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## Marginalizing Risk

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## MARGINALIZING RISK

STEVEN L. SCHWARCZ\*

### ABSTRACT

*A major focus of finance is reducing risk on investments, a goal commonly achieved by dispersing the risk among numerous investors. Sometimes, however, risk dispersion can cause investors to underestimate and under-protect against risk. Risk can even be so widely dispersed that rational investors individually lack the incentive to monitor it. This Article examines the market failures resulting from risk dispersion and analyzes when government regulation may be necessary or appropriate to limit these market failures. The Article also examines how such regulation should be designed, including the extent to which it should limit risk dispersion in the first instance.*

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## I. INTRODUCTION

Risk dispersion, which is widespread in modern finance, is intended to reduce risk from the standpoint of any given investor.<sup>1</sup> Although conventional wisdom has been that risk dispersion is unambiguously good, this Article argues that it may not work in the face of hidden correlations and that it produces social costs that arise from weak monitoring. As a result, investors and other market participants underestimate and under-protect against risk, with few worrying about where dispersed risk goes or whether risk dispersion can impact the stability of financial markets. This “marginalization” of risk appears to have contributed, at least in part, to the recent financial crisis.<sup>2</sup>

1. See *infra* Part I.A.

2. Cf. Joe Nocera, *Risk Mismanagement*, N.Y. TIMES, Jan. 4, 2009, § 6 (Magazine), at 24; sources cited *infra* note 30; see also Jean-Claude Trichet, President, European Cent. Bank, Speech Before the Fifth ECB Central Banking Conference (Nov. 13, 2008) (“[T]he root cause of the [financial] crisis was the overall and massive undervaluation of risk across markets, financial institutions and countries.”). Commentators have advanced other explanations of the causes of the financial crisis. See, e.g., MARK JICKLING, CONG. RESEARCH SERV., R40173, CAUSES OF THE FINANCIAL CRISIS (2010), available at [http://assets.opencrs.com/rpts/R40173\\_20100409.pdf](http://assets.opencrs.com/rpts/R40173_20100409.pdf). I have argued that the causes of the financial crisis more generally can be conceptualized within a framework consisting of conflicts, complacency, complexity, and a type of tragedy of the commons. See Steven L. Schwarcz, *Protecting Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINN. L. REV. 373 (2008); Steven L. Schwarcz, *Keynote Address: Understanding the Subprime Financial Crisis*, 60 S.C. L. REV. 549 (2009). Running throughout these causes is another cause, cupidity; but because greed is so ingrained in human nature and so intertwined with the other causes, it adds little

This Article begins by examining the reasons for risk dispersion. The Article then analyzes why risk dispersion can, and sometimes does, marginalize risk. Finally, the Article examines whether government should attempt to regulate risk dispersion and, if so, how such regulation should be designed.

### A. *Dispersing Risk*

Why does modern finance disperse risk? Finance can be broadly divided into debt finance and equity finance.<sup>3</sup> This Article focuses primarily on debt finance,<sup>4</sup> though its overall principles should theoretically have application to equity finance.<sup>5</sup> A major focus of debt finance (hereinafter, references to “finance” mean debt finance) is reducing risk on investments in order to reduce the interest rate on borrowed funds—thereby reducing a borrower’s cost of funds.<sup>6</sup> Under

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insight to view it separately. This Article uses the foregoing conceptual framework to help examine and analyze risk marginalization.

3. See generally Allen N. Berger & George F. Udell, *The Economics of Small Business Finance: The Roles of Private Equity and Debt Markets in the Financial Growth Cycle*, 22 J. BANKING & FIN. 613, 626–27 (1998).

4. In its most basic form, debt finance involves the lending of money—which is repayable at a later date—from a person who has surplus funds (a “lender”) to a person that needs funds (a “borrower”). See Bernice Kotey, *Debt Financing and Factors Internal to the Business*, 17 INT’L SMALL BUS. J. 11, 14–15 (1999) (discussing basics of debt finance). Loans are typically evidenced by a promissory note, the most basic form of investment security. Cf. *Reves v. Ernst & Young*, 494 U.S. 56, 65 (1990) (using the family resemblance test to determine whether a financial instrument is a note and thus should be categorized as a security). Although conceptually identical, lending in a securities market context is usually described as the investment of money by a person who has surplus funds (an “investor”) in investment securities issued by a person that needs funds (the “issuer”). See JAMES D. COX ET AL., *SECURITIES REGULATION CASES AND MATERIALS 1* (2009). If a loan is made at arm’s length (a “commercial” transaction), the lender will negotiate with the borrower for a return on its investment. A lender naturally will seek a higher return, and a borrower will want to pay a lower return. The return is usually called interest, and the rate of return is usually called the interest rate. See, e.g., IRVING FISHER, *THE THEORY OF INTEREST* 13 (1974); STEPHEN A. ROSS ET AL., *FUNDAMENTALS OF CORPORATE FINANCE* 193 (Michele Janicek ed., 2008). Another common term for interest is “yield.” Interest compensates the lender not only for its cost of funds and the time value of money (including a profit factor), but also for the risk that the borrower may delay or even fail in repaying the loan. See MILES LIVINGSTON, *MONEY AND CAPITAL MARKETS* 12–14 (Maureen Wilson ed., 1990). In a competitive lending market, negotiated interest rates tend to be inversely related to the riskiness of the loan: the less risky the loan, the lower the interest rate. *Id.* at 15. This assumes that all other factors, including the loan’s maturity, are the same.

5. GORDON J. ALEXANDER ET AL., *FUNDAMENTALS OF INVESTMENTS* 1–2 (2001) (observing that debt and equity investments share many common principles).

6. See CHARLES W. SMITHSON, *MANAGING FINANCIAL RISK* 25 (1998). Another focus of finance is increasing a lender’s rate of return by making riskier investments. Cf. Prasanna Gai & Nicholas Vause, *Measuring Investors’ Risk Appetite* 5–6 (Bank of Eng., Working Paper No. 283, Nov. 2005) (discussing how the “risk appetite” of investors varies). Different investors have different “risk profiles,” so some investors prefer low-risk (and thus low-return) investments whereas other investors

modern finance theory, investors can protect themselves from risk by diversifying their investments.<sup>7</sup> To the extent risk is negatively correlated, or uncorrelated, with market risk, the randomly distributed risks of a diversified investment portfolio theoretically “would tend to cancel out, producing a riskless portfolio.”<sup>8</sup>

Investment risk, however, is often at least somewhat correlated with the market in which the investment is made.<sup>9</sup> For example, even if a particular company produces a uniquely valuable product, the company’s stock price will be adversely affected in a collapse of the market in which that stock is traded. It therefore is desirable not only to diversify investments *within* a market but also to diversify investments *across* markets ideally seeking markets that are themselves uncorrelated with the risk of other markets.<sup>10</sup> Risk dispersion is an important way to diversify investments both within and across markets.<sup>11</sup>

To understand why risk dispersion can diversify investments within markets, consider the relatively simple examples of loan syndication and sales of loan participations. Assume that a bank’s customer needs to borrow \$10 million. If the bank makes that loan, it would take on \$10 million (plus interest) of investment risk, because the borrower may fail to repay.<sup>12</sup> A bank typically will reduce this risk by dispersing it, either by joining a lending syndicate whereby other banks share in making the loan, or by selling interests (“participations”) in its loan to other banks.<sup>13</sup> For

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want high-return (but thus high-risk) investments. *See, e.g.*, GLENN YAGO, JUNK BONDS: HOW HIGH YIELD SECURITIES RESTRUCTURED CORPORATE AMERICA 3–5 (1991) (discussing junk bonds as high-risk, but high-return, investments); Pierre Casado et al., *Gaining the Edge: Why Do Entrepreneurial French Companies Choose High Yield?*, LATHAM & WATKINS (Dec. 6, 2006), available at [http://www.lw.com/upload/pubContent/\\_pdf/pub1715\\_1.pdf](http://www.lw.com/upload/pubContent/_pdf/pub1715_1.pdf).

