuss my comments or any questions the Commission may have with respect to this letter. Any comments or questions by the Commission about this letter may be directed to Tom.Lin@Temple.edu.

Sincerely,

/s/ Tom C.W. Lin

Attachments:

1. Tom C.W. Lin, *A Behavioral Framework for Securities Risk*, 34 SEATTLE U. L. REV. 325 (2011)
2. Tom C.W. Lin, *The New Financial Industry*, 65 ALA. L. REV. 567 (2014)

[2] *The New Financial Industry*, 65 ALA. L. REV. 567 (2014) is available at: http://ssrn.com/abstract=2417988.

ARTICLES

A Behavioral Framework for Securities Risk

Tom C. W. Lin†

INTRODUCTION

The most difficult tasks for firms involve forecasting, managing, and disclosing risks. In the wake of the financial crisis, a serious examination of risk and risk management at publicly traded firms has occurred. After the crisis, much of the focus has been on new regulatory agencies and additional powers for existing regulators,[1] while little energy has been expended on examining and improving the efficacy of the current securities risk-disclosure framework, which was intended to serve as a bulwark for investors.[2] The landmark Dodd–Frank Wall Street Reform and Consumer Protection Act created the Consumer Protection Financial Bureau and expanded the powers of the Securities Exchange Commission, yet in 2,319 pages of legislation, no provision was included to en-

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1. *See, e.g.*, Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (2010); Helene Cooper, *Obama Signs Overhaul of Financial System*, N.Y. TIMES, July 21, 2010, http://www.nytimes.com/2010/07/22/business/22regulate.html; Edward Wyatt & David M. Herszenhorn, *In Deal, New Authority Over Wall Street*, N.Y. TIMES, June 26, 2010, at A1 ("The final bill vastly expands the regulatory powers of the Federal Reserve and establishes a systemic risk council of high-ranking officials, led by the Treasury secretary, to detect potential threats to the overall financial system.").

2. *See, e.g.*, 15 U.S.C. § 78m (2008); *see also* Troy A. Paredes, *Blinded by the Light: Information Overload and Its Consequences for Securities Regulation*, 81 WASH. U. L. Q. 417, 418 (2003) ("Disclosure is designed to solve the informational asymmetries that exist between companies and investors. The logic is that by arming investors with information, mandatory disclosure promotes informed investor decision making, capital market integrity, and capital market efficiency.").

hance risk disclosures.[3] This Article seeks to fill that void by providing the first critical analysis and redesign of the existing risk-disclosure framework in light of new understandings in the interdisciplinary field of behavioral law and economics. This Article contends that enhanced risk disclosures based on the behavioral tendencies of actual investors, not theoretically rational investors, can serve as a powerful, complementary risk-management tool in the modern financial-regulatory landscape.

More specifically, this Article examines risk disclosures in the security filings of public firms, particularly those disclosures in the *Risk Factors* section of mandated periodic reports and prospectuses (hereinafter Risk Factors).[4] In light of behavioral law and economics studies,[5] this Article proposes an enhanced behavioral framework for securities risk that can improve risk awareness for investors and risk management for firms. In doing so, this Article challenges the conventional wisdom that securities risk management should be done primarily through increased government oversight and enforcement and advocates for a better capture of disclosure as a risk-management tool for regulators and the regulated.

In order to better capture the advantages of disclosure-based risk regulations given the behavioral tendencies of investors, this Article proposes a behavioral framework for Risk Factors built on (1) the relative likelihood of the risks and (2) the relative impact of dynamic risks. This framework makes risk disclosures more accessible and meaningful to investors and would serve as the new default for public firms. An important feature of the new default is that firms will be able to opt out of the new framework if they believe that the existing Risk Factors requirements are more appropriate. But these firms would need to explain to investors why they opted out. This new default framework would be spatially, optically, and substantively superior to the current framework for investors.[6]

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3. *See* Dodd–Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203, 124 Stat. 1376 (2010).

4. *See* Item 503(c) of Regulation S-K, 17 C.F.R. § 229.503(c) (2007) [hereinafter 503(c)]. Admittedly, discussions of risks concerning an issuer and its offered securities exist in other sections of a registration statement, prospectus, annual report, or quarterly report. For example, in the Management's Discussion and Analysis of Financial Condition and Results of Operations section or MD&A section, certain types of market risks are disclosed. Item 303(4) of Regulation S-K, 17 C.F.R. § 229.303(4) (2007). Nonetheless, the focus here is on the risk disclosures in the Risk Factors section given its prominent placement in SEC filings, its aggregated presentation format of an issuer's risks, and the potential benefits that can be unlocked by improving it.

5. *See* Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471 (1998); Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551 (1998). *See generally* BEHAVIORAL LAW & ECONOMICS (Cass R. Sunstein ed., 2000).

6. *See infra* Part IV.

Spatially, the proposed framework would require Risk Factors to appear as the first substantive item after the cover page or table of contents of any prospectus, quarterly report on Form 10-Q, and annual report on Form 10-K. Taking into account the heuristic of "anchoring," the Risk Factors will serve as an anchor in the minds of investors as they read a firm's later rosier disclosures.[7]

Optically, Risk Factors will be presented in a standardized, menu-like format based on relative likelihood and relative impact.[8] Studies on framing effects suggest that this new menu-like framework would offer the investing public a form of risk disclosure that is easier to comprehend relative to the existing regime.[9] Additionally, in order to better convey the dynamic nature of risk, the proposed framework would require that new or changed disclosures be underlined to make it easier for readers to identify amended disclosures.

Substantively, the new default framework would require that Risk Factors be categorized in terms of relative likelihood and impact.[10] Firms that choose to adhere to the new default framework would have to classify their disclosed significant risks in terms of relative likelihood and impact based on three tiers for each metric. Additionally, in order to better ensure the timeliness of risk disclosures, existing senior executive officer certifications will include specific language attesting to the "freshness" of the disclosed Risk Factors under the proposed framework.

From the firm's perspective, the new framework will also change a firm's disclosure-drafting mindset. Firms under the new framework would have to consider their risks more carefully because they would have to rank their disclosures. This ranking would likely shift their draft-

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7. *See* Susanna Kim Ripken, *Predictions, Projections, and Precautions: Conveying Cautionary Warnings in Corporate Forward-Looking Statements*, 2005 U. ILL. L. REV. 929, 986 (2005) ("Cautionary language that is sufficient in form and content to catch the market's attention, maintain that attention, and turn it toward a serious consideration of the risks provides a much-needed check on the market's collective inclination to accept overly rosy forward-looking information."); *infra* Part II.B.1. *See generally* Peter A. Frensch, *Composition During Serial Learning: A Serial Position Effect*, 20 J. EXPERIMENTAL PSYCHOL.: LEARNING, MEMORY & COGNITION 423 (1994); Richard N. A. Henson, *Short-Term Memory for Serial Order: The Start-End Model*, 36 COGNITIVE PSYCHOL. 73 (1998).

8. *Infra* Part IV.B.2.

9. *See* Jon D. Hanson & Douglas A. Kysar, *Taking Behavioralism Seriously: The Problem of Market Manipulation*, 74 N.Y.U. L. REV. 630, 635 (1999) ("[W]e believe that market outcomes frequently will be heavily influenced, if not determined, by the ability of one actor to control the format of information, the presentation of choices, and, in general, the setting within which market transactions occur."). *See generally* Amos Tversky & Craig R. Fox, *Weighing Risk and Uncertainty*, 102 PSYCHOL. REV. 269 (1995); Orit E. Tykocinski et al., *Message Framing, Self-Discrepancies, and Yielding to Persuasive Messages: The Motivational Significance of Psychological Situations*, 20 PERSONALITY & SOC. PSYCHOL. BULL. 107 (1994).

10. *See infra* Part IV.B.2.

ing emphasis away from a litigation-avoidance posture to an informational posture, which will create disclosures that are more meaningfully compliant. Disclosure then becomes more than a regulatory chore to be completed: it becomes a meaningful risk-management tool for firms.[11] Under the new framework, disclosure may also lead managers to rethink or avoid actions that will generate highly negative disclosures or riskier classifications.[12] If done appropriately, the reconfigured framework can lead to better information for investors and better risk management for firms.[13]

Structurally, the Article proceeds as follows: Part I provides an overview of the current Risk Factor framework and its underlying rationales. Part II challenges the bedrock securities law assumption of the reasonable investor being a rational person by reintroducing the reasonable investor as a predictably irrational person through a discussion of common cognitive limitations: biases, heuristics, and the framing effect, and how these affect risk assessment. Part III critiques and describes key shortcomings of the current risk-disclosure framework. Part IV proposes a behavioral framework configured around relative likelihood and relative impact of dynamic risks, and describes its key elements. Part V examines how the behavioral framework would (1) lead to a better capture of securities disclosure; (2) create a more balanced appeal to the underlying rationales for Risk Factors; (3) simplify transparency and increase financial literacy; (4) lower information costs for investors by requiring companies to enhance their publicly available risk disclosures; and (5) improve financial arbitrage. The Article closes with a brief conclusion.

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11. *See* Merritt B. Fox, *Required Disclosure and Corporate Governance*, 62 LAW & CONTEMP. PROBS. 113, 123 (1999) ("When managers have the legal obligation to disclose certain information, they may have to gather and analyze information they would otherwise ignore.").

12. *See id.* at 125 ("Required disclosure, therefore, will make her try harder to avoid actions that will generate negative information.").

13. *See* MARC STEINBERG, CORPORATE INTERNAL AFFAIRS: A CORPORATE AND SECURITIES LAW PERSPECTIVE 29 (1983) (stating that a reconfigured framework can have a "positive role in influencing the establishment of improved standards of conduct."); Susan Schmidt, *Bies Keynote Address*, 8 FORDHAM J. CORP. & FIN. L. 81, 91–92 (2003) ("[R]isk management framework can improve the transparency of disclosures to help investors and customers better understand the operations of the firm. . . . [E]ach entity should disclose the information its stakeholders need to best evaluate the entity's risk profile."). *See generally* William L. Cary, *Corporate Standards and Legal Rules*, 50 CALIF. L. REV. 408, 410–11 (1962); Arthur R. Pinto, *The Nature of the Capital Markets Allows a Greater Role for the Government*, 55 BROOK. L. REV. 77 (1989); Louis Lowenstein, *Corporate Governance and the Voice of the Paparazzi* (Columbia Law Sch., Working Paper No. 132, 1999), *available at* http://ssrn.com/abstract=163386.

I. THE CURRENT RISK-DISCLOSURE FRAMEWORK

The current federal securities disclosure framework was created when Congress enacted the Securities Act of 1933[14] (the Securities Act) and the Securities Exchange Act of 1934[15] (the Exchange Act) in response to the excesses and ruins of the Roaring Twenties and the Great Depression.[16] The articulated intent of those landmark Acts was to "substitute a philosophy of full disclosure for the philosophy of *caveat emptor*."[17]

The objective of the Securities Act is to ensure "full and fair disclosure of the character of securities sold in interstate and foreign commerce and through the mails, and to prevent frauds in the sale thereof."[18] The Securities Act mandates, with exceptions, the registration of any securities offerings that use any "means or instruments" in interstate commerce.[19] Pursuant to its mandated registration process and its antifraud provisions, the Securities Act attempts to ensure that investors receive accurate and meaningful information about the offered securities and their issuing firms.[20]

The Exchange Act, in turn, governs the subsequent trading of those securities in secondary markets.[21] Like the Securities Act, the Exchange Act attempts to ensure that investors in those secondary markets receive accurate and meaningful information about the offered securities and their issuing firms.[22] The Exchange Act works to achieve this purpose by requiring periodic reporting filings[23] and by imposing a broad antifraud provision in Section 10.[24]

As a result of both Acts, firms are required to make timely disclosures and periodically update them for the "proper protection of the in-

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14. 15 U.S.C. §§ 77a–aa (2000).

15. *Id.* §§ 78a–nn.

16. *The Investor's Advocate: How the SEC Protects Investors, Maintains Market Integrity, and Facilitates Capital Formation*, U.S. SEC. & EXCH. COMM'N (SEC), http://www.sec.gov/about/whatwedo.shtml#create (last modified Sept. 20, 2010).

17. Sec. & Exch. Comm'n v. Capital Gains Research Bureau, Inc., 375 U.S. 180, 186 (1963); *see also* Paredes, *supra* note 2.

18. Creswell-Keith, Inc. v. Willingham, 264 F.2d 76, 81 (8th Cir. 1959) (citing the preamble of the Securities Act of 1933, 48 Stat. 74).

19. § 77e.

20. *See id.* § 77aa (setting forth the various line-item disclosures that are required for inclusion in the disclosure statement).

21. *See id.* §§ 78a–mm.

22. *See id.* § 78m(a)(1) (requiring public companies to "keep reasonably current the information and documents required to be included in or filed with an application or registration statement," as *required* by Section 12 of the Exchange Act).

23. *See id.*

24. *See* 17 C.F.R. § 240.10b-5 (2002) (outlining SEC Rule 10b-5, which is used to implement Section 10).

vestors and to insure fair dealings in the security."[25] These timely disclosures consist of information such as a firm's key contracts, employee headcounts, financial statements, and material risks. These Acts also require firms' disclosures to be timely, topical, periodically updated, and in "plain English."[26] But, in reality, disclosures regarding a firm's risks are often stale, vague, uninformative, and in need of improvement.

A. Introduction to Risk Factors

Under the Securities Act, most firms offering securities to the public are required to file a registration statement. This filing requires the disclosure of certain risks relating to the firm and of the offered securities.[27] Following the Securities Offering Reform of 2005, the Exchange Act required similar Risk Factors to be included in a public firm's annual reports on Form 10-K and quarterly reports on Form 10-Q.[28] In theory, Risk Factors are intended to inform investors of each firm's deepest fears and gravest vulnerabilities.[29] The guidelines for such Risk Factors under the Securities Act and the Exchange Act are identical and spelled out in Item 503(c) of Regulation S-K as follows:

> **Risk Factors.** Where appropriate, provide under the caption "Risk Factors" a discussion of the most significant factors that make the offering speculative or risky. This discussion must be concise and organized logically. Do not present risks that could apply to any issuer or any offering. Explain how the risk affects the issuer or the securities being offered. Set forth each Risk Factor under a subcaption that adequately describes the risk. . . . The Risk Factors may include, among other things, the following:
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> 1. Your lack of an operating history;
> 2. Your lack of profitable operations in recent periods;

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25. § 78m.

26. 17 C.F.R. § 230.421(b) ("You must present the information in a prospectus in a clear, concise and understandable manner."); *see also* James A. Fanto, *We're All Capitalists Now: The Importance, Nature, Provision and Regulation of Investor Education*, 49 CASE W. RES. L. REV. 105, 166–67 (1998) ("There is no question that the SEC's 'plain English' writing principles and clarification standards, which are the foundations of good writing, will lead to, and have produced clearer, more understandable disclosure."); Jeffrey M. McFarland, *Warming Up To Climate Change Risk Disclosure*, 14 FORDHAM J. CORP. & FIN. L. 281, 321 (2009) ("Plain English is particularly important as investors rely less on intermediaries to make their investment decisions.").

27. *See* 503(c), *supra* note 4.

28. *See* Securities Offering Reform, 70 Fed. Reg. 44,722 (Aug. 3, 2005).

29. 503(c), *supra* note 4; *see, e.g.,* Oliver Kay, *The Risk Business: Manchester United Reveal Their Worst Nightmares*, THE TIMES, Jan. 13, 2010, http://www.timesonline.co.uk/tol/sport/football/premier_league/manchester_united/article6985569.ece (In a proposed £500 million bond issue, Manchester United "acknowledge[d] the threats posed to the club by factors as diverse as Sir Alex Ferguson's retirement, UEFA's proposed 'financial fair-play initiative,' the boundless spending of their rivals—and even terrorism.").

3. Your financial position;
4. Your business or proposed business; or
5. The lack of a market for your common equity securities or securities convertible into or exercisable for common equity securities.[30]

In practice, most firms include Risk Factors in their annual reports on Form 10-K and then incorporate those same Risk Factors by reference into prospectuses and quarterly reports, unless they need to be updated.[31] Prospectuses also often include Risk Factors relating to a specific securities offering. In terms of presentation format, many firms organize their Risk Factors into categories and then headline each Risk Factor with a caption in bold or italics, or both, followed by a few sentences of narrative. Below are two excerpted examples.

Google disclosed the following risk in its initial-public-offering preliminary prospectus in 2004:[32]

> Risks Related to Our Business and Industry—
>
> *We face significant competition from Microsoft and Yahoo.*
>
> We face formidable competition in every aspect of our business, and particularly from other companies that seek to connect people with information on the web and provide them with relevant advertising. Currently, we consider our primary competitors to be Microsoft and Yahoo. . . . Both Microsoft and Yahoo have more employees than we do (in Microsoft's case, currently more than 20 times as many). Microsoft also has significantly more cash resources than we do. Both of these companies also have longer operating histories and more established relationships with customers. They can use their experience and resources against us in a variety of competitive ways, including by making acquisitions, investing more aggressively in research and development and competing more aggressively for advertisers and web sites. Microsoft and Yahoo also may have a greater ability to attract and retain users than we do because they operate Internet portals with a broad range of products and services. If Microsoft or Yahoo are successful in providing similar or better web search results compared to ours or leverage their platforms to make their web search services easier to access than ours, we could experience a significant decline in user traffic. Any such decline in traffic could negatively affect our revenues.

30. 503(c), *supra* note 4.

31. *See* 17 C.F.R. § 230.411 (2005) (describing the practice of incorporation by reference).

32. Google Inc., Initial Public Offering (Form S-1), at 4 (Aug. 18, 2004).

Bear Stearns disclosed the following risk in its 2007 Annual Report:[33]

> Our businesses could be adversely affected by market fluctuations. Our businesses are materially affected by conditions in the financial markets and economic conditions generally, both in the U.S. and elsewhere around the world. In the event of a market downturn, our businesses could be adversely affected in many ways, including those described below. Our revenues are likely to decline in such circumstances and, if we were unable to reduce expenses at the same pace, our profit margins would erode. In addition, in the event of extreme market events, such as the global credit crisis, we could incur significant losses. Even in the absence of a market downturn, we are exposed to substantial risk of loss due to market volatility.

While the two cited Risk Factors offer some helpful cautionary information, they, like many Risk Factors, have much room for improvement in terms of substance and presentation.[34]

B. Rationales for Risk Factor Disclosures

Disclosure is at the heart of the federal securities regulatory leviathan. Accurate and timely disclosure is intended to protect investors and to ensure fair dealings in securities.[35] In connection with that noble intention, Risk Factors are meant to serve as a "concise and organized" discussion of a firm's risks and concerns.[36] Risk Factors are primarily driven by three competing, crosscutting rationales: (1) to inform, (2) to comply, and (3) to shield.

1. Information Rationale

Disclosure is designed to provide investors with meaningful, high-quality information.[37] Akin to a doctor's duty to provide a patient with

33. The Bear Stearns Co. Inc., Annual Report (Form 10-K), at 15–16 (Mar. 31, 2008).

34. *See* Ripken, *supra* note 7 ("Effective risk disclosure can help, in part, to overcome some of the cognitive and motivational tendencies that might otherwise lead investors to rush headlong into investments without first confronting the downside potential.").

35. *See* 15 U.S.C. § 78m (2008) (stating that every issuer needs to file annual reports for the protection of investors).

36. *See* 503(c), *supra* note 4.

37. *See* FRANK H. EASTERBROOK & DANIEL R. FISCHEL, THE ECONOMIC STRUCTURE OF CORPORATE LAW 276–314 (1991) (describing the goal of Risk Factors disclosures as being to provide information to investors); *see also* John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717 (1984); Marcel Kahan, *Games, Lies, and*

ample information to grant informed consent,[38] a public firm has a duty to provide an investor with ample information to make a reasonable investment decision. A combination of public and private enforcement mechanisms work to ensure that securities disclosures are of a reasonable quality.[39] Such information is critical to the proper functioning of the securities markets.[40] As the SEC noted on its website, "only through the steady flow of timely, comprehensive and accurate information can people make sound investment decisions."[41]

While some debate exists about the essential role of securities regulations,[42] little dispute exists about the important role of accurate, timely information in the financial markets.[43] This importance is especially true when the information concerns the material risks facing firms.[44]

Securities Fraud, 67 N.Y.U. L. REV. 750 (1992); Paul G. Mahoney, *Mandatory Disclosure as a Solution to Agency Problems*, 62 U. CHI. L. REV. 1047 (1995).

38. *See generally* ZeBarth v. Swedish Hosp. Med. Ctr., 81 Wash.2d 12, 23, 499 P.2d 1 (1972) ("Informed consent . . . is the name for a general principle of law that states that a physician has a duty to disclose what a reasonably prudent physician . . . in the exercise of reasonable care, would disclose to his patient as to whatever grave risks of injury may be incurred from a proposed course of treatment so that a patient, exercising ordinary care for his own welfare, and faced with a choice of undergoing the proposed treatment, or alternative treatment, or none at all, can, in reaching a decision, intelligently exercise his judgment by reasonably balancing the probable risks against the probable benefits.").

39. *See* WILLIAM M. SAGE, MILBANK MEM'L FUND, ACCOUNTABILITY THROUGH INFORMATION: WHAT THE HEALTH CARE INDUSTRY CAN LEARN FROM SECURITIES REGULATION (2000) ("These statutes [the Securities Act of 1933 and the Securities Exchange Act of 1934] emphasize abundant and accurate information as the key to consumer protection, combined to varying degrees with direct regulatory oversight."); Edward Rock, *Securities Regulation As Lobster Trap: A Credible Commitment Theory of Mandatory Disclosure*, 23 CARDOZO L. REV. 675, 686 (2002) ("[T]he public and private enforcement machinery of the securities laws and the combination of criminal and civil liability makes securities disclosures far more credible than purely contractual representations."); Robert B. Thompson & Hillary A. Sale, *Securities Fraud as Corporate Governance: Reflections upon Federalism*, 56 VAND. L. REV. 859, 860–62 (2003) (highlighting the public and private enforcement mechanisms).

40. *See* Paredes, *supra* note 2 ("The logic is that by arming investors with information, mandatory disclosure promotes informed investor decision making, capital market integrity, and capital market efficiency."); *see also* SAGE, *supra* note 39 ("Over the past half-century, this framework [of securities regulation] has accommodated tremendous growth in the capital markets, and has adapted to rapid changes in the mode and diversity of securities transactions.").

41. *See The Investor's Advocate: How the SEC Protects Investors, Maintains Market Integrity, and Facilitates Capital Formation*, U.S. SEC. & EXCH. COMM'N, http://www.sec.gov/about/whatwedo.shtml (last modified Sept. 20, 2010); *see also* Paredes, *supra* note 2.

42. *See, e.g.*, Zohar Goshen & Gideon Parchomovsky, *The Essential Role of Securities Regulation*, 55 DUKE L.J. 711, 713–30 (2006); Homer Kripke, *The SEC and Corporate Disclosure: Regulation*, *in* SEARCH OF A PURPOSE (1979); Donald C. Langevoort, *Theories, Assumptions, and Securities Regulation: Market Efficiency Revisited*, 140 U. PA. L. REV. 851 (1992) (discussing securities regulation and the role of the efficient-market hypothesis); Rock, *supra* note 39.

43. *See* Ripken, *supra* note 7, at 955 ("The purpose of providing warning disclosures is to help investors and consumers evaluate the securities and products at issue. The clear and comprehensible

2. Compliance Rationale

Compliance with the SEC's mandatory disclosure rules grants firms access to funds in the public capital markets.[45] Despite the loss of $6.9 trillion in the financial crisis of 2008,[46] the U.S. capital markets were still worth approximately $55 trillion at the end of 2008,[47] making it one of the largest pools of capital for firms anywhere in the history of the world. Absent proper compliance, the SEC can deny a firm access to raise funds in American capital markets or can make it extremely cumbersome for a firm to proceed in its capital-raising efforts.[48] Absent access to public monies, firms would have to incur significant transactional costs to raise capital for future investments and day-to-day operations.[49]

3. Shield Rationale

Proper and robust disclosures often serve as an effective shield in securities-fraud litigation, which is a real concern for publicly traded firms. Statistics from the *Stanford Law School Securities Class Action Clearinghouse* indicate that from 1998 to 2008, an average of 236 federal class action lawsuits were filed each year.[50] Federal class actions are some of the most costly types of litigation for public firms.[51] In addition

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disclosure of specific and nonobvious risks allows consumers and investors to make informed choices about their future and about pursuing certain courses of action.").

44. *See id.*

45. *See, e.g.*, SAGE, *supra* note 39.

46. *See* Renae Merle, *Wall Street's Final '08 Toll: $6.9 Trillion Wiped Out*, WASH. POST, Jan. 1, 2009, at A1 ("After months of tortuous trading, Wall Street rang out its worst year since the Great Depression yesterday, leaving shareholders $6.9 trillion the poorer.").

47. *See* MCKINSEY GLOBAL INST., GLOBAL CAPITAL MARKETS: ENTERING A NEW ERA 9 (Sept. 2009) (graphing the total financial assets per major region for 2008).

48. *See* 15 U.S.C. § 781(k) (1982); *see also* U.S. SEC. & EXCH. COMM'N, NO. 34-49546, TRADING SUSPENSION: WHISPERING OAKS INTERNATIONAL, INC., D/B/A BIOCUREX, INC. (Apr. 8, 2005) (announcing the temporary suspension of trading of the securities of Whispering Oaks International, Inc., d/b/a BioCurex, Inc.).

49. In the midst of the financial crisis in 2008, many companies, most notably the Big 3 automakers, became paralyzed by the freeze in the credit markets. As access to public monies became more expensive and difficult, many of these companies faced bankruptcies, cutbacks, and temporary shutdowns. *See, e.g.*, Sharon Terlep et al., *GM's Dismal Year: $30.9 Billion Loss*, WALL ST. J., Feb. 27, 2009, at B1; Parija B. Kavilanz, *No. 2 Mall Operator Warns of Bankruptcy*, CNNMONEY, Nov. 11, 2008, http://money.cnn.com/2008/11/11/news/companies/general_growth/index.htm.

50. *See generally* STANFORD LAW SCHOOL SECURITIES CLASS ACTION CLEARINGHOUSE, INDEX OF FILINGS, http://securities.stanford.edu/companies.html (last visited Oct. 9, 2010).

51. *See Securities Litigation Reform, Hearings Before the Subcomm. on Telecomm. and Finance of the House Comm. on Energy and Commerce*, 103d Cong., 2d Sess. 129–34 (1994) (testimony of Janet Cooper Alexander, Professor of Law, Stanford Law School) [hereinafter *Securities Litigation Hearings*]; *see also* Merritt B. Fox, *Why Civil Liability for Disclosure Violations When Issuers do not Trade?*, 2009 WIS. L. REV. 297, 306–07 (2009); Stephanie Plancich & Svetlana Starykh, *Recent Trends in Securities Class Action Litigation: 2009 Mid-*

to those cases, state court actions and individual federal civil actions have also been on the rise.[52] Studies have shown that securities litigation amounted to $2.5 billion in legal fees annually in recent years.[53] While no silver bullet exists for reducing securities-litigation exposure, robust Risk Factor disclosures can refute the commonly pleaded claims by shareholders who suggest that they were not properly warned about a risk that materialized. Hence, practitioners often refer to Risk Factor disclosures as the "cheapest form of insurance."[54]

Furthermore, in reliance on the "bespeaks caution" doctrine, firms include "cautionary language in their disclosure documents with the hopes of shielding themselves from future liability."[55] The doctrine, which has been adopted by many courts since the 1990s, holds that statements in a firm's offering documents relating to projections and expectations are not misleading and can be neutralized by sufficiently specific cautionary language disclosing potential risks.[56] Additionally, the safe harbor provision for forward-looking statements in the Private Securities Litigation Reform Act of 1995 also incentivizes the inclusion of cautionary statements in Risk Factors and other sections of a firm's securities filings.[57] Cautionary language must be directed at forward-

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Year Update, NAT'L ECON. RES. ASSOCS. (2009), http://www.nera.com/image/Recent_Trends_Report_0709.pdfhttp://www.nera.com/image/Recent_Trends_Report_0709.pdf.

52. *See Securities Litigation Hearings*, *supra* note 51; *see also* Fox, *supra* note 51, at 306–07; Plancich & Starykh, *supra* note 51.

53. *See, e.g.*, Fox, *supra* note 51, at 306 ("In recent years in the United States, the lawyers' fees on the two sides of securities litigation have alone, in the aggregate, averaged about $2.5 billion per year.").

54. Robert B. Robbins & Philip L. Rothenberg, *Securities Disclosure, Writing Effective Risk Factor Disclosure in Offering Documents and Exchange Act Reports*, 19 INSIGHTS: CORP. & SEC. L. ADVISOR 1, 4 (May 2005).

55. Tom C. W. Lin, *Undressing the CEO Disclosing Private, Material Matters of Public Company Executives*, 11 U. PA. J. BUS. L. 383, 407 (2009).

56. *Id.* at 407 n.152 (collecting cases).

57. *See* 15 U.S.C. § 77z-2(c) (2002) (setting forth the application of safe harbor for forward-looking statements). Microsoft, for example, includes the following note in its 2008 annual report on Form 10-K about forward-looking statements:

> Certain statements in this report, including estimates, projections, statements relating to our business plans, objectives and expected operating results, and the assumptions upon which those statements are based, are "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act of 1995, Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934. Forward-looking statements may appear throughout this report, including without limitation, the following sections: "Business," "Management's Discussion and Analysis," and "Risk Factors." These forward-looking statements generally are identified by the words "believe," "project," "expect," "anticipate," "estimate," "intend," "strategy," "future," "opportunity," "plan," "may," "should," "will," "would," "will be," "will continue," "will likely result," and similar expressions. Forward-looking statements are based on current expectations and assumptions that are subject to risks and uncertainties which may cause actual results to differ materially from the forward-looking statements. A detailed discussion of

looking statements[58] and be meaningfully specific in order to be effective.[59]

Having introduced the existing framework, the next Part explores a fundamental shortcoming at the foundation of the framework: the myth of the über-rational investor.

II. THE IRRATIONAL REASONABLE INVESTOR

Beneath the core principle of disclosure in federal securities law is the assumption that the reasonable investor is the *homo economicus*, the idealized rational person from neoclassical economic theory.[60] The normative extension of this assumption is that disclosure can serve as a strong and effective regulatory tool to protect investors because, once armed with the requisite information, "investors can protect themselves against corporate abuses and mismanagement."[61] In practice, this assumption has produced a regulatory framework that emphasizes more information over less information, more disclosure over better disclosure, quantity over quality.[62] Yet this regulatory framework ignores that real individuals and investors are not like their rational, neoclassical kin.[63] The rationality of real investors is bounded by biases, heuristics, and oth-

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> risks and uncertainties that could cause actual results and events to differ materially from such forward-looking statements is included in the section entitled "Risk Factors" (refer to Part I, Item 1A). We undertake no obligation to update or revise publicly any forward-looking statements, whether as a result of new information, future events, or otherwise.

Microsoft Corp., Annual Report (Form 10-K), at 3 (June 30, 2009).

58. Lin, *supra* note 55, at 407 n.151 (citing cases).

59. *Id.* at 407 n.154 (citing cases).

60. *See, e.g.*, GARY S. BECKER, THE ECONOMIC APPROACH TO HUMAN BEHAVIOR 14 (1976) ("[A]ll human behavior can be viewed as involving participants who maximize their utility from a stable set of preferences and accumulate an optimal amount of information and other inputs in a variety of markets."); Richard H. Thaler, *Doing Economics Without Homo Economicus*, *in* ECONOMICS: HOW DO ECONOMISTS DO ECONOMICS? 227, 230–35 (Steven G. Medema & Warren J. Samuels eds., 1996); Joan MacLeod Heminway, *Female Investors and Securities Fraud: Is the Reasonable Investor a Woman?*, 15 WM. & MARY J. WOMEN & L. 291, 297 (2009) ("Decisional law and the related literature support the view that the reasonable investor is a rational investor . . . ."); Peter H. Huang, *Moody Investing and the Supreme Court: Rethinking the Materiality of Information and the Reasonableness of Investors*, 13 SUP. CT. ECON. REV. 99, 111 (2005) ("[M]any courts appear to view the reasonable investor as referring to a normative idealized type of behavior, instead of a descriptive realistic depiction of actual behavior.").

61. Paredes, *supra* note 2.

62. *See id.* at 418 ("Securities regulation is motivated, in large part, by the assumption that more information is better than less. Perhaps this is no surprise since the SEC's chief regulatory tool is to require companies to disclose more.").

63. *See* Jolls et al., *supra* note 5, at 1477–79 (discussing the cognitive limitations of individuals in contrast to the rational actor of neoclassical economics); *see also* Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99 (1955) (same).

er cognitive limitations.[64] Investors are generally too loss averse,[65] overconfident in their skills,[66] and overoptimistic about future returns.[67]

Additionally, investors are misled by framing effects and mental shortcuts.[68] For example, "in early 1999, the stock of Mannatech Inc. shot up 368% in its first two days of trading when Internet-crazed traders mistakenly thought Mannatech was a technology stock; in fact, it is a marketer of laxatives and nutritional supplements."[69] As a result of the dissonance between the idealized rational person and the actual investor, disclosure—as a protective instrument—for investors has been severely blunted.

But real people are not entirely irrational. Their rationality, however, is imperfect and limited. Real people have bounded rationality and, in many ways, are predictably irrational.[70] Relative to designing regulations for the rational person, designing regulations for real people is difficult.

In the wake of the recent financial crisis, many neoclassical thinkers, including Alan Greenspan and Richard Posner, have questioned the practicality of the assumption of the rational person as the reasonable investor in a self-correcting über-efficient marketplace.[71] These doubts and denials of the über-rational individual model do not necessarily seek a wholesale rejection of the neoclassical model, but a refinement of it. The neoclassical model, while imperfect and impractical, remains incred-

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64. *Supra* note 60.

65. *See infra* Part II.A.3.

66. *See infra* Part II.A.1.

67. *See infra* Part II.A.1.

68. *See infra* Parts II.B and II.C.

69. JASON ZWEIG, YOUR MONEY AND YOUR BRAIN: HOW THE NEW SCIENCE OF NEUROECONOMICS CAN HELP MAKE YOU RICH 31 (2008).

70. *See* DAN ARIELY, PREDICTABLY IRRATIONAL: THE HIDDEN FORCES THAT SHAPE OUR DECISIONS 239 (2008) ("[W]e are really far less rational than standard economic theory assumes. Moreover, these irrational behaviors of ours are neither random nor senseless. They are systemic, and since we repeat them again and again, predictable."); Stephen Choi & Adam Pritchard, *Behavioral Economics and the SEC*, 56 STAN. L. REV. 1, 2 (2003) ("These [cognitive] biases are not merely isolated quirks, rather, they are consistent, deep-rooted, and systemic behavior patterns."); John Conlisk, *Why Bounded Rationality?*, 34 J. ECON. LIT. 669, 671, 682–83 (1996); Jolls et al., *supra* note 5, at 1475 ("Behavioral economics does not suggest that behavior is random or impossible to predict; rather it suggests, with economics, that behavior is systematic and can be modeled.").

71. *See The Financial Crisis and the Role of Fed. Regulators: Hearing Before the H. Comm. on Oversight and Government Reform*, 110th Cong. 17 (2008) (statement of Alan Greenspan) (Greenspan states that he "found a flaw in the [neoclassical] model that . . . defines how the world works."); *see also* Richard A. Posner, *How I Became a Keynesian*, THE NEW REPUBLIC, Sept. 23, 2009, at 34 ("We have learned since September that the present generation of economists has not figured out how the economy works."). *See generally* RICHARD A. POSNER, A FAILURE OF CAPITALISM: THE CRISIS OF '08 AND THE DESCENT INTO DEPRESSION (2009).

ibly instructive. To borrow Picasso's description of art, the mythical rational person is "the lie that enables us to realize the truth."[72]

Nonetheless, some may contend that the fallacies of real people affect only unsophisticated investors, so-called "noise traders,"[73] and not sophisticated investors, so-called "information traders,"[74] a close kin of the mythical rational person. Thus, securities disclosure should be drafted for sophisticated investors rather than for all investors.[75] Implicit in this contention is the belief that sophisticated investors are superior to the average individual investor, and the "smart money" of the sophisticated will protect the "dumb money" of the unsophisticated through arbitrage and market efficiency.[76] While a significant segment of investors act through more sophisticated agents, studies suggest that sophisticated investors do not necessarily outperform the average lay investor.[77] Sophisticated investors do not outperform their counterparts because they also suffer from cognitive limitations[78] and because arbitrage has severe limitations.[79] Additionally, real markets are not as elegantly efficient as their theoretical counterparts.[80] And "smart money" and "dumb money"

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72. CLAUDIA E. CORNETT, THE ARTS AS MEANING MAKERS 190 (1998).

73. Goshen & Parchomovsky, *supra* note 42, at 714–15 ("*[N]oise traders*, [are those] who act irrationally, falsely believing that they possess some valuable informational advantage or superior trading skills.").

74. *Id.* at 714 ("*[I]nformation traders*, [are those] who specialize in gathering and analyzing general market and firm-specific information.").

75. *See id.* ("[T]he role of securities regulation is to create and promote a competitive market for information traders.").

76. *See* Choi & Pritchard, *supra* note 70, at 3 ("[T]he unsophisticated therefore can rely on market efficiency to ensure that the price he pays for a security will be 'fair.' . . . [T]he overwhelming influence of smart money actually indirectly protects the interests of the poorly informed, as evidenced by the burgeoning popularity of index funds.").

77. *See* GARY BELSKY & THOMAS GILOVICH, WHY SMART PEOPLE MAKE BIG MONEY MISTAKES 162 (2009) ("In fact, in most years the majority of these *professional* managers actually perform worse than stocks in general. Indeed, over periods of a decade or more, roughly 75 percent of all stock funds underperform the market."); *see also* JOHN BOGLE, COMMON SENSE ON MUTUAL FUNDS: NEW IMPERATIVES FOR THE INTELLIGENT INVESTOR 119 (1999) (charting the inferiority of actively managed mutual fund returns relative to the S&P 500 Index); M.P. Dunleavy, *That Rush to Beat the Market*, N.Y. TIMES, Apr. 12, 2009, at BU22 ("In fact, numerous studies have shown that, despite investor willingness to pay higher fees and expenses for actively managed mutual funds, these funds rarely beat the market in the long term."); Bill Barker, *The Performance of Mutual Funds*, THE MOTLEY FOOL, http://www.fool.com/school/mutualfunds/performance/record.htm (last visited Oct. 10, 2010) ("The average actively managed stock mutual fund returns approximately 2% less per year to its shareholders than the stock market returns in general.").

78. *See* Choi & Pritchard, *supra* note 70, at 2 ("There is evidence that supposedly sophisticated institutional investors—mutual funds, pension funds, insurance companies—suffer from similar biases that impair their decisions.").

79. *See infra* Part V.E.

80. *See, e.g.*, Kenneth A. Froot & Richard H. Thaler, *Foreign Exchange*, *in* THE WINNER'S CURSE: PARADOXES AND ANOMALIES OF ECONOMIC LIFE 182, 185–86 (Richard Thaler ed., 1992);

are not so readily delineated in the interconnected financial marketplace.[81] So the "smart money" of sophisticated investors needs protection as well.[82] Even if a few sophisticated investors have superior skills,[83] recognizing and redressing the cognitive limitations of all investors lifts all boats (or yachts, as the case may be).

Ultimately, because securities regulation is based on the mythical rational person, the regulation has been driven primarily by the assumption that more information is better than less information, so emphasis is placed on more disclosure.[84] Yet relatively little emphasis is placed on how that information is used and processed by real investors.[85] Given the dissonance between the rational investor and the real investor, what good is an abundance of mandated disclosure if the information cannot be processed effectively because of cognitive limitations?[86]

Thomas Russell & Richard H. Thaler, *The Relevance of Quasi Rationality in Competitive Markets*, *in* QUASI RATIONAL ECONOMICS 239, 248–49 (Richard Thaler ed., 1991).

81. *See* Heidi N. Moore, *The Myth of the Sophisticated Investor*, THE BIG MONEY, Apr. 27, 2010, http://www.thebigmoney.com/articles/judgments/2010/04/27/myth-sophisticated-investor?page=full (suggesting that there is no difference between sophisticated investors and ordinary investors); President Barack Obama, Remarks by the President on Wall Street Reform (Apr. 22, 2010), http://www.whitehouse.gov/the-press-office/remarks-president-wall-street-reform ("What happens on Wall Street has real consequences across the country, across our economy. . . . Because ultimately, there is no dividing line between Main Street and Wall Street. We will rise or we will fall together as one nation.").

82. *See* Sec. & Exch. Comm'n. v. Tex. Gulf Sulphur Co., 401 F.2d 833, 849 (1968) ("The speculators and chartists of Wall and Bay Streets are also 'reasonable' investors entitled to the same legal protection afforded conservative traders."); *Squawk Box* (CNBC television broadcast Apr. 19, 2010) (interviewing Barney Frank, Senator) [hereinafter Barney Frank Interview] ("[The rich and sophisticated] need protection . . . . They are not just playing with their own money, they are playing with other people's money and the societal impact of their error can be very great, so I think it reinforces the view that no, you can't just leave the rich to their vices.").

83. *See, e.g.*, BELSKY & GILOVICH, *supra* note 77, at 162–63 ("Yes, a few fund managers consistently outperform the market over time . . . [but] the fact of the matter is that most people have no reason to think that they can be more successful identifying worthy investments or timing the ups and downs of the stock and bond markets than they would be if they made their decisions by throwing darts at the financial pages."); Malcolm Baker et al., *Can Mutual Fund Managers Pick Stocks? Evidence from Their Trades Prior to Earnings Announcements*, 26 (Nat'l Bureau of Econ. Research, Working Paper No. 10,685, 2004), *available at* http://papers.nber.org/papers/w10685.pdf.