7. *See, e.g.*, R. GLENN HUBBARD, MONEY, THE FINANCIAL SYSTEM, AND THE ECONOMY 326 (4th ed. 2002) (observing that “diversification reduces the overall credit risk”).

8. RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 446 (6th ed. 2003).

9. Leslie A. Balzer, *Measuring Investment Risk: A Review*, 3 J. INVESTING 47–48 (1994) (partially attributing recent attraction to the topic of investment risk to the increasing use of financial instruments with asymmetric payoffs).

10. *See* ARTHUR J. KEOWN ET AL., FOUNDATIONS OF FINANCE: THE LOGIC AND PRACTICE OF FINANCIAL MANAGEMENT 242–43 (Leah Jewell ed., 1994).

11. *Id.* (recognizing a reduction in risk will occur if investments within a portfolio are not perfectly correlated). *Cf.* CHARLES E. BABIN, INVESTING SECRETS OF THE MASTERS 112 (2000) (suggesting the investment diversification mix should be constantly re-evaluated based on time frames, risk tolerances, income needs, and other factors).

Investment diversification can itself disperse risk in a way unrelated to this Article’s analysis. Investors who recognize their investments have become risky can sell the investments to other investors and reinvest the proceeds. But this merely changes the distribution of the risk without necessarily increasing aggregate risk to society.

12. Recall that a loan is simply an investment by a bank in its borrower. *See supra* note 4.

13. *See* Steven L. Schwarcz, *Intermediary Risk in a Global Economy*, 50 DUKE L.J. 1541, 1557–

example, the bank may individually commit to lend only \$2.5 million in a \$10 million lending syndicate,<sup>14</sup> or it may lend the full \$10 million but then sell participations in 75 percent (\$7.5 million) of its loan to other banks. In either case, the bank will end up having more diversified investments than a \$10 million loan to a single borrower.<sup>15</sup>

In recent years, computerized mathematical models have facilitated even more sophisticated techniques of dispersing risk in order to diversify investments. Consider, for example, securitization markets,<sup>16</sup> in which risk is dispersed from owners of assets to investors in securities backed by those assets (so-called “asset-backed securities” or “ABS”) and to other market participants who may guarantee those securities.<sup>17</sup> Within a given market, the asset-backed securities are divided not only into relatively small amounts but, more significantly, into multiple classes, or “tranches,” with different repayment priorities.<sup>18</sup> Computers make it practical to track the underlying cash flows from the assets backing the securities and to allocate those cash flows to payment of the appropriate securities.<sup>19</sup> This

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58 (2001).

14. This would occur, for example, if a syndicate of four banks commits to lend the borrower \$10 million, each bank committing to 25 percent of that amount. In bank syndicates, different banks can commit to different lending percentages. See STANDARD & POOR’S, A GUIDE TO THE LOAN MARKET 7–12 (2010).

15. This assumes, of course, that the bank lends to other borrowers the \$7.5 million not advanced (in the case of the loan syndication) or repaid (in the case of the sale of loan participations).

16. Another financial product commonly used for risk dispersing technique is the credit-default swap (“CDS”), a type of derivative in which one party (the credit seller) agrees, in exchange for the payment to it of a fee by a second party (the credit buyer), to assume the credit risk of certain debt obligations of a specified borrower or other obligor. See STEVEN L. SCHWARCZ, STRUCTURED FINANCE: A GUIDE TO THE PRINCIPLES OF ASSET SECURITIZATION § 10:1.1, at 10–5 (3d ed. supplemented through 2010). If a “credit event” (for example, default or bankruptcy) occurs in respect of that obligor, the credit seller will either: (a) pay the credit buyer an amount calculated by reference to post default value of the debt obligations or (b) buy the debt obligations (or other eligible debt obligations of the obligor) for their full face value from the credit buyer. *Id.* This Article focuses on risk dispersion through securitization. The general risk-dispersing principles should be the same for securitization and CDS; but because derivatives, including CDS, are sometimes used for speculation, the regulatory concerns go beyond those of merely dispersing risk. Cf. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 219 (2008).

17. VINOD KOTHARI, SECURITIZATION: THE FINANCIAL INSTRUMENT OF THE FUTURE 8–10 (2006). Kothari describes securitization as a series of steps whereby financial assets of one or more originators are pooled and transferred into a separate legal vehicle. This vehicle is usually structured as independent from and protected against the bankruptcy risk of the originator. The vehicle issues securities that are repaid from collections on the pool of assets, not from the general funds of the originator. Sometimes a vehicle issues different classes of securities, usually differentially allocating risk and return to investors by allocating the order in which each class is repaid from collections.

18. Cf. Ingo Fender & Janet Mitchell, *Structured Finance: Complexity, Risk and the Use of Ratings*, BIS Q. REV. 67, 67–68 (2005) (describing the basics of tranching).

19. Leon T. Kendall, *Securitization: A New Era in American Finance*, in A PRIMER ON SECURITIZATION 6 (Leon T. Kendall & Michael J. Fishman eds., 2000) (discussing computer

range of risk dispersion not only helps investors diversify their investments and thereby reduce risk<sup>20</sup> but also, indirectly, maximizes the overall investor base. Because different investors have different risk profiles,<sup>21</sup> offering securities with different repayment priorities will attract a broader range of investors.<sup>22</sup>

*Diversifying investments across markets.* Risk dispersion is also used to diversify investments across markets. Investors traditionally diversified their investments across markets by investing in both debt and equity securities.<sup>23</sup> But investments can also be diversified to some degree across “markets” by investing in debt securities with uncorrelated sources of payment. For example, ABS—in which risk is dispersed from owners of assets to investors in securities backed by those assets and to other market participants guaranteeing those securities<sup>24</sup>—can be backed by virtually any type of predictable underlying payment source.<sup>25</sup> To the extent different underlying payment sources are uncorrelated, the investment risk on securities backed by those different payment sources will also be uncorrelated.

For example, the source of payment of an ordinary corporate bond is the income of the bond’s issuer. Most corporate issuers earn income by engaging in a business enterprise. Risk on corporate bonds is thus correlated with the industry sectors of their issuers.<sup>26</sup> Business activity can also be influenced by the economic environment, further correlating risk on corporate bonds with the economy of the regions in which the issuer does business.<sup>27</sup>

ABS, however, can include sources of payment that are largely uncorrelated with ordinary corporate bonds and that, potentially, are also

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technology created to track cash flows).

20. HUBBARD, *supra* note 7, at 336 (observing that “securitization helps lenders to diversify and share risk”).

21. *See supra* note 6.

22. Steven Schwarcz, *The Alchemy of Asset Securitization*, 1 STAN. J.L. BUS. & FIN. 133, 143 (1994).

23. *See* WILLIAM J. BERNSTEIN, *THE FOUR PILLARS OF INVESTING: LESSONS FOR BUILDING A WINNING PORTFOLIO* 126 (2002) (suggesting the most important investment decision is how to allocate money between debt and equity).

24. *See supra* note 17 and accompanying text.

25. COX ET AL., *supra* note 4, at 80.

26. *Cf.* Edwin J. Elton et al., *Explaining the Rate Spread on Corporate Bonds*, 56 J. FIN. 247, 247–48 (2001) (explaining the differences in the rates offered on corporate bonds and government bonds).

27. *Cf.* Dimitrios Kavvathas, *Estimating Credit Rating Transition Probabilities for Corporate Bonds*, AFA 2001 NEW ORLEANS MEETINGS 1, 9 n.13 (2000) (observing the connection between credit markets and the macroeconomic environment).

largely uncorrelated with other types of ABS. For example, risk on securities backed by a statistically diverse pool of consumer credit-card receivables should have little correlation with risk on bonds issued by a ship-building company. Similarly, risk on securities backed by consumer credit-card receivables should have little correlation with risk on securities backed by commercial mortgage loans.

Part of the “art” of investment diversification, however, is determining the practical degree of correlations. It will never be zero. As the financial crisis has shown, some degree of correlation will always exist in a global economy.<sup>28</sup> Although investment diversification is a primary reason for dispersing risk, there are other reasons as well. For example, asymmetry in market information can be reduced—and risk more efficiently allocated—by shifting risk on financial assets to investors and other market participants (such as third-party credit enhancers) who are better able to assess the risk.<sup>29</sup> Risk dispersion, therefore, can create benefits. However, the following discussion shows how risk dispersion can create market failures that, among other harms, cause market participants to misjudge or ignore potential correlations.

### *B. Market Failures*

Risk dispersion causes market participants to pay less attention to the retained risk. This is reasonable to the extent the lower level of attention is proportionate to the lower level of risk. But risk dispersion can also lead to market failures, causing market participants to underestimate and underprotect against risk.<sup>30</sup> For example, prior to the financial crisis investors believed that ABS provided an investment market that was uncorrelated with traditional debt markets<sup>31</sup> and that, even within the ABS market,

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28. In an economic downturn, for example, some consumers may be unable to pay their credit-card debts, some corporate lessees may be unable to pay their mortgages, and, if less goods are being shipped, ship-building companies may have less business.

29. STRUCTURED FINANCE, *supra* note 16, §§ 2:3–2:4; KOTHARI, *supra* note 17, at 220 (examining risk allocation where a “monoline insurance company would provide insurance cover to some of the securities in a securitization transaction, which, based on the rating of the insurance company itself, would substantially upgrade the rating of the said securities”).

30. Cf. Steven L. Schwarcz, *Protecting Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINN. L. REV. 373, 390–91 (2008) (asking whether structured finance dispersed subprime mortgage risk so widely that no investor had a clear incentive to monitor it); George A. Walker, *Financial Crisis—U.K. Policy and Regulatory Response*, 44 INT’L LAWYER 751, 758 (2010) (“[T]he securitized credit market . . . was intended to diversify and reduce risk rather than aggravate it.”).

31. See, e.g., Anand K. Bhattacharya and Frank J. Fabozzi, *The Expanding Frontiers of Asset Securitization*, in INVESTING IN ASSET-BACKED SECURITIES 2–3 (Frank J. Fabozzi ed., 2000)



many investments were diversified.<sup>32</sup> But when ABS investments backed by subprime mortgage loans began defaulting, other ABS investments backed by other types of assets began defaulting as well.<sup>33</sup> Few had seen the correlation between the subprime mortgage loans and those other assets.<sup>34</sup> The marginalization of risk caused by risk dispersion appears to have made investors and other market participants insufficiently diligent to recognize or worry about this correlation.<sup>35</sup>

Moreover, when the ABS market collapsed, its collapse impacted other debt markets. Although the ABS market had been seen as uncorrelated with ordinary debt markets (like bonds and commercial paper),<sup>36</sup> there was a correlation: most debt securities—even ABS—are rated by rating agencies.<sup>37</sup> When investors lost faith in the ratings of ABS, their loss of faith extended to the ratings of all debt securities.<sup>38</sup> Again, the marginalization of risk caused by risk dispersion appears to have made investors and other market participants insufficiently diligent to recognize, or at least to appreciate the significance of, this second correlation.<sup>39</sup>

*Consequences of Marginalization.* Marginalization of risk can have two orders of consequences. First-order consequences would be harm only to the market participants that underestimate and under-protect against the

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(discussing why ABS then represented a very small fraction of most fixed-income (i.e., debt securities) indices); *Investing in the CDO Market*, CRYSTALFUND.COM, <http://www.crystalfund.com/cdo.shtml> (last visited Jan. 4, 2012); see also ANAND K. BHATTACHARYA & FRANK J. FABOZZI, ASSET BACKED SECURITIES 11–13 (1996).

32. Cf. Tarun Sabarwal, *Common Structures of Asset-Backed Securities and Their Risks*, 4 CORP. OWNERSHIP & CONTROL 258, 258 (2006) (observing that asset-backed securities “increase investment opportunities for different classes of investors, because receivables from a given pool of collateral can be structured so that securities based on this pool have very different risk and return profiles”).

33. Steven L. Schwarcz, *Understanding the Subprime Financial Crisis*, 60 S.C. L. REV. 549, 552 (2009).

34. *Id.* (observing the correlation that once investors lost faith in mortgage-backed securities, they lost confidence in ratings of debt securities generally).

35. *Id.* at 553 (discussing the mutual misinformation problem).

36. ANAND K. BHATTACHARYA ET AL., ASSET-BACKED SECURITIES 12 (1996) (contrasting the ABS market with the corporate bond market and noting, among other non-correlating factors, that “the credit enhancement in the ABS market is provided by a variety of sources”).

37. See Timothy E. Lynch, *Deeply and Persistently Conflicted: Credit Rating Agencies in the Current Regulatory Environment*, 59 CASE W. RES. L. REV. 227, 237 (2009) (noting that “modern credit rating agencies are private, for-profit companies that assess the creditworthiness of the issuers of debt and debt-like securities,” such as asset-backed securities).

38. Schwarcz, *Understanding the Subprime Financial Crisis*, *supra* note 33, at 552.

39. Marginalization of risk does not explain, however, why credit enhancers such as monoline insurance companies, which often insured large loss positions of multiple investors, were sometimes themselves insufficiently diligent. Cf. *supra* note 29 (referencing monoline insurance companies). As observed *supra* note 2, there are various explanations of the financial crisis. Risk marginalization is merely one.

risk.<sup>40</sup> Second-order consequences would be harm that extends beyond (although it may include) those parties—such as harm resulting from a financial crisis or systemic collapse that is caused in whole or in part by a market participant under-protecting against the risk. Thus, first-order consequences would arise if a firm under-protects against a risk that causes the firm to lose \$1 million but causes no harm to others. Second-order consequences would arise if a firm under-protects against a risk that contributes to causing a systemic financial collapse.

The failure of Enron<sup>41</sup> represents an example of first-order consequences. Under-protection against risk caused that failure,<sup>42</sup> but it did not have a systemic impact on the financial system.<sup>43</sup> The financial crisis, in contrast, exemplifies under-protection against risk that did lead to second-order consequences.<sup>44</sup>

## II. ANALYSIS

Why does risk dispersion sometimes marginalize risk, causing market participants to underestimate and under-protect against the risk? The reasons can be different for first-order consequences and second-order consequences.