84. *See* Paredes, *supra* note 2 ("Securities regulation is motivated, in large part, by the assumption that more information is better than less. Perhaps this is no surprise since the SEC's chief regulatory tool is to require companies to disclose more.").

85. *See id.* ("Relatively little attention is paid to how the information [that is disclosed to investors] is used—namely, how investors . . . search and process information and make decisions based on the information the federal securities laws make available."); Jolls et al., *supra* note 5, at 1534 ("'Provide more information' says nothing about the way in which the information will be provided, and yet we know from much of what has been said already, as well as from empirical work by scholars such as W. Kip Viscusi, that this will matter a great deal.").

86. *See* Jennifer O'Hare, *Retail Investor Remedies Under 10b-5*, 76 U. CIN. L. REV. 521, 526 (2008) ("Under this behavioral law and economics approach, individual investors, rather than behaving as rational actors, are heavily influenced by a variety of biases that can lead to bad investment decisions."); *see also* JONAH LEHRER, HOW WE DECIDE 153–54 (2009) (discussing various errone-

Over the last few decades, behavioral economists and other academic researchers have identified common cognitive limitations of real people. This research has undermined the rational person assumption by attempting to better augment choice architectures to account for those shortcomings.[87] These limitations include (1) cognitive biases, (2) heuristics, and (3) framing effects.

A. Cognitive Biases

Cognitive bias is a type of reflexive mental processing used for "quick, low-effort analysis."[88] Cognitive biases "are subconscious mental processes that impair rational thought-processes and ultimately lead to 'irrational' choices."[89] This section discusses four types of cognitive bias: overconfidence and overoptimism, status quo bias, loss aversion and the endowment effect, and confirmation bias.

1. Overconfidence & Overoptimism

Despite facts to the contrary, individuals generally have an overabundance of confidence in their own abilities and an overabundance of optimism in their futures.[90] For example, most Americans believe that

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ous sleight of mind accounting done by people); Paredes, *supra* note 2 ("[I]f the users do not process information effectively, it is not clear what good mandating disclosure does."); W. Kip Viscusi, *Individual Rationality, Hazard Warnings, and the Foundations of Tort Law*, 48 RUTGERS L. REV. 625, 630–36 (1996).

87. *See* CASS R. SUNSTEIN & RICHARD H. THALER, NUDGE 33 (2009); Kent Greenfield & Peter C. Kostant, *An Experimental Test of Fairness Under Agency and Profit-Maximization Constraints (With Notes on Implications for Corporate Governance)*, 71 GEO. WASH. L. REV. 983, 984 (2003) ("BLE scholars have given scholarly weight to the common-sense insight that individuals make decisions and act in the world on many different bases, only some of which can be described as driven by the self-interested pursuit of material utility that is traditionally termed 'economic.'"); David A. Hoffman, *The "Duty" to be a Rational Shareholder*, 90 MINN. L. REV. 537, 546 (2006) ("Behavioral law and economics (BLE) undermines the rationality assumption by using data from psychological experiments to radically alter our view of how humans make choices. BLE documents how individuals' choice-making behavior systematically diverges from the predictions of the rational-actor model of human behavior."); Donald C. Langevoort, *Selling Hope, Selling Risk: Some Lessons for Law from Behavioral Economics About Stockbrokers and Sophisticated Customers*, 84 CALIF. L. REV. 627, 635 (1996) (discussing that "[b]ehavioral decision theorists have generated a number of insights relating to decision making that might apply to investment behavior."). *See generally* Stephen M. Bainbridge, *Mandatory Disclosure: A Behavioral Analysis*, 68 U. CIN. L. REV. 1023 (2000); Russell B. Korobkin & Thomas S. Ulen, *Law and Behavioral Science: Removing the Rationality Assumption from Law and Economics*, 88 CALIF. L. REV. 1051, 1066 (2000).

88. Andrew E. Taslitz, *Prosecutorial Preconditions to Plea Negotiations*, 23 CRIM. JUST. 14, 21 (2008).

89. Michael A. McCann, *It's Not About the Money: The Role of Preferences, Cognitive Biases, and Heuristics Among Professional Athletes*, 71 BROOK. L. REV. 1459, 1468 (2006).

90. *See* David A. Armor & Shelley E. Taylor, *When Predictions Fail: The Dilemma of Unrealistic Optimism*, *in* HEURISTICS AND BIASES: THE PSYCHOLOGY OF INTUITIVE JUDGMENT 334, 334 (Thomas Gilovich et al. eds., 2002) ("One of the most robust findings in the psychology of predic-

their marriages will last, even though 50% of all marriages end in divorce or separation.[91] Lottery players think that they have a reasonable chance at winning the jackpot in the face of astronomical odds to the contrary.[92] Investors think that they have the ability to beat the market, despite statistics to the contrary.[93] Investors buy volatile stocks without fully accounting for the risks, believing that they have superior strategies.[94] Investors hold on to bad investments for too long, unreasonably believing that they will turn around.[95] Our overconfidence in our abilities and overoptimism in our future causes us to unduly take risks. Overconfidence and overoptimism, therefore, are root causes for stock market bubbles and crashes.[96]

2. Status Quo Bias

Individuals have a strong inclination to stick to their current situations, i.e., the status quo bias.[97] Viewers stay on the same television

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tion is that people's predictions tend to be optimistically biased. By a number of metrics and across a variety of domains, people have been found to assign higher probabilities to their attainment of desirable outcomes than either objective criteria or logical analysis warrants.").

91. *See* ROSE M. KREIDER & JASON M. FIELDS, U.S. CENSUS BUREAU, NUMBER, TIMING, AND DURATION OF MARRIAGES AND DIVORCES: 1996 70–80 (2002) (highlighting the number of marriages that end in divorce or separation).

92. *See generally* Edward J. McCaffery, *Why People Play Lotteries and Why It Matters*, 1994 WIS. L. REV. 71 (1994) (discussing why people continue to play the lottery despite the fact that it is inherently difficult to actually win).

93. *See, e.g.*, Hoffman, *supra* note 87, at 555 ("[M]ost investors mistakenly believe they can beat the market."); Donald C. Langevoort, *Taming the Animal Spirits of the Stock Markets: A Behavioral Approach to Securities Regulation*, 97 NW. U. L. REV. 135, 146–48 (2002); Don A. Moore et al., *Positive Illusions and Forecasting Errors in Mutual Fund Investment Decisions*, 79 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 95 (1999) (showing how investors tend to overestimate the performance of their investments); Glen Whyte et al., *When Success Breeds Failure: The Role of Self-Efficacy in Escalating Commitment to a Losing Course of Action*, 18 J. ORGANIZATIONAL BEHAV. 415 (1997) (showing that having a higher view of personal self-efficacy that was built upon past success led investors to have an irrational escalation of commitment).

94. *See, e.g.*, Hoffman, *supra* note 87, at 555 ("[M]ost investors mistakenly believe they can beat the market."); Langevoort, *supra* note 87, at 659–60 (finding that investors who have previously made good investing decisions overvalue their successes based on a perceived level of skill that they possess); Moore et al., *supra* note 93 (demonstrating how investors tend to overestimate the performance of their investments); Ripken, *supra* note 7, at 961 ("The illusion of control causes investors to believe that positive investment outcomes are due to investors' own skills and superior strategy, rather than good luck.").

95. *See* Choi & Pritchard, *supra* note 70, at 13 ("When investors' stocks have lost value, they may hold onto the stocks longer than warranted in hope of reversing the losses. Conversely, investors that make large investment gains may not value the gains as highly, taking on added risk with their gains . . . .").

96. *See generally* Robert J. Shiller, *Measuring Bubble Expectations and Investor Confidence*, 1 J. PSYCHOL. & FIN. MARKETS 49 (2000) (discussing the effect of investor confidence on market bubbles).

97. *See generally* William Samuelson & Richard Zeckhauser, *Status Quo Bias in Decision Making*, 1 J. RISK & UNCERTAINTY 7 (1988).

channel after watching a favorite show even though they may not be particularly interested in the next show.[98] Investors tend to stay with their initial 401(k) allocations despite changes in the market and their lives.[99] In short, the status quo bias causes us to make choices without thinking and to remain static in a changing world.

3. Loss Aversion & The Endowment Effect

Individuals are loss averse.[100] They do not assign static values to objects; and when they give up or lose something, "they are hurt more than they are pleased if they acquire the very same thing."[101] The negative impact of a loss is greater than the positive impact of an equal gain.[102] In fact, studies have shown that the negative impact of a loss may be two times greater than the positive impact of gain.[103]

Related to loss aversion, the endowment effect[104] is the idea that "people tend to value goods more when they own them than when they do not."[105] A practical result of the endowment effect is the "'offer-asking gap,' which is the empirically observed phenomenon that people

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98. *See* John W. Emerson & Ron Shachar, *Cast Demographics, Unobserved Segments, and Heterogeneous Switching Costs in a Television Viewing Choice Model*, 37 J. MARKETING RES. 173 (2000) (defining a new model to determine television viewers' preferences); Srinivas K. Reddy et al., *SPOT: Scheduling Programs Optimally for Television*, 44 MGMT. SCI. 83 (1998); Roland T. Rust & Mark I. Alpert, *An Audience Flow Model of Television Viewing Choice*, 3 MARKETING SCI. 113 (1984).

99. *See* Cass R. Sunstein & Richard H. Thaler, *Libertarian Paternalism is Not an Oxymoron*, 70 U. CHI. L. REV. 1159, 1162–66 (2003) (finding that individuals are slow to join 401(k) plans that offer more choices because they are prone to procrastination); Sheena S. Iyengar et al., *How Much Choice Is Too Much? Determinants of Individual Contributions in 401(k) Retirement Plans* (Pension Res. Council, Working Paper No. 2003-10, 2003) (discussing how people tend to stick with the 401(k) option that they already have if they are faced with multiple 401(k) options).

100. *See* LEHRER, *supra* note 86, at 76 (discussing the mental limitation of loss aversion). *See generally* Amos Tversky & Daniel Kahneman, *Loss Aversion in Riskless Choice: A Reference-Dependent Model*, 106 Q. J. ECON. 1039 (1991).

101. SUNSTEIN & THALER, *supra* note 87, at 33.

102. *See* Samuel Issacharoff, *The Content of Our Casebooks: Why do Cases get Litigated?*, 29 FLA. ST. U. L. REV. 1265, 1276 (2002) ("[W]e know that contrary to what economists would tell us, people value losses more than gains and that they will invest more heavily in seeking to avoid a loss than realize a gain, even of equal value.").

103. *See* SUNSTEIN & THALER, *supra* note 87, at 33; Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325 (1990) (finding that the seller of an object valued it twice as much as the potential purchaser); Richard H. Thaler, *Toward a Positive Theory of Consumer Choice,* 1 J. ECON. BEHAV. & ORG. 39, 44–45 (1980).

104. *See* Issacharoff, *supra* note 102; Duncan Kennedy, *Cost-Benefit Analysis of Entitlement Problems: A Critique*, 33 STAN. L. REV. 387, 401 (1981) (explaining the endowment effect using the "offer-asking problem"); Thaler, *supra* note 103, at 44 (defining "endowment effect").

105. Russell Korobkin, *A New Social Scientific Assessment of Law and Human Behavior: The Endowment Effect and Legal Analysis*, 97 NW. U. L. REV. 1227, 1228 (2003); *see also* Kahneman et al., *supra* note 103, at 1341–46 (further explaining the endowment effect).

will often demand a higher price to sell a good that they possess than they would pay for the same good if they did not possess it at present."[106]

Loss aversion and the endowment effect produce inertia and cause people to resist change, even if change is clearly in their favor. Homeowners overvalue their homes and do not accept reasonable offers, often to their detriment.[107] Investors overvalue losing positions and hold on to them for too long in order to avoid realizing losses.[108] One study indicated that household "investors are 32% less likely to sell a stock after a sharp fall in price than after a rise."[109] Another study indicated that professional money managers "cling to their losing stocks for an average of fifty-five days, more than twice as long as they hold winners."[110] In short, loss aversion and the endowment effect often prevent people from doing what is in their best interests.

4. Confirmation Bias

Individuals search for, remember, and interpret information in a manner that confirms their preconceptions.[111] This cognitive limitation is known as the confirmation bias.[112] When individuals favor a certain selection, be it a stock pick, political candidate, or public policy,[113] they

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106. Korobkin, *supra* note 105. *See generally* Jennifer Arlen et al., *Endowment Effects Within Corporate Agency Relationships*, 31 J. LEGAL STUD. 1 (2002).

107. *See* Korobkin, *supra* note 105 (stating that a person might prefer a house in the city, but when the person moves from a city house to a country house, that person begins to value the country house a lot more than when that person lived in the city); *see also* Issacharoff, *supra* note 102, at 1276–77 (finding that people are reluctant to sell their houses in a declining market because they do not want to suffer a loss that is greater than what they perceive they should lose on the house).

108. *See* Choi & Pritchard, *supra* note 70, at 13; Ronald J. Gilson & Reinier Kraakman, *The Mechanisms of Market Efficiency Twenty Years Later: The Hindsight Bias*, 28 IOWA J. CORP. L. 715, 732 (2003) ("If one imagines the endowment effect is at work on target shareholders, then they may require too high a price for their stock**,** and mistakenly let a good offer pass."); Hoffman, *supra* note 87, at 553 (finding that people "hold 'under water' stocks for longer [than they should], in the hope of reversing the tide"); Issacharoff, *supra* note 102 ("[P]eople tend to hold losing stocks too long and sell winners too quickly. . . .").

109. ZWEIG, *supra* note 69, at 197. The study that Zweig discusses is Mark Grinblatt & Matti Keloharju, *What Makes Investors Trade?*, 56 J. FIN. 589, 600 (2001).

110. ZWEIG, *supra* note 69, at 197.

111. *See generally* Margit E. Oswald & Stefan Grosjean, *Confirmation Bias*, *in* COGNITIVE ILLUSIONS: A HANDBOOK ON FALLACIES AND BIASES IN THINKING, JUDGMENT AND MEMORY 79 (Rüdiger F. Pohl ed., 2004); Jane Risen & Thomas Gilovich, *Informal Logical Fallacies*, *in* CRITICAL THINKING IN PSYCHOLOGY 110 (Robert J. Sternberg ed., 2007).

112. *See* Jason Zweig, *How To Ignore the Yes-Man In Your Head*, WALL ST. J., Nov. 13, 2009, at A13 (describing a study that found "people are twice as likely to seek information that confirms what they already believe as they are to consider evidence that would challenge those beliefs.").

113. Commentators have suggested that the confirmation bias contributed to the Iraq War because key decision makers selectively searched for and interpreted information to support their premise that Iraq posed an imminent security threat, and that they acted upon that bias, while ignoring contrary evidence. *See* Seymour M. Hersh, *Selective Intelligence*, THE NEW YORKER, May 12,

tend to search for and find characteristics that validate their positions and undervalue those that are contrary.[114]

Confirmation bias can lead to suboptimal decisions in the investment context. It can also influence investors to invest more money in a bad asset because they selectively see only those signs that affirm their initial selection of that asset.[115] For example, if you believe that bank stocks are going to rise in the near term, suddenly it seems like most of the financial press is filled with similar sentiments.[116]

B. Heuristics

Heuristics are mental shortcuts or "rules of thumb" that require little information and allow individuals to make swift decisions and judgments.[117] While heuristics can be helpful in aiding individuals to simplify complex circumstances and make timely decisions,[118] they can also mislead individuals because mental shortcuts may prevent people from making optimal decisions. Four prominent types of heuristics are discussed here: anchoring, availability, representativeness, and herd behavior.

2003, http://www.newyorker.com/archive/2003/05/12/030512fa_fact; *see also* BOB WOODWARD, STATE OF DENIAL: BUSH AT WAR PART III 231 (2008) ("The controversy over the president's reference to the discredited Iraq-Niger uranium deal was gaining steam, and fast becoming a symbol of both the failure to find WMD, and the suspicion that the president had cherry-picked intelligence to make the case for war.").

114. *See* Hoffman, *supra* note 87, at 555 (stating that investors validate their beliefs through "privately acquired information" and believe that the companies they invest in are better than other companies in the same field); *see also* Langevoort, *supra* note 87, at 146 ("[Investors] put too much weight on their privately acquired information or inference, and calibrate poorly even when they realize the presence of some uncertainty.").

115. *See* Zweig, *supra* note 112 ("[A person's mind acts] like a compulsive yes-man [that] echoes whatever [that person wants] to believe.").

116. *See* LEHRER, *supra* note 86, at 67 ("The danger of the stock market, however, is that sometimes its erratic fluctuations can actually look predictable, at least in the short term. . . . Instead of seeing randomness, we come up with imagined systems and see meaningful trends where there are only meaningless streaks.").

117. ROY F. BAUMEISTER & BRAD J. BUSHMAN, SOCIAL PSYCHOLOGY AND HUMAN NATURE 161 (2007) ("Heuristics [are] mental shortcuts [that] provide quick estimates (though sometimes inaccurate ones) for decisions about uncertain events."); James H. Kuklinski & Paul Quirk, *Reconsidering the Rational Public: Cognition, Heuristics, and Mass Opinion*, *in* ELEMENTS OF REASON: COGNITION, CHOICE, AND BOUNDS OF RATIONALITY 153 (Arthur Lupia et al. eds., 2000).

118. GERD GIGERENZER, GUT FEELINGS, 16–19 (2007) (explaining the benefits of unconscious intelligence such as "gut feelings" and heuristics).

1. Anchoring

Anchoring describes the process of interpreting information through the lens of information that was received immediately prior.[119] Suppose you were planning to give money to a political candidate but were unsure about how much to give. Brochure A suggests a range of options: $100, $300, $500, and "other amount." Brochure B suggests a range of options: $25, $50, $75, and "other amount." Evidence shows that the more money asked for, within reason, the more you are likely to receive.[120] This result is due to "anchoring and adjustment,"[121] where individuals start with some baseline reference point and then adjust in the direction they believe is appropriate.[122]

Anchoring can mislead people because their adjustments are often insufficient or because they are influenced by irrelevant anchors.[123] For example, the high price of a dress in one store can affect a consumer's valuation and willingness to pay for a music CD in an adjacent store, even though the items are completely unrelated.[124] Moreover, anchoring can cause people to make initial judgments that "prove remarkably resistant to further information, alternative modes of reasoning, and even logical or evidential challenges."[125] In the investment context, investors may hold on to losing positions because they are anchored to either the initial purchase price or their initial favorable impression.

2. Availability

Individuals assess the likelihood of a particular risk based on how readily examples come to mind rather than the risk's actual probability.[126] The more accessible and salient the example, the more weight that example is given.[127] "If people can easily think of relevant examples,

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119. Amos Tversky & Daniel Kahneman, *Judgments of and by Representativeness*, 185 SCI. 1124, 1128 (1974).

120. *See* SUNSTEIN & THALER, *supra* note 87, at 24.

121. *See id.* at 23.

122. *Id.*

123. *See id.* at 23–24; *see also* Tversky & Kahneman, *supra* note 119, at 1128 (describing how anchors have the potential to mislead people).

124. *See generally* Rashmi Adaval & Kent B. Monroe, *Automatic Construction and Use of Contextual Information for Product and Price Evaluations*, 28 J. OF CONSUMER RES. 572 (2002); Joseph C. Nunes & Peter Boatwright, *Incidental Prices and Their Effect on Willingness to Pay*, 41 J. OF MARKETING RES. 457, 458 (2004) (describing studies showing that irrelevant anchors influence the amount that people are willing to pay for certain goods).

125. RICHARD NISBETT & LEE ROSS, HUMAN INFERENCE: STRATEGIES AND SHORTCOMINGS OF SOCIAL JUDGMENT 41 (James J. Jenkins et al. eds., 1980).

126. *See* SUNSTEIN & THALER, *supra* note 87, at 25.

127. *See id.*

they are far more likely [to be] frightened and concerned than if they cannot," regardless of what the empirical evidence suggests.[128]

The availability heuristic can lead to an availability cascade, where popular perceptions and misperceptions are trapped in a self-reinforcing cycle that results in an erroneous collective belief.[129] In the investment context, the availability heuristic can lead to bubbles and crashes, as bad information becomes amplified in a vicious informational cycle.[130]

In sum, the availability heuristic can lead us to overreact to risks that are not as likely as we perceive them to be and underreact to risks that are likely but less salient.[131]

3. Representativeness

The representativeness heuristic makes us judge objects and events as similar based on relatively artificial, "representative" characteristics, regardless of their actual similarity.[132] This heuristic results in individuals inferring a great deal of information "about an object, a being, a pattern of behavior, or a set of results based on their similarities to other

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128. Alan Schwartz & Louis L. Wilde, *Imperfect Information in Markets for Contract Terms: The Examples of Warranties and Security Interests*, 69 VA. L. REV. 1387, 1437 (1983) ("The 'availability heuristic' can cause persons to make mistakes about the frequency with which events occur. One making inferential judgments by use of this heuristic tends to ignore statistical data in favor of evidence that seems germane and is 'in awareness'—is available."); *see also* Jolls et al., *supra* note 4, at 1537 ("[V]ivid and personal information will often be more effective than statistical evidence [because] of the availability heuristic, people will tend to respond to it by attaching a higher probability to the event in question.").

129. *See* Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683, 713 (1999) ("[I]nsofar as people lack independent means of judging a claim's validity, there is a danger that the beliefs generated by a cascade will be factually incorrect. Millions of individuals may develop erroneous beliefs simply by giving each other reasons to adopt and preserve them.").

130. *See, e.g.*, ROBERT SHILLER, IRRATIONAL EXUBERANCE 171–90 (2000) (analyzing the origins of stock market bubbles); Huang, *supra* note 60, at 121 ("Overall, the availability heuristic suggests that whatever piece of information becomes uppermost in the minds of an audience, whether due to primacy, recentness, typicality, or some other such effect, is perceived disproportionately and comes to carry more weight than less activated pieces of information.").

131. The availability heuristic also causes individuals to exaggerate the predictability of an event after it happens, a cognitive deficiency known as hindsight bias. This bias further stunts an individual's ability to make optimal decisions as they rationalize previous bad decisions. *See* John C. Anderson et al., *Evaluation of Auditor Decisions: Hindsight Bias Effects and the Expectation Gap*, 14 J. ECON. PSYCHOL. 711, 722 (1993) (finding that peer reviewers are more likely to evaluate a particular audit procedure negatively if they are told of allegations that the auditor lacked independence); Baruch Fischhoff, *Hindsight Is Not Equal to Foresight: The Effect of Outcome Knowledge on Judgment Under Uncertainty*, 1 J. EXPERIMENTAL PSYCHOL.: HUM. PERCEPTION & PERFORMANCE 288, 288 (1975); Erik Holzl et al., *Hindsight Bias in Economic Expectations: I Knew All Along What I Want to Hear*, 87 J. APPLIED PSYCHOL. 437, 440–42 (2002).

132. MICHAEL KAPLAN & ELLEN KAPLAN, BOZO SAPIENS 42 (2009); Tversky & Kahneman, *supra* note 119, at 1124.

such objects, beings, patterns, and sets."[133] This heuristic can cause individuals to see patterns in randomness and assign similarities to things that are actually different. A gambler playing roulette may think that the table is "due for red" because the previous ten spins were all black.[134] An investor may think that a firm named Typewriters.com is a growth stock because it has "dot.com" in its name.[135] The gambler and the investor are both wrong because they have been misled by the representativeness heuristic.

4. Herd Behavior

Herd behavior is the notion that people tend to behave in a certain way because others are acting and thinking similarly.[136] In the political context, herd behavior can lead to a bandwagon effect for candidates who are perceived to be winning, even if they are not.[137] In the consumer context, herd behavior can lead to trends and fads that cause people to purchase items that they do not want or need.[138] In the investment context, herd behavior can lead to stock market bubbles.[139] This heuristic

133. BELSKY & GILOVICH, *supra* note 77, at 13.

134. NISBETT & ROSS, *supra* note 125, at 25 (stating that an example of the representativeness heuristic is the "gamblers' fallacy" where, "[a]fter observing a long run of 'red' on a roulette wheel, people believe that 'black' is now due, because the occurrence of black would make the overall sequence of events more representative of the generating process than would the occurrence of another red.").

135. *See* ZWEIG, *supra* note 69, at 8 ("In 1999, the stock of Computer Literacy Inc. shot up 33% in a single day, purely because the company changed its name to the more hip-sounding fatbrain.com. During 1998 and 1999, one group of stocks outperformed the rest of the technology industry by a scorching 63 percentage points—merely by changing their corporate names to include .com, .net, or internet.").

136. *See generally* ROBERT PRECHTER, THE WAVE PRINCIPLE OF HUMAN SOCIAL BEHAVIOR 152–53 (1999); Abhijit V. Banerjee, *A Simple Model of Herd Behavior*, 107 Q. J. ECON. 797 (1992); Laurens Rook, *An Economic Psychological Approach to Herd Behavior*, 40 J. ECON. ISSUES 75 (2006).

137. *See generally* Robert K. Goidel & Todd G. Shields, *The Vanishing Marginals, the Bandwagon, and the Mass Media,* 56 J. POL. 802 (1994); Albert Mehrabian, *Effects of Poll Reports on Voter Preferences,* 28 J. APPLIED SOC. PSYCHOL. 2119 (1998); Richard Nadeau et al., *New Evidence About the Existence of a Bandwagon Effect in the Opinion Formation Process,* 14 INT'L POL. SCI. REV. 203 (1993).

138. *See generally* Sushil Bikhchandani et al., *A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascade,* 100 J. POL. ECON. 992 (1992); Harvey Leibenstein, *Bandwagon, Snob, and Veblen Effects in the Theory of Consumers' Demand,* 64 Q. J. ECON. 183 (1950); Vicki G. Morwitz & Carol Pluzinski, *Do Polls Reflect Opinions or Do Opinions Reflect Polls?*, 23 J. CONSUMER RES. 53 (1996).

139. *See, e.g.*, SHILLER, *supra* note 130, at 149–53 (describing how crowd behavior can potentially have an effect on market dynamics).

can lead people astray and cause them to make harmful, irrational decisions.[140]

C. Framing Effects

Framing refers to the constructs of context and presentation,[141] which can affect how people process information and make decisions. Framing, although superficial in nature, can have substantive implications on serious matters like presidential elections, consumer habits, and retirement investments. Advertisers, political strategists, and linguists have long known about the effects of framing[142] The "estate tax" has become the "death tax."[143] The Association of Trial Lawyers of America is now known as the American Association of Justice.[144] Gambling is now marketed as gaming.[145]

While framing can be used for improper purposes, it can also be used to augment choice architectures, change the circumstances in which people make decisions,[146] and enhance the presentation and context of information, which helps people make decisions that are in their best interests.[147] Consider the *San Marcos Power Experiment*, where researchers used framing to increase energy conservation.[148] In the experiment, not only did researchers inform households about the level of their energy consumption, but also the average energy consumption levels of their

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140. *See generally* Sanford J. Grossman & Joseph E. Stiglitz, *Information and Competitive Price Systems*, 66 AM. ECON. REV. 246 (1976); John D. Hey & Andrea Morone, *Do Markets Drive out Lemmings—or vice versa?*, 71 ECONOMICA 637 (2004).

141. *See* Amos Tversky & Daniel Kahneman, *The Framing of Decisions and the Psychology of Choice*, 211 SCI. 453 (1981) (describing the concept of "framing").

142. *See* Hoffman, *supra* note 87, at 558 ("Perceptions of risks and benefits are subject to manipulation by corporations because of the existence of the so-called 'framing effect.'"); Matt Bai, *The Framing Wars*, N.Y. TIMES MAG., July 15, 2005, http://www.nytimes.com/2005/07/17/magazine/17DEMOCRATS.html (showing how framing has been applied in the political context).

143. *See* Jayne W. Barnard, *Corporate Boards and the New Environmentalism*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 291, 302 n.82 (2007) ("[P]oliticians often utilize phrases and evocative words to shape new attitudes about old ideas. [After such framing takes hold, the] estate tax becomes the 'death tax.'").

144. *See* Aziz Rana, *Statesman or Scribe? Legal Independence and the Problem of Democratic Citizenship*, 77 FORDHAM L. REV. 1665, 1667 (2009) ("In an effort to improve its public image, the Association of Trial Lawyers of America (ATLA) recently changed its name to the far vaguer American Association of Justice.").

145. *See* James H. Frey, *Gambling: Socioeconomic Impacts and Public Policy*, 556 ANNALS 8, 10 (1998) ("Corporate marketing efforts have created an image of gambling, or 'gaming' as the industry now prefers, as a desirable recreational activity that is most enjoyed in settings that remind one of Disneyland rather than a backroom bar.").

146. SUNSTEIN & THALER, *supra* note 87, at 3.

147. *See id.* at 83–102.

148. P. Wesley Schultz et al., *The Constructive, Destructive, and Reconstructive Power of Social Norms*, 18 PSYCHOL. SCI. 429 (2007).

neighbors.[149] The households that found themselves using relatively less energy started to use more energy, and vice versa.[150] Next, the researchers added happy faces, ☺, to the bills of low-energy-consumption households, and sad faces, ☹, to bills of high-consumption households. The above-average households decreased their consumption dramatically, and the below-average households continued to conserve energy.[151] This experiment shows that the way information is framed can lead to significant changes in behavior without any real change to the information itself.[152]

In the investment context, prospectuses for securities can be reframed to enhance the presentation to make it more meaningful and helpful for investors.[153] For example, comparable benchmarks presented in a standardized format make it easier for investors to compare companies based on a single metric, such as credit ratings risk.

Because of these cognitive limitations, real people—real investors—are inherently not good at assessing risks.[154] The next section critiques the effectiveness of the current risk-disclosure framework in light of the cognitive limitations discussed here.

III. CRITIQUES & SHORTCOMINGS

The current disclosure framework is an unfinished and imperfect one. It needs constant review and change to account for the evolving marketplace.[155] The recent financial crisis exposed many of the unaddressed risks of certain financial instruments and the financial system.[156]

149. *Id.* at 430–31.

150. *Id.* at 432–33.

151. *Id.*

152. *Id.*

153. *See infra* Part III for a critique of the current risk-disclosure framework.

154. *See* Hoffman, *supra* note 87, at 549 ("Individuals are exceptionally poor at evaluating risk and uncertainty."); Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, *in* CHOICES, VALUES, AND FRAMES 17, 20 (Daniel Kahneman & Amos Tversky eds., 2000); Cass R. Sunstein, *The Laws of Fear*, 115 HARV. L. REV. 1119, 1128–29 (2002) (reviewing PAUL SLOVIC, THE PERCEPTION OF RISK (2000)) ("[M]any people appear to believe that risk is an 'all or nothing' matter; something is either safe or dangerous, and there is no middle ground."); Viscusi, *supra* note 86, at 630–36.

155. *See* Rock, *supra* note 39, at 686. *See generally* Lowenstein, *supra* note 13.

156. President Barack Obama, Remarks by the President on 21st Century Financial Regulatory Reform (June 17, 2009) ("In recent years, financial innovators, seeking an edge in the marketplace, produced a huge variety of new and complex financial instruments. And these products, such as asset-based securities, were designed to spread risk, but unfortunately ended up concentrating risk."); Ben S. Bernanke, Chairman, Fed. Reserve, Lessons of the Financial Crisis for Banking Su-

Over the last few decades, public firms, financial instruments, and the financial system have grown more complex, and the investor base has grown larger and less sophisticated, yet the system has not reacted to these changes in a timely manner.[157] This problem is exacerbated by the fact that these disclosure rules were founded upon economic theories that new research suggests are not descriptively accurate of actual market behavior.[158]

Building upon the discussion about investors' cognitive limitations, this Part discusses four key shortcomings and critiques of the current framework. The framework is (1) nebulous in presentation, (2) silent on likelihood and impact, (3) opaque on risk dynamics, and (4) vague in substance.

A. Nebulous in Presentation

The current Risk Factors framework lacks clarity in its presentation format. While Regulation S-K requires that Risk Factors be "concise and organized logically,"[159] Risk Factors often lack organizational uniformity and are uninformative on key aspects of disclosed risks. The current presentation lacks a uniform standard and frequently amounts to a "data

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pervision (May 7, 2009) ("The crisis exposed the inadequacy of the risk-management systems of many financial institutions."); Timothy F. Geithner, U.S. Sec'y of the Treasury, The Current Financial Challenges: Policy and Regulatory Implications (Mar. 6, 2008) ("The crisis exposed a range of weaknesses in risk management practices within financial institutions in the United States and throughout the world.").

157. *See* SHILLER, *supra* note 130, at 25–28 (discussing the impact of the post-World War II baby boom on the stock market); Geithner, *supra* note 156 ("The typical arsenal of risk management tools relies, by necessity, on history and experience, and as a result has only limited value in assessing the scale of potential future losses. These limitations were particularly damaging in a period in which significant innovation in financial instruments and market structure was coupled with relatively stable macroeconomic and financial conditions. Uncertainty about the future, and the greater complexity of leveraged structured products, created a dense fog around estimates of potential loss, making institutions and markets more vulnerable to an adverse surprise when conditions changed, and making it harder to manage the many principal agent problems inherent in the financial business."); Lin, *supra* note 55, at 389–92 (describing the system's lack of reaction to the complexities of the evolving financial system).

158. S*ee* Ken Gregory & Steve Savage, *Why We Prefer Funds*, KIPLINGER'S PERS. FIN. MAG., Aug. 2002, at 59 ("Behavioral Finance demonstrates that all investors are hard-wired in certain ways that greatly increase the probability they will make poor investment decisions."); O'Hare, *supra* note 86, at 526 ("Behavioral finance scholars have shown that retail investors who do trade behave irrationally."). *See generally* ADVANCES IN BEHAVIORAL FINANCE VOLUME II (Richard H. Thaler ed. 2005); INTRODUCTION TO BEHAVIORAL FINANCE (2000); ANDREI SHLEIFER, INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE (Richard H. Thaler ed. 1993); SHILLER, *supra* note 130; Burton G. Malkiel, *The Efficient Market Hypothesis and Its Critics*, 17 J. ECON. PERSPECTIVES 59 (2003).

159. 503(c), *supra* note 4.

dump."[160] While some firms attempt to organize their Risk Factors by categories, those categories are ad hoc because the rules do not encourage or require specific categories. Alternatively, some firms simply enumerate their risks without any rhyme or reason.[161]

Presentational frames matter a great deal in affecting how we assess risks and make decisions.[162] Numerous studies have shown the impact of framing effects on how we invest, consume, and vote.[163] In the securities context, many commentators, including SEC Commissioner Troy Paredes, have suggested that greater emphasis needs to be placed on the presentation and end-user utility of securities disclosure.[164] For example, uniformity in disclosure formats makes it easier for investors to compare companies based on one or more benchmarks.[165]

B. Silent on Likelihood and Impact

The current Risk Factors framework is silent on two key issues regarding articulated risks: relative likelihood and relative impact. Relative likelihood compares the probability of an articulated risk to other risks. Relative impact compares the severity of the impact when an arti-

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160. Michael R. Siebecker, *Trust & Transparency: Promoting Efficient Corporate Disclosure Through Fiduciary-Based Disclosure*, 87 WASH. U. L. REV. 115, 132 (2009) ("It is no secret to corporations that producing enormous amounts of information in response to consumer and investor demands can undermine adequate understanding. As one multi-national corporation recently reported, 'you can't call it transparency if you simply spew information out into the marketplace, or unleash what is effectively a data dump on your customers.'"); s*ee* Rachel Emma Silverman, *GE to Change Its Practices of Disclosure*, WALL ST. J., Feb. 20, 2002, at A3 (giving an example of how a company can have ineffective disclosure). S*ee generally* Paredes, *supra* note 2.

161. *See* Susanna K. Ripken, *The Dangers and Drawbacks of the Disclosure Antidote: Toward a More Substantive Approach to Securities Regulation*, 58 BAYLOR L. REV. 139, 146–47 (2006) ("[D]isclosure that is too long or complex to be comprehensible to the average person floods the individual with too much nonessential data and overloads the person with information that inhibits optimal decision-making.").

162. *See, e.g.*, Jolls et al., *supra* note 5, at 1533–34 (discussing the substantive implications of presentation); Viscusi, *supra* note 86, at 630–36.

163. *See* Christopher P. Puto, *The Framing of Buying Decisions*, 14 J. CONSUMER RES. 301 (1987) (documenting that buyers show strong framing effects because they base their price targets in large part on gain or loss framing; their willingness to take on risk varies greatly, depending on the experimental frame); *see also* Joseph N. Cappella & Kathleen Hall Jamieson, *News Frames, Political Cynicism, and Media Cynicism*, 546 ANNALS AM. ACAD. POL. & SOC. SCI. 71, 75–82 (1996) (citing studies relating to framing effects).

164. Paredes, *supra* note 2, at 418 ("Relatively little attention is paid to how the information is used—namely, how investors and securities market professionals search and process information and make decisions based on the information the federal securities laws make available. In short, if the users do not process information effectively, it is not clear what good mandating disclosure does.").

165. *See, e.g.*, THOMAS TULLIS & WILLIAM ALBERT, MEASURING THE USER EXPERIENCE 8–10 (2008) (describing the value of comparative metrics for users). S*ee generally* YOUNGME MOON, DIFFERENT: ESCAPING THE COMPETITIVE HERD (2010) (explaining the importance of comparative metrics as a means for product differentiation).

culated risk materializes compared to other risks. This silence makes investing difficult for individuals to properly assess a firm's risk profile, which often exaggerates cognitive implications that, in turn, lead investors to underestimate (or overestimate) a firm's risk exposure. Current risk-disclosure practices result in an enumeration of foreseeable risks without conveying the relative likelihood and impact of those risks. The omission of likelihood and impact can artificially inflate (or deflate) a firm's market capitalization, as investors cannot properly value the firm.[166]

This inability to properly evaluate a firm and its risks has played itself out in recent years. For example, Bear Stearns included the following Risk Factor in its 2007 annual report: "Liquidity risk could impair our ability to fund operations and jeopardize our financial condition."[167] How likely was this impairment? How serious was this impairment? Was this the type of impairment that could cause the firm to shut its doors? (This impairment did occur in 2008 and, in fact, caused the federal government to force Bear Stearns to sell itself to J.P. Morgan.)[168]

Similarly, Lehman Brothers stated in its 2007 Risk Factors section:

> To the extent that a liquidity event lasts for more than one year, or our expectations concerning the market conditions that exist during a liquidity event, or our access to funds, prove to be inaccurate . . . our ability to repay maturing indebtedness and fund operations could be significantly impaired.[169]

Again, investors could have greatly benefited from a good-faith assessment by Lehman Brothers of the likelihood and severity of this type of event. In September 2008, this risk occurred in dramatic fashion: Lehman was forced to file for bankruptcy, and the financial system was pushed to the brink of collapse.[170]

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166. *See* S.P. Kothari et al., *Do Managers Withhold Bad News?* (Mass. Inst. of Tech., Sloan Sch. Mgmt., Working Paper No. 4556–05, 2005), *available at* http://ssrn.com/abstract=803865 (suggesting that "management, on average, delays the release of bad news to investors," but immediately releases good news).

167. Bear Stearns Inc., Annual Report (Form 10-K), at 17 (Jan. 29, 2008) [hereinafter 2007 Bear Stearns Annual Report].

168. *See* WILLIAM D. COHAN, HOUSE OF CARDS: A TALE OF HUBRIS AND WRETCHED EXCESS ON WALL STREET 89–110 (2009) (chronicling the frantic purchase of Bear Stearns by J.P. Morgan with the support of the federal government).

169. Lehman Bros. Inc., Annual Report (Form 10-K), at 16 (Jan. 29, 2008) [hereinafter 2007 Lehman Bros. Annual Report].

170. Ben White & Jenny Anderson, *A Frantic Weekend That Wall Street Won't Forget*, N.Y. TIMES, Sept. 15, 2008, at C1 (describing the weekend Lehman Brothers filed for bankruptcy and the resulting panic on Wall Street).

Merck, the giant pharmaceutical manufacturer, disclosed in the Risk Factors section of its 2009 annual report:

> **Pharmaceutical products can develop unexpected safety or efficacy concerns.**
>
> Unexpected safety or efficacy concerns can arise with respect to marketed products, whether or not scientifically justified, leading to product recalls, withdrawals, or declining sales, as well as product liability, consumer fraud and/or other claims.[171]

Given Merck's troubles with the drug Vioxx, a painkiller that allegedly posed an increased danger for heart attacks and strokes,[172] investors could have benefited from a more detailed assessment of this type of risk. For example, Merck could disclose whether one or more of its blockbuster drugs were specifically raising safety or efficacy concerns.

Investors' understandings of a firm's risk exposure would be substantially enhanced if a firm were to assess and articulate its risk profile in terms of relative likelihood.

Additionally, current risk-disclosure practices result in an enumeration of foreseeable risks without articulating the relative severity of the impact if an articulated risk materializes. Firms often couch the potential impact of a risk materializing with terms such as "material," "significant," or "meaningful," without fully explaining the consequences with greater specificity. For example:

171. Merck & Co., Inc., Annual Report (Form 10-K), at 30 (Mar. 1, 2010) [hereinafter 2009 Merck Annual Report].

172. *See* Alex Berenson, *Plaintiffs Find Payday Elusive in Vioxx Cases*, N.Y. TIMES, Aug. 21, 2007, at A1; Natasha Singer, *Trial Puts Spotlight on Merck*, N.Y. TIMES, May 14, 2009, at B1; Alex Berenson et al., *Despite Warnings, Drug Giant Took Long Path to Vioxx Recall*, N.Y. TIMES, Nov. 14, 2004, http://www.nytimes.com/2004/11/14/business/14merck.html.