### A. First-Order Consequences

For first-order consequences, risk dispersion can cause market participants to underestimate and under-protect against risk for at least three interrelated<sup>45</sup> reasons.

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40. Harm to a market participant includes any harm to the market participant's direct investors. If, for example, XYZ Corporation is an investor, harm to XYZ may also harm XYZ's shareholders. These harms would all be first-order consequences.

41. For a discussion of Enron's failure, see Steven L. Schwarcz, *Enron and the Use and Abuse of Special Purpose Entities in Corporate Structures*, 70 U. CIN. L. REV. 1309, 1310–11 (2002).

42. *Id.* (examining Enron's failure).

43. This appears to be because Enron's failure "did not closely correlate with the viability of other financial institutions." Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Towards an Analytical Framework*, 86 NOTRE DAME L. REV. 1349, 1359 (2011). *But cf.* Alan Greenspan, Chairman, Fed. Reserve, Remarks to the Federal Reserve Bank of Chicago's 2003 Conference on Bank Structure and Competition (May 8, 2003), available at <http://www.federalreserve.gov/boarddocs/speeches/2003/20030508/default.htm> (arguing that the widespread use of credit-default swaps mitigated the potentially devastating repercussions of the "largest corporate defaults in history [WorldCom and Enron]"). This Article does not regard a firm's investors as third parties; hence, the fact that Enron's shareholders were harmed by Enron's failure does not create second-order consequences.

44. See *infra* notes 95–96 and accompanying text.

45. The information, model, and human processing failures discussed below are interrelated. For

### 1. Information Failure

Risk dispersion can cause information failure, of which there are at least two forms: disclosure failure and observational failure.

*Disclosure failure.* As finance becomes more complex, disclosure can become inadequate.<sup>46</sup> Risk dispersion exacerbates this problem by further complicating financial complexity. For example, “[b]y increasing exponentially the number of underlying assets—using assets which themselves are complex financial instruments, and using more complex structures—a CDO investor faces a far greater information burden than an investor in” simple mortgage-backed securities.<sup>47</sup>

Disclosure can become inadequate in the face of complexity for several reasons. Even if technically accurate and complete, disclosure can be virtually incomprehensible—or at least not worth any given investor’s time to comprehend.<sup>48</sup> Even some institutional investors may lack the staffing to evaluate complex securitization transactions.<sup>49</sup> Institutional investors will not always hire securitization experts as needed to decipher complex deals because “at some level of complexity,” the costs of hiring those experts will exceed, “or at least appear to exceed, any potential gain.”<sup>50</sup> This is because the cost of hiring experts is tangible, whereas the benefit gained from fully understanding complex transactions is intangible and harder to quantify.<sup>51</sup> Thus, even large and sophisticated hedge funds have failed, notwithstanding “full” disclosure, to understand the risks

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example, model failure is a specific form of information failure, and human processing failure in part explains why people rely on imperfect information and models, and the result of such reliance. Nonetheless, breaking these failures into these three categories has explanatory utility.

46. Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. 211, 238–45 (2009); see also *infra* notes 48–53 and accompanying text (explaining why disclosure can become inadequate in the face of complexity).

47. Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity and Systemic Risk* (Dec. 14, 2010) (unpublished manuscript) (on file with author); see also Schwarcz, *Systemic Risk*, *supra* note 16, at 221 (observing that risk diversification increases the chance that some market participants may not fully understand the risks they are taking on); Cf. Sabarwal, *supra* note 32, at 258–59 (explaining how, by varying the distribution of proceeds from the same pool of collateral, asset-backed securities with “very different risk and return profiles” can be created).

48. Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 238–45; Cf. Steven L. Schwarcz, *Disclosure’s Failure in the Subprime Mortgage Crisis*, 2008 UTAH. L. REV. 1109, 1113–15 (discussing when an investor’s failure to fully understand an investment may represent rational ignorance); Joel Telpner, *A Securitisation Primer For First Time Issuers*, in GLOBAL SECURITISATION AND STRUCTURED FINANCE 2003 1, 6 (2003) (discussing complexity of disclosing the risk that subordinated investors may not receive payments under the waterfall of payments in transactions that have multiple tranches of securities with different repayment priorities).

49. Schwarcz, *Disclosure’s Failure in the Subprime Mortgage Crisis*, *supra* note 48, at 1114.

50. *Id.*

51. *Id.*

inherent in highly complex ABS CDO transactions.<sup>52</sup> Furthermore, “agency costs stemming from a conflict between the interests of individual employees and the institutions for which they work” may motivate individual employees to sometimes take shortcuts when evaluating complex investments, such as by “over-relying on” the “securities being rated ‘investment grade’... and not spending the time and effort needed to fully understand the hundreds of pages of disclosure for each investment.”<sup>53</sup>

*Observational failure.* After dispersing risk, a market participant may be privy to less information, or may be less concerned, about the consequences of various financial-market events that feed back into the participant’s exposure.<sup>54</sup> To that extent, risk dispersion anomalously decreases the exposure to some risks (the dispersed risk) but exposes the market participant to other risks (less information).<sup>55</sup> Information failure, whether from inadequate disclosure or decreased market feedback, can marginalize risk.<sup>56</sup> For example, market participants may have insufficient information to predict how (or when) correlations could transform otherwise insignificant risks into major risks. This Article has already given examples of correlation failures caused by risk dispersion.<sup>57</sup>

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52. See Robert P. Bartlett, III, *Inefficiencies in the Information Thicket: A Case Study of Derivative Disclosures During the Financial Crisis* (U.C. Berkeley Public Law Res. Paper, Working Paper No. 1585953, 2010), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1585953](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1585953). For an explanation of ABS CDO transactions, see *infra* note 66 and accompanying text.

53. Schwarcz, *Disclosure’s Failure in the Subprime Mortgage Crisis*, *supra* note 48, at 1114–15.

54. E-mail from Oren Sussman, Reader in Finance, Said Business School, University of Oxford, to author (Oct. 5, 2010 (10:11 PM)) (on file with author).

55. *Id.* The point at which the trade-off between these two risks becomes suboptimal is beyond the scope of this Article.

56. It is also possible, of course, that information failure might sometimes motivate market participants to over-protect against unknown consequences.

57. See *supra* notes 32–34 and accompanying text (discussing failure to see the correlation between subprime mortgage loans and other assets); *supra* notes 36–38 and accompanying text (discussing failure to see the correlation between all debt securities and ratings). Another example is the failure of investors to recognize an underlying correlation between mobile-home loans and the price of oil during the late 1970s and early 1980s. An oil boom in Oklahoma drew an influx of oil workers, creating the nation’s fastest growing market for mobile-home loans. When oil prices crashed, drilling in Oklahoma ceased, resulting in massive unemployment and widespread defaults on the mobile-home loans. Paul Bennett, *Effective Monetary Policy in the U.S. and Emerging Markets* 5–8 (Sept. 2006) (unpublished manuscript) (on file with author). Enron’s collapse illustrates another correlation failure. Enron’s primary and most profitable business strategy was acting as a derivatives counterparty. Schwarcz, *Enron and the Use and Abuse of Special Purpose Entities in Corporate Structures*, *supra* note 41, at 1309. Because only investment-grade firms are generally accepted as counterparties, it was critical to Enron to preserve its investment-grade rating—the main risk to this rating being the possibility that Enron’s merchant assets might drop in value, requiring Enron to mark down to market those asset values. *Id.* at 1309–10 & 1309 n.2. Enron sought to protect its rating by engaging in a series of structured transactions that effectively used Enron stock—which had a

Correlations may only be observable when there is full appreciation of the underlying variables.<sup>58</sup>

## 2. Model Failure

As previously discussed, computerized mathematical models have facilitated more sophisticated techniques of dispersing risk in order to diversify investments.<sup>59</sup> But this can increase the complexity of the investments themselves, often requiring business managers to rely on the output of mathematical models to understand the risk. To the extent these models rely on untested assumptions and simplifications, they can be misleading.

Consider, for example, VaR, or value-at-risk. With limited time available to devote to risk assessment, a firm's senior managers often want risk to be modeled and reduced to useable numbers.<sup>60</sup> VaR was the most widely used model for reducing investment risk to a number.<sup>61</sup> As the VaR model became more accepted, firms began compensating analysts not only for generating profits but also for generating profits with low risks, measured by VaR.<sup>62</sup> Analysts, therefore, began to refocus investment portfolios to concentrate more on securities (such as mortgage-backed securities and credit-default swaps) that generate high gains and only rarely have losses.<sup>63</sup> Because the likelihood of these losses was less than the risk percentages taken into account under VaR modeling—which typically excludes losses that have less than a one-percent (or, in some cases, five-percent) likelihood of occurring within the model's limited time frame—such losses were not included in the VaR computations.<sup>64</sup>

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historically rising public-market price—as collateral to hedge the value of its merchant assets. In return, Enron made guarantees tied to the stock price. *Id.* Enron “judged the risk that it would have to pay on its guarantees as remote,” but Enron’s stock price subsequently fell to unanticipated levels—triggering the Enron guarantees and causing Enron to lose its investment-grade rating. *Id.* at 1310–11, 1315. Deprived of its primary business strategy, Enron had little choice but to file for bankruptcy. *Id.*

58. The limitations of cognitive complexity may also help to explain the inability of even financial analysts and other “experts” to see correlations. Different people perceive the same phenomena on different levels of complexity. As the complexity of financial products increased, fewer analysts possessed sufficiently nuanced cognition to properly understand and price the products. Trying to do their jobs, many analysts made oversimplifications—usually on the optimistic side because the economy was expanding. To some extent, these simplifications involved overreliance on heuristics. See Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 222–23.

59. See *supra* notes 14–22 and accompanying text.

60. Nocera, *supra* note 2, at 26.

61. *Id.*

62. *Id.* at 46.

63. *Id.* Mortgage-backed securities are a subset of ABS.

64. *Id.*

Analysts knew, but did not always communicate, that VaR could cause senior managers to underestimate risk: in the rare cases where losses occurred, they could be huge.<sup>65</sup>

So-called “ABS CDO” securities—essentially securitizations of asset-backed securities already issued in prior securitization transactions<sup>66</sup>—illustrate another way that computerized mathematical models have failed, through their very complexity, in the attempt to disperse risk. These securities did not have an active trading market, so models were used to substitute for real market information.<sup>67</sup> Investors therefore relied on mark-to-model valuation of these securities.<sup>68</sup> “When assumptions underlying the models turned out to be wrong, investors panicked because they did not know what the securities were worth.”<sup>69</sup>

### 3. Human Processing Failure

Behavioral psychology helps to explain why dispersed risk can be marginalized.<sup>70</sup> On a basic level, the human brain’s ability to accurately correlate perceived and actual risk is limited.<sup>71</sup> Even worse, human thought processing is not merely inaccurate but subject to discontinuities and misdirection. An example of a discontinuity is the predilection to ignore or undervalue risk below a minimum threshold level.<sup>72</sup> Examples of misdirection include the tendency to see what one wants to see if risks are unclear,<sup>73</sup> to assume that the future will resemble the recent past,<sup>74</sup> and to value immediate certain gains over contingent long-term losses.<sup>75</sup>

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65. *Id.*; Cf. Carlo Acerbi et al., *Expected Shortfall as a Tool for Financial Risk Management*, ARXIV (Feb. 16, 2001), [http://arxiv.org/PS\\_cache/cond-mat/pdf/0102/0102304v1.pdf](http://arxiv.org/PS_cache/cond-mat/pdf/0102/0102304v1.pdf) 1, 3 (noting that “VaR always come[s] late when the damage is already done” is a well-known adage reflecting that future market probabilities are commonly estimated from past market data).

66. Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 220.

67. Steven L. Schwarcz, *The Future of Securitization*, 41 CONN. L. REV. 1313, 1324 (2009).

68. *Id.*

69. *Id.*

70. This discussion of human thought processing failure can be viewed as a subset of the more general problem of ‘complacency,’ which I have identified as one of the causes of the financial crisis. See Schwarcz, *Protecting Financial Markets*, *supra* note 30, at 404–05.

71. See, e.g., Paul Slovic et al., *Risk As Analysis and Risk As Feelings: Some Thoughts About Affect, Reason, Risk, and Rationality*, 24 RISK ANALYSIS 311, 315 (2004) (finding that humans are inherent risk takers and do not shy away from situations they recognize are risky).

72. Cf. Richard J. Herring et al., Wharton Fin. Inst. Ctr. and Oliver Wyman Inst. 12th Annual Fin. Risk Roundtable 2009: The New Role of Risk Management: Rebuilding the Model (June 24, 2009), available at <http://knowledge.wharton.upenn.edu/article.cfm?articleid=2268>.

73. It is reported, for example, that King Croesus of Lydia wanted to make war on Cyrus, but was wary of doing so without heavenly sanction. After singling out the Delphic Oracle as the most reliable, the king’s messengers “asked the practical question about the advisability of Croesus’ going to war, and received the famous [and famously ambiguous] response that ‘Croesus by crossing the

By increasing complexity,<sup>76</sup> risk dispersion makes these human thought processing failures worse. For example, fewer people will have sufficiently nuanced cognition to fully understand the complexity, and those without that cognitional ability may overrely on simplifying heuristics.<sup>77</sup> That overreliance may be worsened by the human tendency to ignore details when overwhelmed by complexity.<sup>78</sup>

Even hiring experts may not always provide perfect information. Indeed, it sometimes can generate misleading information. Experts do not always see the big picture. Consider medical specialists with intensive training in a particular organ, disease, or part of the body. Once they leave medical school, they concentrate on their specialty, focusing on the organ or disease rather than on the whole body.<sup>79</sup> A general practitioner, in contrast, is more likely to detect other illnesses, which can prevent further harm for the patient.<sup>80</sup>

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Halys would destroy a mighty kingdom.” THOMAS DEMPSEY, *THE DELPHIC ORACLE: ITS EARLY HISTORY, INFLUENCE, AND FALL* 70 (1918). Croesus interpreted this to mean what he wanted to hear—that Cyrus would fall—but in fact the empire that fell was his own. *Id.* at 71; *see also id.* at 71, 107 (discussing the historical method of the oracles as “shelter[ing] his ignorance behind a studied ambiguity” and vagueness). This same method of response is said also to be used today by fortune tellers. *See* J. Barkley Rosser, Jr., *Alternative Keynesian and Post Keynesian Perspectives on Uncertainty and Expectations*, 23 *J. POST KEYNESIAN ECON.* 545, 554–57 (2001) (arguing that uncertainty leads to self-fulfilling mistakes).