> We [Tesla Motors] began production of our Tesla Roadster only in 2008, and our second planned vehicle, our Model S, is not expected to be in production until 2012, requires *significant* investment prior to commercial introduction, and may never be successfully developed or commercially successful. There can be no assurance . . . that our future models, including the Model S, will become commercially viable.[173]

> Our [Bear Stearns's] businesses could be adversely affected by market fluctuations. Our businesses are *materially* affected by conditions in the financial markets and economic conditions generally, both in the U.S. and elsewhere.[174]

Not all material risks have the same impact. Although it is difficult to project the consequences of future events, firms are in the best position to analyze and articulate these risks with greater specificity.

Absent enhanced Risk Factors, resource-constrained investors, with their cognitive limitations, try (without great success) to assess for themselves the likelihood and severity of various risks of public firms.[175] Given their resources and access to information, firms are often in a much better position than the investing public to make a good faith assessment of the relative likelihood and severity of their risks. Where a firm is unable to make a good faith assessment, it could simply inform investors that it is unable to do so, and such uncertainty can be priced into a firm's valuation.

C. Opaque on Risk Dynamics

The current Risk Factor framework is also opaque regarding changes to a firm's risk exposure. Firms generally update their Risk Factors on an annual basis, often replicating disclosures from the previous year without making any meaningful changes. Yet, when changes occur, those changes are not readily apparent to investors. Such changes are

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173. Tesla Motor, Inc., Initial Public Offering (Form S-1), at 19 (June 29, 2010) [hereinafter 2009 Tesla Initial Public Offering] (emphasis added).

174. 2007 Bear Stearns Annual Report, *supra* note 167, at 2 (emphasis added).

175. *See* BARUCH FISCHHOFF ET AL., ACCEPTABLE RISK (1981) (finding that people overestimate low-probability risks while they underestimate high-probability risks); Chris Guthrie, *A New Social Scientific Assessment of Law and Human Behavior: Prospect Theory, Risk Preference, and the Law*, 97 NW. U. L. REV. 1115, 1119 (2003) ("People 'overweigh outcomes that are considered certain, relative to outcomes which are merely probable.'") (quoting Kahneman & Tversky, *supra* note 100, at 265).

often a reflection of new information or new assessments of prior information. In either instance, changes are the result of meaningful recalibrations of a firm's risk exposure. The failure to highlight these changes makes it harder for investors to examine the change in a firm's risk exposure. Investors would only be aware of the new or changed disclosures if they manually compared one periodic filing to a prior version. This process is incredibly cumbersome and performed by few investors.

Moreover, the confirmation bias, the status quo bias, and the anchoring heuristic can make it difficult for investors to reassess a firm's risk profile after previously having a favorable initial impression of a firm.[176] Therefore, changes in a firm's risk profile need to be highlighted so that they are more salient to the investor.[177]

D. Vague in Substance

The SEC requires Risk Factors to be drafted in "plain English,"[178] but much of the disclosure in the public filings cannot be properly described using the adjectives plain and English.[179] Disclosures are overly general, vague in content, and lacking in meaningful detail for the read-

176. *See* Ripken, *supra* note 7, at 968 ("[T]he confirmation bias and the anchoring heuristic may lead investors who have already formed a favorable impression of a company to interpret managers' cautionary language in a manner that conforms to investors' own previously held optimistic views.").

177. *See id.* ("Risk Factor warnings that are not particularly salient or given primary consideration may not enter into investors' initial risk perceptions at all.").

178. 503(c), *supra* note 4.

179. *See* McFarland, *supra* note 26, at 321–22 ("Plain English is particularly important as investors rely less on intermediaries to make their investment decisions. . . . Applying the Plain English rules to . . . disclosure would help alleviate the potential for investors to misunderstand the disclosure, or simply tune it out because of information overload."); Ripken, *supra* note 161, at 186 ("[D]isclosure documents today are written by corporate lawyers in formalized language to protect the corporation from liability rather than to provide the investor with meaningful information. The document is, consequently, often presented in technical language and unreadable 'legalese.'") (quoting Alan B. Levenson, *The Role of the SEC as a Consumer Protection Agency*, 27 BUS. LAW. 61, 68 (1971) (citing H.R. REP. NO. 73–85, at 2 (1933), *reprinted in* 2 LEGISLATIVE HISTORY OF THE SECURITIES ACT OF 1933 AND SECURITIES EXCHANGE ACT OF 1934 (J.S. Ellenberger & Ellen P. Mahar eds., 1973))); John Schwartz, *Transparency, Lost in the Fog*, N.Y. TIMES, Apr. 8, 2007, at C1 (discussing the lack of understandable disclosure regarding executive compensation).

er.[180] These shortcomings result in disclosures that often fail to properly convey, with ample specificity, the gravity of a firm's risks.[181]

Vague risk disclosures can amplify and play into certain investors' cognitive limitations. The lack of specificity makes it more likely that existing investors of a firm interpret the disclosure to confirm their initial positive perceptions about a firm.[182]

The current risk-disclosure framework has serious shortcomings, many of which are exacerbated by the cognitive limitations of real investors. The next Part addresses those shortcomings by proposing a behavioral framework for securities risk disclosure.

IV. A BEHAVIORAL FRAMEWORK: KEY ELEMENTS

A. A New Default

Under the proposed framework, the SEC would amend existing rules to set a new default framework for Risk Factors. This new framework will work within the current disclosure apparatus to minimize

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180. *See, e.g.*, Donald C. Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Mislead Stock Market Investors (and Cause Other Social Harms)*, 146 U. PA. L. REV. 101, 106–09 (1997) (describing some of the problems with the current disclosure system); Alan R. Palmiter, *Toward Disclosure Choice in Securities Offerings*, 1999 COLUM. BUS. L. REV. 1, 26 (1999) ("[S]tudies indicate that even under mandatory constraints managers systematically avoid releasing unfavorable forecasts . . . ."). *See generally* Merritt B. Fox et al., *Law, Share Price Accuracy, and Economic Performance: The New Evidence*, 102 MICH. L. REV. 331 (2003).

181. Consider the vagueness of the following examples from Bear Stearns and Lehman Brothers, two firms that played roles in the recent financial crisis, and Eli Lilly and Company, a major pharmaceutical company:

- "Our risk management policies and procedures may leave us exposed to unidentified or unanticipated risk." 2007 Bear Stearns Annual Report, *supra* note 167, at 16.
- "As a global investment bank, risk is an inherent part of our business. Our businesses are materially affected by conditions in the financial markets and economic conditions generally around the world." 2007 Lehman Bros. Annual Report, *supra* note 169, at 13.
- "We face many product liability claims today, and future claims will be largely self-insured. We are subject to a substantial number of product liability claims involving primarily Zyprexa, diethylstilbestrol ('DES'), thimerosal, and Byetta, and because of the nature of pharmaceutical products, it is possible that we could become subject to large numbers of product liability claims for other products in the future." Eli Lilly & Co., Annual Report (Form 10-K), at 13 (Feb. 22, 2010).

182. *See* Langevoort, *supra* note 42, at 639–40 (finding that investors who have previously made good investing decisions overvalue their successes based on a perceived level of skill that they possess); Philip E. Tetlock, *Theory-Driven Reasoning About Plausible Pasts and Probable Futures in World Politics: Are We Prisoners of Our Preconceptions?*, 43 AM. J. POL. SCI. 335 (1999) (showing that individuals whose predictions wind up materializing tend to take credit for being right, and as a result, exude confidence in their abilities); Whyte et al., *supra* note 93 (showing that investors with a higher view of self-efficacy built upon past success irrationally escalate commitment).

adoption costs for public firms. An important feature of the proposed framework is that firms will be able to opt out if they believe that the existing Risk Factor requirements are more appropriate for them. Firms that opt out, however, would have to disclose why they are unable or unwilling to comply with the new, enhanced rules.[183] This feature is a departure from the one-size-fits-all mandates of most securities regulation.[184] Companies in various industries and of various sophistication have different levels of certainty and knowledge concerning their risk exposure. An emerging biotechnology firm with one potential marketable product may not have the same grasp of its risks as a bookseller like Barnes & Noble. A path-breaking startup electric-car manufacturer may not have the same handle on its risks as the well-established Ford Motor Company.[185]

Further, numerous behavioral studies suggest that defaults with opt-out provisions tend to result in more compliance than defaults with opt-in provisions.[186] These studies suggest that compliance by many firms may, in the long run, lead to a "race to the top," leaving firms that opt out in the minority.[187] This could cause harm to the reputations of firms who refuse to, or are unable to comply with, the new more investor-friendly risk-disclosure rules.[188] Alternatively, the opt-out provision can serve as

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183. *See* Troy A. Paredes, *On the Decision to Regulate Hedge Funds: The SEC's Regulatory Philosophy, Style, and Mission*, 2006 U. ILL. L. REV. 975, 1026 (2006) ("The virtue of default rules is that they allow parties to contract around the law to order their affairs to fit their particular needs and preferences. The ability to opt out also provides an important safety valve against the risk of overregulation.").

184. *See id.* ("When the SEC chooses to regulate, instead of imposing mandatory one-size-fits-all requirements as it almost always does, the Commission should increasingly consider default rules.").

185. *See, e.g.*, 2009 Tesla Initial Public Offering, *supra* note 173, at 13 (discussing the plethora of risks faced by a modern electric car company).

186. *See, e.g.*, SUNSTEIN & THALER, *supra* note 87, at 35 ("In many contexts defaults have some extra nudging power because consumers may feel, rightly or wrongly, that default options come with an implicit endorsement from the default setter [the SEC]."); *see also* Steven Bellman et al., *To Opt-In or Opt-Out? It Depends on the Question*, 44 COMM. OF THE ACM 25 (2001) (finding that in regards to wireless-access point configuration, default settings dominated user behavior); Eric J. Johnson & Daniel Goldstein, *Do Defaults Save Lives?*, 302 SCI. 1338 (2003) (showing how default rules lead to wide compliance in the area of organ donation).

187. *See* Edward K. Cheng, *Structural Laws and the Puzzle of Regulating Behavior*, 100 NW. U. L. REV. 655, 665 (2006) ("Higher compliance rates lead to a virtuous cycle. Over time, the structurally preferred default behaviors give rise to accompanying social norms, further enforcing the desired conduct."); *see also* Choi & Pritchard, *supra* note 70, at 44–46 (showing there will be a presumption of doing something that leads to compliance because the alternative is to drive investors away in the context of regulation).

188. *See* Cheng, *supra* note 187, at 665; *see also* Choi & Pritchard, *supra* note 70, at 44–46.

a pricing signal and risk indicator to investors about management's grasp of a firm's risks.[189]

B. New Risk Framing

1. A New Anchor

Under the behavioral framework, Regulation S-K will be amended to make Risk Factors the "anchor." Risk Factors will be the first substantive item after the cover page or table of contents of any prospectus, quarterly report on Form 10-Q, or annual report on Form 10-K. Taking into account the heuristic of "anchoring," the Risk Factors[190] will serve as an anchor in the minds of investors as they read a firm's later rosier disclosures.[191]

This new placement will also help confront the overoptimism bias.[192] Moreover, the new framework would require firms to restate in full their latest Risk Factors immediately after the cover page or table of contents when they incorporate their Risk Factors in a prospectus by reference to their annual and quarterly reports. Restating this information allows it to be readily viewed.[193] Absent this restatement, investors need to search for the Risk Factors in other filings, which discourages investors from becoming fully educated and leaves them with a more positive perception of a firm.

2. New Risk Taxonomy

Whereas the current rules require only that Risk Factors "be concise and organized logically," the new framework would specify how to accomplish this goal. It would require Risk Factors to be organized in terms of relative likelihood and relative impact.[194] The framework would

189. *See, e.g.*, Choi & Pritchard, *supra* note 70, at 3 ("[I]f companies do not give credible assurances that they will disclose truthfully the information that investors rely upon to value securities, those companies will pay substantial risk premia (thereby compensating investors for the risk of fraud) or be unable to sell their securities altogether.").

190. *See* discussion *supra* Part II.B.1.

191. S*ee also* Ripken, *supra* note 7, at 986 ("Cautionary language that is sufficient in form and content to catch the market's attention, maintain that attention, and turn it toward a serious consideration of the risks provides a much-needed check on the market's collective inclination to accept overly rosy forward-looking information."). *See generally* Henson, *supra* note 7; Frensch, *supra* note 7.

192. *See* discussion *supra* Part II.A.1.

193. *See* Hoffman, *supra* note 87, at 557 (according to behavioral law and economics research, "new information is processed against the background of what came before").

194. 503(c), *supra* note 4.

be based on three tiers for each metric.[195] It would offer the investing public a more comprehensible form of disclosure by disclosing risks in a more salient, menu-like framework with accessible comparative metrics.[196]

Relative likelihood would be categorized based on levels corresponding to each risk's probable occurrence: *Level A: Very Likely*, *Level B: Likely*, and *Level C: Unlikely*. This type of classification is similar to that used by meteorologists to measure typhoon conditions of readiness, where "Condition 1" indicates that destructive winds are probable within twelve hours, and each additional level indicates a longer period of time until impact.[197]

Relative impact would be categorized based on the relative seriousness of the consequences should an articulated risk materialize. A Category 1 risk, for example, would be a risk that would have a *significant effect* on the firm if it were to materialize; a Category 2 risk would have a *material effect* on the firm; and a Category 3 risk would have a *catastrophic effect* on the firm. This type of classification is akin to the classification used by meteorologists to warn people about a hurricane's intensity, where a Category 1 hurricane is expected to have damaging winds and a Category 5 hurricane is expected to cause catastrophic damage.[198]

For example, under the current framework, a risk factor would be entitled "Credit Risk." Under the behavioral framework, the same factor would be entitled "A1—Credit Risk." This designation means that the credit risk is *very likely* to occur and will have a *significant effect* on the firm.

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195. *See* Basic Inc. v. Levinson, 485 U.S. 224, 238 (1988) (quoting S.E.C. v. Tex. Gulf Sulphur Co., 401 F.2d 833, 849 (2d Cir. 1968) ("[M]ateriality 'will depend at any given time upon a balancing of both the indicated probability that the event will occur and the anticipated magnitude of the event in light of the totality of the company activity.'")); United States v. Carroll Towing Co., 159 F.2d 169, 173–74 (2d Cir. 1947).

196. Many state securities regulators already require Risk Factors for small companies that use the Small Co. Offering Registration Form (Form U-7) to "[l]ist in the order of importance the factors that the Company considers to be the most significant risks to an investor." *See* SMALL CO. OFFERINGS REGISTRATION FORM (FORM U-7), NASAA Rep. (CCH) P 5057, at 5197 (Dec. 1999); Hanson & Kysar, *supra* note 9, at 635 ("[W]e believe that market outcomes frequently will be heavily influenced, if not determined, by the ability of one actor to control the format of information, the presentation of choices, and, in general, the setting within which market transactions occur."). *See generally* Tversky & Fox, *supra* note 9; Tykocinski et al., *supra* note 9.

197. *See* Dave Puckett, Responder's Forum: *Typhoon Conditions Warrant Preparation* (Apr. 13, 2005), http://www.navy.mil/search/displaybbs.asp?bbs_id=1326 (defining the Tropical Cyclone Conditions of Readiness).

198. NAT'L OCEANIC & ATMOSPHERIC ADMIN., NAT'L WEATHER SERV., NAT'L HURRICANE CTR., THE SAFFIR–SIMPSON HURRICANE SCALE, http://www.nhc.noaa.gov/aboutsshs.shtml (last modified Feb. 17, 2010).

Below is an illustration that compares Risk Factors under the existing and behavioral frameworks:

Existing Framework	**Behavioral Framework**
Credit Risk	*A1—Credit Risk*
_____	_____
_____	_____
Key Persons Risk	*B1—Counterparty Risk*
_____	_____
_____	_____
Counterparty Risk	*C3—Key Persons Risk*
_____	_____
_____	_____

The new framework makes Risk Factors more meaningful to the investing public in three ways. First, investors can readily see which risks are most likely to occur and are most serious. Many studies have suggested that people have difficulty assessing probability and impact.[199] Therefore, disclosures that state the firm's assessments increase the meaningfulness of the disclosures.

Second, the behavioral framework allows investors to better calibrate their investment calculus. For example, an investor is interested in buying stock in Firm A because of its high credit ratings and senior management. That investor would be able to assess the likelihood and seriousness of risks regarding those key issues of concern, thereby allowing the investor to make a more informed investment decision.

Third, the behavioral framework allows investors to better compare the risk profiles of similar firms. For example, if an investor is debating between investing in Bank A or Bank B, that investor can readily compare the risk profiles of both banks before making an investment decision. The tiered, menu-like format creates inherent, accessible comparative metrics for investors. Additionally, recent developments at the SEC regarding disclosures are similarly driven towards giving ordinary investors enhanced information.[200]

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199. *See, e.g.*, Guthrie, *supra* note 175; FISCHHOFF ET AL., *supra* note 175 (finding that people overestimate low probability risks while underestimate high probability risks). *See generally* Kahneman & Tversky, *supra* note 100.

200. *See* U.S. SEC. & EXCH. COMM'N., 21ST CENTURY DISCLOSURE INITIATIVE, TOWARD GREATER TRANSPARENCY: MODERNIZING THE SECURITIES AND EXCHANGE COMMISSION'S DISCLOSURE SYSTEM 3 (2009), http://www.sec.gov/spotlight/disclosureinitiative/report.pdf [herei-

Although this new risk taxonomy may appear similar to the much-maligned credit ratings of the recent financial crisis, significant differences exist.[201] Unlike ratings agencies that generate ratings using modeling that is based on limited information samples provided by firms,[202] the proposed rankings will be conducted by the firms themselves, using all of the information available to them. Therefore firms would not be able to "shop" for better risk rankings like they do with credit ratings.[203] A serious onus would also be on the firm to generate accurate risk rankings so as to avoid liability-generating defective disclosures and financially consequential reputational harms.[204]

Admittedly, forecasting uncertain future events is difficult, but firms are in a better position than most investors to assess the probabilities and seriousness of the firms' articulated risks. Many public firms already make such risk assessments internally.[205] If a firm is unable to

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nafter DISCLOSURE INITIATIVE] ("Modernizing the disclosure system [is geared towards improving] transparency by making disclosure information more accessible and easier to use.").

201. *See* MICHAEL LEWIS, THE BIG SHORT 98 (2010) ("Like pretty much everything else that was happening between subprime mortgage borrowers and lenders, it followed from the defects of the models used to evaluate subprime mortgage bonds by the two major rating agencies, Moody's and Standard & Poor's."); ROGER LOWENSTEIN, THE END OF WALL STREET 39–46 (2010) (critiquing the role of the credit rating agencies in the recent financial crisis); Gretchen Morgenson & Louise Story, *Rating Agency Data Aided Wall Street in Deals*, N.Y. TIMES, Apr. 23, 2010, at A1, *available at* http://www.nytimes.com/2010/04/24/business/24rating.html?_r=1&emc=eta1 ("But by routinely sharing their models, the agencies in effect gave bankers the tools to tinker with their complicated mortgage deals until the models produced the desired ratings."); Frank Partnoy, *Overdependence on Credit Ratings was a Primary Cause of the Crisis* (Fondazione Eni Enrico Mattei, Working Paper No. 288, 2009), *available at* http://www.bepress.com/cgi/viewcontent.cgi?article=1299&context=feem.

202. *See, e.g.*, LEWIS, *supra* note 201; Morgenson & Story, *supra* note 201 (critiquing the sampling-based model of rating agencies).

203. *See* LOWENSTEIN, *supra* note 201, at 40–41 (commenting on the pay-to-rate business model of ratings agencies); Louise Story, *Prosecutors Ask if 8 Banks Duped Rating Agencies*, N.Y. TIMES, May 13, 2010, at A1, *available at* http://www.nytimes.com/2010/05/13/business/13street.html ("The New York attorney general has started an investigation of eight banks to determine whether they provided misleading information to rating agencies in order to inflate the grades of certain mortgage securities.").

204. Admittedly, the lack of rating-agency-like conflicts in the proposed risk rankings does not mean a complete absence of conflicts. Firms may be conflicted by different motivations in ranking and disclosing risks, but generally such conflicts already exist in terms of securities disclosures.

205. Many firms forecast with great accuracy on quarterly and annual earnings and other financial metrics for the marketplace. So, if their crystal balls can work for potential good news, then those same crystal balls should work for potential bad news. *See* John S. Poole, *Management Forecasts: Do They Have a Future in Corporate Takeovers?*, 42 SW. L.J. 765, 803 (1988) (arguing that management forecasts are more accurate, empirically, than analyst forecasts); *see also* Curt Cutting, *Turning Point for Rule 10b-5: Will Congressional Reforms Protect Small Corporations?*, 56 OHIO ST. L.J. 555, 571 (1995) (noting that the "reticence to issue forward-looking statements undermines the adequacy and accuracy of corporate disclosure."); Ripken, *supra* note 7, at 986 ("[C]orporate managers . . . should view meaningful risk disclosure as an opportunity to encourage . . . deliberation

make such projections, it should say so. Then, investors can properly "price" that information into a firm's valuation.[206]

C. Highlighting Risk Dynamics

1. Highlighting Changes & Omissions

The current Risk Factors framework fails to highlight the changes in a firm's risk exposures. In reading a firm's Risk Factors from quarter to quarter, from year to year, an investor cannot readily discern changes in a firm's Risk Factors. For example, the online computer merchant, Dell Inc., included new language, underlined below, in its 2007 Annual Report. Dell Inc. added the new language to an existing Risk Factor to reflect important changes in the company's risk profile related to laptop battery shortages:

> Because we maintain minimal levels of component and product inventories a disruption in component or product availability <u>such as the current industry shortage of laptop batteries</u> could harm our financial performance and our ability to satisfy customer needs.[207]

Under the current regulations, investors reading the annual report would likely miss the new language about the material concerns relating to laptop-battery shortages.

Under the proposed framework, Item 503(c) of Regulation S-K, would be amended to require firms to highlight changes in Risk Factors by <u>underlining</u> the caption of disclosures with new language or omissions to call attention to those changed or new risk assessments.

This simple change lowers the information costs and leads to a better framing effect by calling attention to new and changed risks. A limited number of sophisticated investors at hedge funds and investment banks already have tools to highlight these changes, so the behavioral

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from investors who must confront the fact that there may be very good reasons not to purchase the shares of a company, notwithstanding its favorable predictions for the future.").

206. For example, Merck's Risk Factors state an inability to forecast certain legal liabilities. *See* 2009 Merck Annual Report, *supra* note 171, at 27 ("[Merck] is not currently able to estimate any additional amounts that it may be required to pay in connection with the *Vioxx* Lawsuits or *Vioxx* Investigations. These proceedings are still expected to continue for years and the Company cannot predict the course the proceedings will take. In view of the inherent difficulty of predicting the outcome of litigation, particularly where there are many claimants and the claimants seek unspecified damages, the Company is unable to predict the outcome of these matters, and at this time cannot reasonably estimate the possible loss or range of loss with respect to the *Vioxx* Lawsuits.").

207. 2007 Dell Inc., Annual Report (Form 10-K), at 12–13 (Mar. 31, 2008) (emphasis added).

framework essentially democratizes this critical information for all investors.[208]

2. Executive Risk Attestations

Similar to highlighting changes in Risk Factors, the behavioral framework would amend the chief executive officer's certification. Pursuant to Rules 13a-14(a) and 15d-14(a) of the Exchange Act, the chief executive officer's certification is attached as an exhibit to a firm's quarterly and annual reports.[209] The behavioral framework would require the following language to be inserted into the certificate for attestation: "Based on my knowledge, the Risk Factors, and other risk-related information included in this report, fairly present in all material respects the risk profile of the registrant as of this report."

This language is substantially similar to, and based on, existing language in the certification concerning the disclosures and the financial information contained in a quarterly or annual report for a public firm, so it should not be unduly cumbersome. In effect, this additional provision in the certificate, which senior executives personally attest to, will serve as a critical reminder for a firm's highest officers to monitor the staleness (or freshness) of their Risk Factors for investors.[210]

The behavioral framework for securities risk disclosure is a practicable way of enhancing information for investors and improving risk management for firms. The next Part explores some key implications of the behavioral framework.

V. KEY IMPLICATIONS

The behavioral framework has a number of profound implications, five of which are discussed here. The behavioral framework would (1) lead to a better capture of securities disclosure; (2) create a more balanced appeal to the underlying rationales for Risk Factors; (3) simplify

208. *See* Zweig, *supra* note 112 (reporting on tools used by hedge funds to combat confirmation bias).

209. 17 C.F.R. § 229.601(b)(31) (2009) (Regulation S-K).

210. *See* Robert A. Prentice & David B. Spence, *Sarbanes-Oxley as Quack Corporate Governance: How Wise is the Received Wisdom?*, 95 GEO. L.J. 1843, 1901 (2007) ("Clearly, today a strong empirical case indicates that section 302 certifications not only warn CEOs and CFOs to take their responsibilities seriously, but also provide valuable information to the capital markets."); *see also* Paul A. Griffin & David H. Lont, *Taking the Oath: Investor Response to SEC Certification Under Sarbanes-Oxley,* 1 J. CONTEMP. ACCT. & ECON. 27 (2005) ("[I]nvestors d[o], in fact, respond to the events associated with SEC certification.").

transparency and increase financial literacy; (4) lower information costs for investors by requiring companies to enhance their publicly available risk disclosures; and (5) improve financial arbitrage.

A. A Better Capture of Securities Disclosure

In recent years, many financial regulations concerning securities risk have often taken on the form of statutory prohibitions and penalties and overlooked disclosure as a powerful, complementary regulatory tool.[211] Worried about ordinary investors partaking in risky private unregistered offerings? Pass a rule banning ordinary investors from investing in such offerings.[212] Concerned about stock-option granting practices? Levy large penalties on the offending parties.[213] While prohibitions and penalties are more satisfying politically and can have some deterrent effect, they are—standing alone—flawed and ineffective approaches to risk regulation.[214]

After the economic crisis, many politicians, regulators, investor advocates, and some regulated entities called for corrective mechanisms to fix risk-management vulnerabilities that the recent crisis exposed.[215] Many post-crisis proposals and actions are solely in the form of enhanced penalties for financial misconduct and additional enforcement tools to deter potential bad acts.[216] These "sell-side" regulations include

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211. *See, e.g.*, Sarbanes–Oxley Act of 2002, Pub. L. No. 107-204 § 906, 2002 U.S.C.C.A.N. (116 Stat.) 743 (codified at 18 U.S.C. §§ 1350(a)–(b)); Thomas Lee Hazen, *Disparate Regulatory Schemes for Parallel Activities: Securities Regulation, Derivatives Regulation, Gambling, and Insurance*, 24 ANN. REV. BANKING & FIN. L. 375, 384 (2005) ("In the first instance, the Sarbanes–Oxley Act provides heightened criminal penalties for securities law violations.").

212. 17 C.F.R. § 230.144A (2009).

213. *See generally* NIXON PEABODY, THE STOCK OPTIONS PROBE: CONSIDERATIONS FOR BOARD OF DIRECTORS AND AUDIT COMMITTEE, May 25, 2006, *available at* http://www.nixonpeabody.com/publications_detail3.asp?ID=1381; *Perfect Payday: Options Scorecard,* WALL ST. J. ONLINE, http://online.wsj.com/public/resources/documents/info-optionsscore06-full.html (last modified Sept. 4, 2007); Press Release, U.S. Sec. & Exch. Comm'n, SEC Settles Options Backdating Case Against Ryan Ashley Brant, Former Chief Executive Officer and Chairman of the Board of Take-Two Interactive Software, Inc. (Feb. 14, 2007), *available at* http://www.sec.gov/litigation/litreleases/2007/lr20003.htm; Press Release, U.S. Sec. & Exch. Comm'n, SEC Files Actions Against Former CFO and Former Controller of Engineered Support Systems, Inc. Relating to Options Backdating Scheme (Feb. 6, 2007), *available at* http://www.sec.gov/litigation/litreleases/2007/lr19990.htm.

214. *See, e.g.*, Jolls et al., *supra* note 5, at 1510–17 (critiquing the ineffectiveness of bans on market transactions).

215. *See, e.g.*, Cooper, *supra* note 1; Wyatt & Herszenhorn, *supra* note 1.

216. *See* John C. Coates IV, *The Goals and Promise of the Sarbanes–Oxley Act*, 21 J. ECON. PERS. 91, 110 (2007) ("The Sarbanes–Oxley legislation increased maximum criminal sentences for fraud, consistent with Congress's penchant over the last 50 years to criminalize more conduct and increase criminal penalties."); Ripken, *supra* note 161, at 142–43 (discussing new bans and penalties in the Sarbanes–Oxley Act of 2002); *see also* 148 CONG. REC. S6516, 6524–25 (daily ed. July 10,

litigation and investigations from state attorneys general,[217] legislation aimed at clawing back and curbing compensation in the industry,[218] and proposals for new regulatory agencies and additional powers for existing regulators.[219]

While these regulations can have a meaningful impact on the financial industry, they are, at best, a half measure because they fail to adequately address the risk vulnerabilities of the purchasing actor or the system at large.[220] Every transaction has two sides. For every defaulted subprime mortgage, there is, perhaps, an unscrupulously aggressive mortgage lender, but also an uninformed, overly optimistic homeowner.[221] For every failed publicly traded bank, not only are there highly

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2002) (statement of Sen. Wellstone) ("This bill . . . holds bad actors accountable for their fraud and deception."); Press Release, White House Office of the Press Sec'y, President Bush Signs Corporate Corruption Bill (July 30, 2002), *available at* http://georgewbush-whitehouse.archives.gov/news/releases/2002/07/20020730.html.

217. *See* FIN. CRISIS INQUIRY COMM'N, ENFORCEMENT MEASURES RELATED TO THE FINANCIAL CRISIS (2010), *available at* http://fcic.gov/reports/pdfs/2010–0114–EnforcementMeasures.pdf (highlighting the various enforcement actions taken by state attorneys general); Jonathan R. Macey, *Wall Street in Turmoil: Who is Protecting the Investor?: State–Federal Relations Post-Eliot Spitzer*, 70 BROOK. L. REV. 117, 118 (2004) ("[Eliot] Spitzer, the most successful of what might best be described as an emerging generation of 'Enronian Policy Entrepreneurs,' saw the collapse of Enron as opening what political scientists describe as a 'policy window'—a window in time during which the political environment is unusually welcoming of new regulations and policy proposals."); Paredes, *supra* note 2, at 429 ("[S]tate attorneys general, most notably New York Attorney General Eliot Spitzer, have been active to an unprecedented degree in bringing or threatening charges for fraud or corporate corruption against corporate executives, financial firms on Wall Street, and securities market professionals.").

218. *See* U.S. DEP'T OF TREASURY, FINANCIAL REGULATORY REFORM: A NEW FOUNDATION 12 (2009), http://www.financialstability.gov/docs/regs/FinalReport_web.pdf [hereinafter FINANCIAL REGULATORY REFORM] ("Federal regulators should issue standards and guidelines to better align executive compensation practices of financial firms with long-term shareholder value and to prevent compensation practices from providing incentives that could threaten the safety and soundness of supervised institutions."); Andrea Fuller, *House Approves Limits on Executive Pay*, N.Y. TIMES, July 31, 2009, http://www.nytimes.com/2009/08/01/business/01pay.html (describing legislation aimed at reducing executive pay); Stephen Labaton, *U.S. to Order Pay Cuts at Firms That Got Most Aid*, N.Y. TIMES, Oct. 21, 2009, http://www.nytimes.com/2009/10/22/business/22pay.html (describing efforts to reduce compensation at companies that received government assistance).

219. *See generally* FINANCIAL REGULATORY REFORM, *supra* note 218.

220. *See* Richard A. Posner, Op-Ed., *Treating Financial Consumers as Consenting Adults*, WALL ST. J., July 22, 2009, http://online.wsj.com/article/SB10001424052970203946904574302213213148166.html (opining that consumers must bear some responsibility for their financial choices).

221. *See* John Carney, *20 Year Old Buys Home With $183,000 FHA Loan And Just 3.5% Down*, BUS. INSIDER, Oct. 18, 2009 (giving an example of an overly optimistic homeowner); Bianna Golodryga, *Do Homeowners Share Blame for Mortgage Mess?*, ABC NEWS, Oct. 7, 2008, http://abcnews.go.com/GMA/SmartHome/story?id=5973820 ("More Americans than ever have become first-time homeowners in the last decade. It's become increasingly clear, however, that many of them couldn't keep up with home payments."); Posner, *supra* note 220 ("It cannot just be assumed that most people who during the housing boom bought homes with adjustable-rate mortgages, or mortgages with prepayment penalties, or mortgages that required a low or even no down

aggressive executives, but also millions of investors who were ignorant of the risks inherent in their investments. Therefore, in addition to enhanced sell-side regulation, improved buy-side regulation is also needed to better protect investors.

A more effective regulatory approach is one that could supplement the enforcement paradigm with an enhanced disclosure framework based on what I term an "informational theory of regulation."[222] The theory, in this context, focuses on enhancing information for investors and other buy-side actors in order to allow them to maintain their sovereignty and make better decisions.[223] A behavioral-framework approach to risk disclosure is one such approach that can lead to a better capture of the utility of disclosure.

1. Increased Effectiveness

A behavioral framework for risk disclosure, while not fail-safe, has inherent advantages over a purely enforcement-based approach.[224] First, a structural, disclosure-based approach lowers monitoring costs in a world where securities regulators, such as the SEC, have serious resource constraints.[225] A purely enforcement-based approach would require constant monitoring, policing, and punishment, which is impractical and ineffective in the face of limited resources. Moreover, underenforcement

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payment, were fools or victims of fraud."); Ruth Simon & James R. Hagerty, *One in Four Borrowers is Underwater*, WALL ST. J., Nov. 24, 2009, http://online.wsj.com/article/SB125903489722661849.html ("The proportion of U.S. homeowners who owe more on their mortgages than the properties are worth has swelled to about 23%, threatening prospects for a sustained housing recovery.").

222. An "informational theory of regulation and law," as I have termed it, departs from historical conceptions of the law, which were often rooted in power relations, social justice, control, and command. While those conceptions have been constructive, our understanding of the law can be expanded through an information-based conception—a view of the law as a source of information aggregation and information enhancement towards better policies and choices. The shift to this new theory would work in conjunction with, while not actually replacing, existing legal theories. As initially conceptualized, an information theory of law would favor transparency over secrecy, collaboration over control, and incentives over mandates.

223. *See, e.g.*, Richard H. Thaler & Cass R. Sunstein, Op-Ed., *Disclosure Is the Best Kind Of Credit Regulation*, WALL ST. J., Aug. 13, 2008, at A17 (advocating for transparency and electronic disclosure as the superior mode of credit regulation).

224. *See generally* Louis Lowenstein, *Corporate Governance and the Voice of the Paparazzi* (Columbia Law Sch., Working Paper No. 132, 1999), *available at* http://www.law.columbia.edu/null/Working+Paper+No?exclusive=filemgr.download&file_id=64160&showthumb=0.

225. *See* Troy A. Paredes, Comm'r, Sec. & Exch. Comm'n, Remarks at The SEC Speaks in 2009 (Feb. 6, 2009), *available at* http://www.sec.gov/news/speech/2009/spch020609tap.htm ("[A]s an agency, the SEC has limited resources. Even if the agency's budget increases, we still will be faced with the challenge of allocating a finite number of people and funds. It is critical to recognize that there is an opportunity cost when we dedicate resources to administer particular regulations, undertake certain examinations and inspections, and pursue specific enforcement actions.").

would likely lead to ad hoc, dilutive compliance.[226] The inability of the SEC to regularly review and monitor existing Risk Factors has resulted in disclosures of varying forms and utility for investors under the current framework.[227] In contrast, a structural approach would push firms to make more meaningful disclosures by configuring the rules to require more substantive disclosures, and making vague disclosures undesirable and troublesome.[228]

As an example of the advantages of a structural approach over an enforcement-based approach, consider the collection of federal income tax. Federal law requires that income taxes for wages be withheld from the earner at the source of payment, rather than having a self-reporting, self-paying system that would require constant monitoring and collection by a resource-constrained Internal Revenue Service.[229] Non-compliance with the current structural-based system is less likely because it requires affirmative fraudulent actions by the wage payer and payee. The structural-regulatory approach of withholding is widely considered to be a great success in law.[230]

Second, a structural, disclosure-based approach would lead to increased effectiveness because once a regulatory apparatus geared towards the desired outcome is constructed, that apparatus would be self-executing. The proposed framework will set a new default for public firms, which will likely lead to wide compliance.[231] Wide compliance, in turn, will lead to a "virtuous cycle" of more compliance by other public firms and private firms going public.[232] Wide compliance will also result in the positive externality of more uniformity in risk disclosures, which

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226. *See* Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968) (highlighting how sporadic enforcement dilutes the deterrent effect of law).

227. *See* Cheng, *supra* note 187, at 660 ("Underenforced laws create what might be (adventurously) called 'vagueness in practice.'").

228. See *supra* Part IV for a more detailed discussion regarding the specific mechanisms under the proposed behavioral framework.

229. *See* 26 U.S.C. § 3402 (2006).

230. *See* Cheng, *supra* note 187, at 677 ("The use of structure to encourage tax compliance has been an unqualified success."); Leandra Lederman, *Statutory Speed Bumps: The Roles Third Parties Play in Tax Compliance*, 60 STAN. L. REV. 695, 698 (2007).

231. *See* SUNSTEIN & THALER, *supra* note 87, at 35 ("The combination of loss aversion and mindless choosing implies that if an option is designated as the 'default,' it will attract a large market share. Default options act as powerful nudges."); *see also* Eric J. Johnson & Daniel Goldstein, *Do Defaults Save Lives?*, 302 SCI. 1338 (2003) (showing how default rules lead to wide compliance in the area of organ donation).

232. *See* Cheng, *supra* note 187, at 665 ("Higher compliance rates lead to a virtuous cycle. Over time, the structurally preferred default behaviors give rise to accompanying social norms, further enforcing the desired conduct.").

will lend itself to easier "comparison shopping," as uniformity will create inherent comparative metrics for investors.[233]

2. Increased Market Confidence

Enhanced Risk Factors can lead to increased market confidence.[234] The recent financial crisis has eroded the public's trust in the market and the market regulators.[235] Trust is a crucial component to success of individual firms and the economy at large.[236] Enhanced Risk Factors create a greater sense of fairness for investors, both procedurally and expressively, which will likely help restore and increase market confidence.

On a procedural level, the behavioral framework creates a greater sense of procedural justice, the idea that fairness in processes engenders greater faith in those processes.[237] The new framework will signal investors that market regulators heard investors' calls for better protections and are responding to their desires, which will generate more confidence in the system.[238] Additionally, the behavioral framework gives notice to investors of the risks of their investments. Notice is an important part of procedural justice.[239] Both the signaling and notice effects of better dis-

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233. *See, e.g.*, THOMAS TULLIS & WILLIAM ALBERT, MEASURING THE USER EXPERIENCE 8–10 (2008) (describing the value of comparative metrics for users). *See generally* YOUNGME MOON, DIFFERENT: ESCAPING THE COMPETITIVE HERD (2010) (explicating the importance of comparative metrics as a means for product differentiation).

234. *See* EASTERBROOK & FISHEL, *supra* note 37, at 692 ("The justification most commonly offered for mandatory disclosure rules is that they are necessary to 'preserve confidence' in the capital markets . . . . Disclosure rules both deter fraud and equalize 'access' to information, restoring the necessary confidence."); Ripken, *supra* note 161, at 155 ("Investor trust is therefore critical for the securities markets to work, and disclosure helps to facilitate that trust.").

235. *See* Robert J. Shiller, *Animal Spirits Depend on Trust*, WALL ST. J., Jan. 27, 2009, at A15, *available at* http://online.wsj.com/article/SB123302080925418107.html ("The trust in the innovative lending practices was excessive; now that trust is replaced by deep mistrust.").

236. *See* ARIELY, *supra* note 70, at 195–230 (discussing the importance of honesty and trust in economic transactions); ANNA BERNASEK, THE ECONOMICS OF INTEGRITY (2009) (discussing the critical role of integrity in the success and failure of company and states); Thorold Barker, *Wall Street's Trust Busters*, WALL ST. J., Jan. 23, 2009, at C10 ("But beyond the power struggles, huge losses and increased regulation, there is a more fundamental threat to the industry: the destruction of trust."); Philippe Aghion et al., *Regulation and Distrust* (Nat'l Bureau of Econ. Research, Working Paper No. 14,648, 2009), *available at* http://www.nber.org/papers/w14648; Laura Bottazzi et al., *The Importance of Trust for Investment: Evidence from Venture Capital* (Innocenzo Gasparini Inst. for Econ. Research, Working Paper No. 325, 2010), *available at* ftp://ftp.igier.uni–bocconi.it/wp/2007/325.pdf ("[W]e find a positive effect of trust on investments.").

237. *See generally* Tom R. Tyler & E. Allan Lind, *Procedural Justice*, *in* HANDBOOK OF JUSTICE RESEARCH IN LAW 65 (Joseph Sanders & V. Lee Hamilton eds., 2000).

238. *See* Tom R. Tyler & Hulda Thorisdottir, *A Psychological Perspective on Compensation for Harm: Examining the September 11th Victim Compensation Fund*, 53 DEPAUL L. REV. 355, 380–82 (2003) (finding that when people get to state their case to an authority, they are more likely to accept the decision that the authority makes than when their opinions are not taken into account).