74. Under the availability heuristic, for example, we overestimate the frequency or likelihood of an event when examples of, or associations with, similar events are easily brought to mind. Thus, people typically overestimate the divorce rate if they can quickly find examples of divorced friends. Paul Slovic, Baruch Fischhoff & Sarah Lichtenstein, *Facts Versus Fears: Understanding Perceived Risk*, in *JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES* 463, 465 (Daniel Kahneman et al. eds., 1982).

75. *Cf.* Cullen Roche, *Risk Management: An Undervalued Commodity on Wall Street*, *BUSINESS INSIDER* (Jan. 14, 2011, 5:35 AM), <http://www.businessinsider.com/risk-management-an-undervalued-commodity-on-wall-street-2011-1>. Market participants might also be misled by the incongruity that although risk dispersion can reduce investment risk from an individual participant’s standpoint, it does not necessarily reduce overall risk; in other words, risk may be widely distributed among participants in a given market, but the aggregate amount of risk may still be present. *Id.*

76. *See supra* notes 46–47 and accompanying text (explaining why risk dispersion increases complexity).

77. *See supra* note 58. Investors may also tend to ignore “details” when overwhelmed by complexity, leading to overreliance on heuristics. *See, e.g.*, Paul Monk, Austhink, Plenary Address to the 2004 Fenner Conference on the Environment (May 24, 2004), *available at* <http://www.science.org.au/events/fenner/fenner2004/monk.html> (explaining how individuals are prone to be swayed by only salient points and forgetful of details, due to the combined effects of limited working memory capacity, confirmation bias, and belief preservation). Query whether that tendency might be a metaphor for the financial future.

78. WILLIAM J. RAPAPORT ET AL., *LANGUAGE AND MEANING IN COGNITIVE SCIENCE: COGNITIVE ISSUES AND SEMANTIC THEORY* 85 (Josefa Toribio & Andy Clark eds., 1998).

79. I. R. McWhinney, *Decision Making in General Practice*, 10 *J. ROYAL C. GEN. PRAC. OCCASIONAL PAPERS* 31, 32 (1980).

80. *Id.*

Explanations of the myopia of experts focus on accuracy of recall and inflexibility.<sup>81</sup> Although “[e]xperts may outperform novices in recalling the details of a problem or text,”<sup>82</sup> they “tend to *underperform* novices” when their domain knowledge cannot be specifically utilized.<sup>83</sup> Indeed, experts with large amounts of specialized knowledge are effectively confined by their knowledge, which “is efficient if the solution happens to fall [within that knowledge] but which can backfire if it does not.”<sup>84</sup> A failure to see the big picture is especially likely when risk dispersion causes some financial products to become so complex that few financial “experts” have the specialized knowledge to understand them in their entirety.<sup>85</sup>

### *B. Second-Order Consequences*

For second-order consequences, risk dispersion can marginalize risk due to the same market failures discussed previously and also because of another type of market failure—collective action problems, as discussed below. First, consider the previously discussed market failures.

#### *1. Information, Model, and Human Processing Failures*

Risk dispersion can cause market participants to underestimate and under-protect against risk, leading to second-order consequences due to the information, model, and human thought processing failures. For example, the seeds of the financial crisis were planted when mortgage lenders began making loans to risky borrowers secured by the homes that the borrowers purchased with the loan proceeds. Mortgage lenders then dispersed risk on these “subprime mortgage loans” by bundling them together as collateral to partially support the payment of complex asset-backed securities that were sold to banks and other institutional investors.<sup>86</sup> These securities maintained their value so long as home prices

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81. See Ahmad Hashem et al., *Medical Errors as a Result of Specialization*, 36 J. BIOMEDICAL INFORMATICS 61, 61–62 (2003).

82. *Id.* at 61.

83. *Id.* (emphasis added).

84. *Id.* at 62.

85. Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 13–4 (2004) (comparing complex financial transactions to airplanes about which few understand the entirety); Cf. WALL STREET: MONEY NEVER SLEEPS (20th Century Fox 2010) (in which Gordon Gekko, the fictional banker, observed that “there are probably only seventy-five people in the world who actually understand the new breed of complex financial instruments.”).

86. See Schwarcz, *Understanding the Subprime Financial Crisis*, *supra* note 33, at 550–51. Although lenders made these subprime loans to risky borrowers, the basic business model was not



appreciated, as they had been doing for decades and as market observers assumed would continue.<sup>87</sup> That assumption, in retrospect, was a multiple human thought processing failure—ignoring a small risk, under-estimating a low-probability risk, seeing what one wants to see when risks are unclear, assuming that the future (of housing prices) will resemble the recent past, and valuing immediate certain gains (such as fees) over contingent long-term losses.<sup>88</sup>

When home prices began falling, some of these asset-backed securities began defaulting,<sup>89</sup> requiring financial institutions heavily invested in these securities to write down their value, causing these institutions to appear, and possibly to become, financially risky.<sup>90</sup> The fact that financial institutions became heavily invested in dubious securities resulted at least in part from model failure: a reliance on mathematical models with untested assumptions or simplifications, like VaR, to assess risk.<sup>91</sup>

The apparent riskiness of financial institutions heavily invested in these securities should have had only first-order consequences, to the firms themselves. It took on second-order consequences, however, because of an information failure—to appreciate the significance of the correlation among financial firms and markets<sup>92</sup> and to know with certainty the actual riskiness of any given firm. As firms perceived the riskiness of other firms (“counterparty risk”) increasing, they stopped dealing with each other, thereby reducing the availability of credit.<sup>93</sup> Similarly, as securities backed by subprime loans began defaulting, investors stopped investing—not only in those securities but also in securities backed by other types of collateral and in debt securities more generally.<sup>94</sup> Because debt markets had been

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irrational and had some successful precedent. *See id.* at 550.

87. *See* Jack Guttentag, *Shortsighted About the Subprime Disaster*, WASH. POST, May 26, 2007, at F2 (explaining that because housing prices had been rising for a long period of time, it was assumed that they would continue to rise).

88. *See supra* Part II.A.3 (discussing these human thought processing failures).

89. Schwarcz, *Understanding the Subprime Financial Crisis*, *supra* note 33, at 550–51 (explaining that home appreciation had been expected to enable risky borrowers to refinance to lower interest rates).

90. *Id.* at 553.

91. *See supra* notes 60–65 and accompanying text (discussing VaR).

92. *See supra* Part II.A.1 (discussing correlation failure as a subset of information failure).

93. Market participants are bound to become concerned about counterparty risk in the aftermath of an economic shock, such as the collapse of Lehman Brothers, because all parties are only aware of their own contractual obligations. Concern over perceived counterparty risk becomes self-fulfilling since firms become reluctant to deal with each other. This creates additional funding needs; for example, by increasing the price of credit default swaps. *See* Markus K. Brunnermeier, *Deciphering the Liquidity and Credit Crunch 2007–2008*, 23 J. ECON. PERSP. 77, 97–98 (2009).

94. *See* Schwarcz, *Protecting Financial Markets*, *supra* note 30, at 395. The original defaults on securities backed by subprime loans implicated only highly leveraged ABS CDO securities; but those

supplanting banks as sources of credit, reduced investment in those markets further reduced the availability of credit.<sup>95</sup> The resulting lack of credit impacted the real economy.<sup>96</sup>

Risk dispersion therefore led to the types of market failures discussed in Part II.A, which contributed to the financial crisis.<sup>97</sup> But risk dispersion can also lead to collective-action market failures that more directly cause second-order consequences.