239. *See* Lawrence B. Solum, *Procedural Justice*, 78 S. CAL. L. REV. 181, 305 (2004) (highlighting notice as a principle of procedural justice); *see also* Mathews v. Eldridge, 424 U.S. 319, 348

closures will likely result in a greater sense of procedural justice for investors leading to more trust in the marketplace.[240] Mechanisms that are procedurally more just engender greater confidence in those mechanisms.[241]

A greater sense of procedural justice may reduce the success rates of meritless private litigation against public firms. Evidence from the medical malpractice and tort contexts suggests that a greater sense of procedural justice can reduce litigation.[242]

On an expressive level, the rulemaking process of creating the behavioral framework can also increase confidence and change norms in the marketplace. The rulemaking process would aggregate information about improving Risk Factors and bring greater focus to the benefits of the behavioral framework, which would generally create additional confidence in risk disclosures.[243] Furthermore, the behavioral framework would better inform investors about the risks of public firms, thereby changing their attitudes about the utility of risk disclosure and the trust-

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(1976) (finding that due process requires that when a person is in serious jeopardy of serious loss, he should be given notice of the case against him and an opportunity to respond); Eash v. Riggins Trucking Co., 757 F.2d 557, 579 (3d Cir. 1985) (en banc) (Sloviter, J., dissenting) ("[T]he principles of procedural fairness embedded in the Constitution . . . require adversary proceedings including notice."); Am. Motor Inns, Inc. v. Holiday Inns, Inc., 521 F.2d 1230, 1244 (3d Cir. 1975) ("One of the basic tenets of American jurisprudence is that procedural fairness requires that each party have notice of the issues involved and an opportunity to be heard at a meaningful time and in a meaningful manner.").

240. *See* Tyler & Thorisdottir, *supra* note 238, at 380–83 (showing that people whose views are considered in the decision making process will emerge from the process with a belief that the process was fair). *See generally* JOHN THIBAUT & LAURENS WALKER, PROCEDURAL JUSTICE: A PSYCHOLOGICAL ANALYSIS (Lawrence Erlbaum Assocs. 1975); Tyler & Lind, *supra* note 237, at 65.

241. *See, e.g.*, E. ALLAN LIND & TOM R. TYLER, THE SOCIAL PSYCHOLOGY OF PROCEDURAL JUSTICE (Plenum Press 1988); THIBAUT & WALKER, *supra* note 240; Edith Barrett-Howard & Tom R. Tyler, *Procedural Justice as a Criterion in Allocation Decisions*, 50 J. PERSONALITY & SOC. PSYCHOL. 296, 300 (1986); Tom R. Tyler, *The Psychological Consequences of Judicial Procedures: Implications for Civil Commitment Hearings*, 46 SMU L. REV. 433 (1992).

242. *See, e.g.*, Rick Boothman, *Apologies and a Strong Defense at the University of Michigan Health System*, 32 PHYSICIAN EXEC. 7, 10 (2006) (showing how a doctor's honesty with a patient can reduce a patient's willingness to litigate); Steve S. Kraman & Ginny Hamm, *Risk Management: Extreme Honesty May Be the Best Policy*, 131 ANNALS OF INTERNAL MED. 963 (1999) (showing how a doctor's honesty with a patient can lead to a lower chance of litigation); E. Allan Lind et al., *In the Eye of the Beholder: Tort Litigants' Evaluations of Their Experiences in the Civil Justice System*, 24 LAW & SOC'Y REV. 953, 967–68 (1990) (showing the effect of procedural justice on the filing of lawsuits); Liz Kowalczyk, *Hospitals Study When to Apologize to Patients*, BOSTON GLOBE, June 24, 2005, at A1 ("[T]here . . . is growing belief among malpractice insurers that . . . disclosure and open expression of sympathy and remorse could head off malpractice lawsuits in a system reeling from skyrocketing premiums.").

243. *See generally* Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649 (2000).

worthiness of the disclosing firms.[244] This change would lead to a greater collective confidence in the marketplace.[245] This expectation is consistent with market studies suggesting that "companies voluntarily disclosing more in their annual reports than is required may command a higher stock price."[246]

B. A More Balanced Appeal to Underlying Rationales

In Part I, I articulated three underlying rationales for Risk Factors: information, compliance, and litigation avoidance.[247] Given the evolution of securities litigation and regulation, much of the current risk-disclosure practice appears to be driven by the litigation-avoidance and compliance rationales.[248] Due to the expensive nature and proliferation of securities litigation, firms and their attorneys often imagine plaintiffs' lawyers as their intended readers in drafting Risk Factors.[249] As a result, disclosures are obfuscated and muddled with overly large qualifiers and legalese despite requirements for "plain English."[250] This heavy emphasis on the litigation-avoidance and compliance rationales comes at the expense of the information rationale. This leads to a disclosure regime that is technically compliant with the rules but unfaithful to the SEC's historical, core principle of receiving high-quality information to protect investors.[251]

The proposed framework leads to a more balanced approach to the underlying, cross-cutting rationales and shifts emphasis back to the information rationale. Classifying risks based on relative likelihood and relative impact creates a more accessible presentation format that allows readers to better understand the information. The new framework could

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244. *See generally* Richard H. McAdams, *An Attitudinal Theory of Expressive Law*, 79 OR. L. REV. 339 (2000); McAdams, *supra* note 243 (suggesting that the expressive function of law can lead to more cooperation).

245. *See generally* McAdams, *supra* note 244; McAdams, *supra* note 243.

246. *Meet S&P's Corporate–Disclosure Rankings*, BUSINESSWEEK ONLINE, Oct. 15, 2002, http://www.businessweek.com/investor/content/oct2002/pi20021015_6208.htm.

247. *See supra* Part I.B.

248. *See* Siebecker, *supra* note 160, at 132 ("Why would corporations engage in a 'data dump' that impedes understanding? The securities regulation regime that governs mandatory reporting of public companies, as well as most state corporate laws, provide significant immunity from fraud liability for comprehensive disclosure, even if the amount of disclosure arguably renders adequate understanding all but impossible.").

249. *See* Ripken, *supra* note 161, at 186 ("[D]isclosure documents today are written by corporate lawyers in formalized language to protect the corporation from liability rather than to provide the investor with meaningful information.").

250. *See generally* Ripken, *supra* note 161, at 186 ("[D]isclosure documents [are] 'often presented in technical language and unreadable 'legalese.'"); Schwartz, *supra* note 179 (discussing the lack of understandable disclosure regarding executive compensation).

251. *See* Siebecker, *supra* note 160.

also lead to a shift in a firm's perspective when drafting disclosures. Firms under the new framework would have to consider their risks more carefully because they would have to rank their vulnerabilities. This ranking would shift the drafting posture from a litigation-avoidance posture to an informational posture, thereby creating disclosure that is more meaningful to the investor. Disclosure then becomes more than a regulatory chore to be completed; it becomes a meaningful risk-management tool for firms.[252] Additionally, this disclosure may also lead managers to rethink or avoid actions that will generate highly negative disclosures or riskier classifications.[253] If done appropriately, the behavioral framework can lead to better information for investors and better risk management for firms.[254]

C. Simplified Transparency & Financial Literacy

The behavioral framework can lead towards more simplified transparency that increases financial literacy and readership of securities filings. For much of the SEC's history, regulatory emphasis has been placed on more disclosure rather than better disclosure.[255] That focus, perhaps, has been unduly tied to quantity rather than quality.[256] In this instance, Hebert Simon may have said it best: "A wealth of information creates a poverty of attention."[257] As a result, a popular perception (or misperception) exists that all securities disclosure is incomprehensible and unhelpful.[258] Many investors cannot understand the disclosed infor-

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252. *See* Fox, *supra* note 11, at 123 ("When managers have the legal obligation to disclose certain information, they may have to gather and analyze information they would otherwise ignore.").

253. *See id.* at 125 ("Required disclosure, therefore, will make [management] try harder to avoid actions that will generate negative information.").

254. *See* Cary, *supra* note 13, at 410–11; Schmidt, *supra* note 13, at 91–92 ("[R]isk management framework can improve the transparency of disclosures to help investors and customers better understand the operations of the firm . . . . [E]ach entity should disclose the information its stakeholders need to best evaluate the entity's risk profile."). *See generally* STEINBERG, *supra* note 13; Lowenstein, *supra* note 13; Pinto, *supra* note 13.

255. *See* Ripken, *supra* note 161, at 161 ("Corporations have become accustomed to disclosing more and more information to investors without accounting for the drawbacks of information overload. As one large public corporation put it: 'If [our] annual report or quarterly report has to be the size of the New York City phone book, that's life.'"); Siebecker, *supra* note 160, at 131 ("Some corporations attempt to satisfy disclosure obligations through massive 'data dumping.'").

256. *See* JONATHON BARON, THINKING AND DECIDING 260, 272 (3d ed. 2000) (suggesting that more information does not necessarily lead to better judgment); Paredes, *supra* note 2, at 418 (suggesting that more mandated disclosure does not result in better use of the disclosure by investors).

257. Herbert A. Simon, *Designing Organizations for an Information-Rich World*, *in* COMPUTERS, COMMUNICATIONS, AND THE PUBLIC INTEREST 37, 40–41 (Martin Greenberger ed., 1971).

258. *See* McFarland, *supra* note 26, at 321–22 ("Plain English is particularly important as investors rely less on intermediaries to make their investment decisions . . . . Applying the Plain

mation and many more simply do not read it.[259] Thus, despite a rise in the population of investors and a rise in complex financial instruments, financial literacy is in decline.[260]

Changing how public firms disclose their risks can ultimately alter how firms draft their disclosure documents and how investors respond to them. Because the new framework accounts for cognitive limitations and framing effects, the substance and presentation of the information will be more accessible and user-friendly.[261] This accessibility, in turn, will change norms and expectations about the utility of securities disclosures. Behavioral studies indicate that expectations alone can change the utility of a product.[262] Therefore, once investors, like consumers, become reacquainted with the new and improved product, they will likely utilize disclosure more to educate themselves.[263] Moreover, a renewed awareness in its utility will lead to a rise in its consumption because mandated disclosure imposes few direct monetary costs on investors thus

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English rules to . . . disclosure would help alleviate the potential for investors to misunderstand the disclosure, or simply tune it out because of information overload."); Paredes, *supra* note 2, at 418 (stating that the goal of disclosure is aimed at providing investors with more information without considering how investors actually use that information); Ripken, *supra* note 161, at 185 ("Disclosure cannot fulfill its communicative purpose if investors find it impenetrable and therefore ignore it.").

259. *See* Fanto, *supra* note 26, at 170 ("[Investors] do not read lengthy disclosure documents, no matter how plainly written, and it makes no sense to encourage them to do so."); Langevoort, *supra* note 42, at 682 ("[A]necdotal evidence, supported by many people's assumptions about investment practices, indicates that most nonprofessional investors do not read the prospectuses and other legal disclosure documents they are given."); Baruch Lev & Meiring de Villiers, *Stock Price Crashes and 10b-5 Damages: A Legal, Economic, and Policy Analysis*, 47 STAN. L. REV. 7, 19 (1994) ("[M]ost investors do not read, let alone thoroughly analyze, financial statements, prospectuses, or other corporate disclosures . . . .").

260. *See* Steven J. Dubner, *Suze Orman Answers Your Money Questions*, N.Y. TIMES, FREAKONOMICS BLOG, Sept. 19, 2008, http://freakonomics.blogs.nytimes.com/2008/09/19/suze-orman-answers-your-money-questions/ ("[Financial literacy] is woefully low."); Matt Taibbi, *The Big Takeover*, ROLLING STONE, Mar. 19, 2009, http://www.rollingstone.com/politics/story/26793903/the_big_takeover ("Literacy is power. In the age of the CDS and CDO, most of us are financial illiterates.").

261. *See, e.g.*, Schmidt, *supra* note 13 ("[R]isk management framework can improve the transparency of disclosures to help investors and customers better understand the operations of the firm . . . . [E]ach entity should disclose the information its stakeholders need to best evaluate the entity's risk profile."). *See generally* Lowenstein, *supra* note 13.

262. *See, e.g.*, ARIELY, *supra* note 70, at 155–72 (discussing the cognitive effects of expectation).

263. *See* EASTERBROOK & FISHEL, *supra* note 37, at 693–94 ("Some say that uninformed investors are exploited investors; whoever knows less will get a raw deal. Others maintain that fear of such exploitation erodes confidence whether or not these investors lose out. Disclosure rules equalizing access and simplifying the presentation of information, so all can understand it, overcome the problem, whichever way it is put.").

increasing readership and elevating financial literacy.[264] Improved disclosures will create a positive feedback cycle where increased demand by investors for more meaningful, simplified disclosure will lead firms to become more transparent.[265]

D. Information-Technology Leverage

Increased transparency and financial literacy would attract more investors to use technology to inform and educate themselves.[266] This use would be consistent with the SEC's recent initiatives to modernize the disclosure system.[267] Beginning with the tenure of SEC Chairman Christopher Cox in 2005, there has been a significant movement for the agency to leverage new information technology to enhance disclosure for investors.[268]

In terms of the behavioral framework, the categorizations of risks lend themselves to easy comparison for investors. For example, if an investor wanted to compare the catastrophic risks that are most likely for two investment banks, the investor can pull the disclosure of those firms from the SEC's website and make an educated assessment. Under the current ad hoc disclosure system, that type of comparison is not readily practicable.

More importantly, once informational costs are reduced by enhanced disclosures, entrepreneurs will have more incentive to create pro-

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264. *See* ARIELY, *supra* note 70, at 49–65 (discussing the psychological impact of "free" as a price and how it leads to overconsumption). *See generally* CHRIS ANDERSON, FREE: THE FUTURE OF A RADICAL PRICE (2009).

265. Admittedly, there may initially be a wide gap between disclosure and comprehension, but that gap will narrow as firms respond to investor demands for more accessible Risk Factors and investors become more capable of understanding them. *See* Cheng, *supra* note 187, at 665 ("Higher compliance rates lead to a virtuous cycle. Over time, the structurally preferred default behaviors give rise to accompanying social norms, further enforcing the desired conduct.").

266. *See generally* Goshen & Parchomovsky, *supra* note 42.

267. John Coffee, the renowned securities law scholar, foresaw this development. *See* Coffee, *supra* note 37, at 752 ("In the computerized securities marketplace of the future, individual investor review of corporate disclosures will be the exception, rather [than] the rule, and clients will increasingly rely on professional advice, both to select individual securities and to diversify their portfolios efficiently. In this world, collectivization of financial data within the SEC is best justified as a strategy for making more efficient use of securities analysts and other market professionals, both by eliminating duplication and by making it feasible for them, at the margin, to cover smaller firms."); *see also* THOMAS L. FRIEDMAN, THE WORLD IS FLAT 3.0: A BRIEF HISTORY OF THE TWENTY–FIRST CENTURY 177–78 (2007) (discussing the equalizing role of internet search engines); Lowenstein, *supra* note 13; McFarland, *supra* note 26, at 321–22 ("Plain English is particularly important as investors rely less on intermediaries to make their investment decisions . . . . Applying the Plain English rules to . . . disclosure would help alleviate the potential for investors to misunderstand the disclosure, or simply tune it out because of information overload.").

268. For example, in 2007, the SEC proposed using the markup language XBRL (eXtensible Business Reporting Language) for financial disclosures to allow investors to readily compare and disaggregate financial information. *See* DISCLOSURE INITIATIVE, *supra* note 200.

grams that summarize and repackage the information for wider consumption.[269] Enhanced mandatory disclosure can act as an open-source platform for investors and entrepreneurs. It is not hard to imagine an iPhone application or web-based tool that gives updates to people about changed Risk Factors or new catastrophic Risk Factors once informational costs are reduced significantly.[270] Such informational advances will make financial information more palatable to more investors.[271] Therefore, enhancing the risk-disclosure framework can be a step towards democratizing and demystifying financial information for more investors.[272]

E. Enhancing Arbitrage

Critiques of behavioral approaches to securities regulation have suggested that such approaches are futile and unnecessary because arbitrage and efficient markets can adequately protect investors.[273] The contention is that regulators and firm managers[274] also suffer from cognitive

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269. *See* FRIEDMAN, *supra* note 267, at 93–94 (discussing the power of open-source software and online communities); Charles Homan, *The Geekdom of Crowds: The Obama Administration Experiments with Data-Driven Democracy*, WASH. MONTHLY, July/Aug. 2009, http://www.washingtonmonthly.com/features/2009/0907.homans.html ("It used to be that if you wanted financial intelligence, you had to pay for the services of a ratings agency like Moody's, where analysts made sense of the data tapes gathered in person from the Securities and Exchange Commission. Now you can get a comparable analysis at Freerisk.org, a site launched by a pair of amateur programmers.").

270. *See, e.g.*, Thaler & Sunstein, *supra* note 223 (expounding the potential of disclosure-based regulation given modern information technology); Jeff Howe, *The Rise of Crowdsourcing*, WIRED, June 2006, at 176 ("The open source software movement proved that a network of passionate, geeky volunteers could write code just as well as the highly paid developers at Microsoft or Sun Microsystems. Wikipedia showed that the model could be used to create a sprawling and surprisingly comprehensive online encyclopedia.").

271. *See* Fanto, *supra* note 26, at 170 (explaining that while investors do not read lengthy disclosure documents, they are more inclined to read and benefit from summaries of such documents).

272. *See* Homan, *supra* note 269 ("[G]reater computing power, better software tools, and the ever-extending reach of the Internet have all democratized the once-rarified field of data use. Making sense of huge piles of raw information used to require a degree in computer science, a university lab mainframe's worth of circuits, and an awful lot of time. Now all it takes is an Internet connection and the ability to type in 'Google.'").

273. *See, e.g.*, Mark Seidenfeld, *Cognitive Loafing, Social Conformity, and Judicial Review of Agency Rulemaking*, 87 CORNELL L. REV. 486 (2002); *see also* Choi & Pritchard, *supra* note 70, at 5 ("If cognitive defects are pervasive, will intervention help?"); Stephen J. Choi, *The Globalization of Corporate and Securities Law in the Twenty-First Century: Channeling Competition in the Global Securities Market*, 16 TRANSNAT'L LAW. 111, 117 (2002) ("Even well intentioned regulators may face decision-making problems.").

274. *See* Choi, *supra* note 273, at 117 ("Commentators have identified a great number of behavioral biases under which all people labor. Expertise may help alleviate some of these biases. Certainly, many SEC staffers can claim a large degree of expertise in the functioning of the financial markets (as well as the various guises of fraud). However, with expertise often comes several behavioral illusions."). *See generally* Choi & Pritchard, *supra* note 70, at 5 ("If cognitive defects are pervasive, will intervention help?"); Posner, *supra* note 220 ("Behavioral economists are right to

limitations like investors; therefore, we should defer to the efficient-market hypothesis[275] and let a few sophisticated market players correct and signal the rest of the market through arbitrage and pricing.[276] This line of argument, however, places too much faith in efficient markets and too little faith in individuals.

In theory, arbitrage is the "process of earning riskless profits by taking advantage of differential pricing for the same physical asset or security."[277] Theoretical or textbook arbitrage requires no real capital, assumes no real risk, and operates in a realm of infinitely patient actors.[278] In reality, arbitrage requires much capital and an assumption of significant risk.[279] Mispricing of an asset allows an investor to arbitrage that asset. In the short run, the investor may lose money until the differential prices converge and the investor will need additional capital and ample tolerance to maintain that position.[280] Depending on how long the markets stay "irrational" or "inefficient," this position could require substantial capital and risk assumption, and markets, as John Maynard Keynes famously noted, "can stay irrational longer than you can stay solvent."[281]

Additionally, arbitrage by a few select investors in a supposedly efficient market is not an optimal corrective tool because even the most sophisticated and well-resourced investors suffer from cognitive biases; and price is not always a good corrective signal in the short term.[282] Arbitrage by sophisticated investors can, in the near term, lead to a widening of mispricing and send erroneous signals to the market. These circumstances lead to cascades of misinformation that cause a magnifica-

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point to the limitations of human cognition. But if they have the same cognitive limitations as consumers, should they be designing systems of consumer protection?"); Seidenfeld, *supra* note 273 (discussing how regulators can also be influenced by cognitive limitations).

275. *See generally* Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970).

276. *See* Choi & Pritchard, *supra* note 70, at 3 ("Under the Efficient Capital Market Hypothesis, the 'smart' money will set prices and through the process of arbitrage will swamp the influence of the poorly informed or foolish. Even the unsophisticated therefore can rely on market efficiency to ensure that the price he pays for a security will be 'fair.'"). *See generally* Eugene F. Fama & Kenneth R. French, *Disagreement, Tastes, and Asset Pricing*, 83 J. FIN. ECON. 667 (2007); Edward Glaeser, *Paternalism and Psychology*, 73 U. CHI. L. REV. 133 (2006).

277. WILLIAM F. SHARPE ET AL., INVESTMENTS 284 (1999).

278. *See* Andrei Shleifer & Robert Vishny, *The Limits to Arbitrage*, 52 J. FIN. 35, 36 (1997) (exhibiting how real-world arbitrage involves risk and requires capital).

279. *Id.*

280. *See, e.g.*, Owen A. Lamont & Richard H. Thaler, *Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs*, 111 J. POL. ECON. 227 (2003) (studying mispricing in U.S. technology stocks).

281. POSNER, *supra* note 71, at 92.

282. *See, e.g.*, Fama & French, *supra* note 276; Lamont & Thaler, *supra* note 280; Shleifer & Vishny, *supra* note 278.

tion of individual and systemic risks.[283] Therefore, arbitrage alone cannot fully address securities risk.[284]

This behavioral approach to disclosure does not seek to undermine arbitrage but to refine and enhance it, to make it work more efficiently by better informing investors. While the regulator and regulated may both suffer from cognitive limitations, collective self-awareness of these shortcomings enables self-correction.[285] Because cognitive limitations are easier to see in others, collective recognition makes redress more probable.[286] This collective awareness is the nature of human collaboration and human progress, and it can also be the nature of regulatory progress.

CONCLUSION

In the wake of the most recent economic crisis, many questioned whether ominous forewarnings about the crash existed.[287] If so, why were they ignored?[288] Why were disclosures concerning serious risks

283. *See, e.g.*, Lamont & Thaler, *supra* note 280 (challenging the presumption that mispricing can be corrected by arbitrage alone). *See generally* Sushil Bikhchandani et al., *Learning from the Behavior of Others: Conformity, Fads, and Informational Cascades*, 12 J. ECON. PERSP. 151 (1998); Péter Kondor, *Risk in Dynamic Arbitrage: Price Effects of Convergence Trading*, 64 J. FIN. 631 (2009); Barney Frank Interview, *supra* note 82 ("[The rich and sophisticated] need protection . . . . They are not just playing with their own money, they are playing with other people's money and the societal impact of their error can be very great, so I think it reinforces the view that no, you can't just leave the rich to their vices.").

284. *See* Kondor, *supra* note 283; Shleifer & Vishny, *supra* note 278 (expounding the limits of arbitrage in practice).

285. *See* BELSKY & GILOVICH, *supra* note 77, at 199–211 (discussing various methodologies for individuals to overcome their cognitive biases); SUNSTEIN & THALER, *supra* note 87, at 83–102 (expounding choice architecture that accounts for cognitive biases).

286. *See* Jeffrey J. Rachlinski, *Heuristics and Biases in the Courts: Ignorance or Adaptation?*, 79 OR. L. REV. 61, 65–66 ("[C]ognitive biases are easier to spot in others than in oneself."); *see also* Justin Kruger & Thomas Gilovich, *"Naïve Cynicism" in Everyday Theories on Responsibility Assessment: On Biased Assumptions of Bias*, 76 J. PERSONALITY & SOC. PSYCHOL. 743, 744 (1999) (finding that it is easier to spot cognitive limitations in other people).

287. Many commentators have pointed to the public filings of major financial firms like Lehman Brothers and Bear Stearns as documents that contained forewarnings of a looming crash. *See, e.g.*, 2007 Lehman Bros. Annual Report, *supra* note 169, at 14 ("Recently, the residential real estate market in the U.S. has experienced a significant downturn due to declining real estate values, substantially reducing mortgage loan originations and securitizations, and precipitating more generalized credit market dislocations and a significant contraction in available liquidity globally, which negatively impacted our revenues."); *id.* at 16 ("To the extent that a liquidity event lasts for more than one year, or our expectations concerning the market conditions that exist during a liquidity event, or our access to funds, prove to be inaccurate . . . our ability to repay maturing indebtedness and fund operations could be significantly impaired."); *id.* at 17 ("Liquidity risk could impair our ability to fund operations and jeopardize our financial condition.").

288. There are numerous accounts about the recent financial crisis detailing how regulators and key industry players failed to see the forewarnings of an economic meltdown. *See, e.g.*, COHAN, *supra* note 168; PAUL KRUGMAN, THE RETURN OF DEPRESSION ECONOMICS AND THE CRISIS OF

disregarded? What can firms do better to avoid being cast as Cassandras?[289] How can Risk Factors be amended to better communicate serious risks facing public firms and the public at large?

In an attempt to answer those questions, this Article critiqued the current securities risk-disclosure framework and demonstrated that its ineffectiveness is rooted primarily in the faulty fundamental assumption of the rational person as the reasonable investor. Recognizing this shortcoming, this Article proposed a behavioral framework built on relative likelihood and relative impact of dynamic risks that accounts for the behavioral tendencies of real investors, not the unrealistic rational person of neoclassical economics.

Furthermore, the proposed behavioral framework has several important implications for securities regulation. First, this Article suggested that the framework can lead to a better capture of securities regulation. Second, this Article contended that the framework can better appeal to the underlying rationales of securities disclosure. Third, this Article demonstrated that the proposed framework can reverse the decline in financial literacy and readership in a marketplace that is growing more complex. Fourth, this Article discussed the opportunities under the proposed framework to leverage information technology to proliferate enhanced financial information to more investors. Lastly, this Article argued that the behavioral framework seeks not to undermine arbitrage but to enhance it.

Ultimately, no securities regulatory framework is perfect, but the current framework can be greatly advanced by a framework that accounts for the behavioral tendencies of real investors. A behavioral framework for securities risk would improve risk awareness, reduce information costs, increase financial literacy, and refine arbitrage. Before this new framework and similar regulatory approaches can materialize, people must recognize the limitations of the current system. Securities regulation is founded on an elegant, but faulty, assumption—that investors act

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2008 (2008); LOWENSTEIN, *supra* note 201; LAWRENCE G. MCDONALD & PATRICK ROBINSON, A COLOSSAL FAILURE OF COMMON SENSE: THE INSIDE STORY OF THE COLLAPSE OF LEHMAN BROTHERS (2009); HENRY M. PAULSON, ON THE BRINK: INSIDE THE RACE TO STOP THE COLLAPSE OF THE GLOBAL FINANCIAL SYSTEM (2010); ANDREW ROSS SORKIN, TOO BIG TO FAIL (2009); GILLIAN TETT, FOOL'S GOLD: HOW THE BOLD DREAM OF A SMALL TRIBE AT J.P. MORGAN WAS CORRUPTED BY WALL STREET GREED AND UNLEASHED A CATASTROPHE (2009).

289. *See* SORKIN, *supra* note 288, at 5 ("There were, of course, Cassandras in both business and academia who warned that all this financial engineering would end badly."); *see, e.g.*, EDITH HAMILTON, TIMELESS TALES OF GODS AND HEROES 211 (1999) ("Cassandra was the Greek mythological figure who had the gift of prophecy, but the curse that no one would believe her predictions.").

entirely rationally.[290] This faulty assumption has resulted in a good, but flawed, disclosure-based regulatory framework that needs continual perfecting. In order for disclosure to become a more powerful complementary regulatory tool, we must accept the need to address this faulty assumption as an incompletely theorized agreement, meaning that while there may be disagreements about how best to address it, there should be a consensus about the need to address it.[291] In a marketplace where investors, regulators, and managers all suffer from cognitive limitations, if we collectively recognize our shortcomings and construct mechanisms to mitigate their effects, regulatory progress becomes more achievable.

290. *See* ARIELY, *supra* note 70, at 239 ("We are really far less rational than standard economic theory assumes. Moreover, these irrational behaviors of ours are neither random nor senseless. They are systemic, and since we repeat them again and again, predictable."); Hanson & Kysar, *supra* note 9, at 669 (holding that decisions are made through both a rational system and an emotionally driven experiential system); Ripken, *supra* note 161, at 146 ("[S]ubstantial evidence indicates that . . . assumptions [about investor] rationality and efficiency in information processing are faulty."); Paul Krugman, *How Did Economists Get It So Wrong?*, N.Y. TIMES MAG., Sept. 6, 2009, http://www.nytimes.com/2009/09/06/magazine/06Economic-t.html?pagewanted=all ("[E]conomists need to abandon the neat but wrong solution that everyone is rational and markets work perfectly. The vision that emerges as the profession rethinks its foundations may not be all that clear; it certainly won't be neat; but we can hope that it will have the virtue of being at least partly right.").

291. *See* Cass R. Sunstein, *Incompletely Theorized Agreements*, 108 HARV. L. REV. 1733, 1739 (1995) ("[P]eople often reach incompletely theorized agreements on a general principle. Such agreements are incompletely theorized in the sense that people who accept the principle need not agree on what it entails in particular cases.").

THE NEW FINANCIAL INDUSTRY

Tom C.W. Lin[*]

Modern finance is undergoing a fundamental transformation. Artificial intelligence, mathematical models, and supercomputers have replaced human intelligence, human deliberation, and human execution. A financial industry once dominated by humans has evolved into one where humans and machines share power. Modern finance is becoming cyborg finance—an industry that is faster, larger, more complex, more global, more interconnected, and less human.

This Article offers an early systemic examination of this ongoing financial transformation, and presents an original set of regulatory principles for governing the emerging, new financial industry. This Article provides a normative and descriptive cartography of this changing financial landscape. It identifies particular perils, systemic risks, and regulatory shortcomings emanating from this financial transformation. It then proposes new guiding principles for the future of financial regulation in response to this sea-change. Drawing from a rich literature of past financial crises and transformations, this Article explores the next big movement in finance and financial regulation. And it offers fresh insights for better addressing the perils and promises emerging from the new financial industry.

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INTRODUCTION

Machines are taking over Wall Street.[1] Artificial intelligence, mathematical models, and supercomputers have replaced human intelligence, human deliberation, and human execution.[2] The modern financial industry is becoming faster, larger, more complex, more global,

1. *See, e.g.*, DAVID J. LEINWEBER, NERDS ON WALL STREET: MATH, MACHINES, AND WIRED MARKETS 31–64 (2009) (chronicling the rise of new, electronic financial markets); Jonathan R. Macey & Maureen O'Hara, *From Markets to Venues: Securities Regulation in an Evolving World*, 58 STAN. L. REV. 563, 563 (2005) ("Advances in technology, combined with the dramatic decrease in the cost of information processing, have conspired to change the way that securities transactions occur."); Saule T. Omarova, *Wall Street as Community of Fate: Toward Financial Industry Self-Regulation*, 159 U. PA. L. REV. 411, 430 (2011) (describing finance as "[a]n increasingly complex marketplace, [with] dependence on fast-changing technology"); Felix Salmon & Jon Stokes, *Bull vs. Bear vs. Bot*, WIRED, Jan. 2011, at 93 ("It's the machines' market now; we just trade in it.").

2. *See* Frank J. Fabozzi et al., *High-Frequency Trading: Methodologies and Market Impact*, 19 REV. FUTURES MKTS. 7, 9–10 (2011) (describing the essential role of computerization in financial trading); Jonathan Keats, *Thought Experiment: Neuroscientist Henry Markram Says He Can Build a Supercomputer Replica of the Human Brain. Now He Has $1.3 Billion to Prove It*, WIRED, June 2013, at 171 (reporting on plans to build a computerized replication of the human brain); Salmon & Stokes, *supra* note 1 ("Algorithms have become so ingrained in our financial system that the markets could not operate without them.").

more interconnected, and less human.[3] An industry once dominated by humans has evolved into one where humans and machines share dominion.

This Article is about that transformation and the regulatory principles that should govern it. This Article offers one of the first systemic examinations of this ongoing financial transformation and presents an original set of regulatory tenets for governing the emerging, new financial industry. [4] This Article normatively and descriptively traces the journey of this financial transformation, highlights promising and perilous paths, explains current regulatory shortcomings, and proposes new guiding principles for the road ahead.

While policymakers, commentators, and scholars continue to look back and study the last financial crisis,[5] this Article looks forward to what is emerging in finance and financial regulation. Drawing on a rich literature of past financial crises and transformations,[6] this Article examines the next big movement in finance and financial regulation.

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3. *See* SCOTT PATTERSON, DARK POOLS: HIGH-SPEED TRADERS, A.I. BANDITS, AND THE THREAT TO THE GLOBAL FINANCIAL SYSTEM 233–78 (2012); Andrew G. Haldane, Exec. Dir. Fin. Stability, Bank of Eng., The Race to Zero: Speech at the International Economic Association Sixteenth World Congress 3 (July 8, 2011) (transcript available at http://www.bankofengland.co.uk/publications/speeches/2011/speech509.pdf) (commenting on fundamental changes in the financial industry over the last century).

4. In a previous article, the author examined the rise of machines in finance and its impact on legal conceptions of the investor. The present Article builds upon the normative and descriptive examination of that publication and extends it to the financial industry and financial regulation at large. *See* Tom C.W. Lin, *The New Investor*, 60 UCLA L. REV. 678, 699–703 (2013).

5. *See, e.g.*, CONG. OVERSIGHT PANEL, SPECIAL REPORT ON REGULATORY REFORM: MODERNIZING THE AMERICAN FINANCIAL REGULATORY SYSTEM: RECOMMENDATIONS FOR IMPROVING OVERSIGHT, PROTECTING CONSUMERS, AND ENSURING STABILITY 3–4 (2009) (suggesting reforms to improve oversight, transparency, and fairness); DEP'T OF THE TREASURY, BLUEPRINT FOR A MODERNIZED FINANCIAL REGULATORY STRUCTURE (2008), *available at* http://www.treasury.gov/press-center/press-releases/Documents/Blueprint.pdf; FIN. CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES (2011), *available at* http://www.gpo.gov/fdsys/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf; S. PERMANENT SUBCOMM. ON INVESTIGATIONS, WALL STREET AND THE FINANCIAL CRISIS: ANATOMY OF A FINANCIAL COLLAPSE (2011), *available at* http://www.hsgac.senate.gov/public/_files/Financial_Crisis/FinancialCrisisReport.pdf; DAVID SKEEL, THE NEW FINANCIAL DEAL (2011); Jeffrey N. Gordon & Christopher Muller, *Confronting Financial Crisis: Dodd-Frank's Dangers and the Case for a Systemic Emergency Insurance Fund*, 28 YALE J. ON REG. 151 (2011); Henry T. C. Hu, *Too Complex to Depict? Innovation, "Pure Information," and the SEC Disclosure Paradigm*, 90 TEX. L. REV. 1601 (2012); Adam J. Levitin, *In Defense of Bailouts*, 99 GEO. L.J. 435 (2011); Andrew W. Lo, *Regulatory Reform in the Wake of the Financial Crisis of 2007–2008*, 1 J. FIN. ECON. POL'Y 4 (2009); Steven L. Schwarcz, *Protecting Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINN. L. REV. 373 (2008); Frederick Tung, *Pay for Banker Performance: Structuring Executive Compensation for Risk Regulation*, 105 NW. U. L. REV. 1205 (2011); Charles K. Whitehead, *Reframing Financial Regulation*, 90 B.U. L. REV. 1 (2010).

6. *See, e.g.*, RAGHURAM G. RAJAN, FAULT LINES: HOW HIDDEN FRACTURES STILL THREATEN THE WORLD ECONOMY (2010); CARMEN M. REINHART & KENNETH S. ROGOFF, THIS TIME IS DIFFERENT: EIGHT CENTURIES OF FINANCIAL FOLLY xxxix (2009); Lucian A. Bebchuk & Holger Spamann, *Regulating Bankers' Pay*, 98 GEO. L.J. 247 (2010); Chris Brummer, *Stock Exchanges and the*

The objective of this Article is not to perfectly forecast the future of finance, nor is it to present an elegant, quixotic regulatory framework with specific rules to prevent all financial flaws and failures.[7] Rather, the objectives of this Article are more sensible and practical: First, this Article seeks to offer a new and better understanding of the rise of computerization and artificial intelligence in the financial industry and its wide-ranging effects on financial regulation. Second, this Article aims to present a preliminary set of guiding principles for thinking anew about regulatory design in this changing financial landscape. Collectively, this Article attempts to map the path of modern finance and financial regulation, from the recent past to the ongoing present, so as to provide an early guide for the emerging future. Inevitably, such an effort to chart the continuing, complex metamorphosis of modern finance and its regulation will be preliminary, unfinished, and dated. Yet, it is a shift that must be sketched and studied, for the effects of the ongoing financial transformation have become too consequential to ignore or wait.[8]

This Article endeavors this dynamic cartography of modern finance and financial regulation in five parts. Part I charts the road traveled and the road ahead. It offers a retrospective on how technological advances and financial innovations have transformed the financial industry into a new industry that is faster, larger, more complex, more global, more interconnected, and less human. It then previews key attributes of the emerging, new financial industry relating to technological progress,

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New Markets for Securities Laws, 75 U. CHI. L. REV. 1435 (2008); Charles W. Calomiris, *The Subprime Turmoil: What's Old, What's New, and What's Next*, 15 J. STRUCTURED FIN. 6 (2009); Stephen J. Choi & Andrew T. Guzman, *Portable Reciprocity: Rethinking the International Reach of Securities Regulation*, 71 S. CAL. L. REV. 903 (1998); John C. Coffee, Jr. & Hillary A. Sale, *Redesigning the SEC: Does the Treasury Have a Better Idea?*, 95 VA. L. REV. 707 (2009); Joseph A. Grundfest, *Punctuated Equilibria in the Evolution of United States Securities Regulation*, 8 STAN. J.L. BUS. & FIN. 1 (2002); Henry T.C. Hu, *Swaps, the Modern Process of Financial Innovation and the Vulnerability of a Regulatory Paradigm*, 138 U. PA. L. REV. 333 (1989); Howell E. Jackson, *Regulation in a Multisectored Financial Services Industry: An Exploration Essay*, 77 WASH. U. L.Q. 319 (1999); Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657, 701 (2012); Donald C. Langevoort, *Chasing the Greased Pig Down Wall Street: A Gatekeeper's Guide to the Psychology, Culture, and Ethics of Financial Risk Taking*, 96 CORNELL L. REV. 1209 (2011); Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 200 (2008); Jill E. Fisch, *Top Cop or Regulatory Flop? The SEC at 75*, 95 VA. L. REV. 785 (2009); James D. Cox, *Coping In A Global Marketplace: Survival Strategies For A 75-Year-Old SEC*, 95 VA. L. REV. 941 (2009).

7. Financial failures and crises will inevitably occur again. No financial regulatory framework will ever be fail-safe. *See* REINHART & ROGOFF, *supra* note 6, at xxvi ("Of course, financial crises are nothing new. They have been around since the development of money and financial markets.").

8. Charles Reich in his seminal work, *The New Property*, makes a similar concession in his commentary about the then-transforming and transformative role of government on property, wealth, and individualism. *See* Charles A. Reich, *The New Property*, 73 YALE L.J. 733, 733 (1964) ("Inevitably, such an effort must be incomplete and tentative. But it is long past time that we began looking at the transformation taking place around us.").

traditional financial structures, the growth of "shadow banking,"[9] and the role of humans in the future of finance.

Part II highlights threats along the way. It reviews the Flash Crash of May 6, 2010, which, in minutes, destroyed nearly $1 trillion in market capitalization.[10] It forewarns of similar crashes in the future given the increasing reliance of finance on computerized systems. Part II then discusses new crimes and perils as the new financial industry migrates into cyberspace on a grand scale. It warns of threats posed by hackers, spies, criminals, competitors, and other nation-states.

Part III foreshadows new systemic dangers. It asserts that the enhanced speed and interconnectedness of the new financial industry presents two underappreciated systemic risks of speed and connectivity. The risk relating to speed is termed "too fast to save," and the risk relating to connectivity is termed "too linked to fail." Part III argues that these new systemic risks will be at least as challenging and pressing as the widely recognized systemic risk of "too big to fail."[11]

Part IV contends with structural pitfalls. It identifies fundamental shortcomings in the current regulatory framework that render law and regulation unsuitable for better monitoring finance under the prevailing governance model. Part IV explains why core matters relating to jurisdiction, origination, and resource prevent regulators from effectively governing the emerging, new financial industry.

Part V offers a new way forward. Mindful of the perils and pitfalls articulated in the previous Parts, it proposes an original set of regulatory, first principles to better harness the potential and promise of the changing financial landscape. These proposed tenets address issues fundamental to financial regulation including effectiveness, transparency, speed, coordination, bailouts, costs, and accountability. Part V concludes with a reminder that the proposed tenets should serve as principles of regulatory

9. *See* Lo, *supra* note 5, at 13–18 (discussing the emergence of shadow banking in the modern financial infrastructure); Steven L. Schwarcz, *Regulating Shadow Banking: Inaugural Address for the Inaugural Symposium of the Review of Banking & Financial Law*, 31 REV. BANKING & FIN. L. 619, 620–26 (2012) (defining shadow banking).

10. *See generally* U.S. COMMODITY FUTURES TRADING COMM'N & U.S. SECS. AND EXCH. COMM'N, FINDINGS REGARDING THE MARKET EVENTS OF MAY 6, 2010 1–6 (2010) [hereinafter CFTC & SEC FINDINGS], *available at* http://www.sec.gov/news/studies/2010/marketevents-report.pdf (summarizing the Flash Crash).

11. For an overview of the too-big-to-fail systemic risk, see S. PERMANENT SUBCOMM. ON INVESTIGATIONS, *supra* note 5, at 15–17 (reporting on the rise of too-big-to-fail financial institutions); ANDREW ROSS SORKIN, TOO BIG TO FAIL: THE INSIDE STORY OF HOW WALL STREET AND WASHINGTON FOUGHT TO SAVE THE FINANCIAL SYSTEM FROM CRISIS—AND THEMSELVES 538–39 (2009) (discussing the policy challenges presented by "too big to fail" institutions); and Tom C. Frost, *The Big Danger with Big Banks*, WALL ST. J., May 16, 2012, at A12.

design for policymakers as they re-imagine a better, workable framework for the emerging, new financial industry.

I. CYBORG FINANCE

The dramatic and continuing rise of computerization and artificial intelligence over the last three decades has had a profound impact on the financial industry. It has transformed an industry once dominated by humans into one where machines play a significantly larger and more inextricable role. Modern finance is becoming an industry where the main players are no longer entirely human. Rather, the main financial players today are cyborgs: part human and part machine. Modern finance is becoming "cyborg finance," or "cy-fi."[12]

A. A Brief Retrospective

Modern finance evolved into cyborg finance as a result of complimentary advances in technology and financial regulation. New technological advances and financial innovation encouraged regulatory reforms, which in turn spurred more innovation and advances within the financial industry.[13]

Beginning in the 1990s, technological advances made electronic trading a viable alternative to traditional intermediary-based platforms. Electronic communication networks led to direct market access, allowing firms to execute trades on exchanges without going through financial intermediaries.[14] Around the same time, the Securities and Exchange

12. *See* Lin, *supra* note 4, at 682 (introducing the term "cyborg finance"); Salmon & Stokes, *supra* note 1 (reporting on the rise of automated, computerized systems in finance); *see also* SHERRY TURKLE, ALONE TOGETHER: WHY WE EXPECT MORE FROM TECHNOLOGY AND LESS FROM EACH OTHER 152 (2012) ("We are all cyborgs now."); Donna J. Haraway, *A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century*, *in* READINGS IN THE PHILOSOPHY OF TECHNOLOGY 161, 161 (David M. Kaplan ed., 2004) ("A cyborg is a cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as a creature of fiction."); David J. Hess, *On Low-Tech Cyborgs*, *in* THE CYBORG HANDBOOK 371, 373 (Chris Hables Gray ed., 1995) ("[A]lmost everyone in urban societies could be seen as a low-tech cyborg, because they spend large parts of the day connected to machines . . . .").

13. For a general discussion about the evolution of modern finance, see Robert DeYoung, *Safety, Soundness, and the Evolution of the U.S. Banking Industry,* 92 FED. RES. BANK OF ATLANTA ECON. REV. 41 (2007); Loretta J. Mester, *Commentary: Some Thoughts on the Evolution of the Banking System and the Process of Financial Intermediation*, 92 FED. RES. BANK OF ATLANTA ECON. REV. 67, 67–72 (2007); and Arthur E. Wilmarth, Jr., *The Transformation of the U.S. Financial Services Industry, 1975–2000: Competition, Consolidation, and Increased Risks*, 2002 U. ILL. L. REV. 215 (2002).

14. SAL ARNUK & JOSEPH SALUZZI, BROKEN MARKETS: HOW HIGH FREQUENCY TRADING AND PREDATORY PRACTICES ON WALL STREET ARE DESTROYING INVESTOR CONFIDENCE AND YOUR PORTFOLIO 68–78 (2012).

Commission (SEC) introduced reforms like Regulation Alternative Trading System (Reg ATS) to promote alternative trading platforms and electronic communication networks.[15] During this period, regulators also introduced decimalization to securities pricing, which made electronic trading more profitable as smaller pricing spreads increased trading opportunities.[16] By the end of the 1990s, computers were key players in finance, serving as critical components in financial trading and investment management.[17]

Over the course of the decade that followed, information technology continued to innovate and evolve. Advances in computer science and digitized information spurred more computerization and artificial intelligence in financial trading and investment management. Decreases in the cost of technology also spawned the growth of discount brokerages and other intermediaries that gave more investors greater access to more classes of assets. In response to these advances, the SEC passed Regulation National Market System (Reg NMS) in 2005.[18] Reg NMS was designed to connect disparate electronic marketplaces into one linked national market platform to increase competition and access in finance.[19] Additionally, Reg NMS, coupled with globalization, helped to internationalize financial markets by connecting electronic marketplaces across the globe.

In the years since the implementation of Reg NMS, the use of computerization and artificial intelligence in finance has dramatically accelerated. It has transformed modern finance into cy-fi. A key feature of cyborg finance is the use of supercomputers to analyze risk, manage assets,

15. *See* Regulation ATS, 17 C.F.R. § 242.300(a) (2009); ARNUK & SALUZZI, *supra* note 14; BRIAN R. BROWN, CHASING THE SAME SIGNALS: HOW BLACK-BOX TRADING INFLUENCES STOCK MARKETS FROM WALL STREET TO SHANGHAI 2 (2010); LEINWEBER, *supra* note 1.

16. *See* STAFF OF THE SEC, REPORT TO CONGRESS ON DECIMALIZATION 4 (2012), *available at* http://www.sec.gov/news/studies/2012/decimalization-072012.pdf ("Prior to implementing decimal pricing in April 2001, the U.S. equity market used fractions as pricing increments, and had done so for hundreds of years."); CHRISTOPHER STEINER, AUTOMATE THIS 185 (2012) (discussing how decimalization bolsters electronic trading volumes and profits).

17. *See, e.g.*, RAY KURZWEIL, THE AGE OF SPIRITUAL MACHINES: WHEN COMPUTERS EXCEED HUMAN INTELLIGENCE 70 (2000) ("Not only were the stock, bond, currency, commodity, and other markets managed and maintained by computerized networks, but the majority of buy-and-sell decisions were initiated by software programs . . . ."); Markku Malkamäki & Jukka Topi, *Future Challenges for Securities and Derivative Markets*, *in* 3 RESEARCH IN BANKING AND FINANCE 359, 382 (Iftekhar Hasan & William C. Hunter eds., 2003) ("At the end of [the] 1990s, between 30% and 40% of all U.S. securities were channeled through the Internet and about 15% of all the U.S. equity trades were done on-line."); William M. Bulkeley, *Computers Take on New Role as Experts in Financial Affairs*, WALL ST. J., Feb. 7, 1986.

18. 17 C.F.R. § 242.601 (2005).

19. *See* Regulation NMS, 69 Fed. Reg. 11126-01, at 11161 (proposed Mar. 9, 2004) (codified at 17 C.F.R. §§ 200, 230, 240, 242, 249); *see also* PATTERSON, *supra* note 3, at 49; Laura Nyantung Beny, *U.S. Secondary Stock Markets: A Survey of Current Regulatory and Structural Issues and a Reform Proposal to Enhance Competition*, 2002 COLUM. BUS. L. REV. 399, 426 ("[T]he express purpose of the NMS [is] to promote efficiency and competition across secondary markets.").

and execute trades based on complex algorithmic programs operating at super-speeds.[20] Many of these programs, once successfully installed, can operate completely devoid of human intervention with great profitability.[21]

In terms of risk analysis and asset management, almost every significant financial participant today uses computers with artificial intelligence to assess risk and manage investments.[22] For instance, BlackRock, the world's largest asset management firm, uses its proprietary artificial intelligence program, dubbed Aladdin, to help clients manage risk and capital relating to stocks, bonds, derivatives, and other complex financial instruments.[23] During the financial crisis of 2008 ("the Financial Crisis"), Aladdin even aided the federal government with its critical decisions concerning Bear Stearns, AIG, Citigroup, Fannie Mae, and Freddie Mac.[24]

In terms of trading, the emergence of computerization and artificial intelligence has led to the rise of black-box or algorithmic trading, which refers to the use of incredibly powerful computers to analyze and execute trading opportunities based on complex mathematical models.[25] In the age of cy-fi, almost every financial institution with significant capital employs some form of algorithmic trading.[26] These programs frequently operate exclusively on artificial intelligence, devoid of human input after initial installation.[27] These programs can process massive amounts of information, spot trends, and allocate capital accordingly within seconds.[28] In fact, some programs are so advanced that within fractions of seconds of a securities

20. *See* PATTERSON, *supra* note 3, at 36–38 (describing the rise of powerful, high-speed computers in finance); *see also* FIN. CRISIS INQUIRY COMM'N, *supra* note 5, at 44.

21. *See* PATTERSON, *supra* note 3, at 128–30; David M. Serritella, *High Speed Trading Begets High Speed Regulation: SEC Response To Flash Crash, Rash*, 2010 U. ILL. J.L. TECH. & POL'Y 433, 436 (discussing the automated nature of financial algorithmic programs); Brody Mullins, et al., *Traders Pay for an Early Peek at Key Data*, WALL ST. J., June 13, 2013, at A1 (discussing the value of seconds to traders using computerized programs).

22. For a general discussion of computerized risk models, see Erik F. Gerding, *Code, Crash, and Open Source: The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis*, 84 WASH. L. REV. 127, 130–35 (2009).

23. *See* Sheelah Kolhatkar & Sree Vidya Bhaktavatsalam, *The Colossus of Wall Street*, BUS. WK., Dec. 13, 2010, at 62, 66.

24. *Id*.

25. *See* BROWN, *supra* note 15, at 8; ROBERT A. G. MONKS & ALEXANDRA REED LAJOUX, CORPORATE VALUATION FOR PORTFOLIO INVESTMENT: ANALYZING ASSETS, EARNINGS, CASH FLOW, STOCK PRICE, GOVERNANCE, AND SPECIAL SITUATIONS 229 (2011).

26. *See* BROWN, *supra* note 15, at 11.

27. *See* CFTC & SEC FINDINGS, *supra* note 10, at 13–16 (discussing automation in high-frequency trading); PATTERSON, *supra* note 3, at 128–30; Serritella, *supra* note 21, at 436 ("Automation is a crucial element in HFT [high-frequency trading].").

28. *See* Fabozzi et al., *supra* note 2, at 8; Charles Duhigg, *Stock Traders Find Speed Pays, in Milliseconds*, N.Y. TIMES, July 24, 2009, at A17 ("[Algorithmic computer programs] can spot trends before other investors can blink, changing orders and strategies within milliseconds.").

filing or news report, the programs can "read" them and execute trades based on the new information without any human assistance.[29] In the new financial industry, decisions that previously took hours or minutes to analyze and execute by numerous teams of individuals now take only seconds by a single computer.

A prominent form of algorithmic trading is high-frequency trading. High-frequency trading refers to computerized trading that generates positive returns by executing deluges of trades at super speeds.[30] This form of trading normally occurs at rates measured in seconds and milliseconds,[31] with daily volumes measured in the range of billions of units, and valued in the billions of dollars.[32] By 2010, high-frequency trading constituted approximately 30% of all foreign-exchange transactions.[33] In 2011, high-frequency trading made up about 60% of U.S. equity trading[34] and 35 to 40% of European equity trading,[35] with signs of more potential growth in the years to come.

This emphasis on speed in finance has given considerable advantages to market participants who can afford better technology and better real estate so as to reduce the latency of their trade executions through the process of colocation.[36] Latency refers to the period between an order submission and the receipt of an order acknowledgement.[37] If an institution's server is located closer to the server of an exchange or other relevant intermediary, then that institution can lower their latency period and increase their execution speed.[38] As such, market participants with

29. *See* ARNUK & SALUZZI, *supra* note 14, at 121 ("Machine-readable news data feeds enable HFT [high-frequency trading] computers to react within microseconds to news events, beating out traditional institutional and retail investors."); LEINWEBER, *supra* note 1, at 31–88, 109–34; Helen Coster, *Search and Disrupt*, FORBES, Sept. 26, 2011, at 60 (reporting on software that summarizes federal securities filings in seconds).

30. *See* Concept Release on Equity Market Structure, 75 Fed. Reg. 3594, 3598 (Jan. 21, 2010) (codified at 17 C.F.R. pt. 242); IRENE ALDRIDGE, HIGH-FREQUENCY TRADING: A PRACTICAL GUIDE TO ALGORITHMIC STRATEGIES AND TRADING SYSTEMS 1 (2010).

31. Fabozzi et al., *supra* note 2, at 8.

32. *See* Eric Dash & Christine Hauser, *As Dizzying Week Ends on Wall St., Dangers Linger*, N.Y. TIMES, Aug. 13, 2011, at A1.

33. Neil Shah, *High-Speed Traders Dive into Forex Despite Doubts,* WALL ST. J., Apr. 25, 2011, http://online.wsj.com/article/SB10001424052748704677404576284921020282968.html.

34. Graham Bowley, *Fast Traders, In Spotlight, Battle Rules*, N.Y. TIMES, July 18, 2011, at A1.

35. Fabozzi et al., *supra* note 2, at 8.

36. *See* BROWN, *supra* note 15, at 63; PATTERSON, *supra* note 3, at 230 ("The new hierarchy would be all about who owned the most powerful computers, the fastest links between markets, the most sophisticated algorithms—and the inside knowledge of how the market's plumbing was put together.").

37. *See* BROWN, *supra* note 15, at 64.

38. *See* Fabozzi et al., *supra* note 2, at 10 ("It is estimated that for each 100 miles the server is located away from the matching engine, 1 millisecond of delay is added to [the transmittal and execution time] . . . .").

more resources can arguably outperform other participants on a regular basis, even if all participants receive actionable information simultaneously.[39] While market participants with better resources have always had some advantages in execution over other participants,[40] the differences this time may be differences in kind rather than degrees.

In retrospect, over the last few decades, advances in technology and artificial intelligence accompanied by complementary regulatory reforms have fundamentally transformed modern finance into cyborg finance. It has turned an industry once based primarily on human interactions into one that is drastically less human, faster, larger, more global, more complex, and more interconnected.[41]

B. A Modest Preview

Previewing the future of cyborg finance is difficult given the dynamism of modern finance and technology. Yet, past developments and contemporary changes offer glimpses of the emerging future. Four potential characteristics of the emerging new financial industry are particularly noteworthy.

First, the use of computers and artificial intelligence will likely persistently rise in finance with lower cost barriers to entry. In 1965, Gordon Moore, the founder of Intel, coined what would later be termed "Moore's Law," which predicted that components on integrated circuits would increase exponentially about every two years and costs would fall correspondingly, leading to incredible technological progressions.[42] Since the 1960s, computing power and capacity have only grown increasingly better, faster, smaller, and cheaper.[43] A single iPhone today possesses more computing power than all of NASA during the first lunar mission.[44] In addition to being stronger, computer power has also become smarter. Through computerized data aggregation and analyses, colloquially known

39. *See, e.g.,* James B. Stewart, *Fair Play Measured in Slivers of a Second*, N.Y. TIMES, Jul. 13, 2013, at B1.

40. STEINER, *supra* note 16, at 121.

41. *See, e.g.*, PATTERSON, *supra* note 3, at 281–322; Salmon & Stokes, *supra* note 1, at 90.

42. *See* NICHOLAS CARR, THE BIG SWITCH: REWIRING THE WORLD, FROM EDISON TO GOOGLE 58 (2008); Gordon E. Moore, *Cramming More Components Onto Integrated Circuits*, 86 PROCEEDINGS OF THE IEEE 82, 82–83 (1998).

43. *See* NICHOLAS CARR, THE SHALLOWS: WHAT THE INTERNET IS DOING TO OUR BRAINS 83 (2011) ("[T]he price of a typical computing task has dropped by 99.9 percent since the 1960s."); ORG. FOR ECON. CO-OPERATION AND DEV., 255 21ST CENTURY TECHNOLOGIES: PROMISES AND PERILS OF A DYNAMIC FUTURE 9 (1998) (stating that "[f]aster, cheaper, [and] smaller" are the key objectives of the technology sector); Chip Walter, *Kryder's Law*, SCIENTIFIC AM., Aug. 2005, at 32.

44. MICHIO KAKU, PHYSICS OF THE FUTURE: HOW SCIENCE WILL SHAPE HUMAN DESTINY AND OUR DAILY LIVES BY THE YEAR 2100 21 (2011).

as Big Data, information technology is constantly providing new insights into the world.[45] As technology continues to progress in capacity and capability, finance—like other industries—will continue to adopt computers and artificial intelligence as key operational inputs.[46] The future intellectual and physical infrastructure of finance and other industries will likely be one based more and more on computerization and artificial intelligence, creating an omni-computing existence where the workings and manifestations of computerized data analyses become like oxygen—necessary but unnoticed.

Second, technological advances and corresponding market changes will make traditional financial frameworks, like public stock exchanges and human brokers, less relevant.[47] For instance, algorithmic trading has already advanced so much that exchange floors manned by human traders have been rendered relics of a bygone era.[48] Today, most equities are traded in private electronic markets using fully computerized systems rather than in public exchanges like the New York Stock Exchange (NYSE) or the NASDAQ.[49] In recent years, more than half of the trading of equities listed on the NYSE takes place in electronic exchanges.[50] In fact, in 2013, two

45. *See, e.g.*, VIKTOR MAYER-SCHONBERGER & KENNETH CUKIER, BIG DATA: A REVOLUTION THAT WILL TRANSFORM HOW WE LIVE, WORK, AND THINK 6–10 (2013); NATE SILVER, THE SIGNAL AND THE NOISE: WHY SO MANY PREDICTIONS FAIL—BUT SOME DON'T 9–10 (2012); Andrew McAfee & Erik Brynjolfsson, *Big Data: The Management Revolution*, HARV. BUS. REV., Oct. 2012, at 60–68; Ashlee Vance, *The Data Knows*, BUS. WK., Sept. 12, 2011, at 71.

46. *See* ERIK BRYNJOLFSSON & ANDREW MCAFEE, THE SECOND MACHINE AGE: WORK, PROGRESS AND PROSPERITY IN A TIME OF BRILLIANT TECHNOLOGIES 13–39 (2014); CARR, *supra* note 42, at 45–46 (reporting on the proliferation of computers in society); David H. Autor et al., *The Skill Content of Recent Technological Change: An Empirical Exploration*, 118 Q.J. ECON. 1279, 1322 (2003) (studying how computerization increases the substitution of machinery for human labor in certain situations); W. Brian Arthur, *The Second Economy*, MCKINSEY Q., Oct. 2011, at 92 (discussing how computerization and artificial intelligence have replaced human labor in many industries); Mary Childs, *Computers Elbow Traders Aside*, BUS. WK., Nov. 19, 2012, at 48; Bill Wasik, *Welcome to the Programmable World*, WIRED, June 2013, at 140.

47. *See* Donald C. Langevoort & Robert B. Thompson, *"Publicness" in Contemporary Securities Regulation After the JOBS Act*, 101 GEO. L.J. 337, 347 (2013) ("Today, liquidity is now much more possible outside of traditional exchanges. In the new millennium, cheap information and low communication costs have expanded markets . . . ."); Ben Paynter, *The Exchange Blew Up*, BUS. WK., March 18, 2013, at 58; Jacob Bunge, *BATS, Direct Edge in Talks to Merge*, WALL ST. J., Aug. 24, 2013, at B1 (reporting on the merger of two large electronic exchanges).

48. *See, e.g.*, Jerry W. Markham & Daniel J. Harty, *For Whom the Bell Tolls: The Demise of Exchange Trading Floors and the Growth of ECNs*, 33 J. CORP. L. 865, 866 (2008) ("Exchange trading floors are fast fading into history as the trading of stocks and derivative instruments moves to electronic communications networks (ECNs) that simply match trades by computers through algorithms.").

49. Nathaniel Popper, *Public Exchanges Duel with Newcomers over Trade Transparency*, N.Y. TIMES, June 27, 2012, at B1.

50. Nelson D. Schwartz & Louise Story, *Surge of Computer Selling After Apparent Trading Glitch Sends Stocks Plunging*, N.Y. TIMES, May 7, 2010, at B7.

leading electronic trading exchanges merged;[51] and the IntercontinentalExchange, an electronic derivatives and commodities exchange, announced a takeover of the NYSE.[52] That same year, the NYSE made preparations to operate without human traders in the event of a major disaster.[53] It is probably safe to predict that in the near future, human traders will no longer work the NYSE's famed trading floor in their traditional roles; the exchange will become like a façade on a movie set. Additionally, these changes in financial technology will likely allow more individuals to invest in a wider array of assets.[54] Online brokers, like Charles Schwab, already offer investment options that were not available to investors in eras past without well-connected financial intermediaries.[55]

Third, cyborg finance will likely expand the "shadow banking" system as it grows darker, more complex, more global, but not necessarily more profitable.[56] While significant volumes of trading still take place on public exchanges, a growing volume of trades are taking place in less-regulated private exchanges and "dark pools."[57] A dark pool is an electronic trading network that facilitates anonymous trading and is hidden from the general marketplace.[58] Private exchanges and dark pools are particularly attractive to investors, many of whom prefer to trade securities without losing informational advantages to competitors that may mimic their trades.[59] These opaque financial forums also facilitate innovative and complex transactions and strategies because they are less regulated.[60] Moreover,

51. Michael J. De La Merced and Nathaniel Popper, *Two Exchanges to Merge, Taking On Larger Rivals*, N.Y. TIMES, Aug. 27, 2013, at B1.

52. Ben Protess & Nathaniel Popper, *Exchange Sale Reflects New Realities of Trading*, N.Y. TIMES, Dec. 21, 2012, at A1.

53. Jacob Bunge, *NYSE Revamps Disaster Plan*, WALL ST. J., Mar. 9, 2013, at B1.

54. *See, e.g.*, Nathaniel Popper, *Complex Investments Prove Risky as Savers Chase Bigger Payoff*, N.Y. TIMES, Feb. 11, 2013, at A1.

55. CHARLES SCHWAB INVESTMENT PRODUCTS, http://www.schwab.com/public/schwab/investing/accounts_products/investment (last visited Feb. 1, 2014).

56. *See, e.g.*, GARY B. GORTON, SLAPPED BY THE INVISIBLE HAND: THE PANIC OF 2007 6–9 (2010) (noting the growing importance of the shadow banking system); SKEEL, *supra* note 5 (discussing deregulation and financial innovation in connection to shadow banking); Lo, *supra* note 5, at 13–18 (describing the expansive shadow banking system); Schwarcz, *supra* note 9, at 619–42.

57. *See* Regulation of Non-Public Trading Interest, Exchange Act Release No. 34-60997 (Nov. 13, 2009); Mary L. Schapiro, Chairman, SEC, Statement on Dark Pool Regulation Before the Commission Open Meeting (Oct. 21, 2009) (transcript available at http://www.sec.gov/news/speech/2009/spch102109mls.htm); ARNUK & SALUZZI, *supra* note 14; LEINWEBER, *supra* note 1, at 79 (discussing the growth of dark pools and alternative trading systems in recent years); PATTERSON, *supra* note 3, at 61–62; Matthew Philips, *Where Has All the Trading Gone*?, BUS. WK., May 14, 2012, at 49 (reporting on the migration of trading from public exchanges to dark pools).

58. BROWN, *supra* note 15, at 116.

59. *See id*.

60. *See* Schwarcz, *supra* note 9, at 619–42.

unlike traditional exchanges, which are partially constrained by spatial and geographic limitations, private exchanges and dark pools exist in cyberspace, a frontier without such limitations.[61] In the past few years, rather than defend the benefits of well-regulated, transparent trading, traditional exchanges have begun to create opaque electronic networks to capture the growing computerized trading market.[62] Increased participation in shadow banking coupled with lower costs of technology will likely lead to greater competition and lower profit margins.[63]

Fourth, humans will likely remain critical players in the future of cyborg finance. Advances in the speed, precision, and convenience of computerized systems have led many in finance to view such systems as the antidotes to the follies of human thought and human action.[64] After all, computers process deluges of data faster and better than humans, computers do not suffer from emotional fits or irrational impulses, and computers do not fatigue the way humans do. As a result of these advantages, there exists an understandable enchantment with advanced technologies in finance and beyond.[65] And at the same time, there also exists an equally understandable lamentation of the fall of humans in the face of rising technology.[66] Yet, such easy sentiments about the demise of humans are misplaced. Humans, after all, possess arguably the most powerful and complex of computing machineries, the human brain, which contains billions of neurons and trillions of synaptic connections.[67] And lest we forget, the Financial Crisis occurred partially because many prevalent,

61. *See, e.g.*, David R. Johnson & David Post, *Law and Borders—The Rise of Law in Cyberspace*, 48 STAN. L. REV. 1367, 1367 (1996); Lawrence Lessig, *The Law of the Horse: What Cyberlaw Might Teach*, 113 HARV. L. REV. 501, 514–22 (1999).

62. Popper, *supra* note 49.

63. *See* Matthew Philips, *How the Robots Lost*, BUS. WK., June 10, 2013, at 64, 66 (discussing the decrease in profits of high-frequency traders due to competition).

64. EMANUEL DERMAN, MODELS.BEHAVING.BADLY.: WHY CONFUSING ILLUSION WITH REALITY CAN LEAD TO DISASTER, ON WALL STREET AND IN LIFE 143–87 (2011).

65. Computers today excel over humans in tasks beyond the mechanical and rote to the subjective and judgmental. Computers with artificial intelligence can grade essays, select movie scripts, predict court decisions, review legal documents, and spot out lies. *See* CARR, *supra* note 43, at 223 (discussing computerized review of essays); Joe Dysart, *A New View of Review*: *Predictive Coding Vows to Cut E-Discovery Drudgery*, A.B.A. J., Oct. 1, 2011, at 26; Theodore W. Ruger et al., *The Supreme Court Forecasting Project: Legal and Political Science Approaches to Predicting Supreme Court Decisionmaking*, 104 COLUM. L. REV. 1150, 1150 (2004); Anne Eisenberg, *Software that Listens for Lies*, N.Y. TIMES, Dec. 4, 2011, at BU5; Malcolm Gladwell, *The Formula*, NEW YORKER, Oct. 16, 2006, at 139 (reporting on software that predicts the potential success of screenplays based on their narrative elements).

66. *See* JARON LANIER, YOU ARE NOT A GADGET: A MANIFESTO 24–30 (2010) (lamenting the self-subordination of humans to technology).

67. ELLEN E. PASTORINO & SUSANN M. DOYLE-PORTILLO, WHAT IS PSYCHOLOGY? 355 (2011).

"smart" computerized risk models failed to properly account for the collapse of the U.S. housing market and its deleterious economic effects.[68]

With the ascension of artificially intelligent machines driven by data, humans are actually needed more than ever.[69] Humans are needed to gather and create the data that is the lifeblood of artificial intelligence.[70] Humans are needed to design and create the algorithms and programs for the computers.[71] Humans are needed to attest to the veracity and utility of the computerized systems.[72] Artificially intelligent machines, despite their advances, are still devoid of the awareness, sophistication, and judgment of human intelligence.[73] Computerized modeling of a financial world populated by humans will remain flawed and limited.[74] Data about the past can only give so much insight about the future. Thus, humans will likely remain key players in the future of cyborg finance.

II. CRASHES AND CRIMES

While the new financial industry presents many great opportunities for investors and financial institutions, it also presents grave perils. The enhanced speed and linkage of finance can make industry participants more vulnerable to volatile crashes and cybercrimes.

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68. *See, e.g.*, ANTHONY SAUNDERS & LINDA ALLEN, CREDIT RISK MANAGEMENT IN AND OUT OF THE FINANCIAL CRISIS: NEW APPROACHES TO VALUE AT RISK AND OTHER PARADIGMS 31 (3d ed. 2010); Amir E. Khandani & Andrew W. Lo, *What Happened to the Quants in August 2007?: Evidence From Factors and Transactions Data,* 5 J. INV. MGMT. 5, 5–9 (2007); Paul Krugman, *How Did Economists Get It So Wrong?*, N.Y. TIMES MAG., Sept. 6, 2009, at 36 ("There was nothing in the prevailing models suggesting the possibility of the kind of collapse that happened last year.").

69. RISHI K. NARANG, INSIDE THE BLACK BOX: THE SIMPLE TRUTH ABOUT QUANTITATIVE TRADING xi (2009).

70. *See* IAN AYRES, SUPER CRUNCHERS: WHY THINKING-BY-NUMBERS IS THE NEW WAY TO BE SMART 124–26 (2007); Steve Lohr, *Google Schools Its Algorithm*, N.Y. TIMES, Mar. 6, 2011, at WK 4 ("Computers are only as smart as their algorithms—man-made software recipes for calculation . . . .").

71. NARANG, *supra* note 69, at xi.

72. Shvetank Shah et al., *Good Data Won't Guarantee Good Decisions*, HARV. BUS. REV., Apr. 2012, at 23.

73. *See* STEPHEN BAKER, FINAL JEOPARDY: MAN VS. MACHINE AND THE QUEST TO KNOW EVERYTHING 148–69 (2011) (discussing the limitations of artificial intelligence). *But see* JAMES BARRAT, OUR FINAL INVENTION: ARTIFICIAL INTELLIGENCE AND THE END OF THE HUMAN ERA 7–8 (2013).

74. *See* CLAYTON M. CHRISTENSEN ET AL., HOW WILL YOU MEASURE YOUR LIFE? 14 (2012) ("People often think that the best way to predict the future is by collecting as much data as possible . . . . But this is like driving a car looking only at the rearview mirror—because data is only available about the past."); Jón Daníelsson, *The Emperor Has No Clothes: Limits to Risk Modeling*, 26 J. BANKING & FIN. 1273, 1274 (2002); Krugman, *supra* note 68 ("[E]conomists, as a group, mistook beauty, clad in impressive-looking mathematics, for truth.").

A. Flash Crashes

The accelerated speed of cyborg finance means faster executions, faster market-making, and faster profits. But the accelerated speed also means faster ascents and faster crashes at speeds previously unattainable, posing challenges previously unimaginable.

On May 6, 2010, the world witnessed a stock market crash of incredible volatility and velocity.[75] In less than thirty minutes, approximately $1 trillion in market value vanished from the U.S. stock market. [76] That episode in financial history is now simply referred to as the Flash Crash.[77]

An SEC and Commodity Futures Trading Commission (CFTC) joint investigation following the crash revealed that the Flash Crash was initiated by a futures order from a Kansas mutual fund company.[78] With a high-speed, automated computer program, the mutual fund company, Waddell & Reed, created an order to sell $4.1 billion of E-Mini S&P futures contracts at approximately 2:32 p.m.[79] The program executed the order "without regard to price or time,"[80] and completed it in about twenty minutes.[81] In years past, an order of this size would have taken several hours or days to complete.[82]

Within minutes of the fulfillment of Waddell & Reed's order, other computerized programs executed corresponding high-speed trades in the futures and equity markets that caused significant volatility in the Dow Jones Industrial Average (Dow), S&P futures, other futures contracts, and domestic equities.[83] Within the span of twenty minutes after Waddell & Reed's initial trade, S&P futures experienced a 3% drop,[84] and the Dow experienced a 9.16% drop.[85] During the Dow's rapid free fall, share prices in blue-chip stocks like 3M and Proctor & Gamble suffered losses nearing or exceeding 20%, or billions of dollars in market capitalization.[86] Other stocks also experienced severe volatility during this brief period.

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75. CFTC & SEC FINDINGS, *supra* note 10, at 1.
76. Haldane, *supra* note 3, at 2.
77. Graham Bowley, *Lone Sale of $4.1 Billion in Contracts Led to 'Flash Crash' in May*, N.Y. TIMES, Oct. 2, 2010, at B1.
78. CFTC & SEC FINDINGS, *supra* note 10, at 2; Bowley, *supra* note 77.
79. *Id*.
80. Bowley, *supra* note 77 (quoting CFTC & SEC FINDINGS, supra note 10, at 2).
81. CFTC & SEC FINDINGS, *supra* note 10, at 2.
82. *See id*.
83. *Id*. at 1–4.
84. *Id*. at 3.
85. *See* Serittella, *supra* note 21, at 435.
86. CFTC & SEC FINDINGS, *supra* note 10, at 84–85.

Accenture, a leading consulting company, saw its shares fall by over 99%, from $40 to $0.01.[87] Shares of the famed auction house, Sotheby's, increased three thousand-fold, from $34 to $99,999.99.[88] At the end of the rollercoaster trading day, the major futures and equity indexes closed with losses of about 3% relative to the previous day.[89]

In the aftermath, the SEC and CFTC joint inquiry did not blame black-box traders and automated computerized programs entirely for causing the Flash Crash. Instead, the investigation noted that such traders and programs played a critical role in eroding liquidity and exacerbating volatility on the day of the Flash Crash.[90]

While another crash matching the velocity and magnitude of the Flash Crash has yet to materialize, there have been many smaller and more isolated lightning crashes,[91] including one in 2013 that caused the NASDAQ to suspend trading of its securities for three hours during a normal trading day.[92] Nevertheless, some experts and policymakers speculate that as finance accelerates and automates, it will only be a matter of time before another major crash like the Flash Crash occurs again.[93]

B. Cy-Fi Crimes

Threats of new financial crimes accompany the emergence of cyborg finance. Cy-fi's heavy reliance on computerized systems to store

87. *Id*. at 83; Haldane, *supra* note 3, at 2.

88. Haldane, *supra* note 3, at 2.

89. CFTC & SEC FINDINGS, *supra* note 10, at 1.

90. *Id*. at 6.

91. *See* Graham Bowley, *The Flash Crash, in Miniature*, N.Y. TIMES, Nov. 9, 2010, at B1 (reporting on the occurrence of smaller flash crashes); Jacob Bunge, et al., *Goldman's Misfire Rattles Options*, WALL ST. J., Aug. 21, 2013, at C1; Amy Chozick & Nicole Perlroth, *Twitter Speaks, Markets Listen, and Fears Rise*, N.Y. TIMES, April 29, 2013, at A1 (describing the stock market crash caused by a false tweet); Shen Hong, *Everbright Securities Fiasco Casting a Shadow*, WALL ST. J., Aug. 21, 2013, at C3; Edward E. Kaufman, Jr. & Carl M. Levin, Op-Ed, *Preventing the Next Flash Crash,* N.Y. TIMES, May 6, 2011, at A27 (discussing mini-crashes since the Flash Crash); Matt Krantz, *Mini Flash Crashes Worry Traders*, USA TODAY, May 17, 2011, *available at* http://www.usatoday.com/money/markets/2011-05-16-mini-flash-crashes-market-worry_n.htm; Nathaniel Popper, *Wave of Runaway Trades Spread Turmoil Across Wall St.*, N.Y. TIMES, Aug. 2, 2012, at A1 (discussing market instability caused by computerized trading relating to Facebook's initial public offering and a rogue computer program related to Knight Trading); Nathaniel Popper, *BATS Flaw Not So Rare, Data Shows*, N.Y. TIMES, Mar. 29, 2012, at B1 (reporting on the volatility surrounding the initial public offering of BATS Global Markets, an electronic stock exchange pioneer).

92. *See* E.S. Browning and Scott Patterson, *Complex Systems Get Blame*, WALL ST. J., Aug. 23, 2013, at C1; Nathaniel Popper, *Pricing Problem Suspends NASDAQ for Three Hours*, N.Y. TIMES, Aug. 23, 2013, at A1.

93. *See* Kaufman, Jr. & Levin, *supra* note 91 ("[A]lgorithmic trading has caused mini-flash crashes since, and surveys suggest that most investors and analysts believe it's only a matter of time before the Big One.").

information, analyze data, and manage capital renders it particularly vulnerable to cybercrimes.[94] The new financial industry is essentially a high-tech industry where software codes, computerized systems, intellectual property, and technological infrastructure represent some of the industry's most valuable assets.[95] Many serious crimes against financial institutions now involve computers as the weapons of choice and cyberspace as the preferred setting.[96] For instance, with the proliferation of automated trading platforms, simply by injecting bad data and false trades into the system, cyber criminals can cause significant financial damage without guns and from the comforts of a remote location.[97] General Keith Alexander, the head of the National Security Agency and the U.S. Cyber Command in 2013, called the loss of American business secrets and intellectual property to cyber criminals "the greatest transfer of wealth in history."[98]

With the emergence of crimes in cyborg finance, a new lineup of criminal suspects is also emerging. Episodes from recent history suggest that financial firms must protect their interests from various, elusive antagonists including employees, competitors, hackers, and other nation-states.[99] In 2009, a former Goldman Sachs programmer was arrested for allegedly stealing the firm's algorithmic trading codes.[100] In 2011, hackers

94. *See* Duncan B. Hollis, *Why States Need an International Law for Information Operations*, 11 LEWIS & CLARK L. REV. 1023, 1042 (2007) (speculating about computer viruses that incapacitate stock markets); Scott Patterson, *CME Was the Victim of 'Cyberintrusion' in July*, WALL ST. J., Nov. 16, 2013, at B5; Michael Riley & Ashlee Vance, *The Code War*, BUS. WK., July 25, 2011, at 52.

95. *See* BROWN, *supra* note 15, at 49 (discussing the urgent need for black-box firms to safeguard successful strategies for as long as possible); David Barboza & Kevin Drew, *Security Firm Sees Global Cyberspying*, N.Y. TIMES, Aug. 4, 2011, at A11 ("Cybersecurity is now a major international concern, with hackers gaining access to sensitive corporate and military secrets, including intellectual property."); Alex Berenson, *Arrest over Trading Software Illuminates a Secret of Wall St*., N.Y. TIMES, Aug. 24, 2009, at A1 (noting the importance of computer programs to financial institutions).

96. Riley & Vance, *supra* note 94.

97. *Id*. at 56.

98. John Seabrook, *Network Insecurity*, NEW YORKER, May 20, 2013, at 64 (quoting Gen. Keith Alexander).

99. *See* SEC v. Dorozhko, 574 F.3d 42, 44–46 (2d Cir. 2009) (opining on a case involving hackers who traded on illicitly-acquired, material, nonpublic information); MARK BOWDEN, WORM: THE FIRST DIGITAL WORLD WAR 48 (2011) ("Today the most serious computer predators are funded by rich criminal syndicates and even nation-states, and their goals are far more ambitious."); INTELLIGENCE & NAT'L SEC. ALLIANCE, CYBER INTELLIGENCE: SETTING THE LANDSCAPE FOR AN EMERGING DISCIPLINE 7–9 (2011); SCOTT PATTERSON, THE QUANTS: HOW A NEW BREED OF MATH WHIZZES CONQUERED WALL STREET AND NEARLY DESTROYED IT 107–16 (2010) (discussing the theft of trade secrets from hedge funds); Michael Joseph Gross, *Silent War*, VANITY FAIR, July 2013, at 98; Nicole Perlroth, *Hunting for Syrian Hackers' Chain of Command*, N.Y. TIMES, May 18, 2013, at B1 (reporting on the difficulties of tracing hackers); Nathaniel Popper, *Wall Street's Exposure to Hacking Laid Bare*, N.Y. TIMES, July 26, 2013, at B1.

100. *See* Azam Ahmed, *Ex-Programmer Is Sentenced to 8 years for Stealing Code from Goldman*, N.Y. TIMES, Mar. 19, 2011, at B2; Reed Albergotti, *Questions Linger in Goldman Code*

threatened Bank of America with stolen, corporate information.[101] In 2012, large, coordinated attacks, some attributable to Iran, dubbed "Operation High Roller," targeted American and international financial institutions.[102] In 2013, hackers infiltrated the Associated Press's Twitter account to falsely broadcast an attack on the White House that temporarily erased $136 billion in market value.[103] Furthermore, in recent years, China has been suspected of serious cybercrimes against American business interests.[104]

Due to the amorphous and anonymous nature of cybercrimes, and the unwillingness of corporate victims to come forward, they can be difficult to prevent, trace, and prosecute.[105] Recognizing the seriousness of cybercrimes against the financial system and other American interests,[106] the federal government has responded to this emerging threat with more intense, strategic cyberspace studies[107] and aggressive cyber-defense

Case, WALL ST. J., June 14, 2013, at C1. *But see* Michael Lewis, *Goldman's Greek Tragedy*, VANITY FAIR, Sept. 2013, at 312.

101. Nelson D. Schwartz, *Facing a New Type of Threat From WikiLeaks, a Bank Plays Defense*, N.Y. TIMES, Jan. 3, 2011, at B1.

102. DAVE MARCUS & RYAN SHERSTOBITOFF, MCAFEE/GUARDIAN ANALYTICS, DISSECTING OPERATION HIGH ROLLER 3 (2012), *available at* http://www.mcafee.com/us/resources/reports/rp-operation-high-roller.pdf; Nicole Perlroth, *Attacks on 6 Banks Frustrate Customers*, N.Y. TIMES, Oct. 1, 2012, at B1; Nicole Perlroth & Quentin Hardy, *Bank Hacks Were Work Of Iranians, Officials Say*, N.Y. TIMES, Jan. 9, 2013, at B1.

103. Chozick and Perlroth, *supra* note 91.

104. *See* Barboza & Drew, *supra* note 95; Sanger et al., *China's Army Seen as Tied to Hacking Against U.S.*, N.Y. TIMES, Feb. 19, 2013, at A1; David E. Sanger and Mark Landler, *U.S. and China Will Hold Talks About Hacking*, N.Y. TIMES, June 2, 2013, at A1.

105. *See, e.g.*, BOWDEN, *supra* note 99, at 48–53 (describing challenges in creating a cybersecurity defense system); 2 ROCCI LUPPICINI, HANDBOOK OF RESEARCH ON TECHNOETHICS 542 (2009) (acknowledging difficulties in tracing the origins of cyberattacks); Sarah Gordon & Richard Ford, *On the Definition and Classification of Cybercrime*, 2 J. COMPUTER VIROLOGY 13, 13 (2006) ("Despite the fact that the word 'Cybercrime' has entered into common usage, many people would find it hard to define the term precisely."); Oona A. Hathaway et al., *The Law of Cyber-Attack*, 100 CALIF. L. REV. 817, 874–77 (2012) (opining on legal challenges to addressing cyberattacks); Michael Joseph Gross, *Enter the Cyber-Dragon*, VANITY FAIR, Sept. 2011, at 220 ("Because virtual attacks can be routed through computer servers anywhere in the world, it is almost impossible to attribute any hack with total certainty."); Christopher Matthews, *Cybertheft Victims Itchy to Retaliate*, WALL ST. J., June 3, 2013, at B6; Chris Strohm et al., *Cyber Attack? What Cyber Attack?*, BUS. WK., Apr. 15, 2013, at 40 (reporting on the reluctance of companies to disclose cyber attacks).