## 2. *Collective Action Failures*

There are at least two types of collective action market failures. The first is a form of tragedy of the commons (hereinafter, “TOC failure”), “in which the benefits of exploiting finite capital resources accrue to individual market participants, each of whom is motivated to maximize use of the resource, whereas the costs of exploitation” are distributed more widely.<sup>98</sup> This failure arises because individual market participants are self-regarding when making risk-taking decisions, whereas those decisions can have spillover effects (externalities) due to the interconnectivity among financial firms and markets.<sup>99</sup> Absent regulatory intervention, market participants will progressively pursue their self-interest to the detriment of other market participants, the financial system, and the real economy.<sup>100</sup> It is rational for individual market participants to under-protect against second-order consequences.<sup>101</sup>

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defaults triggered a lack of confidence in the broader asset-backed securities markets and in rating-agency ratings, which in turn triggered a lack of investor confidence in the broader markets for debt securities. See Schwarcz, *Understanding the Subprime Financial Crisis*, *supra* note 33, at 552; see also Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 223 (observing that “although [these] ABS CDO securities were backed by what appeared to be significantly diverse assets, there was an underlying correlation in the subprime mortgage loans backing many of those securities”).

95. This ongoing shift of the source of corporate financing from banks to financial and capital markets is referred to as disintermediation. See Schwarcz, *Systemic Risk*, *supra* note 16, at 200. Around the time of the financial crisis, “conventional commercial bank lending had dropped to [only] 30 percent” of corporate financing. See Mortimer B. Zuckerman, *No Time to Lose*, U.S. NEWS & WORLD REP., Mar. 2009, at 80.

96. See Schwarcz, *Understanding the Subprime Financial Crisis*, *supra* note 33, at 571.

97. See *supra* Part II.A.

98. See Schwarcz, *Systemic Risk*, *supra* note 16, at 206 (observing this failure). This is a form of tragedy of the commons, though not a classic tragedy of the commons in which the parties involved commonly suffer the externality they cause. See Garret Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968) (using example of an overgrazed pasture resulting from common ownership, where no individual owner has the right to exclude use by other owners).

99. Anabtawi & Schwarcz, *supra* note 43, at 1375.

100. *Id.*

101. Individual market participants may well, on an expected-value basis, be better off (e.g., by

Although the potential for TOC failure exists regardless of risk dispersion,<sup>102</sup> risk dispersion can greatly exacerbate that failure. For example, a tragedy of the commons will “play out as long as the decision-making structures regarding resource management are based solely on individuals making decisions for their own gain,”<sup>103</sup> and risk dispersion increases individual investment decisions. More significantly, risk dispersion can mislead investors into thinking that they no longer need to worry about the dispersed risk. In the financial crisis, for example, few market participants appear to have thought about where dispersed risk went, or whether dispersed risk could impact the stability of financial markets.

The second type of collective action failure is unique to risk dispersion: risk can be so widely dispersed that a rational market participant individually lacks the incentive to monitor it (hereinafter, “incentive failure”).<sup>104</sup> For example, an investor contemplating purchasing a relatively small tranche of high-yield subordinated securities may find that the cost of performing due diligence and ongoing monitoring would wipe out any interest-rate advantage of the securities.<sup>105</sup> The investor may nonetheless be motivated to make the investment, notwithstanding lack of due diligence and monitoring, if its competitors are investing in similarly risky but high-yield securities and the investor needs to invest in those securities to remain competitive (at least in the short term).<sup>106</sup>

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receiving fees) engaging in risk-dispersing transactions because most of any potential harmful externalities would be imposed on third parties (e.g., “Main Street”).

102. Cf. Schwarcz, *Systemic Risk*, *supra* note 16, at 206.

103. Alok Gupta et al., *Streamlining the Digital Economy: How to Avert a Tragedy of the Commons*, 1 IEEE INTERNET COMPUTING 38, 39 (1997); Accord DAVID NICKERSON & RONNIE J. PHILLIPS ET AL., TOO BIG TO FAIL: POLICES AND PRACTICES IN GOVERNMENT BAILOUTS 117–18 (Benton E. Gup ed., 2004).

104. See *supra* note 30. Incentive failure and TOC failure have different natures and even consequences. For example, any harm from TOC failure is likely to consist of externalities in the form of systemic effects, although that harm may indirectly impact the market participant; whereas any harm from incentive failure is likely to impact the market participant itself, although that harm may indirectly cause externalities in the form of systemic effects.

105. Although a single small investment would not cause significant externalities, an investor may engage in numerous such transactions or numerous investors may engage in similar transactions.

106. If, for example, the investor invests in safer, and therefore lower-yielding, securities, its (at least short term) profitability will be lower than that of its competitors. That can cause the investor’s shareholders to shift their money to more profitable investors. Cf. Michiyo Nakamoto & David Wighton, *Citigroup Chief Stays Bullish on Buy-out*, FIN. TIMES, July 9, 2007, <http://www.ft.com/cms/s/0/80e2987a-2e50-11dc-821c-0000779fd2ac.html> (quoting Chuck Prince, former chairman and CEO of Citigroup, as stating that “When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you’ve got to get up and dance. We’re still dancing.”).

The investor may then be under-protecting against risk. The investor may assume, for example, that other investors have more significant amounts at stake and therefore must be engaging in due diligence and monitoring, and the investor therefore can be a free rider (although this assumption may not always be true). The investor also may be rationalizing that it will be in no worse position than its competitors, who are making these same kinds of investments, if the investment fails<sup>107</sup>—especially given the investment’s relatively small size. Even if that rationalization is justified at the outset, however, continuing competitive pressures may motivate the investor to increase the investment, especially where approval of the initial investment sets an institutional precedent that makes further approvals easier.

The behavioral psychology factors discussed earlier also help to explain why a market participant, under pressure to remain competitive, would rely on untested assumptions or would engage in rationalizations when making what might later turn out to be bad investments.<sup>108</sup> The market participant may ignore or undervalue bad-investment risk, for example, if that risk appears to be small. Likewise, the investor will see what it wants to see, given the competitive pressures, if the bad-investment risk is unclear, or it will value the immediate certain gain of maintaining its competitive position over the contingency that the investment will cause a long-term loss.<sup>109</sup> Risk dispersion can also potentiate “herd behavior” by masking its consequences.<sup>110</sup>

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107. A market participant may rationalize in this way even without believing that other market participants have better information on which it may free ride. *See, e.g.*, GORDON DE BROUWER, HEDGE FUNDS IN EMERGING MARKETS 150 (2001) (noting that “even rational market participants may at times ignore their own private information and follow the actions of earlier participants because the [perceived] information in other people’s collective actions overwhelms the individual’s private information.”).

108. *See supra* Part II.A.3.

109. *Cf. supra* note 106 and accompanying text (discussing short-term investor focus).

110. Herd behavior involves following the lead of a critical mass of other market participants. *See, e.g.*, H. KENT BAKER & JOHN R. NOFSINGER, BEHAVIORAL FINANCE: INVESTORS, CORPORATIONS, AND MARKETS 204–05 (2010) (noting the propensity to make investment decisions based on herding, and suggesting that “[a] rational explanation for such behavior hinges upon the assumption that in a world of imperfect and asymmetric information, individuals follow the market trend as a fast and frugal heuristic,” rationalizing that “the crowd or market might be better informed than a single individual”).