106. *See* TERRORNOMICS 117 (Sean S. Costigan & David Gold, eds. 2007) (noting the FBI estimated that cybercrime costs the U.S. $400 billion annually).

107. *See, e.g.*, DEP'T OF DEF., CYBERSPACE POLICY REPORT (Nov. 2011), *available at* http://www.defense.gov/home/features/2011/0411_cyberstrategy/docs/NDAA%20Section%20934%20Report_For%20webpage.pdf; SEC DIV. OF CORP. FIN., CF DISCLOSURE GUIDANCE: TOPIC NO. 2: CYBERSECURITY (Oct. 13, 2011), *available at* http://sec.gov/divisions/corpfin/guidance/cfguidance-topic2.htm#_ednref1; THE WHITE HOUSE, INTERNATIONAL STRATEGY FOR CYBERSPACE: PROSPERITY, SECURITY, AND OPENNESS IN A NETWORKED WORLD (May 2011), *available at* http://www.whitehouse.gov/sites/default/files/rss_viewer/international_strategy_for_cyberspace.pdf.

programs.[108] In 2012 alone, the Air Force spent about $4 billion on its cyber programs,[109] and the Labor Department, in response to cyber threats, improved the computer security of its valuable economic data.[110] In 2013, it was revealed that President Obama possessed broad powers relating to cyberstrikes against our enemies.[111] That same year, President Obama also issued an executive order aimed at enhancing cybersecurity.[112] Despite these efforts, as cyborg finance grows and evolves, industry and government sentinels must remain vigilant of the growing and evolving criminal threats against the new financial industry. It should not be surprising if most significant financial crimes of the future are cybercrimes.

III. EMERGING SYSTEMIC RISKS

As the financial system evolves and grows, so do its systemic risks.[113] In recent years, the systemic risk of "too big to fail" has garnered much attention.[114] "Too big to fail" refers to the systemic risk where large financial intuitions become too critical to the economy, so much so that government has to bail out any of such faltering private firms with public funds. [115] The emergence of cyborg finance has borne two new systemic risks: one related to connectivity that the author terms "too linked to fail" and the other related to speed that the author terms "too fast to save."[116]

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108. James Bamford, *The Silent War*, WIRED, July 2013, at 90.

109. *See* Julian E. Barnes, *Pentagon Digs in on Cyberwar Front*, WALL ST. J., July 6, 2012, at A4 (stating that "[o]verall the Air Force spends about $4 billion a year on its cyber programs").

110. John H. Cushman Jr., *Guarding the Numbers*, N.Y. TIMES, July 17, 2012, at B1.

111. David E. Sanger & Thom Shanker, *Broad Powers Seen for Obama in Cyberstrikes*, N.Y. TIMES, Feb. 4, 2013, at A1.

112. Exec. Order No. 13636, 78 Fed. Reg. 11739 (Feb. 12, 2013), *available at* http://www.whitehouse.gov/the-press-office/2013/02/12/executive-order-improving-critical-infrastructure-cybersecurity.

113. *See* Hal S. Scott, *The Reduction of Systemic Risk in the United States Financial System*, 33 HARV. J.L. & PUB. POL'Y 671, 673 (2010) ("Going forward, the central problem for financial regulation . . . is to reduce systemic risk.").

114. *See, e.g.*, S. PERMANENT SUBCOMM. ON INVESTIGATIONS, *supra* note 5, at 15–17 (reporting on the rise of too-big-to-fail financial institutions); SORKIN, *supra* note 11 (discussing the policy challenges presented by "too big to fail" institutions); Frost, *supra* note 11.

115. *See, e.g.*, 12 C.F.R. § 1320.1 (2011); Amir E. Khandani, Andrew W. Lo & Robert C. Merton, *Systemic Risk and the Refinancing Ratchet Effect* 38 (Harv. Bus. Sch. Fin., Working Paper No. 147892, 2012), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1472892 ("[S]ystemic risk . . . arises when large financial losses affect important economic entities that are unprepared for and unable to withstand such losses, causing a cascade of failures and widespread loss of confidence.").

116. The author previously introduced these terms in a prior publication. *See* Lin, *supra* note 4, at 711–17.

A. Too Linked to Fail

In the age of cyborg finance, numerous financial participants and products coexist in an expansive, global financial web that crosses institutions, industries, instruments, and states, creating a systemic risk of "too linked to fail." Today, commercial banks, investment banks, hedge funds, sovereign funds, mutual funds, and other financial participants are all involved, intermediated, and interconnected like never before, operating in a single financial network with numerous intertwined products and transactions.[117] JPMorgan Chase, for instance, is linked to a host of counterparties through a wide-range of services and products including investment banking, commercial banking, lending, market-making, trading, clearing, custodial servicing, and prime brokering.[118] Moreover, these modern, hi-tech financial links can be difficult to break cleanly and be inherently prone to accidents, as described by Charles Perrow in his seminal study of the risks of technology, *Normal Accidents*.[119]

In eras past, the failures of one nation-state, one financial institution, or one financial instrument could have been more readily isolated by geography. In the new financial industry, geographic borders matter little as financial participants and products have grown more linked than ever. For instance, the collateralized debt obligations (CDOs) and mortgage-backed securities (MBSs) that played such critical roles in the Financial Crisis frequently linked thousands of mortgages, hundreds of CDOs, and hundreds of payment tranches across multiple financial institutions.[120] Like never before, the failings of one nation-state, one financial institution, or one financial instrument can affect all nation-states, all institutions, and all instruments.[121]

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117. *See* Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007–2008*, 23 J. ECON. PERSPS. 77, 96 (2009) (discussing the financial system's "interwoven network of financial obligations"); Robin Greenwood & David S. Scharfstein, *How to Make Finance Work*, at 107; HAL S. SCOTT, COMM. ON CAPITAL MKTS. REGULATION, INTERCONNECTEDNESS AND CONTAGION (2012), *available at* http://www.aei.org/files/2013/01/08/-interconnectedness-and-contagion-by-hal-scott_153927406281 .pdf.

118. JPMorgan Chase & Co., Annual Report (Form 10-K) (Feb. 29, 2012), *available at* http://www.sec.gov/Archives/edgar/data/19617/000001961713000221/corp10k2012.htm.

119. *See* CHARLES PERROW, NORMAL ACCIDENTS: LIVING WITH HIGH-RISK TECHNOLOGIES 4–5 (1999); *see also* Anna Gelpern & Adam J. Levitin, *Rewriting Frankenstein Contracts: Workout Prohibitions in Residential Mortgage-Backed Securities*, 82 S. CAL. L. REV. 1075, 1076 (2009); Judge, *supra* note 6, at 701–11 (commenting on the "stickiness" of modern financial products); Adam J. Levitin & Tara Twomey, *Mortgage Servicing*, 28 YALE J. ON REG. 1, 58 (2011).

120. Kenneth E. Scott & John B. Taylor, Op-Ed., *Why Toxic Assets Are So Hard to Clean Up*, WALL ST. J., July 20, 2009, at A13.

121. *See* LESSONS FROM THE FINANCIAL CRISIS: CAUSES, CONSEQUENCES, AND OUR ECONOMIC FUTURE 128 (Robert W. Kolb ed., 2010) ("The failure of just one large financial institution might lead to the failure of one or more other institutions that would then spread to yet more financial institutions

Distinct from "too big to fail," this emerging systemic risk of "too linked to fail" includes smaller participants and products, whose failures may ripple across the system because of their linkages regardless of their value or size despite not being classified as systemically important financial institutions.[122] In 1998, the Federal Reserve initiated a $3.6 billion industry-led bailout for Long-Term Capital Management, a hedge fund with less than two hundred employees, because its failure would have created significant losses for many investment banks and caused widespread panic on Wall Street.[123] Since then, hedge funds and other financial intermediaries have only grown larger in size and number, further exacerbating the risks of "too linked to fail."[124] More recent events involving individual institutions and individual nation-states also signal the emergence of "too linked to fail." Between 2008 and 2013, the failings of Bear Stearns and Lehman Brothers,[125] along with the sovereign debt crises of Greece, Italy, and Spain all individually, and collectively, created serious strains on the global financial system. [126]

Further complicating the risks of "too linked to fail" is the fact that many financial participants engage in similar and interdependent strategies.[127] As such, many of these strategies may be similarly flawed due

in a contagion that was feared might end in the collapse of the entire financial system."); Judge, *supra* note 6, at 659 (arguing that new linked products in the modern financial system generate new sources of systemic risk); Serritella, *supra* note 21, at 437 (noting the potential perils emanating from "the interconnectivity of financial markets and their participants, as well as increased interconnections between securities and their derivatives").

122. *See* Schwarcz, *supra* note 6, at 200 (discussing the systemic risks caused by financial intermediation and disintermediation); Hong, *supra* note 91 (reporting on the impact of a trading glitch at a medium-sized Chinese brokerage); FINANCIAL STABILITY BOARD, ASSESSMENT METHODOLOGIES FOR IDENTIFYING NON-BANK NON-INSURER GLOBAL SYSTEMICALLY IMPORTANT FINANCIAL INSTITUTIONS, Jan. 8, 2014, *available at*: http://www.financialstabilityboard.org/publications/r_140108.pdf.

123. *See* ROGER LOWENSTEIN, WHEN GENIUS FAILED: THE RISE AND FALL OF LONG-TERM CAPITAL MANAGEMENT xviii–xx (2000); FRANK PARTNOY, INFECTIOUS GREED: HOW DECEIT AND RISK CORRUPTED THE FINANCIAL MARKETS 261 (2003).

124. *See* Whitehead, *supra* note 5, at 5 ("Although hedge funds grew by 260% between 1999 and 2004 to become a one trillion dollar business, they were largely exempt from regulation under the federal securities and investment advisory laws.").

125. *See* Bryan Burrough, *Bringing Down Bear Stearns*, VANITY FAIR, Aug. 2008, at 106; Carrick Mollenkamp et al., *Lehman's Demise Triggered Cash Crunch Around Globe*, WALL ST. J., Sept. 29, 2008, at A1; Andrew Ross Sorkin, *Bids to Halt Financial Crisis Reshape Landscape of Wall St.*, N.Y. TIMES, Sept. 15, 2008, at A1.

126. *See* Clive Crook, *Who Lost the Euro?*, BUS. WK., May 24, 2012, at 12. euro; Peter Coy, *Greece: Why the Beast is Back*, BUS. WK., May 30, 2011, at 11; Carol Matlack & Jeff Black, *Exit the Euro Zone? Think Before You Leap*, BUS. WK., Sept. 19, 2011, at 15.

127. *See* Concept Release on Equity Market Structure, Exchange Act Release No. 34-61358, 75 Fed. Reg. 3594, 3611 (proposed Jan. 21, 2010) (codified at 17 C.F.R. pt. 242) ("[M]any proprietary firms potentially could engage in similar or connected trading strategies that, if such strategies generated significant losses at the same time, could cause many proprietary firms to become financially

to shared conceptual biases.[128] As a result, the failing of one participant or one product could not only adversely impact others, but could also create vicious cycles of volatility for the entire global financial system as trades cascade and generate feedback loops and spillover effects of serious consequences.[129]

As cyborg finance expands, the systemic perils posed by "too linked to fail" will only grow more challenging and more pressing in the coming years as the complexity and multiplicity of linkages create greater risks and opportunities for error.[130]

B. Too Fast to Save

In the new financial industry of cyborg finance, financial transactions operate at incredible velocities. Billions of transactions worth trillions of dollars move through cables and spectra across seas and states at the speed of milliseconds.[131] The accelerated velocity has resulted in faster executions and also faster investment turnover. "At the end of World War II, the average holding period for a stock was four years. By 2000, it was eight months. By 2008, it was two months. And by 2011 it was *twenty-two seconds* . . . ."[132] And the future of cy-fi only appears to be accelerating as financial engineers chase the speed of light with new technology like quantum computing.[133] Such velocity and acceleration give rise to a new systemic risk of "too fast to save."

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distressed and lead to large fluctuations in market prices."); Bernard S. Donefer, *Algos Gone Wild: Risk in the World of Automated Trading Strategies*, 5 J. TRADING 31, 32 (2010).

128. Geoffrey P. Miller & Gerald Rosenfeld, *Intellectual Hazard: How Conceptual Biases in Complex Organizations Contributed to the Crisis of 2008*, 33 HARV. J.L. & PUB. POL'Y 807, 810 (2010).

129. *See* BROWN, *supra* note 15, at 7; PATTERSON, *supra* note 3, at 9–10 (discussing the financial dangers of "a vicious self-reinforcing feedback loop"); Louise Story & Graham Bowley, *Market Swings Are Becoming New Standard*, N.Y. TIMES, Sept. 12, 2011, at A1.

130. *See* Henry T.C. Hu & Bernard Black, *Debt, Equity and Hybrid Decoupling: Governance and Systemic Risk Implications*, 14 EUR. FIN. MGMT. 663, 691 (2008) ("The longer the ownership chain . . . the greater the potential for agency costs and valuation errors to creep in."); Judge, *supra* note 6, at 685; *see also* Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 215 (2009).

131. *See* Fabozzi et al., *supra* note 2, at 8.

132. PATTERSON, *supra* note 3, at 46.

133. *See, e.g.*, Concept Release on Equity Market Structure, Exchange Act Release No. 34-61358, 75 Fed. Reg. 3594, 3610 (proposed Jan. 21, 2010) (codified at 17 C.F.R. pt. 242) (acknowledging the accelerating speed of modern financial markets); A. D. Wissner-Gross & C. E. Freer, *Relativistic Statistical Arbitrage*, 82 PHYSICAL REV. E 056104 (2010) (studying arbitrage opportunities for trading near the speed of light); Graham Bowley, *The New Speed of Money*, N.Y. TIMES, Jan. 2, 2011, at BU1 ("Almost each week, it seems, one exchange or another claims a new record: Nasdaq, for example, says its time for an average order 'round trip' is 98 microseconds—a mind-numbing speed equal to 98 millionths of a second."); Quentin Hardy, *Testing a New Class of*

While the accelerated speed of finance can be beneficial in terms of efficiencies, the accelerated speed also increases risks of error, volatility, market fragmentation, and malfeasance before anyone can stop it.[134] A single misinformed or rogue trader can cause material damage to a financial institution or the entire system in a very short amount of time. In 2008, a trader at Société Générale, the storied French investment bank, nearly destroyed the firm with $69 billion in unauthorized positions over a period of several months.[135] In 2011, another rogue trader at UBS, a leading Swiss investment bank, caused losses of $2.3 billion.[136]

Beyond human traders, automated programs pose even more serious systemic perils related to speed. Automated programs responding to bad data or nefarious stimuli can cause catastrophic harm to financial institutions before remedial or rescue measures can be implemented.[137] Automated programs operating at warp speeds can exacerbate volatility and reduce liquidity during periods of tumult by eliminating trading positions in the marketplace.[138] The Flash Crash serves as a prime example of the problems of "too fast to save":

> For the first time in financial history, machines can execute trades far faster than humans can intervene. That gap is set to widen. In some respects the 2010 Flash Crash and the 1987 stock market crash have common genes – algorithmic amplification of stress. But they differ in one critical respect. Regulatory intervention could feasibly have forestalled the 1987 crash. By the time of the Flash Crash, regulators might have blinked—literally, blinked—and missed their chance.[139]

Speedy Computer, N.Y. TIMES, Mar. 22, 2013, at B1; Matthew Philips, *Trading at the Speed of Light*, BUS. WK., April 2, 2012, at 46.

134. *See* FRANK PARTNOY, WAIT: THE ART AND SCIENCE OF DELAY 43 (2012); PERROW, *supra* note 119, at 71 (discussing the tendency for failures or "accidents" to compound upon one another); Haldane, *supra* note 3, at 15; s*ee also* Fabozzi et al., *supra* note 2, at 29 (discussing how emphasis on speed and technology fragments the financial industry); Matthew Baron et al., The Trading Profits of High Frequency Traders (Nov. 2012) (unpublished manuscript) (available at http://conference.nber.org/confer//2012/MMf12/Baron_Brogaard_Kirilenko.pdf) (finding that high-frequency traders profit at the expense of ordinary investors); Floyd Norris, *In Markets' Tuned-Up Machinery, Stubborn Ghosts Remain*, N.Y. TIMES, Aug. 23, 2013, at B1.

135. Nicola Clark, *Ex-Trader Gets 3 Years*, N.Y. TIMES, Oct. 6, 2010, at B1.

136. Julia Werdigier, *Revealing Details of Rouge Trades, UBS Raises Loss Estimate to $2.3 Billion*, N.Y. TIMES, Sept. 19, 2011, at B3.

137. *See* THOMAS NEAL FALKENBERRY, HIGH FREQUENCY DATA FILTERING: A REVIEW OF THE ISSUES ASSOCIATED WITH MAINTAINING AND CLEANING A HIGH FREQUENCY FINANCIAL DATABASE (2002), *available at* http://www.tickdata.com/pdf/Tick_Data_Filtering_White_Paper.pdf; Fabozzi et al., *supra* note 2, at 11.

138. PARTNOY, *supra* note 134.

139. Haldane, *supra* note 3, at 15.

Additionally, cyborg finance's emphasis on speed has also meant that traditional, institutional safeguards have been sacrificed for velocity and efficiency, making it more difficult to prevent such calamitous episodes. While such episodes may have occurred in eras past, they would have taken longer to execute and, therefore, allowed more time for intervention.

As cyborg finance accelerates, the systemic perils posed by "too fast to save" will only grow more apparent and more difficult in the coming years.

IV. CURRENT REGULATORY SHORTCOMINGS

Legal change frequently trails technological change.[140] Old laws and old regulations become blunt in the face of sharp, new financial developments.[141] As technological advances transform modern finance into cyborg finance, law's lagging performance has grown more apparent and more consequential. [142] The current regulatory framework's shortcomings can be partially traced to matters of jurisdiction, origination, and resource.

A. Matters of Jurisdiction

Sovereign and regulatory boundaries frequently bound law and regulation.[143] Yet cyborg finance is unencumbered by such quaint boundaries as it operates in a global marketplace, crosscutting states and regulators.[144] This jurisdictional dissonance helps to explain part of the

140. Lyria Bennett Moses, *Recurring Dilemmas: The Law's Race to Keep up with Technological Change*, 2007 U. ILL. J.L. TECH. & POL'Y 239, 239 (2007).

141. *See* Tara Bhupathi, *Technology's Latest Market Manipulator? High Frequency Trading: The Strategies, Tools, Risks, and Responses*, 11 N.C. J.L. & TECH. 377, 377–78 (2010) ("Rapid technological advances have . . . caus[ed] the legal world to either choose to judicially adapt old laws and policies to the new digital situations or to legislatively create new doctrines to deal with unforeseen challenges."); Stephen J. Choi & Andrew T. Guzman, *National Laws, International Money: Regulation in a Global Capital Market*, 65 FORDHAM L. REV. 1855, 1856–57 (1997); Whitehead, *supra* note 5, at 2–5 (noting the lack of regulatory innovation in response to financial innovation).

142. *See* REINHART & ROGOFF, *supra* note 6, at 224–25 (discussing the high costs of financial crises and failures).

143. *See* Morrison v. Nat'l Austl. Bank Ltd., 130 S. Ct. 2869, 2885 (2010) ("Like the United States, foreign countries regulate their domestic securities exchanges and securities transactions occurring within their territorial jurisdiction."); EEOC v. Arabian Am. Oil Co., 499 U.S. 244, 248 (1991) ("It is a longstanding principle of American law 'that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.'") (quoting Foley Bros. v. Filardo, 336 U.S. 281, 285 (1949)).

144. *See* BROWN, *supra* note 15, at 149 ("Advancements in electronic trading technology have rapidly accelerated the globalization of equity markets . . . ."); Johnson & Post, *supra* note 61, at 1367 (discussing the need for new conceptions of jurisdiction with the emergence of the Internet); Lawrence Lessig, *The Path of Cyberlaw*, 104 YALE L.J. 1743, 1743–45 (1995); Cox, *supra* note 6, at 945 ("As technology has made national borders seamless, it challenges the territorial orientation of securities regulations."); *see also* JACK GOLDSMITH & TIM WU, WHO CONTROLS THE INTERNET?: ILLUSIONS OF A BORDERLESS WORLD vii–viii (2006) (finding that the Internet is "becoming bordered");

current regulatory framework's shortcomings in governing financial innovation.

Because of the jurisdictional dissonance between government regulators and the regulated, financial industry participants and products exist in spaces with varying degrees of governance. In some spaces, multiple competing regulators govern participants and products across various territories and agencies with rules that overlap and conflict.[145] For instance, a complex multiplicity of regulators in the United States and the United Kingdom govern investment banks with intercontinental presence.[146] In other spaces, financial participants and products exist in regulatory penumbras with little oversight.[147] As an example, the credit default swap markets operated with few regulations and little oversight for many years prior to the Financial Crisis.[148]

The jurisdictional dissonance between the regulators and the regulated has encouraged financial players to engage in games of regulatory arbitrage within and across nations, by skirting and leaping ahead of existing law, and by moving between shadow finance and regulated finance.[149] The jurisdictional gaps and gulfs among regulators often serve as fertile ground for financial innovation and malfeasance.[150] As cy-fi continues to push and

145. *See* Fisch, *supra* note 6, at 787 (discussing jurisdictional conflict among regulators).

146. *See* Jack Ewing, *Global Rules for Banks Draw Near*, N.Y. TIMES, Sept. 11, 2010, at B1 (discussing the complexities in creating and standardizing banking rules internationally).

147. *See, e.g.*, ALEXANDER DAVIDSON, HOW THE GLOBAL FINANCIAL MARKETS REALLY WORK: THE DEFINITIVE GUIDE TO UNDERSTANDING INTERNATIONAL INVESTMENT AND MONEY FLOWS 17 (2009) (discussing shadow banking and financial regulation); Robert A. Eisenbeis, *Agency Problems and Goal Conflicts in Achieving Financial Stability: The Case of the EMU*, *in* THE STRUCTURE OF FINANCIAL REGULATION 232, 235 (David G. Mayes & Geoffrey E. Wood eds., 2007) (explicating on state and federal financial regulation conflicts); James J. Park, *The Competing Paradigms of Securities Regulation*, 57 DUKE L.J. 625, 665 (2007) (suggesting that regulatory competition creates regulatory gamesmanship opportunities).

148. *See* James E. Kelly, *Transparency and Bank Supervision*, 73 ALB. L. REV. 421, 424 (2010) (noting regulatory gaps relating to "hedge funds; derivatives markets; off balance sheet entities; the credit ratings agencies; firms' disclosure of risk, valuation, and compensation policies; securitized and structured products"); Whitehead, *supra* note 5, at 34 ("[Credit default swaps] were also exempt from regulation under the Securities Act of 1933 and the Securities Exchange Act of 1934, and were preempted from state gaming or bucketshop laws under the Commodity Exchange Act.") (footnote omitted); Gretchen Morgenson, *First Comes the Swap*. *Then It's the Knives*., N.Y. TIMES, June 1, 2008, at BU1; Interview by Michael Kirk with Brooksley Born, Chair 1996–1999, Commodity Futures Trading Comm'n (Aug. 28, 2009), *available at* http://www.pbs.org/wgbh/pages/frontline/warning/interviews/born.html ("When I was chair of the Commodity Futures Trading Commission [CFTC], I became aware of how quickly the over-the-counter derivatives market was growing, how little any of the federal regulators knew about it.").

149. *See* Victor Fleischer, *Regulatory Arbitrage*, 89 TEX. L. REV. 227, 229 (2010); Edward F. Greene & Elizabeth L. Broomfield, *Promoting Risk Mitigation, Not Migration: A Comparative Analysis of Shadow Banking Reforms by the FSB, USA and EU*, 8 CAP. MKTS. L.J. 6, 14–15 (2013); Robin Greenwood and David S. Scharfstein, *How to Make Finance Work*, at 107.

150. *See, e.g.*, GILLIAN TETT, FOOL'S GOLD: HOW THE BOLD DREAM OF A SMALL TRIBE AT J.P. MORGAN WAS CORRUPTED BY WALL STREET GREED AND UNLEASHED A CATASTROPHE 39–47 (2009)

break traditional regulatory boundaries based on jurisdiction, law must seek new paradigms to better address this shortcoming.[151]

B. Matters of Origination

Law is built on reaction, precedent, and predictability,[152] but cyborg finance is built on initiative, innovation, and change.[153] Financial regulations often do not originate organically; instead, they are the children of busts and scandals and become orphans in boom times.[154] The aftermath of the Great Depression led to the creation of the SEC and the modern federal securities regulatory framework.[155] The Enron and WorldCom scandals served as catalysts for the Sarbanes Oxley Act.[156] The Financial Crisis sowed the seeds of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank).[157] In response to the Flash Crash, regulators implemented new rules to address high-frequency trading.[158] Finance innovation, in contrast, originates organically as market participants create and change in the dynamic pursuit of profit.

(discussing how the derivatives market originated from regulatory evasion); Charles W. Calomiris, *Financial Innovation, Regulation, and Reform*, 29 CATO J. 65, 65 (2009) (explaining how financial innovation is often borne out of "sidestepping regulatory restrictions").

151. *See, e.g.*, Choi & Guzman, *supra* note 6, at 904–08; Merritt B. Fox, *Securities Disclosure in a Globalizing Market: Who Should Regulate Whom*, 95 MICH. L. REV. 2498, 2501–03 (1997).

152. *See, e.g.*, Frederick G. Kempin, Jr., *Precedent and Stare Decisis: The Critical Years, 1800 to 1850*, 3 AM. J. LEGAL HIST. 28, 28 (1959) ("The modern doctrine of stare decisis as applied in the United States is a general policy of all courts to adhere to the ratio decidendi of prior cases decided by the highest court in a given jurisdiction . . . .").

153. *See, e.g.*, Henry T.C. Hu, *Misunderstood Derivatives: The Causes of Informational Failure and the Promise of Regulatory Incrementalism*, 102 YALE L.J. 1457, 1479 (1993) ("To stay competitive, banks constantly introduce new financial products because margins on products decline quickly."); Eamonn K. Moran, *Wall Street Meets Main Street: Understanding the Financial Crisis*, 13 N.C. BANKING INST. 5, 33 (2009) (discussing the financial innovation behind mortgage-backed securities and collateralized debt obligations).

154. *See* ERIK F. GERDING, LAW, BUBBLES, AND FINANCIAL REGULATION 2–3 (2013) Stuart Banner, *What Causes New Securities Regulation? 300 Years of Evidence*, 75 WASH. U. L.Q. 849, 850 (1997) ("[M]ost of the major instances of new securities regulation in the past three hundred years of English and American history have come right after crashes."); John C. Coffee, Jr., *The Political Economy of Dodd-Frank: Why Financial Reform Tends To Be Frustrated and Systemic Risk Perpetuated*, 97 CORNELL L. REV. 1019, 1020 (2012) ("[O]nly after a catastrophic market collapse can legislators and regulators overcome the resistance of the financial community and adopt comprehensive 'reform' legislation."); Grundfest, *supra* note 6, at 1 ("[E]very dramatic change in the structure of our securities laws has been provoked by a perceived failure in the capital markets that stimulated a regulatory response.").

155. JACK E. KIGER ET AL., ACCOUNTING PRINCIPLES 409 (1984).

156. Larry E. Ribstein, *Bubble Laws*, 40 HOUS. L. REV. 77, 83 (2004).

157. SKEEL, *supra* note 5, at 43–59.

158. *See* Troy A. Paredes, Comm'r, SEC, Speech by SEC Commissioner: Remarks at the Symposium on "Hedge Fund Regulation and Current Developments" (June 8, 2011) (transcript available at http://www.sec.gov/news/speech/2011/spch060811tap.htm) (remarking on new regulatory proposals following the Flash Crash).

Because of this dissonance in origination, law frequently lags behind finance. New financial products and problems frequently lack elegant legal guidance and remedies. In some cases, the swiftness of financial innovation simply laps the slowness of rulemaking.[159] In other cases, mistimed, mismatched, and misinformed regulations create the bases for future financial problems.[160] This reactionary approach to rulemaking has led some leading corporate law scholars to call such an approach to financial regulation, "quack corporate governance."[161]

Because of this dissonance in origination, law has fallen gravely short in effectively governing financial markets. As cy-fi continues to innovate and evolve, law must re-examine its sources of origination in order to be more effective.[162]

C. Matters of Resource

There exists a significant resource asymmetry between participants in cyborg finance and the government regulators that oversee them. While the pursuit of profits drives financial firms to invest in technology and expertise, regulatory funding lacks a similar driving force and is often constrained by politics.[163]

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159. *See*, SEQUENCING?: FINANCIAL STRATEGIES FOR DEVELOPING COUNTRIES 133 (Alison Harwood & Bruce L. R. Smith eds., 1997); Ben Protess & Jessica Silver-Greenberg, *Senate Report Said to Fault JPMorgan on Loss*, N.Y. TIMES, March 5, 2013, at B1 (reporting on huge losses from risky trading while regulators have spent years trying to finalize and implement the Volcker Rule to curb such trading activities).

160. *See, e.g.*, Calomiris, *supra* note 150, at 67 ("Risk-taking was driven by government policies; government's *actions* were the root problem, not government *inaction*.").

161. *See* Stephen M. Bainbridge, *Dodd-Frank: Quack Federal Corporate Governance Round II*, 95 MINN. L. REV. 1779, 1821 (2011); Roberta Romano, *The Sarbanes-Oxley Act and the Making of Quack Corporate Governance*, 114 YALE L. J. 1521 (2005).

162. *See, e.g.*, Evan J. Criddle, *Fiduciary Administration: Rethinking Popular Representation in Agency Rulemaking*, 88 TEX. L. REV. 441, 448–49 (2010) (proposing a new regulatory model based on fiduciary duties); Randy J. Kozel & Jeffrey A. Pojanowski, *Administrative Change*, 59 UCLA L. REV. 112, 115 (2011) (suggesting a regulatory model based on "prescriptive reasoning").

163. *See Testimony on Budget and Management of the U.S. Securities Exchange Commission: Hearing Before the H. Comm. on Fin. Servs., & the Subcomm. on Capital Mkts., Ins., and Gov't-Sponsored Enters. of the H. Comm. on Fin. Servs.*, 112th Cong. (2011) (statement of Robert Khuzami et al., Dirs., Secs. Exch. Comm'n), *available at* http://www.sec.gov/news/testimony/2011/ts031011 directors.htm ("Over the past decade, the SEC has faced significant challenges in maintaining a staffing level and budget sufficient to carry out its core mission. The SEC experienced three years of frozen or reduced budgets . . . that forced a reduction of 10 percent of the agency's staff. Similarly, the agency's investments in new or enhanced IT systems declined about 50 percent . . . ."); Arthur Levitt Jr., Op-Ed, *Don't Gut the S.E.C.*, N.Y. TIMES, Aug. 8, 2011, at A19 (opining on the funding and political constraints on the SEC); Mark Maremont & Deborah Solomon, *Missed Chances: Behind SEC's Failings: Caution, Tight Budget, '90s Exuberance*, WALL ST. J., Dec. 24, 2003, at A1; Richard Rubin, *House Panel Endorses Budget Cuts at IRS, Consumer Bureau*, BLOOMBERG, June 16, 2011, *available at* http://www.bloomberg.com/news/2011-06-16/house-panel-endorses-budget-cuts-at-irs-consumer-bureau-1-.html ("[Because of budget cuts], the SEC wouldn't be able to carry out the new

Resource limitations can directly impact regulators on important matters of technology and expertise. In terms of technology, industry participants invest millions of dollars into the technology that is at the heart of cy-fi, while regulators lack similar resources to keep pace.[164] For instance, while the financial industry pushes into the new frontiers of technology, the federal government still has agencies that use floppy disks to submit information to the Federal Register in the year 2013. [165] In terms of expertise, private cy-fi participants can earn millions of dollars and continue to deepen their expertise.[166] Government regulators generally earn a fraction of that income with fewer opportunities for expertise development.[167] These significant compensation disparities have made it difficult for regulators to attract and retain talent.[168] Given the technology and complexity behind cyborg finance, effective regulation requires regulators that have sufficient technological capacity and financial comprehension to understand the industry that they seek to regulate.[169]

Moreover, regulated firms also expend significant influence to lobby policymakers, while regulators lack a similar influence.[170] A deleterious

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responsibilities it received in the Dodd-Frank law."); James B. Stewart, *As a Watchdog Starves, Wall St. Is Tossed a Bone*, N.Y. TIMES, July 16, 2011, at A1 (discussing the small budgets of financial regulators like the SEC).

164. Nathaniel Popper & Ben Protess, *To Regulate High-Speed Traders, S.E.C. Turns to One of Them*, N.Y. TIMES, Oct. 8, 2012, at B1.

165. Jada F. Smith, *Slowly They Modernize: A Federal Agency that Still Uses Floppy Disks*, N.Y. TIMES, Dec. 7, 2013, at A14.

166. *See, e.g.*, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-11-654, SEC: EXISTING POST-EMPLOYMENT CONTROLS COULD BE FURTHER STRENGTHENED (2011), *available at* http://www.gao.gov/new.items/d11654.pdf (studying the revolving door between the SEC and the private sector); MICHAEL SMALLBERG, PROJECT ON GOV'T OVERSIGHT, DANGEROUS LIAISONS: REVOLVING DOOR AT SEC CREATES RISK OF REGULATORY CAPTURE (2013), *available at* http://pogoarchives.org/ebooks/20130211-dangerous-liaisons-sec-revolving-door.pdf; JAMES Q. WILSON ET AL., AMERICAN GOVERNMENT: INSTITUTIONS & POLICIES 279 (11th ed. 2008) ("Every year, hundreds of people leave important jobs in the federal government to take more lucrative positions in private industry.").

167. *See, e.g.*, U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 166; WILSON, *supra* note 166, at 279. While this has traditionally been the case, in the last few decades, the compensation gap between those in the industry and those in government regulating the industry has grown exponentially. Admittedly, better compensated financial regulators and monitors do exist, namely private industry and intra-institution regulators like stock exchange officials, in-house attorneys, and compliance officers. Nevertheless, the commentary herein focuses on external, governmental regulators, who arguably serve as the most prominent and consequential financial regulators.

168. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 166; Edward Wyatt, *Study Questions Risk of S.E.C. Revolving Door*, N.Y. TIMES, Aug. 6, 2012, at B2.

169. *See, e.g.*, PATTERSON, *supra* note 3, at 230 ("The new hierarchy would be all about who owned the most powerful computers, the fastest links between markets, the most sophisticated algorithms—and the inside knowledge of how the market's plumbing was put together."); Hu, *supra* note 6, at 412; Fisch, *supra* note 6, at 820.

170. *See* Roberta S. Karmel, *IOSCO's Response to the Financial Crisis*, 37 J. CORP. L. 849, 853 (2012) ("Where regulated industries have so much power and influence over lawmakers, there is a lack of political will to engage in vigorous regulation even when regulators perceive the dangers of

consequence of this influence is that financial regulators can become "captured" by the industry.[171] Prior to the Financial Crisis, partially due to industry lobbying, credit default swaps[172] and hedge funds[173] were left largely unregulated under existing rules. Following the Financial Crisis, industry lobbyists were (and are) at the forefront of helping to draft financial reform rules and regulations.[174]

As a result of the resource disparities between the regulators and the regulated, it has been challenging for regulators to meaningfully police financial industry participants.[175] The net effect is a marketplace where large segments are poorly regulated or regulated only on paper. [176] As cy-fi continues to advance, policymakers must examine ways to narrow the resource disparities between the regulators and the regulated with new funding sources and new paradigms of financial governance.[177]

V. REGULATORY PRINCIPLES FOR THE NEW FINANCIAL INDUSTRY

Regulating the new financial industry of cyborg finance will be one of the most important endeavors for government and industry policymakers in the coming years. While actual and potential challenges presented by cy-fi are many, serious, and real,[178] so are its actual and potential benefits. Thus, regulatory efforts to govern it must be sensible and thoughtful, and they

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insufficient market place standards."); Rebecca M. Kysar, *The Sun Also Rises: The Political Economy of Sunset Provisions in the Tax Code*, 40 GA. L. REV. 335, 392 (2006) ("Through campaign contributions and lobbyists, these [interest] groups seek legislative votes favorable to their interests from politicians."); *see also* MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION: PUBLIC GOODS AND THE THEORY OF GROUPS 33–36 (2d ed. 1971).

171. *See, e.g.*, Saule T. Omarova, *The Quiet Metamorphosis: How Derivatives Changed the "Business of Banking,"* 63 U. MIAMI L. REV. 1041, 1077 (2009) (analyzing industry "capture" of the Office of the Comptroller of Currency).

172. *See* 7 U.S.C. § 16(e)(2) (2006); Frank Partnoy & David A. Skeel, Jr., *The Promise and Perils of Credit Derivatives*, 75 U. CIN. L. REV. 1019, 1046–47 (2007); Whitehead, *supra* note 5, at 34.

173. Troy A. Paredes, *On the Decision to Regulate Hedge Funds: The SEC's Regulatory Philosophy, Style, and Mission*, 2006 U. ILL. L. REV. 975, 976–1001.

174. *See* JEFF CONNAUGHTON, THE PAYOFF: WHY WALL STREET ALWAYS WINS (2012); ROBERT G. KAISER, ACT OF CONGRESS: HOW AMERICA'S ESSENTIAL INSTITUTION WORKS, AND HOW IT DOESN'T 127–41 (2013); Eric Lipton & Ben Protess, *Banks' Lobbyists Help in Drafting Bills on Finance*, N.Y. TIMES, May 24, 2013, at A1.

175. It should be noted that despite asymmetric resources, the SEC has recently had some high profile victories against better-resourced participants in the financial industry. *See* Devin Leonard, *Outmanned, Outgunned, And On a Roll*, BUS. WK., April 23, 2012, at 60–66.

176. Serritella, *supra* note 21, at 441–42.

177. *See* Omarova, *supra* note 1, at 427 (advocating for more private regulation as a form of new governance); *see also* Orly Lobel, *The Renew Deal: The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought*, 89 MINN. L. REV. 342, 343–44 (2004) (describing a new governance model based on de-centralization, localization, and collaboration).

178. *See* Derek E. Bambauer, *Conundrum*, 96 MINN. L. REV. 584, 598–603 (2011) (describing the challenges of regulating cyberspace issues).

must not inhibit the promise and "generativity" of cy-fi.[179] Toward that end, this Part of the Article proposes a preliminary set of first principles for cyborg finance that should be considered by policymakers in creating a better regulatory framework for the emerging, new financial industry.

A. Embrace Reality

Policymakers should embrace the functional realities of the new financial industry in terms of its individual and institutional participants when designing regulations for cyborg finance.[180] Policymakers may need to update antiquated paradigms of reasonable individual investors and elegantly compartmentalized institutions in order to better regulate the financial industry.

In terms of individuals, financial regulators have long operated under the assumption that individual participants in the financial industry are rational actors of neo-classical economic theory who invest for the long term.[181] Financial regulation for the mythical rational actor is fairly simple: equip him with the requisite information, and he would then perfectly process that information and make the utility-maximizing decision.[182] Thus, transparency and disclosure have been longtime hallmarks of financial regulation.[183]

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179. *See* LAWRENCE LESSIG, THE FUTURE OF IDEAS: THE FATE OF THE COMMONS IN A CONNECTED WORLD 8–16 (2002) (arguing that misguided regulations can inhibit the potential of new technology); Jonathan L. Zittrain, *The Generative Internet*, 119 HARV. L. REV. 1974, 1980–81 (2006).

180. *See, e.g.*, Ronald Coase, *Saving Economics from the Economists*, HARV. BUS. REV., Dec. 2012, at 36 (arguing that policymakers need to focus on the realities of the world in order to remain effective and relevant).

181. *See* Regulation NMS, Exchange Act Release No. 34-51808, 70 Fed. Reg. 37,496, 37,500 (June 29, 2005) ("Indeed, the core concern for the welfare of long-term investors . . . was first expressed in the foundation documents of the Exchange Act itself."); Joan MacLeod Heminway, *Female Investors and Securities Fraud: Is the Reasonable Investor a Woman?*, 15 WM. & MARY J. WOMEN & L. 291, 297 (2009); David A. Hoffman, *The "Duty" to Be a Rational Shareholder*, 90 MINN. L. REV. 537, 537–39 (2006); Margaret V. Sachs, *Materiality and Social Change: The Case for Replacing "the Reasonable Investor" with "the Least Sophisticated Investor" in Inefficient Markets*, 81 TUL. L. REV. 473, 475 (2006).

182. *See* GARY S. BECKER, THE ECONOMIC APPROACH TO HUMAN BEHAVIOR 14 (1976) (advocating use of the economic approach for understanding human behavior); JOEL SELIGMAN, THE TRANSFORMATION OF WALL STREET: A HISTORY OF THE SECURITIES AND EXCHANGE COMMISSION AND MODERN CORPORATE FINANCE 39–40 (3d ed. 2003); Troy A. Paredes, *Blinded by the Light: Information Overload and Its Consequences for Securities Regulation*, 81 WASH. U. L.Q. 417, 418 (2003).

183. *See, e.g.*, SELIGMAN, *supra* note 182; Tom C.W. Lin, *A Behavioral Framework for Securities Risk*, 34 SEATTLE U. L. REV. 325, 336 (2011) ("In practice, this assumption has produced a regulatory framework that emphasizes more information over less information, more disclosure over better disclosure, quantity over quality.").

In order to remain effective, financial regulators need to better embrace the reality that actual individuals and investors are not rational actors.[184] A voluminous body of behavioral law and economics literature suggests that actual investors suffer from cognitive quirks, such as overconfidence and status quo bias, which affect their ability to process information perfectly and make optimal decisions consistently.[185] Admittedly, following the Financial Crisis, there has been greater awareness of the fallacies of the rational actor as the reasonable investor assumption.[186]

Beyond the imperfect assumption of investor rationality, with the emergence of cyborg finance, regulators also need to be more mindful that new investors have capabilities unmatched by previous paradigms of investors.[187] Given the inextricable technology that is at the heart of modern finance, new investors are essentially cyborgs—part human, part machine. New investors are faster, smarter, more global, and less human; they should be regulated accordingly.[188]

In terms of institutions, for too long financial regulation has been organized on elegantly compartmentalized institutional categories.[189] Distinct regulators oversaw commercial banks, thrifts, broker-dealers, and investment banks, respectively, for much of the last seven decades.[190] But

184. *See* Stephen J. Choi & A.C. Pritchard, *Behavioral Economics and the SEC*, 56 STAN. L. REV. 1, 2 (2003); Christine Jolls et al., *A Behavioral Approach to Law and Economics*, 50 STAN. L. REV. 1471, 1473–76 (1998); Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551, 1552–56 (1998).

185. *See* DANIEL KAHNEMAN, THINKING, FAST AND SLOW 377–85 (2011); Robert B. Ahdieh, *The Visible Hand: Coordination Functions of the Regulatory State*, 95 MINN. L. REV. 578, 625 (2010) ("Over the last twenty years, psychologists and experimental economists have collected significant evidence that the rationality assumption of neoclassical economics fares poorly in the real world."); Ehud Guttel & Alon Harel, *Matching Probabilities: The Behavioral Law and Economics of Repeated Behavior*, 72 U. CHI. L. REV. 1197, 1197–200 (2005); Robert J. Shiller, *Measuring Bubble Expectations and Investor Confidence*, 1 J. PSYCHOL. & FIN. MKTS. 49, 50–52 (2000) (studying investor overconfidence); Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99 (1955).

186. *See, e.g.*, *The Financial Crisis and the Role of Federal Regulators: Hearing Before the H. Comm. on Oversight and Gov't Reform*, 110th Cong. 46 (2008) (statement of Alan Greenspan, Former Chairman of the Fed. Reserve Bd.) (acknowledging that he "found a flaw in the [neoclassical] model that . . . defines how the world works"); Richard A. Posner, *How I Became a Keynesian*, NEW REPUBLIC, Sept. 23, 2009, at 34.

187. *See* Lin, *supra* note 4, at 699–703 (discussing a new investor paradigm in cyborg finance).

188. *See, e.g.*, CLIVE THOMPSON, SMARTER THAN YOU THINK: HOW TECHNOLOGY IS CHANGING OUR MINDS FOR THE BETTER 6 (2013) ("At their best, today's digital tools help us see more, retain more, communicate more.")

189. *See* Anita K. Krug, *Escaping Entity-Centrism In Financial Services Regulation*, 113 COLUM. L. REV. 2039, 2049 (2013) ("Financial services regulation embodies entity-centrism, in that it is largely premised on the notion that the entity is the appropriate unit of regulation."); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-32, FINANCIAL REGULATION: INDUSTRY TRENDS CONTINUE TO CHALLENGE THE FEDERAL REGULATORY STRUCTURE 4–5 (2007); Jackson, *supra* note 6, at 332–39; Whitehead, *supra* note 5, at 2–3.

190. *See, e.g.*, Michael S. Barr, *The Financial Crisis and the Path of Reform*, 29 YALE J. ON REG. 91, 97 (2012) ("Before Dodd-Frank, major financial firms were regulated according to their formal

in recent years, financial institutions operate and penetrate across old categories, rendering such categorizations quaint and arbitrary.[191] Sophisticated financial industry participants today frequently exist less as singular entities and more as a collection of entities. JPMorgan Chase, for example, through subsidiary companies and limited partnerships, has significant operations in commercial banking, investment banking, consumer finance, financial processing, and private equity.[192] Smaller entities, like hedge funds and private equity groups, also work across multiple segments of the financial industry. As a result of this financial evolution, the old categorical approach to financial regulation does not match the functional realities of the new marketplace.

This mismatched categorical approach to regulation can have significant consequences on the effectiveness of regulation. The categorical approach, for instance, largely presumes that if individual categories and individual institutions were safeguarded and stabilized, then the entire financial system would be safeguarded and stabilized.[193] While elegant, this syllogism is false. Efforts targeted at protecting individual institutions or select categories of institutions by industry players and regulators can result in actions and consequences that harm the entire system given the crosscutting, linked realities of the new financial industry.[194] Borrowing lessons and language from property law, attempts at imposing categorical regulation to cross-categorical industry participants can lead to financial tragedies of the commons, where due to misguided regulations, firms

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labels—as banks, thrifts, investment banks, insurance companies, and the like—rather than according to what they actually did."); Gary Gorton, *Bank Regulation When "Banks" and "Banking" Are Not the Same*, 10 OXFORD REV. ECON. POL'Y 106, 107 (1994); Heidi Mandanis Schooner & Michael Taylor, *United Kingdom and United States Responses to the Regulatory Challenges of Modern Financial Markets*, 38 TEX. INT'L L.J. 317, 328–29 (2003) (noting that financial regulatory mandates are largely categorically-driven); *see generally* MARK JICKLING & EDWARD V. MURPHY, CONG. RESEARCH SERV., R40249, WHO REGULATES WHOM? AN OVERVIEW OF U.S. FINANCIAL SUPERVISION (2010).

191. *See* Howell E. Jackson, *The Expanding Obligations of Financial Holding Companies*, 107 HARV. L. REV. 507, 509 (1994) ("[T]oday's financial giants . . . now operate in multiple sectors of the industry, typically through a network of subsidiaries specializing in deposit-taking, insurance underwriting, securities activities, and various other financial services."); Robert C. Merton, *Financial Innovation and the Management and Regulation of Financial Institutions*, 19 J. BANKING & FIN. 461, 466–70 (1995); Schwarcz, *supra* note 5, at 374–75.

192. *See* JPMorgan Chase & Co., Annual Report (Form 10-K) 1 (Feb. 29, 2012) ("[JPMorgan Chase] is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing, asset management and private equity.").

193. MARKUS KONRAD BRUNNERMEIER ET AL., THE FUNDAMENTAL PRINCIPLES OF FINANCIAL REGULATION xv (2009).

194. *See Id*. ("It is perhaps banal by now to point out that the reason why we try to prevent banking crises is that the costs to society are invariably enormous and exceed the private cost to individual financial institutions."); Beverly J. Hirtle et al., *Macroprudential Supervision of Financial Institutions: Lessons from the SCAP* 1 (Fed. Reserve Bank of N.Y., Staff Report No. 409, 2009), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1515800.

undertake self-serving, aggressive actions, such as overcapitalizing their reserves, which may harm the entire system in the long run.[195] Alternatively, such attempts could also lead to financial tragedies of the anticommons, where regulatory restrictions cause industry participants to underutilize available capital to the detriment of the financial system and the economy.[196]

Following the Financial Crisis, there have been greater regulatory efforts to recognize the cross-categorical nature of financial participants.[197] Many of the provisions in Dodd-Frank were intended to better regulate large financial institutions with cross-categorical presence.[198] With the emergence of cyborg finance, those efforts should be redoubled as cy-fi has made it possible for more institutional participants to operate across more traditional categories at higher speeds and greater magnitudes. In the new financial industry, one institution can perform functions that in eras past would have required multiple investment banks, commercial banks, and brokerages to act in concert. The fact of the matter is that many financial industry participants work across traditional categories of regulation. And thus, they should be regulated in modes that break away from stale, isolated categories.[199]

In sum, in order to effectively regulate cyborg finance, as a matter of first principles, policymakers should embrace the emerging individual and institutional realities of finance, and should be mindful of the fact that old paradigms of governance may be ill-suited and inadequate for the new financial industry.

B. Enhance Disclosure

When thinking about regulating cyborg finance, policymakers should enhance the old financial regulatory tool of disclosure.[200] By thoughtfully building upon existing disclosure rules and practices, policymakers can create a familiar, yet smarter framework for cy-fi.[201]

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195. *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCI. 1243, 1244–45 (1968) (explaining the tragedy of commons concept).

196. *See* Michael A. Heller, *The Tragedy of Anticommons: Property in the Transition From Marx to Markets*, 111 HARV. L. REV. 621, 624 (1998) (introducing the tragedy of anticommons concept).

197. *See* CONG. OVERSIGHT PANEL, *supra*, note 5, at 22–24, 29.

198. Judge, *supra* note 6, at 659.

199. *See* Schwarcz, *supra* note 5, at 374 (calling old modes of financial regulation focused on banks "anachronistic"); Whitehead, *supra* note 5, at 42 (advocating for a new "supra-functional approach" to financial regulation that is not limited by "function, categories, or intermediaries").

200. *See* Hu & Black, *supra* note 130, at 693.

201. *See, e.g.*, Jose A. Lopez, *Disclosure as a Supervisory Tool: Pillar 3 of Basel II* 1 (Fed. Reserve Bank of S.F., Econ. Letter 2003-22, 2003), *available at* http://www.frbsf.org/publications/economics/letter/2003/el2003-22.pdf ("The principle underlying

The existing federal securities regime is largely based on the straightforward motivation to "substitute a philosophy of full disclosure for the philosophy of *caveat emptor*."[202] Currently, publicly traded companies are required to make periodic and timely disclosures to the investing public. The working assumption is that with good disclosures, the financial market, like other efficient markets, would inform and govern itself and allocate capital accordingly.[203] Despite inherent flaws and notable setbacks, this disclosure-oriented framework has worked fairly well in terms of creating a growing economy and robust capital markets in America.[204] Nonetheless, in the aftermath of the Financial Crisis, many policymakers and commentators have suggested that prior to the crisis regulators allowed the financial industry participants to provide too little disclosure and operate in the shadows.[205]

With the emergence of cyborg finance, in order to maintain an efficient marketplace, policymakers should examine how they can adapt and update old disclosure practices to an industry that is more complex and more technologically driven than ever before.[206] The vast array of interlinked, complex instruments moving around the cyborg financial infrastructure is a departure from the relatively simple financial industry of the past where instruments like bonds and stocks dominated the marketplace.[207] The

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Pillar 3 is that improved public disclosure of relevant information should enhance market discipline and hence its potential usefulness to bank supervisors."); Robert P. Bartlett, III, *Making Banks Transparent*, 65 VAND. L. REV. 293 (2012) (advocating for enhanced disclosure as a tool for better financial regulation); Hu, *supra* note 5, at 1607–12 (suggesting a new disclosure paradigm based on "pure information" and new technology); Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 16–17.

202. SEC v. Capital Gains Research Bureau, Inc., 375 U.S. 180, 186 (1963).

203. *See* BECKER, *supra* note 182; Hu, *supra* note 5, at 1607; Arthur Fleischer, Jr., *"Federal Corporation Law": An Assessment*, 78 HARV. L. REV. 1146, 1148–49 (1965) ("Because disclosure is designed to provide investors with the data necessary to make informed judgments, the information required may encompass all aspects of corporate life, and consequently all aspects of corporate life may be affected." (footnote omitted)).

204. *See, e.g.*, OFFICE OF MGMT. & BUDGET, EXEC. OFFICE OF THE PRESIDENT, BUDGET OF THE UNITED STATES GOVERNMENT, FISCAL YEAR 2006, 20–21 (2005), *available at* http://www.gpo.gov/fdsys/pkg/BUDGET-2006-BUD/pdf/BUDGET-2006-BUD-7.pdf (detailing the rise of the U.S. gross domestic product since 1940); Bengt Holmstrom & Steven N. Kaplan, *The State of U.S. Corporate Governance: What's Right and What's Wrong?*, 15 J. APPLIED CORP. FIN. 8, 8 (Spring 2003) ("Despite the alleged flaws in its governance system, the U.S. economy has performed very well, both on an absolute basis and particularly relative to other countries."); s*ee* CHARLES ROXBURGH ET AL., MCKINSEY GLOBAL INST., GLOBAL CAPITAL MARKETS: ENTERING A NEW ERA 9 (2009) (depicting the growth of U.S. capital markets).

205. *See* CONG. OVERSIGHT PANEL, *supra*, note 5, at 13–15.

206. Accurate timely information has long been a hallmark of efficient capital markets. *See, e.g.,* Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383, 404 (1970); Ronald J. Gilson & Reinier H. Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549, 550–66 (1984) (explaining that informed trading is a prerequisite for efficient markets).

207. Even in traditional financial markets, information asymmetry was a huge problem for market participants. *See* Bernard S. Black, *Information Asymmetry, the Internet, and Securities Offerings*, 2 J.

current paradigm is built on the disclosure of material information written in "plain English" by firms and issuers.[208] While informative, the current paradigm may be ill-suited and inadequate to depict the complex risks and realties of cyborg finance.[209] In a marketplace with vast complex links and linked products, investors and participants in the various lower chains of cy-fi may be seriously under-informed or misinformed by the current disclosure paradigm that cannot fully depict this complex financial web.[210] At best, firms and issuers are only capable of depicting one piece of a much larger mosaic. Therefore, more information in terms of volume and variety may need to be disclosed in order to better inform market participants.[211]

Mindful of new technological capabilities, policymakers should examine new ways to leverage technology towards creating a better, more workable disclosure framework. Policymakers should move beyond quaint beliefs that regulated disclosures are intended to be read by average, reasonable investors, so they must be written in "plain English."[212] The reality is that most reasonable investors do not educate themselves through raw, regulated disclosures, which at times can amount to information overload for many average investors.[213] Rather, in the age of cy-fi, professionals using artificial intelligence programs process regulated disclosures in ways and at speeds previously unimaginable.[214] Investors in the new financial industry may need to depend less on the depicted

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SMALL & EMERGING BUS. L. 91, 92 (1998) ("[T]he single largest cost that stands between issuers and investors is the problem of asymmetric information.").

208. *See* Presentation of Information in Prospectuses, 17 C.F.R. § 230.421(b) (2013) ("You must present the information in a prospectus in a clear, concise and understandable manner."); Plain English Disclosure, Securities Act Release No. 7497, Exchange Act Release No. 39,593, Investment Company Act Release No. 23,011, 63 Fed. Reg. 6370 (Feb. 6, 1998); OFFICE OF INVESTOR EDUC. & ASSISTANCE, SEC, A PLAIN ENGLISH HANDBOOK: HOW TO CREATE CLEAR SEC DISCLOSURE DOCUMENTS 4 (1998).

209. *See* Hu, *supra* note 5, at 1608 (arguing that conventional disclosure methodoligies "are especially limited in their ability to convey the pertinent quantitative aspects of financial innovations and of banks involved in such innovations"); Donald C. Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Mislead Stock Market Investors (and Cause Other Social Harms)*, 146 U. PA. L. REV. 101, 135–46 (1997).

210. *See, e.g.*, BD. OF GOVERNORS OF THE FED. RESERVE SYS., REPORT TO THE CONGRESS ON RISK RETENTION 41 (2010), *available at* http://federalreserve.gov/boarddocs/rptcongress/securitization/riskretention.pdf ("Participants in securitization markets—originators, securitizers, rating agencies, and investors—have come to recognize that investors may have less information than other members of the securitization chain, particularly about the credit quality of the underlying assets.").

211. *See* Judge, *supra* note 6, at 690–96 (commenting on how financial complexity leads to information loss and dangerous consequences).

212. *See supra* note 208.

213. Paredes, *supra* note 182.

214. *See* Hu, *supra* note 5, at 1607 (suggesting that a new disclosure paradigm can be "facilitated by innovations in computer and Internet technologies").

disclosures of firms and issuers.[215] Advances in information technology have made it possible for market participants to process information that is more voluminous, more complex, and more unfiltered at faster rates than ever before.[216] As such, policymakers can reform the volume and variety of information disclosed to include more unfiltered data so that all investors can benefit directly or indirectly from that information. Sophisticated investors can benefit from that information using their superior technical capacity and financial expertise to analyze it; and ordinary investors can benefit from repackaged presentations of that information from market entrepreneurs, in addition to more accurate prices in a market with better information.[217]

Following the Financial Crisis, policymakers have taken actions to better leverage technology to enhance disclosure. Dodd-Frank requires the disclosure of swap prices and volume data "as soon as technologically practicable."[218] The SEC has also adopted a "consolidated audit trail" rule to make it easier for regulators to monitor and track the complex securities clearinghouse infrastructure.[219] At the end of 2013, pursuant to the Jumpstart Our Business Startups Act (the "JOBS Act"),[220] the SEC also issued a comprehensive study on how to modernize disclosure processes.[221]

In sum, as a matter of first principles, policymakers should aim to enhance the traditional regulatory tool of disclosure for cyborg finance. Through a fresh recognition of present financial complexities and technological capacities, policymakers may be able to upgrade an old tool for a new time.[222] While enhanced disclosure by itself will not cure all

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215. *See id*. at 1610 (arguing that "[i]f the investor is given the opportunity to see reality itself with his own eyes, he could come much closer to pure information, the objective truth in all of its quantitative and qualitative dimensions").

216. *See id*. ("With advances in computer and Internet technologies, it is no longer essential for an investor to rely exclusively on intermediary depictions."); *cf*. Schwarcz, *supra* note 130, at 221 (opining that regardless of disclosed information "[c]omplexity can deprive investors and other market participants of the understanding needed for markets to operate effectively").

217. *See* Zohar Goshen & Gideon Parchomovsky, *The Essential Role of Securities Regulation*, 55 DUKE L.J. 711, 714–15 (2006) (discussing the important informational role of sophisticated investors).

218. Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act), Pub. L. No. 111-203, 124 Stat. 1376 (2010) (to be codified in scattered sections of the U.S. Code). In the years since the passage of Dodd-Frank, the CFTC has made progress towards enhancing transparency in the swaps market. *See* Interpretive Guidance and Policy Statement Regarding Compliance with Certain Swap Regulations, 78 Fed. Reg. 45,292 (July 26, 2013).

219. 17 C.F.R. § 242.613 (2013).

220. Pub. L. No. 112-106 (2012).

221. STAFF OF THE SEC, REPORT ON REVIEW OF DISCLOSURE REQUIREMENTS IN REGULATION S-K (2013), *available at*: http://www.sec.gov/news/studies/2013/reg-sk-disclosure-requirements-review.pdf.

222. *See* Hu, *supra* note 5, at 1608–10 (proposing a new disclosure paradigm based on new technology and "pure information"); Judge, *supra* note 6, at 712 ("Better disclosure, by its nature, should reduce information loss, and increased transparency could reduce the magnitude of the

potential financial flaws and failures arising from the complexity of cyfi,[223] it will be a meaningful early step towards that elusive goal.

C. Slow Down

In contemplating smarter regulations for cyborg finance, policymakers should consider ways to create safer speeds and smarter brakes for finance as a key principle of future regulation.[224] The velocity at which much of cyfi currently operates, fractions of seconds, can create serious problems for the financial system and its participants.[225] This is not to suggest that policymakers should, as a matter of principle, favor a dilatory financial system. Rather, this suggests that policymakers should favor a more thoughtful, deliberative pace for finance. While high speeds contain significant benefits, they also contain high risks that can be catastrophic.

In the aftermath of the Flash Crash, domestic policymakers, regulators, and scholars have begun to pay greater attention to the effects of high velocities on finance.[226] Regulators at the national exchanges and the SEC proposed and implemented new rules aimed at sensibly slowing the speed of finance in the form of new circuit breakers designed to pause trading during periods of high volatility. Shortly after the Flash Crash, the national exchanges proposed more stringent circuit breakers in the event of dramatic

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coordination challenges that lead to stickiness."); Saule T. Omarova, *Rethinking the Future of Self-Regulation in the Financial Industry*, 35 BROOK. J. INT'L L. 665, 684 (2010) ("[T]he key to managing an increasingly complex financial system is timely access to, and ability to process, relevant market information."); Richard H. Thaler and Will Tucker, *Smarter Information, Smarter Consumers*, HARV. BUS. REV., Jan.–Feb. 2013, at 45–54.

223. *See* Robert P. Bartlett, III, *Inefficiencies in the Information Thicket: A Case Study of Derivative Disclosures During the Financial Crisis*, 36 J. CORP. L. 1, 7 (2010); Steven Davidoff & Claire Hill, *Limits of Disclosure*, 36 SEATTLE U. L. REV. 599, 604 (2013); Hu, *supra* note 5, at 1603–10 (discussing the various limits of disclosure).

224. *See* Frank Partnoy, *Don't Blink: Snap Decisions and Securities Regulation*, 77 BROOK. L. REV. 151, 155 (2011) (espousing the virtues of slower speeds in financial markets).

225. *See infra* Part III.B (describing the dangers of the accelerating velocity of finance).

226. *See, e.g.*, Charles K. Whitehead, *The Goldilocks Approach: Financial Risk and Staged Regulation*, 97 CORNELL L. REV. 1267, 1283–89 (2012) (explicating on risky, accelerated, and high-volume financial trading); Baron et al., *supra* note 134 (finding that high-frequency traders profit at the expense of ordinary investors). For general commentary on the effects of short-term, voluminous trading, see Fischer Black, *Noise*, 41 J. FIN. 529, 532–33 (1986); Robert Bloomfield et al., *How Noise Trading Affects Markets: An Experimental Analysis*, 22 REV. FIN. STUD. 2275, 2300 (2009); Robert Pollin et al., *Securities Transaction Taxes for U.S. Financial Markets*, 29 E. ECON. J. 527, 534–36 (2003); Joseph E. Stiglitz, *Using Tax Policy To Curb Speculative Short-Term Trading*, 3 J. FIN. SERVICES RES. 101, 102–05 (1989); Lawrence H. Summers & Victoria P. Summers, *When Financial Markets Work Too Well: A Cautious Case for a Securities Transactions Tax*, 3 J. FIN. SERVICES RES. 261, 264–69 (1989).

market decreases.[227] In the years since the Flash Crash, the SEC has also implemented a series of new circuit breakers for single stocks and entire markets to better manage the velocity of cyborg finance.[228] In addition to circuit breakers, policymakers should also consider kill switches for high speed systems,[229] and multi-location dissemination points for sensitive public information, like unemployment data, to minimize the significance of co-location and speed.

Policymakers abroad have similarly recognized the institutional and systemic risks of the accelerating velocity of finance. Internationally, regulators in Australia, Canada, France, Germany, and Hong Kong have utilized various mechanisms, including speed restrictions, volume limits, transaction fees, stress tests, and trading curbs to better manage the supersonic speed of finance.[230] For instance, in 2013, the Royal Bank of Canada, with the support of its regulators and some Canadian banks, purposely slowed customer trade orders to avoid the speed of high-frequency traders and dark pools so as to better fulfill such orders.[231]

While the accelerating speed has been quite beneficial to many market participants, as those speeds approach the speed of light they may contain more risks than rewards to the financial system. Thus, policymakers should adopt regulations aimed at moderating the velocities of finance as a designing principle for regulating cyborg finance.

D. Mind the Gaps

Policymakers should adhere to a principle of minding gaps in designing regulations for cyborg finance. Modern finance has frequently innovated and mutated at the regulatory breaks and market crevices of the financial system.[232] Every regulatory candle lit casts a new shadow within the system. Policymakers should be more aware of gaps created by regulations

227. *See, e.g.*, Notice of Filing of Proposed Rule Change to Update Rule 6121 and Amend Rule 6440, SEC Release No. 34-65430 (Sept. 28, 2011), *available at* http://www.sec.gov/rules/sro/finra/2011/34-65430.pdf.

228. CFTC & SEC FINDINGS, *supra* note 10, at 7; *Investor Bulletin: New Measures to Address Market Volatility*, SEC, Last Updated April 9, 2013, http://www.sec.gov/investor/alerts/circuitbreakersbulletin.htm.

229. Luis A. Aguilar, Comm'r, "Addressing Market Instability through Informed and Smart Regulation" at Practicing Law Institute's SEC Speaks in 2013 Program, Washington, D.C. (Feb. 22, 2013) (transcript available at http://www.sec.gov/News/Speech/Detail/Speech/1365171492386#.UthfBr9jRtK) (discussing the concept of kill switches for financial markets).

230. Nathaniel Popper, *As U.S. Discusses Limits on High-Speed Trading, Other Nations Act*, N.Y. TIMES, Sept. 27, 2012, at B1.

231. Nathaniel Popper, *Bank Gains by Putting the Brakes on Traders*, N.Y. TIMES, June 26, 2013, at B1.

232. Judge, *supra* note 6, at 659.

and market operations given the accelerated pace and growing complexity of cy-fi.[233]

Market participants design new instruments and transactions to take advantage of apertures in the financial system.[234] In some cases, gaps in financial markets provided fertile ground for financial innovation and regulatory arbitrage.[235] For instance, mortgage-backed securities and new forms of securitized assets originated partially because the market then lacked more efficient mechanisms to manage liabilities related to mortgages.[236] In other related cases, gaps in financial regulations created rich openings for new financial products. Credit default swaps, for instance, were created to circumnavigate commodities and securities regulations.[237] In both cases, gaps in the financial markets created fertile penumbras for shadow banking to blossom.[238] Some scholars have already speculated that new post-crisis regulations such as increased capital reserve requirements and rules on futures and swaps will create new gaps and shadows for financial regulators and industry participants.[239]

Since the Financial Crisis, policymakers have made strides towards better minding the gaps in the financial system by broadening the mandates of existing regulators and also by creating new regulators. Before the Financial Crisis, "no regulator or supervisor had the authority to look across the full sweep of the financial system—including less-regulated segments—and take action when it perceived a threat."[240] The post-crisis financial reform efforts led to the creation of the Financial Services Oversight Counsel, the National Bank Supervisor, the Consumer Financial Protection Bureau, and other government regulators geared towards filling

233. *See, e.g.*, Schwarcz, *supra* note 130, at 212–13 (discussing complexity "as the greatest financial-market challenge of the future").

234. *See* Calomiris, *supra* note 150 ("Financial innovations often respond to regulation by sidestepping regulatory restrictions that would otherwise limit activities in which people wish to engage.").

235. *See* Fleischer, *supra* note 149 ("Regulatory arbitrage exploits the gap between the economic substance of a transaction and its legal or regulatory treatment, taking advantage of the legal system's intrinsically limited ability to attach formal labels that track the economics of transactions with sufficient precision."); Frank Partnoy, *Financial Derivatives and the Costs of Regulatory Arbitrage*, 22 J. CORP. L. 211, 227 (1997) ("Regulatory arbitrage consists of those financial transactions designed specifically to reduce costs or capture profit opportunities created by differential regulations or laws.").

236. *See, e.g.*, Judge, *supra* note 6, at 670–73 (summarizing the origins of mortgaged-backed securities).

237. *See* Coffee, Jr. & Sale, *supra* note 6, at 727, 731–37 (mentioning Congress's failure to give the SEC authority over credit default swap). *See generally* Partnoy & Skeel, Jr., *supra* note 172.

238. *See* RAJAN, *supra* note 6, at 16; Gary Gorton & Andrew Metrick, *Regulating the Shadow Banking System*, *in* BROOKINGS PAPERS ON ECON. ACTIVITY 261 (2010), *available at* http://www.brookings.edu/~/media/projects/bpea/fall%202010/2010b_bpea_gorton.pdf.

239. GORTON, *supra* note 56, at 167–69.

240. Barr, *supra* note 190, at 99–100.

perceived regulatory gaps.[241] While these steps may begin to help alleviate some of the risks associated with the gaps of the old financial system, policymakers must also be mindful of new gaps created by the dynamism of cyborg finance.[242]

As cy-fi emerges and evolves, policymakers should, as a principled matter, craft rules that help regulators better mind the gaps of cyborg finance because it is in those openings that risks mutate and rewards blossom.[243]

E. Coordinate

Policymakers should operate with the principle of promoting smarter coordination in designing regulations for cyborg finance. The coordinating function of law and regulation can create greater uniformity and lower transactional costs for the financial system while promoting interagency competition and accountability.[244] Similar to how market participants take advantage of gaps in the financial system, they also take advantage of uncoordinated regulations by engaging in highly profitable and dangerous games of arbitrage and evasion.[245] As cy-fi evolves, it will grow more complex, cutting across regulatory and sovereign boundaries through cables and spectra in cyberspace. Criminal laws pertaining to cybercrimes,

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241. *See* 12 U.S.C. § 5301 (2012); U.S. DEP'T OF TREASURY, FINANCIAL REGULATORY REFORM: A NEW FOUNDATION: REBUILDING FINANCIAL SUPERVISION AND REGULATION 3 (2010), *available at* http://www.treasury.gov/initiatives/Documents/FinalReport_web.pdf; *see, e.g.*, Barr, *supra* note 190, at 109 ("The Dodd-Frank Act took several key steps toward reorganizing the U.S. federal regulatory system and reducing regulatory arbitrage . . . . [M]uch more could have been done to close gaps and relieve tensions arising from fragmentation."); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-358, SECURITIES AND EXCHANGE COMMISSION: GREATER ATTENTION NEEDED TO ENHANCE COMMUNICATION AND UTILIZATION OF RESOURCES IN THE DIVISION OF ENFORCEMENT 3–8 (2009), *available at* http://www.gao.gov/assets/290/288156.pdf.

242. *See* Judge, *supra* note 6, at 659 ("[R]eforms adopted to produce a more stable financial system are unlikely to achieve that aim unless complemented by efforts to address the corresponding changes they are likely to induce in the capital markets.")

243. *See, e.g.*, Hu, *supra* note 153, at 1502–03 (discussing the regulatory duty to monitor the systemic impact of financial innovation).

244. *See* Scott A. Beaulier et al., *Knowledge, Economics, and Coordination: Understanding Hayek's Legal Theory*, 1 N.Y.U. J.L. & LIBERTY 209, 211–15 (2005); Jody Freeman & Jim Rossi, *Agency Coordination in Shared Regulatory Space*, 125 HARV. L. REV. 1131, 1133 (2012) ("Coordination can also help to preserve the functional benefits of shared or overlapping authority, such as promoting interagency competition and accountability, while minimizing dysfunctions like discordant policy."); Charles K. Whitehead, *Destructive Coordination*, 96 CORNELL L. REV. 323, 325 (2011) ("In the financial markets, coordination helps to minimize costs and promote stability."); *see also* Richard H. McAdams, *A Focal Point Theory of Expressive Law*, 86 VA. L. REV. 1649, 1666–68, 1676–78 (2000) (explaining how law serves as a coordinating nexus for disparate individual actions); Cass R. Sunstein, *Problems with Rules*, 83 CALIF. L. REV. 953, 969–71 (1995) (discussing how legal rules mitigate collective action problems by encouraging coordination).

245. Whitehead, *supra* note 5, at 36–37.

for instance, are largely limited by sovereign jurisdiction even though the criminals and their financial crimes can cross multiple countries.[246] As financial market participants continue to innovate and grow with little regard for sovereign and regulatory borders, policymakers must explore new paradigms for coordination that break away from antiquated models based primarily on jurisdiction, be it sovereign jurisdiction or regulatory jurisdiction.[247]

In order to govern effectively and efficiently, policymakers must design regulations that promote smarter coordination among the regulators and the regulated to minimize thoughtless redundancies.[248] In practice, this may lead to more standardization among industry participants and regulators creating greater efficiencies.[249] To reduce transaction costs, participants may use more standardized forms and boilerplate provisions to create new industry conventions consistent with new regulations.[250] For instance, the International Swaps and Derivatives Association (ISDA), an industry organization, has already developed a robust body of standardized contracts, forms, terminology, and practices for industry participants.[251] Similarly, financial regulators across jurisdictions may develop common standards to ease doing business internationally and aid in achieving regulatory aims.[252]

Following the recent financial crisis, policymakers have initiated some steps aimed at promoting smarter coordination given the disastrous consequences of discordant policies prior to the crisis.[253] Through the enactment of Dodd-Frank, Congress has given regulators greater mandates to standardize banking capital reserves requirements and to stress test banks.[254] Similarly, Dodd-Frank also created new regulators and updated old ones to better harmonize the financial regulatory framework in order to

246. Hathaway et al., *supra* note 105, at 877.

247. *See* Chris Brummer, *Post-American Securities Regulation*, 98 CALIF. L. REV. 327, 328–30 (2010) (summarizing challenges relating to coordination faced by American regulators); Judge, *supra* note 6, at 702–07 (discussing the "coordination challenges" of complex financial products).

248. *See* Freeman & Rossi, *supra* note 244, at 1138–39 (critiquing various agency rulemaking problems).

249. *See, e.g.*, NOURIEL ROUBINI & STEPHEN MIHM, CRISIS ECONOMICS: A CRASH COURSE IN THE FUTURE OF FINANCE 193–94 (2010) (promoting standardization in pursuit of financial stability).

250. *See* Robert B. Ahdieh, *The Strategy of Boilerplate*, 104 MICH. L. REV. 1033, 1053–55 (2006).

251. *See* Sean M. Flanagan, *The Rise of a Trade Association: Group Interactions Within the International Swaps and Derivatives Association*, 6 HARV. NEGOT. L. REV. 211, 240–49 (2001).

252. *See id*.

253. *See* Ahdieh, *supra* note 185, at 585 ("The heart of the financial crisis, however, was a failure of coordination.").

254. 12 U.S.C. §§ 5322, 5365 (2012).

meet the realities of the marketplace.[255] Internationally, similar efforts have been made to promote smarter regulation. The Basel III Accord, for instance, standardized capital reserve metrics for banks in many countries including the United States, those in the United Kingdom, and Japan.[256]

It is important to note that this principle of promoting coordination is not a call for an extraterritorial super-regulator devoid of respect for agency borders and sovereign jurisdictions. While too little coordination is problematic, too much coordination can also create serious risks. Too much coordination could lead to "destructive coordination,"[257] which could result in thoughtless herd behavior by regulators and participants.[258] Too much coordination can also erode competition among regulators with different areas of focus and expertise.[259] Rather than too much or too little coordination, this principle calls for smarter coordination: coordination that thinks anew about harmonizing financial regulation beyond traditional spaces bounded by anachronistic notions of jurisdiction, coordination that reduces redundancies thoughtfully while retaining the benefits of competition among regulators.[260]

F. Trust but Verify

Mindful of the structural limitations of government-oriented, top-down regulation, policymakers should place more trust in sensible private regulation by industry participants as part of regulating cyborg finance in concert with public regulation by government regulators. To better complement government regulations, policymakers can better leverage the

255. *See, e.g.*, 12 U.S.C. §§ 5321, 5322 (2012) (establishing the Financial Stability Oversight Council to monitor systemic risks and coordinate preemptive responses).

256. *See* BANK FOR INT'L SETTLEMENTS, BASEL COMM. ON BANKING SUPERVISION, BASEL III: A GLOBAL REGULATORY FRAMEWORK FOR MORE RESILIENT BANKS AND BANKING SYSTEMS 12–17, 27–28 (2011), *available at* http://www.bis.org/publ/bcbs189.pdf.

257. *See* Whitehead, *supra* note 244, at 326 ("By promoting coordination, regulations and standards can erode key presumptions underlying financial risk management, reducing its effectiveness and magnifying the systemic impact of a downturn in the financial markets.").

258. *See* BANK FOR INT'L SETTLEMENTS, COMM. ON THE GLOBAL FIN. SYS., LONG-TERM ISSUES IN INTERNATIONAL BANKING 31 (CGFS Publications No. 41, 2010), *available at* http://www.bis.org/publ/cgfs41.pdf ("[C]onvergence to a single risk assessment or risk management framework . . . would encourage herd behaviour and weaken financial stability.").

259. *See* Stavros Gadinis, *The Politics of Competition in International Financial Regulation*, 49 HARV. INT'L L.J. 447, 448–50 (2008); Park, *supra* note 147, at 626–28.

260. *See* FRANK H. EASTERBROOK & DANIEL R. FISCHEL, THE ECONOMIC STRUCTURE OF CORPORATE LAW 13–14 (1991) (praising the benefits of regulations that encourage competition); ROBERTA ROMANO, THE GENIUS OF AMERICAN CORPORATE LAW 148 (1993); *see also* Freeman & Rossi, *supra* note 244, at 1193–96 (discussing ways to improve regulatory coordination); Kathryn Judge, *Interbank Discipline*, 60 UCLA L. REV. 1262, 1281 (2013) (examining why and how banks can discipline one another).

expertise, proximity, and resources of industry participants, through existing industry regulatory groups and market mechanisms, to create governance tools that are more knowledgeable and more responsive to the issues facing the financial markets.[261] It is important to note that many financial industry participants are already governed by internal compliance policies, private industry rules, and financial customs.[262] Thus, the threshold inquiry is not about whether to permit private regulation or not, but about how best to design and partner private, industry-oriented regulation to complement public, government-oriented regulation.[263]

Private regulation, when appropriately designed, can break through some of the structural limitations of jurisdiction, origination, and resource faced by government regulators. In terms of jurisdiction, industry participants are not bound by the same issues of agency and sovereign boundaries as governmental regulators.[264] An American investment bank headquartered in New York can readily help monitor and discipline the financial soundness of a Spanish counterpart headquartered in Madrid through various financial instruments and transactions.[265] Similarly, private electronic networks can require foreign participants in those private spaces

261. *See, e.g.*, BANK FOR INT'L SETTLEMENTS, BASEL COMM. ON BANKING SUPERVISION, CONSULTATIVE DOCUMENT: PILLAR 3 (MARKET DISCIPLINE), SUPPORTING DOCUMENT TO THE NEW BASEL CAPITAL ACCORD 1 (2001), *available at* http://www.bis.org/publ/bcbsca10.pdf ("[M]arket discipline has the potential to reinforce capital regulation and other supervisory efforts to promote safety and soundness in banks and financial systems."); Ross P. Buckley, *The Role and Potential of Self-Regulatory Organizations: The Emerging Markets Traders Association from 1990 to 2000*, 6 STAN. J.L. BUS. & FIN. 135, 135–37 (2000); Omarova, *supra* note 1, at 413–16 (espousing the virtues of private financial regulation).

262. *See generally* Judge, *supra* note 260, at 1286–88; Miriam Hechler Baer, *Governing Corporate Compliance*, 50 B.C. L. REV. 949, 950 (2009); Gerding, *supra* note 22.

263. For general commentary on public-private partnerships in financial regulation, see William A. Birdthistle & M. Todd Henderson, *Becoming A Fifth Branch*, 99 CORNELL L. REV. 1, 12–24 (2013); Roberta S. Karmel, *Should Securities Industry Self-Regulatory Organizations Be Considered Government Agencies?*, 14 STAN. J.L. BUS. & FIN. 151, 151–55 (2008); Marianne K. Smythe, *Government Supervised Self-Regulation in the Securities Industry and the Antitrust Laws: Suggestions for an Accommodation*, 62 N.C. L. REV. 475, 480–87 (1984).

264. *See* Omarova, *supra* note 1, at 418 ("Unconstrained by matters of formal jurisdiction, private firms are also better equipped to monitor and manage their activities and risks on a global basis as an integrated economic enterprise."); Rolf H. Weber & Douglas W. Arner, *Toward a New Design for International Financial Regulation*, 29 U. PA. J. INT'L L. 391, 392–96 (2007).

265. *See* John C. Coffee, Jr., *Systemic Risk After Dodd-Frank: Contingent Capital and the Need for Regulatory Strategies Beyond Oversight*, 111 COLUM. L. REV. 795 (2011); Elena Cubillas, Ana Rosa Fonseca & Francisco González, *Banking Crises and Market Discipline: International Evidence*, 36 J. BANKING & FIN. 2285 (2012); Douglas D. Evanoff, *Preferred Sources of Market Discipline*, 10 YALE J. ON REG. 347, 350 (1993); Douglas D. Evanoff, Julapa A. Jagtiani & Taisuke Nakata, *Enhancing Market Discipline in Banking: The Role of Subordinated Debt in Financial Regulatory Reform*, 63 J. ECON. & BUS. 1 (2011); David G. Oedel, *Private Interbank Discipline*, 16 HARV. J.L. & PUB. POL'Y 327, 330 (1993). *But see* David A. Skeel, Jr. & Thomas H. Jackson, *Transaction Consistency and the New Finance in Bankruptcy*, 112 COLUM. L. REV. 152, 164 (2012) (detailing "the now-infamous Repo 105 transactions that Lehman employed at the end of each quarter to disguise the amount of its leverage" to fool regulators and counterparties).

to adhere to certain rules without facing the same jurisdictional issues that may be encountered by the SEC and other government regulators.[266] Because cy-fi participants exist across multiple jurisdictions, sensible private regulatory mechanisms can be an effective governance feature of a new framework for dealing with jurisdictional obstacles faced by government regulators.[267]

In terms of origination, relative to government regulators, industry participants are driven less by market booms and busts to create sensible regulation given their expertise and proximity to the daily operations of finance. Given the speed and complexity of cyborg finance,[268] regulatory needs will be dynamic and accelerated as well, perhaps too fast for the slog of governmental legislation and rulemaking.[269] In contrast to government fiats that are reactions to the latest scandal, scare, or bust, industry participants, in some cases, can be more knowledgeable than government regulators about how best to craft and refine rules and practices as needed.[270] Moreover, because of the interconnectedness of cy-fi, many of the participants share a stake in the soundness and stability of the system.[271] A recent study suggested that many of the largest banks in the country had substantial credit exposures to one another.[272] Mindful of these shared interests, policymakers should design regulations that encourage institutions to regulate and moderate one another. For instance, policymakers can encourage market-based mechanisms, like special debt securities, that better position investment banks to monitor the financial soundness of their peers and counterparties by being watchful of the pricing of the assets being used as collateral among and between institutions.[273]

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266. *See* Brummer, *supra* note 6, at 1450–63.

267. *See* Omarova, *supra* note 1, at 431 (discussing the capacity of financial participants "to regulate and monitor their own activities and risks on a seamlessly global, cross-border basis").

268. *See* Andrew W. Lo & Robert C. Merton, *Preface to the Annual Review of Financial Economics*, 1 ANN. REV. FIN. ECON. 1, 12 (2009) ("[T]he implementation of financial innovation is likely to be more rapid because the threshold for change is lower.").

269. Hu, *supra* note 153, at 1463.

270. *See, e.g.*, Hu, *supra* note 6, at 412 (suggesting that regulators may not possess sufficient expertise to effectively regulate some complex financial products); Judge, *supra* note 260, at 1296–97.

271. *See, e.g.*, JPMorgan Chase & Co., Annual Report (Form 10-K) 10 (Feb. 29, 2012) ("The financial condition of JPMorgan Chase's customers, clients and counterparties, including other financial institutions, could adversely affect the Firm."); Omarova, *supra* note 1, at 422, 443–47 (articulating shared, collective interests as the bases of meaningful private regulation in the financial industry).

272. *See* Judge, *supra* note 260, at 1283–84; Letter from The Clearing House et al., to Jennifer J. Johnson, Sec'y, Bd. of Governors of the Fed. Reserve Sys. C-3 (Apr. 27, 2012), *available at* http://www.aba.com/ABASA/Documents/Dodd-Frank-Sections-165166-Comment-Letter.pdf.

273. *See, e.g.*, Charles W. Calomiris, *Blueprints for a New Global Financial Architecture*, *in* INTERNATIONAL FINANCIAL MARKETS: THE CHALLENGE OF GLOBALIZATION 259, 270−72 (Leonardo Auernheimer ed., 2003) (recommending that banks hold debt in one another to promote stability); Craig H. Furfine, *Banks as Monitors of Other Banks: Evidence from the Overnight Federal Funds Market*, 74 J. BUS. 33, 54 (2001) ("[B]anks with higher profitability, fewer problem loans, and higher capital ratios

In terms of resources, industry participants do not face the same political and budgetary constraints as government regulators. Instead, private regulation would be driven by industry incentives for profit, certainty, and sustainability.[274] For instance, because cyborg finance is so reliant on expensive, advanced information technology, private industry may be better positioned, in terms of resources, to leverage technology and expertise to monitor and manage risk in partnership with government regulators.[275] In an era of growing mandates and shrinking budgets, policymakers should consider sensible private regulation as a tool for overcoming their resource challenges.[276]

This advocacy for private regulation as a first principle for regulating cyborg finance should not be mistaken as a call for deregulation or an abdication of the state's role in financial governance. It is understood that the financial industry cannot perfectly regulate itself.[277] As such, this principle is not advocating for exclusive private regulation or self-regulation. Rather, this proposed principle is an invitation for thinking

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pay lower interest rates . . . ."); John Geanakoplos, *Solving the Present Crisis and Managing the Leverage Cycle*, 16 FED. RES. BANK OF N.Y. ECON. POL'Y REV. 101, 104 (2010) ("[T]he best way to monitor leverage is to do it at the *security* level by keeping track of haircuts on all the different kinds of assets used as collateral, including in the repo market and in the housing market.").

274. *See* Jonathan R. Macey & Elizabeth H. Garrett, *Market Discipline by Depositors: A Summary of the Theoretical and Empirical Arguments*, 5 YALE J. ON REG. 215, 220 (1988) ("The likelihood that regulators are as effective as private parties at designing methods to control bank risk is slight, because unlike private parties, regulators do not have their own funds at stake . . . .").

275. *See* Kenneth A. Bamberger, *Technologies of Compliance: Risk and Regulation in a Digital Age*, 88 TEX. L. REV. 669, 685–87, 689–92 (2010); Judge, *supra* note 260, at 1296–97 (discussing how financial institutions, unlike government regulators, can "hire the best and the brightest personnel available").

276. *See, e.g.,* SEC, FY 2014 CONGRESSIONAL BUDGET JUSTIFICATION (2014), *available at* http://www.sec.gov/about/reports/secfy14congbudgjust.pdf; William Alden, *For 2 Wall Street Regulators, More Belt-Tightening*, N.Y. TIMES: DEALBOOK, (Jan. 14, 2014), http://dealbook.nytimes.com/2014/01/14/for-2-wall-street-regulators-more-belt-tightening/; Matthew Philips, *The CFTC Is Drowning in Data*, BUS. WK., Nov. 4, 2013, at 35–36. ("The CFTC's budget has risen from $111 million to about $200 million over the past five years, but that's coincided with a more than tenfold increase in the size of the markets it oversees.")

277. *See, e.g.*, Baer, *supra* note 262, at 950–56 (critiquing internal compliance programs); Brooksley Born, *Foreword: Deregulation: A Major Cause of the Financial Crisis*, 5 HARV. L. & POL'Y REV. 231, 242–43 (2011) ("The causative role of deregulation and inadequate regulation in the financial crisis demonstrates the fallacies of reliance on self-regulation in a field central to the American economy and the welfare of the American people."); Kimberly D. Krawiec, *The Return of the Rogue*, 51 ARIZ. L. REV. 127, 128–32 (2009) (discussing flaws of self-regulated risk management); Langevoort, *supra* note 6, at 1214; Macey & O'Hara, *supra* note 1 (theorizing that profit-maximizing may conflict with private, industry-oriented regulation); Leo E. Strine, Jr., *Our Continuing Struggle with the Idea that For-Profit Corporations Seek Profit*, 47 WAKE FOREST L. REV. 135, 136 (2012) ("In the end, policy makers should not delude themselves about the corporation's ability to police itself; government still has a critical role in setting the rules of the game."); *Morgan Stanley's Mack: "We Cannot Control Ourselves"*, N.Y. TIMES: DEALBOOK, (Nov. 19, 2009), http://dealbook.blogs.nytimes.com/2009/11/19/morgan-stanleys-mack-we-cannot-control-ourselves/ (quoting Morgan Stanley CEO John Mack as stating "[w]e cannot control ourselves").

anew about financial governance, about balancing and partnering traditional government-oriented regulation with more industry-oriented regulation.[278] If cy-fi is a manifestation of Lawrence Lessig's famous observation that "code is law,"[279] then the industry participants, who are at the forefront of creating and implementing the code, should also be key partners at the forefront of creating and implementing the law.[280] There are significant advantages to private industry regulation in terms of expertise, proximity, and incentives that should be harnessed "to serve public goals."[281] Thus, policymakers should place more trust in industry-based frameworks for regulation coupled with sensible government oversight in theorizing a new regulatory framework for cyborg finance.

G. Customize

Policymakers, in designing regulations for cyborg finance, should prefer narrowly tailored, customized rules whenever possible and favor broadly construed, categorical rules only when necessary. Customization would help minimize the harmful, unintended, and unanticipated consequences of one-size-fits-all, comprehensive rules.[282] Customization would allow regulators and industry participants to carefully target areas where risks are most significant without inhibiting the potential rewards from areas where risks are manageable.[283]

Because financial regulatory reform efforts historically follow busts, scandals, or scares,[284] policymakers tend to react and overreact in an

278. *See* Cristie L. Ford, *New Governance, Compliance, and Principles-Based Securities Regulation*, 45 AM. BUS. L.J. 1, 27–28 (2008); Lobel, *supra* note 177, at 468 ("There is a tendency to equate shifts from top-down regulation with deregulation, privatization, and devolution. The new governance paradigm resists this dichotomized world and requires ongoing roles for government and law.").

279. LAWRENCE LESSIG, CODE: VERSION 2.0, 5 (2006).

280. *See* Gerding, *supra* note 22, at 184–85; Joel R. Reidenberg, *Lex Informatica: The Formulation of Information Policy Rules Through Technology*, 76 TEX. L. REV. 553, 565–69 (1998).

281. Jody Freeman, *The Private Role in Public Governance*, 75 N.Y.U. L. REV. 543, 549 (2000).

282. *See* J.B. Ruhl & James Salzman, *Mozart and the Red Queen: The Problem of Regulatory Accretion in the Administrative State*, 91 GEO. L.J. 757, 814 (2003) ("The unintended consequences of a rule thus emerge from the complex interactions between the full set of rules and the human behaviors they motivate."); Whitehead, *supra* note 226, at 1270 (opining that there is "a real risk that new rules will have unanticipated consequences, particularly in a system as complex as today's financial markets").

283. Judge, *supra* note 6, at 724.

284. *See* Whitehead, *supra* note 5, at 2 ("Financial regulation is often reactive. New regulation seals up leaks in the financial system – usually following a crisis, a shift in the markets, or other change that threatens financial stability.").

omnibus manner.[285] As financial crises grow in size, so do the regulatory responses to those crises. The Glass-Steagall Act of 1933, which was implemented following the Great Depression, ran 37 pages; Dodd-Frank is contained in 848 pages with thousands of pages' worth of additional rules.[286] The so-called "Volcker Rule" alone which stemmed from Dodd-Frank is contained in 964 pages, including an 893-page preamble.[287] The rule involved 18,223 comments and 1,238 days of rulemaking.[288]

Moreover, regulations promulgated by such efforts in down times usually become deregulated in good times—creating a consequential and costly cycle of over-regulation, deregulation, and re-regulation.[289] In order to prevent the last crisis from repeating itself, policymakers frequently use sledgehammers rather than scalpels in creating new regulations, which may be politically and psychologically satisfying, but not necessarily most workable and effective.[290] Mandating that diverse groups of banks and other financial institutions adhere to the same rules, irrespective of their differences, can reduce institutional and systemic welfare as capital is obtusely shifted from productive efforts to costly compliance efforts.[291] Additionally, a "one-size-fits-all" regulatory approach may "force risk migration rather than mitigation."[292] For instance, when new rules on futures and swaps were promulgated some institutions simply "futurized" swaps by converting them into futures to receive more favorable regulatory

285. *See* Banner, *supra* note 154; Erik F. Gerding, *The Next Epidemic: Bubbles and the Growth and Decay of Securities Regulation*, 38 CONN. L. REV. 393, 418–24 (2006); Grundfest, *supra* note 6; Tom C.W. Lin, *Vistas of Finance*, 61 UCLA L. REV. DISCOURSE 78, 85 (2013).

286. Andrew G. Haldane, Exec. Dir., Fin. Stability, Bank of Eng., The Dog and the Frisbee, Speech at the Federal Reserve Bank of Kansas City's 36th Economic Policy Symposium: The Changing Policy Landscape, Jackson Hole, Wyoming 8 (Aug. 31, 2012), *available at* http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech596.pdf.

287. *See* Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships with, Hedge Funds and Private Equity Funds, 12 C.F.R. §§ 44, 248, 351, 255 (2013).

288. Peter Coy, et al., *1,238 days, 18,223 comments, 71-page rule, 893-page preamble, 5 agencies, 1 man*, BUS. WK., Dec. 16, 2013, at 41.

289. *See* GERDING, *supra* note 154, at 137–39; NOLAN MCCARTY ET AL., POLITICAL BUBBLES: FINANCIAL CRISES AND THE FAILURE OF AMERICAN DEMOCRACY 14–15 (2013); Coffee, *supra* note 154, at 1029 (calling this phenomenon, the "Regulatory Sine Curve"); Patricia A. McCoy et al., *Systemic Risk Through Securitization: The Result of Deregulation and Regulatory Failure*, 41 CONN. L. REV. 1327, 1333 (2009); Omarova, *supra* note 1, at 416 (discussing the "never-ending spiral of rulemaking and rule evading"); Reuters, *Global Banking Regulators Agree to Ease Capital Rule,* N.Y. TIMES, Jan. 13, 2014, at B6; *see also* Susan Rose-Ackerman, *Defending the State: A Skeptical Look at "Regulatory Reform" in the Eighties*, 61 U. COLO. L. REV. 517, 520–22 (1990).

290. *See* Greene & Broomfield, *supra* note 149, at 8 ("[The current regulatory approach] subjects diverse entities to a 'one-size-fits-all' regulatory approach, ignoring the different causes of risk, and also further complicating legal obligations for entities that are often already subject to other complex regulatory regimes.").

291. *See* RAJAN, *supra* note 6, at 174–75.

292. Greene & Broomfield, *supra* note 149, at 8.

treatment.[293] When these types of unintended and unanticipated consequences occur over large portions of the industry, senseless and broad regulations can inhibit the progression and recovery of the entire financial system and economy.

Given the complexity of cyborg finance and the diversity of its participants,[294] a first principle towards customization makes much sense. In a financial marketplace where participants come in all forms and sizes, broad categorical rules should be favored only when necessary, and narrowly customized rules should be preferred whenever possible. While customization may require more diligence and may be less politically satisfying, it may ultimately prove to be more sensible and effective in the long run.

H. Incentivize

In designing regulation for cyborg finance, as a matter of principle, policymakers should use affirmative incentives in addition to negative penalties to help encourage industry participants to behave sensibly.[295] This first principle of using affirmative incentives in designing a regulatory framework for cy-fi is rooted in the belief that individuals and institutions do not react equally or with perfect rationality to rewards and punishments, so policymakers need to sensibly use both towards achieving their goals.[296] While penalties and punishments may be psychologically, politically, and administratively more satisfying following financial misbehavior,[297]

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293. Katy Burne, *Traders Seek Harmonization in New Futures, Swaps Rules*, WALL ST. J., Jan. 30, 2013, http://online.wsj.com/article/SB10001424127887323701904578274704132048858.html.

294. *See, e.g.*, Hu, *supra* note 5, at 1713 ("The modern process of financial innovation has resulted in financial strategies and other products, as well as major financial institutions, that are far more complex than in the past.").

295. *See* MICHAEL G. AAMODT, INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY: AN APPLIED APPROACH 349–54 (7th ed. 2013) (providing an overview of reward versus punishment in organizational settings).

296. *See* Paul H. Robinson & John M. Darley, *Does Criminal Law Deter? A Behavioural Science Investigation*, 24 OXFORD J. LEGAL STUD. 173, 174 (2004) ("[E]ven if they know the legal rules and perceive a cost-benefit analysis that urges compliance, potential offenders commonly cannot or will not bring such knowledge to bear to guide their conduct in their own best interests, such failure stemming from a variety of social, situational, or chemical influences."); Tobias Wächter et al., *Differential Effect of Reward and Punishment on Procedural Learning*, 29 J. NEUROSCIENCE 436, 436 (2009) ("Our results suggest that reward and punishment engage separate motivational systems with distinctive behavioral effects and neural substrates."). *But see* Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169, 172–80 (1968).

297. *See* Miriam H. Baer, *Choosing Punishment*, 92 B.U. L. REV. 577, 579 (2012) ("[P]ublic actors have ample reason to 'choose' punishment over other forms of government action as a means of attracting and maintaining public support."); Max Minzner, *Why Agencies Punish*, 53 WM. & MARY L. REV. 853, 854–57 (2012); Jeffrey J. Rachlinski & Forest Jourden, *The Cognitive Components of Punishment*, 88 CORNELL L. REV. 457, 485 (2003); Paul H. Robinson & John M. Darley, *Intuitions of*

incentives may be more effective in preventing and correcting such misbehavior in the future. Incentives, when properly calibrated and designed, can be incredibly powerful regulatory tools for governing individuals and institutions in the face of complexity.[298]

On the individual level, policymakers can design incentives that better link executive compensation with risk management to encourage cy-fi leaders to broaden their focus beyond short-term profits. Prior to the Financial Crisis, many corporate stakeholders encouraged equity compensation as a tool to better align the interests of executives with the interests of shareholders.[299] In theory, equity compensation would lead to better governance to the benefit of shareholders.[300] In practice, equity compensation led to significant appreciation in executive compensation that did not always correspond with performance;[301] and sometimes it encouraged excessive risk-taking that caused significant harms to shareholders and other industry participants in the long run.[302] Immediately

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Justice: Implications for Criminal Law and Justice Policy, 81 S. CAL. L. REV. 1, 3–4 (2007) (contending that intuition, not reason, may be the main motivator for punishment); William J. Stuntz, *The Pathological Politics of Criminal Law*, 100 MICH. L. REV. 505, 507 (2001) ("[A]ll change in criminal law seems to push in the same direction—toward more liability . . . ."); Neil Vidmar & Dale T. Miller, *Sociopsychological Processes Underlying Attitudes Toward Legal Punishment*, 14 L. & SOC'Y REV. 565, 565 (1980) ("Punishment . . . defines social boundaries, vindicates norms, and provides an outlet for the psychological tensions aroused by deviant acts.").

298. *See* RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS 8 (2008); Gerrit De Geest & Giuseppe Dari-Mattiacci, *The Rise of Carrots and the Decline of Sticks*, 80 U. CHI. L. REV. 341, 345 (2013) (suggesting that "carrots" are superior to "sticks" in the face of complexity); Manuel A. Utset, *Financial System Engineering*, 32 REV. BANKING & FIN. L. 371, 417–27 (2013) (discussing trade-offs in managing financial complexities).

299. *See* LUCIAN BEBCHUK & JESSE FRIED, PAY WITHOUT PERFORMANCE: THE UNFULFILLED PROMISE OF EXECUTIVE COMPENSATION 1 (2004); Holmstrom & Kaplan, *supra* note 204, at 12; Edward B. Rock, *Adapting to the New Shareholder-Centric Reality*, 161 U. PA. L. REV. 1907, 1917–18 (2013).

300. *See* Michael C. Jensen & Kevin J. Murphy, *Performance Pay and Top-Management Incentives*, 98 J. POL. ECON. 225, 226 (1990).

301. *See* Lucian Bebchuk & Yaniv Grinstein, *The Growth of Executive Pay*, 21 OXFORD REV. ECON. POL'Y 283, 289, 290 tbl.4 (2005); Daniel Costello, *The Drought Is Over (at Least for C.E.O.'s)*, N.Y. TIMES, Apr. 10, 2011, at BU1.

302. *See* Press Release, Bd. of Governors of the Fed. Reserve Sys., Federal Reserve Issues Proposed Guidance on Incentive Compensation (Oct. 22, 2009) (quoting Fed. Reserve Chairman Ben S. Bernanke) ("Compensation practices at some banking organizations have led to misaligned incentives and excessive risk-taking, contributing to bank losses and financial instability."); Bebchuk & Spamann, *supra* note 6, at 255–74; Lucian A. Bebchuk et al., *The Wages of Failure: Executive Compensation at Bear Stearns and Lehman 2000–2008*, 27 YALE J. ON REG. 257, 273–76 (2010); Vicente Cuñat & Maria Guadalupe, *Executive Compensation and Competition in the Banking and Financial Sectors*, 33 J. BANKING & FIN. 495, 496 (2009); Heidi Mandanis Schooner, *Who Determines When Enough Is Enough? Refocusing Regulatory Limitations on Banks' Compensation Practices*, 37 B.C. L. REV. 861, 867–68 (1996). *But see* Joel F. Houston & Christopher James, *CEO Compensation and Bank Risk: Is Compensation in Banking Structured to Promote Risk Taking?*, 36 J. MONETARY ECON. 405, 408 (1995) (stating that the authors could find "no evidence that equity-based compensation is used to promote risk taking in banking").

before the Financial Crisis, executives of financial firms were compensated significantly in equity relative to executives at nonfinancial firms.[303] For instance, preceding the Financial Crisis, the financial executives with the largest equity stakes in their companies were the CEOs of Bear Stearns, Lehman Brothers, Merrill Lynch, and Countrywide.[304] Post-crisis, all of those companies were seen by many as having taken excessive risks.[305]

Following the crisis, some scholars and industry experts have suggested introducing subordinated debt,[306] long-term equity,[307] and representative baskets of securities[308] into executive compensation packages to better balance profit motives with risk management motives. Pursuant to Dodd-Frank, regulators have also promulgated new guidelines on how to better structure compensation to discourage imprudent, myopic risk-taking through mechanisms such as compensation claw-backs.[309] Given the incredible speed of cyborg finance, properly calibrated incentives should also be used to encourage executives to better balance short-term desires for profit with long-term interests in risk management.

On the institutional level, policymakers can also use incentives to better achieve regulatory aims. Given the vulnerabilities of cyborg finance to threats in cyberspace, one clear regulatory aim would be greater cyber security. A punishment-based approach to achieving that goal would be to penalize industry participants who do not meet certain government-mandated benchmarks on cyber security by levying a severe fine. Alternatively, an incentive-based approach would be to encourage industry participants to enhance their cyber defense by giving tax credits or allowing participants to write off their investments earlier through bonus depreciation or increased deductions of such expenditures.[310] Following the Financial Crisis, Congress, pursuant to the American Recovery and Reinvestment Act, used various tax mechanisms to incentivize businesses to make capital investments to help stimulate the economy.[311] Similar incentives can be utilized to motivate financial industry participants to act

303. Tung, *supra* note 5, at 1222.

304. Sallie Krawcheck, *Four Ways to Fix Banks*, HARV. BUS. REV., June 2012, at 108–09.

305. *Id.*

306. Tung, *supra* note 5, at 1207.

307. Sanjai Bhagat & Roberta Romano, *Reforming Executive Compensation: Focusing and Committing to the Long-Term*, 26 YALE J. ON REG. 359, 359 (2009).

308. Bebchuk & Spamann, *supra* note 6, at 248–53.

309. *See* Guidance on Sound Incentive Compensation Policies, 75 Fed. Reg. 36,395 (June 25, 2010).

310. *See* I.R.S., CAT. NO. 13081F, PUBLICATION 946, HOW TO DEPRECIATE PROPERTY 3–24 (2012), *available at* http://www.irs.gov/pub/irs-prior/p946--2011.pdf (explaining bonus depreciation and increased deductions).

311. I.R.S., BONUS DEPRECIATION AND INCREASED SECTION 179 DEDUCTION UNDER THE AMERICAN RECOVERY AND REINVESTMENT ACT (Oct. 24, 2012)

more expediently towards achieving regulatory goals, like enhancing cyber security, in the new financial industry.

Additionally, on the institutional level, policymakers can also create better mechanisms to manage and monitor incentives so that transactions are driven by the fortunes of principals, and not by the fees of agents.[312] Being self-interested agents, financial intermediaries and gatekeepers such as auditors, investment banks, and credit ratings agencies can at times encourage transactions that harm long-term institutional and systemic stability for short-term fees.[313] Policymakers can perhaps dedicate more regulatory resources to examining fee structures for their distortive and harmful effects so as to better align financial incentives with regulatory objectives.

This principle of using incentives as well as penalties should not be misconstrued as one aimed at sparing the rods of punishment to spoil industry, nor should it be mistaken as rewarding bad financial behavior. Bad and dangerous financial actions should be punished, but punishments alone are insufficient to remedy financial flaws and failures.[314] Moreover, circumstances and negative externalities at times render penalties impractical and counterproductive.[315] Rather than just penalize bad and dangerous acts, this principle promotes using smart, affirmative incentives to better manage and prevent such harmful actions in the first place.

I. Promote Self-Insurance

A key principle in creating regulations for cyborg finance should be the promotion of self-insurance mechanisms within the industry. Private failures of industry participants should have private solutions. Private losses should not require public bailouts, whenever possible.

During the recent financial crisis, some of the most unpopular and controversial regulatory actions of the government were the bailouts of faltering private businesses. These public bailouts of private failures

312. Kathryn Judge, *Fee Effects*, 98 IOWA L. REV. 1517, 1529–34 (2013).

313. *See, e.g.*, Lawrence A. Cunningham, *Too Big to Fail: Moral Hazard in Auditing and the Need to Restructure the Industry Before It Unravels*, 106 COLUM. L. REV. 1698, 1699–1722 (2006); Frank Partnoy, *How and Why Credit Rating Agencies Are Not Like Other Gatekeepers*, in FINANCIAL GATEKEEPERS: CAN THEY PROTECT INVESTORS? 59–65 (Yasuyuki Fuchita & Robert E. Litan eds., 2006).

314. *See, e.g.*, John Braithwaite, *What's Wrong with the Sociology of Punishment*, 7 THEORETICAL CRIMINOLOGY 5, 15–30 (2003); Tracey L. Meares et al., *Updating the Study of Punishment*, 56 STAN. L. REV. 1171, 1172–96 (2004).

315. *See, e.g.*, Andrew Ross Sorkin, *Realities Behind Prosecuting Big Banks*, N.Y. TIMES, March 12, 2013, at B1 (reporting that the size of some banks renders them too difficult to prosecute because of negative social externalities).

resulted in the strange phenomena of the American government owning significant stakes in large, faltering, American corporations.[316] In 2008, the government invested $85 billion in the insurance giant, AIG, in exchange for majority ownership stake.[317] Between 2008 and 2009, the government purchased $45 billion of securities, or a 34% ownership stake in the financial firm, Citigroup.[318] Between 2008 and 2009, $82 billion in public funds poured into the American auto industry.[319] This resulted in the government, at various times, owning 8% of Chrysler,[320] 60% of General Motors,[321] and 56% of GMAC,[322] General Motor's financing affiliate.

Following the Financial Crisis, policymakers and scholars have contemplated various self-insurance mechanisms to prevent future public bailouts. For instance, American and international policymakers have raised capital reserve requirements for large financial institutions to ensure that losses can be better covered by the firms themselves.[323] Additionally, there have been proposals for levying transaction fees on financial institutions to create an insurance fund.[324] Beyond government-oriented initiatives, there have also been suggestions to create industry-oriented mechanisms to share costs in the event of another financial crisis, and bankruptcy law reforms to better address the complex structure of financial institutions in the event of future liquidations and breakdowns.[325] Mindful of moral hazards and other considerations emanating from past insurance

316. Marcel Kahan & Edward B. Rock, *When the Government Is the Controlling Shareholder*, 89 TEX. L. REV. 1293, 1297 (2011).

317. Press Release, Bd. of Governors of the Fed. Reserve Sys., Federal Reserve Board, with Full Support of the Treasury Department, Authorizes the Federal Reserve Bank of New York to Lend up to $85 Billion to the American International Group (Sept. 16, 2008).

318. *See* Jeff Zeleny & Eric Dash, C*itigroup Nears Payback Deal; Obama to Press Banks for Help*, N.Y. TIMES, Dec. 14, 2009, at A1.

319. Nick Bunkley, *G.M. Repays U.S. Loan, While Chrysler Posts Improved Quarterly Results*, N.Y. TIMES, Apr. 22, 2010, ab B3.

320. *Id*.

321. *See* Bill Vlasic & Nick Bunkley, *Obama Is Upbeat for G.M. Future on a Day of Pain*, N.Y. TIMES, June 2, 2009, at A1.

322. Binyamin Appelbaum, *U.S. to Give $3.8 Billion More in Aid to GMAC; Move Makes Government the Majority Owner of Troubled Auto Lender*, WASH. POST, Dec. 31, 2009, at A1.

323. *See* Dodd-Frank Wall Street Reform and Consumer Protection Act § 171, 12 U.S.C. § 5371 (Supp. IV 2010); BASEL COMM. ON BANKING SUPERVISION, *supra* note 256, at 3; *see also* ANAT ADMATI & MARTIN HELLWIG, THE BANKERS' NEW CLOTHES: WHAT'S WRONG WITH BANKING AND WHAT TO DO ABOUT IT 94–100 (2013).

324. *See, e.g*., Let Wall Street Pay for the Restoration of Main Street Act of 2009, H.R. 4191, 111th Cong. (2009).

325. *See* Kenneth Ayotte & David A. Skeel, Jr., *Bankruptcy or Bailouts*?, 35 J. CORP. L. 469, 470–75 (2010); Onnig H. Dombalagian, *Requiem for the Bulge Bracket?: Revisiting Investment Bank Regulation*, 85 IND. L.J. 777, 836–43 (2010); Gordon & Muller, *supra* note 5, at 205–06; Jonathan C. Lipson, *The Shadow Bankruptcy System*, 89 B.U. L. REV. 1609, 1664–68 (2009).

funds like the Federal Deposit Insurance Corporation (FDIC),[326] which protects the funds of depositors at insured banks,[327] policymakers can better design sensible self-insurance programs for the new financial industry.[328]

As cyborg finance continues to evolve and grow, so will its risks and the potential for significant losses. To create a fully self-insuring financial system that never needs public bailouts is perhaps an elusive goal, as policymakers are unlikely to permit the entire financial system to collapse.[329] Nonetheless, policymakers should pursue regulations that promote mechanisms for self-insurance, so that public bailouts of the magnitude of past financial crises can be better mitigated in future financial crises.

J. Review, Renew, Reform, or Relinquish

In designing regulations for cyborg finance, policymakers should create a framework that better accounts for its dynamic nature by defaulting to a principle of predetermined reassessment. In practice, this means that whenever sensible, policymakers should favor temporary rules with sunset provisions and preset opportunities for review over permanent or "lasting" rules.[330] This would apply to both new laws and rules that regulated

326. *See, e.g.*, Jens Forssbaeck, *Ownership Structure, Market Discipline, and Banks' Risk-Taking Incentives Under Deposit Insurance*, 35 J. BANKING & FIN. 2666, 2666 (2011) ("What deposit insurance does is to remove depositors' incentives to discipline the bank by charging a risk premium commensurate with the bank's risk level, their own costs of monitoring, and other agency-related costs . . . ."); Macey & Garrett, *supra* note 274 (suggesting that deposit insurance could reduce market discipline and lead to greater systemic risk); William Poole, *Moral Hazard: The Long-Lasting Legacy of Bailouts*, 65 FIN. ANALYSTS J. 17, 21 (2009).

327. *See* 12 U.S.C. § 1821 (2006) (establishing the FDIC).

328. *See* Charles W. Calomiris, *Is Deposit Insurance Necessary? A Historical Perspective*, 50 J. ECON. HIST. 283, 284 (1990); Richard S. Grossman, *Deposit Insurance, Regulation, and Moral Hazard in the Thrift Industry: Evidence from the 1930's*, 82 AM. ECON. REV. 800, 802–03 (1992); Jonathan R. Macey & Geoffrey P. Miller, *Bank Failures, Risk Monitoring, and the Market for Bank Control*, 88 COLUM. L. REV. 1153, 1155, 1165 (1988); Patricia A. McCoy, *The Moral Hazard Implications of Deposit Insurance: Theory and Evidence*, *in* 5 CURRENT DEVELOPMENTS IN MONETARY AND FINANCIAL LAW 417, 423–25 (Int'l Monetary Fund Legal Dep't ed., 2008).

329. *See, e.g.*, Oliver Hart & Luigi Zingales, *Curbing Risk on Wall Street*, 2010 NAT'L AFFAIRS 20, 21 (opining on the pragmatic need for bailouts to safeguard the financial system during periods of serious distress); Levitin, *supra* note 5, at 439 ("Bailouts are an inevitable feature of modern economies . . . ."); Jonathan R. Macey & James P. Holdcroft, Jr., *Failure is an Option: An Ersatz-Antitrust Approach to Financial Regulation*, 120 YALE L.J. 1368, 1370 (2011) ("Policymakers . . . cannot credibly commit to refrain from supporting large, important financial institutions" when inaction could seriously threaten financial stability.").

330. *See, e.g.*, Jacob E. Gersen, *Temporary Legislation*, 74 U. CHI. L. REV. 247, 298 (2007) ("Normatively, temporary legislation should not be globally eschewed, and at least in specific policy domains such as responses to newly recognized risk, there should be a presumptive preference in favor of temporary legislation."); George K. Yin, *Temporary-Effect Legislation, Political Accountability, and Fiscal Restraint*, 84 N.Y.U. L. REV. 174, 187–94 (2009) (espousing the benefits of temporary legislation for budgeting purposes); Romano, *supra* note 161, at 1600–02. *But see* STEPHEN BREYER,

industry as well as those that deregulated industry. This principle of predetermined reassessment and its practical features are neither new nor radical. Tax legislation, in this country, frequently has had sunset provisions and preset reviews,[331] and the same is true for legislation in other areas of the law in our history.[332]

Because of prevalent rulemaking pathologies and cognitive biases,[333] financial rulemaking in response to the last crisis and past problems can quickly grow stale in a dynamic marketplace.[334] Policymakers, like most individuals, are bad judges of risk.[335] They often overreact and overestimate risk, especially in the aftermath of crises or catastrophes.[336] Moreover, policymakers, again, like most individuals, suffer from status quo bias, where they become attached to the current state of affairs with no rational basis.[337] Such pathologies and biases can create costly issues for industry participants, regulators, and the entire financial system.[338] Absent

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REGULATION AND ITS REFORM 366–67 (1982) (disfavoring sunset provisions as a way to reform administrative law); Coffee, *supra* note 154, at 1023–26 (arguing against sunset provisions in financial regulation); Rebecca M. Kysar, *Lasting Legislation*, 159 U. PA. L. REV 1007, 1009–10 (2011) (favoring lasting or permanent legislation over temporary legislation).

331. *See* Joint Comm. On Taxation, *List of Expiring Federal Tax Provisions*, *2009–2020* (JCX-3-10), Jan. 29, 2010, *available at* https://www.jct.gov/publications.html?func=startdown&id=3646; William G. Gale & Peter R. Orszag, *Sunsets in the Tax Code*, 99 TAX NOTES 1553, 1554–57 (2003).

332. Kysar, *supra* note 330, at 1014–21 (summarizing the history of temporary legislation).

333. *See, e.g.*, David A. Dana, *A Behavioral Economic Defense of the Precautionary Principle*, 97 NW. U. L. REV. 1315, 1324–25 (2003) (explaining cognitive biases towards recent and immediate losses and its impact on rulemaking); Jolls et al., *supra* note 184, at 1473; John O. McGinnis & Michael B. Rappaport, *Symmetric Entrenchment: A Constitutional and Normative Theory*, 89 VA. L. REV. 385, 444 (2003) (suggesting that sunset provisions do not suffer from the "special problems of public choice, aberrational majorities, partisanship, or imperfect psychological heuristics"); Jeffrey J. Rachlinski & Cynthia R. Farina, *Cognitive Psychology and Optimal Government Design*, 87 CORNELL L. REV. 549, 603–06 (2002) (discussing how to craft rules and legislation that better account for behavioral tendencies).

334. *See* Calomiris, *supra* note 6, at 43 (opining that the financial system "will probably undergo significant changes over the next few years"); Gersen, *supra* note 330, at 271 ("Empirically, it is true that new policy initiatives are often enacted in the immediate aftermath of realized or recognized risks.").

335. *See* CASS R. SUNSTEIN, RISK AND REASON: SAFETY, LAW, AND THE ENVIRONMENT 33–35 (2002) (discussing cognitive bias where "people tend to think that events are more probable if they can recall an incident of their occurrence"); Amos Tversky & Daniel Kahneman, *Availability: A Heuristic for Judging Frequency and Probability*, 5 COG. PSYCHOL. 207, 230 (1973).

336. Gersen, *supra* note 330, at 269; Roger G. Noll & James Krier, *Some Implications of Cognitive Psychology for Risk Regulation*, 19 J. LEGAL STUD. 747, 774–75 (1990); Paul Slovic, Baruch Fischhoff & Sarah Lichtenstein, *Regulation of Risk: A Psychological Perspective*, *in* REGULATORY POLICY AND THE SOCIAL SCIENCES 241, 256–59 (Roger G. Noll ed., 1985).

337. *See* Lin, *supra* note 183, at 341–42 (discussing status quo bias); William Samuelson & Richard Zeckhauser, *Status Quo Bias in Decision Making*, 1 J. RISK & UNCERTAINTY 7 (1988).

338. *See* Cass R. Sunstein, *Paradoxes of the Regulatory State*, 57 U. CHI. L. REV. 407, 411 (1990) ("Sometimes [regulation] has imposed enormously high costs for speculative benefits; sometimes it has accomplished little or nothing; and sometimes it has aggravated the very problem it was designed to solve."); Yin, *supra* note 330, at 178 ("[T]he legislative process fails to account for the complete costs of programs enacted through permanent legislation . . . .").

predetermined mechanisms for review, revision, and renewal, industry participants can incur significant costs complying with rules that no longer make sense in a changed marketplace.[339]

For regulators, stale and sticky rules without built-in exits can be costly to enforce and even more costly to unwind.[340] Permanent rules continue until repeal, and as such, their ongoing costs, in terms of budget and impact, are not properly accounted for, given changes in the regulated space.[341] At minimum, a predetermined reassessment principle would permit policymakers to periodically examine whether rules drafted in the past still make financial and pragmatic sense for the present and the near future.[342]

For the financial system, leaving outdated regulation in place can sow the seeds for new problems and crises as industry participants gravitate towards shadowed areas cast by the old regulations.[343] Additionally, it can also lead to suboptimal allocations of capital, decreases in competition, and reductions in social welfare as regulators and industry participants incur significant costs navigating stale rules.[344]

A primary intent for this principle of predetermined reassessment is to ensure that financial regulation best reflects the current market realities and the best available information.[345] From the regulator's perspective, this principle will probably manifest in staged rulemaking processes as features like preset reviews and sunset provisions drive policymakers to incorporate

339. *See* Bruce Adams, *Sunset: A Proposal for Accountable Government*, 28 ADMIN. L. REV. 511, 519–21 (1976) (opining that sunset provisions can create more government accountability); Lewis Anthony Davis, *Review Procedures and Public Accountability in Sunset Legislation: An Analysis and Proposal for Reform*, 33 ADMIN. L. REV. 393, 407–08 (1981) (suggesting methods to design better sunset provisions); *see also* PAUL ROSE & CHRISTOPHER J. WALKER, THE IMPORTANCE OF COST-BENEFIT ANALYSIS IN FINANCIAL REGULATION (2013).

340. *See* Yin, *supra* note 330, at 180 (discussing the budget benefits of temporary legislation); Roberta Romano, *Regulating in the Dark*, *in* REGULATORY BREAKDOWN: THE CRISIS OF CONFIDENCE IN U.S. REGULATION 88–98 (Cary Coglianese ed., 2012).

341. Romano, *supra* note 340, at 88–89.

342. *See* Robert W. Hahn, *Achieving Real Regulatory Reform*, 1997 U. CHI. LEGAL F. 143, 156; Romano, *supra* note 340, at 95.

343. *See infra* Part V.D; *see also* Calomiris, *supra* note 150; McCoy et al., *supra* note 289; Andrei Shleifer & Robert W. Vishny, *Unstable Banking*, 97 J. FIN. ECON. 306, 306–07 (2010); Christine Harper and Yalman Onaran, *Pushing Banks to Unwind Their Global Bets*, BUS. WK., Dec. 17, 2012, at 45 (discussing the increased operational costs of international banks in light of new U.S. capital rules).

344. *See* Whitehead, *supra* note 226, at 1295 ("Permitting new rules to be adjusted to reflect market feedback can assist in minimizing uncertainty over the rules' benefits, as well as lower the likelihood that regulation will be ineffective or result in unanticipated costs.").

345. *See* Gersen, *supra* note 330, at 248 ("From an informational perspective, temporary legislation provides concrete advantages over its permanent cousin by specifying windows of opportunity for policymakers to incorporate a greater quantity and quality of information into legislative judgments.").

the latest information, mitigate past cognitive biases, and assuage certain political pathologies related to rulemaking.[346] From the industry's perspective, the principle of predetermined assessment will allow industry participants to better adjust to regulatory realities and help inform policymakers of regulatory mismatches. Collectively, with well-designed regulations, this principle will better facilitate regulators and industry to periodically engage in a dynamic, information-sharing regulatory process.[347]

This advocacy for a first principle of reassessment is not to suggest that the benefits of adhering to this principle are not without their drawbacks; there are shortcomings to mechanisms like sunset provisions and mandatory reviews inherent in temporary rules.[348] Rather, this commentary suggests that, on balance, by adhering to a principle of default reassessment, policymakers can better create a regulatory framework that is more dynamic, more adaptive, and more flexible just like the new financial industry that it seeks to govern.

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Regulating the emerging, new financial industry will be one of the most challenging endeavors for policymakers in the coming years. It is understood that much of the difficulties of financial regulation lie in the actual drafting, passage, implementation, execution, and enforcement of new rules and regulations. The tenets proposed herein aim to serve as principles of regulatory design for policymakers as they face those difficulties, as they contemplate fresh rules and regulations for cyborg finance. Admittedly, some of the proposed principles can be perceived as competing, complementary, and crosscutting. Nevertheless, these principles are intended to serve as guideposts and not roadblocks for creating a better, workable framework for the new financial industry in the years ahead.

346. *See id*. at 266–67; Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 859–60 (2006); Whitehead, *supra* note 226, at 1273 (espousing the virtues of staged regulation).

347. *See* Gersen, *supra* note 330, at 271 ("Under these circumstances, temporary legislation should create stronger incentives for accurate information revelation because staged decision procedures ensure repeated interaction between affected interests and legislators."); Yair Listokin, *Learning Through Policy Variation*, 118 YALE L.J. 480, 524–27 (2008).

348. *See* GUIDO CALABRESI, A COMMON LAW FOR THE AGE OF STATUTES 61–62 (1982) (arguing against the utility of sunset provisions); Coffee, *supra* note 154, at 1023–26 (criticizing mandatory sunset provisions financial reform regulation); Kysar, *supra* note 330, at 1009 ("[T]emporary legislation is worse than ineffective: such legislation creates serious political-economy concerns, entrenchment problems, and planning disruptions.").

CONCLUSION

Modern finance is undergoing a fundamental transformation. A financial industry built largely on human actions and human relationships is changing into one built on artificial intelligence, mathematical models, and supercomputers. Humans and machines now inextricably reign over a new financial industry that is faster, larger, more complex, more global, more interconnected, and less human.

This Article offered an early systemic account of this complex, ongoing metamorphosis and its wide-ranging policy ramifications for financial regulation. This Article provided a normative and descriptive cartography of this changing financial landscape. It identified particular dangers, systemic risks, and current regulatory shortcomings. It then presented an original set of guiding principles for the future of financial regulation. In the end, this Article is intended to serve as an early framework for further study on how best to regulate the emerging, new financial industry.