### III. SOLUTIONS

#### A. *Should Government Attempt to Regulate the Problem?*

Risk dispersion can create market failures, and a traditional role of government is to help correct market failures.<sup>111</sup> In principle, therefore, government regulation should be appropriate, but that begs the practical question of whether the problem of risk dispersion is sufficiently harmful to merit regulation. In answering this question, one should start by distinguishing first- and second-order consequences. Regulating risk dispersion that causes only first-order consequences would likely be inefficient. Market participants themselves should want to protect against first-order consequences. This does not mean that all firms will protect perfectly against such consequences, but it is unlikely that paternalistic government regulation would do a better job.<sup>112</sup>

In contrast, it may well be appropriate to regulate risk dispersion that causes second-order consequences. Second-order consequences are externalities, and traditionally government regulations attempt to require parties to internalize the externalities they cause.<sup>113</sup> The discussion below therefore focuses on designing regulation of risk dispersion that causes second-order consequences. Any such regulation will diminish first-order consequences as well because the market failures that cause risk dispersion leading to second-order consequences can also create first-order consequences.<sup>114</sup>

#### B. *Designing Regulation*

Regulation should be designed to correct market failures.<sup>115</sup> Thus, regulation protecting against risk dispersion that causes second-order consequences should be designed either to correct the underlying market failures caused by the risk dispersion or to limit the risk dispersion ab initio. First consider correcting the underlying market failures.

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111. Hans-Werner Sinn, *The Selection Principle and Market Failure in Systems Competition*, 66 J. PUB. ECON. 247, 248 (1997) (recognizing that governments usually try to correct market failures).

112. Joseph E. Stiglitz, *Markets, Market Failures, and Development*, 79 AM. ECON. REV. 197, 202 (1989) (recognizing that governments may not want to enter a place where the private market has failed, and that government may not do a better job than the private market does in correcting failures).

113. STEPHEN BREYER, *REGULATION AND ITS REFORM* 23 (1982); *see also* Vincent Ostrom et al., *The Organization of Government in Metropolitan Areas: A Theoretical Inquiry*, 55 AM. POL. SCI. REV. 831, 832 (1961) (observing that a basic goal of government is to internalize externalities).

114. *See supra* notes 85–86 and accompanying text.

115. *See, e.g.*, IVAN PNG & DALE LEHMAN, *MANAGERIAL ECONOMICS* 414 (3d ed. 2007).

### 1. *Regulating the Information, Model, and Human Processing Failures*

Recall that risk dispersion can cause information, model, and human thought processing failures that not only cause first-order consequences but also can result in second-order consequences. As discussed, market participants should want to self-regulate to prevent first-order consequences; but self-regulation will be insufficient to prevent second-order consequences, which are externalities.<sup>116</sup> To the extent the information, model, and human thought processing failures are not corrected through self-regulation, the discussion next examines, albeit briefly, how regulation could be designed to help correct them.<sup>117</sup>

*Information failure.* In the related context of complexity, I have examined whether disclosure itself can be improved in the face of complexity.<sup>118</sup> I considered a range of possible responses to disclosure's limitations, including guaranties and governmental and private-sector certifications of quality.<sup>119</sup> These responses, especially private-sector certification of quality, can help to some degree.<sup>120</sup> For example, aligning the compensation of employees with the long-term interests of their firms can help to mitigate information failure that results from agency conflicts.<sup>121</sup> These solutions, however, will not fully solve the information failure problem.<sup>122</sup> That problem results not only from information asymmetry but, sometimes more insidiously, can be exacerbated when parties with apparently greater information mistakenly certify quality, thereby (inadvertently) misleading investors and other parties.<sup>123</sup>

*Model failure.* I have also separately examined how to mitigate model failure in the face of complexity. The most effective approach would be to

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116. *Supra* Part II.B.

117. That discussion is not this Article's primary focus because, in a related context, I have separately addressed regulation of these types of failures. *See* Anabtawi & Schwarcz, *supra* note 43, at 1382–93.

118. *See generally* Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46; *see also* Schwarcz, *Disclosure's Failure in the Subprime Mortgage Crisis*, *supra* note 48.

119. *See* Schwarcz, *Disclosure's Failure in the Subprime Mortgage Crisis*, *supra* note 48, at 1119–21.

120. *Id.*

121. *Compare supra* note 53 and accompanying text (explaining how agency costs stemming from a conflict between the interests of individual employees and the institutions for which they work may motivate individual employees to sometimes take shortcuts) *with infra* notes 124–25 and accompanying text (discussing how to mitigate agency costs by aligning compensation with long-term interests of the firm).

122. Schwarcz, *Disclosure's Failure in the Subprime Mortgage Crisis*, *supra* note 48, at 1119–21.

123. *Id.* at 1121 (referring to this as a mutual misinformation problem).

align the compensation of employees working with or relying on models with the long-term interests of their firms.<sup>124</sup> That would motivate employees to better reveal the risks and limitations of models to their senior management.<sup>125</sup>

Firms have incentives and are in a better position than government regulators to determine how best to align their long-term interests with employee compensation. Alignment is difficult to achieve, however, because individual firms that attempt to align incentives will be disadvantaged in their ability to compete for the best employees.<sup>126</sup> Regulation “may well be needed to help resolve this collective-action problem.”<sup>127</sup> Because firms are increasingly global and top employees can move among nations, any such regulation should ideally be international in order to avoid prejudicing nations that individually require employee compensation to be aligned with long-term firm interests.<sup>128</sup>

Another way to mitigate model failure in the face of complexity would be to develop more reliable models. Although VaR has been the most common model used by market participants for assessing risk,<sup>129</sup> its limitations were not always communicated to senior managers.<sup>130</sup> The alignment of incentives, discussed above, would help to increase that communication, but efforts should also be made to improve the VaR model to make it more accurate. Economists Tobias Adrian and Markus Brunnermeier, for example, are attempting to reduce what they see as the VaR model’s two most significant limitations: that it measures the risk of an individual financial institution in isolation, without factoring in systemic risk, and that its calculations are based on short-term data samples that reflect current rather than future market conditions.<sup>131</sup>

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124. Steven L. Schwarcz, *Conflicts and Financial Collapse: The Problem of Secondary-Management Agency Costs*, 26 *YALE J. ON REG.* 457, 465–67 (2009) (arguing that compensation conflicts explain, among other things, the failure of secondary managers to disclose the limitations of the VaR model to senior management); see also Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 261.

125. *Cf.* Schwarcz, *Conflicts and Financial Collapse*, *supra* note 124, at 460.

126. *Id.* at 468.

127. *Id.* at 469.

128. *Cf. id.* at 460.

129. For a description of the VaR model, see *supra* notes 60–65 and accompanying text.

130. See *supra* text accompanying note 65.

131. Tobias Adrian & Markus Brunnermeier, *CoVaR*, FED. RESERVE BANK N.Y. STAFF REPORTS NO. 348 (revised Sept. 2011), [http://newyorkfed.org/research/staff\\_reports/sr348.pdf](http://newyorkfed.org/research/staff_reports/sr348.pdf) (proposing an alternate method for market regulators to measure risk, called conditional value at risk (CoVaR), designed to factor in systemic risk and also to take into account future risk by factoring in the institution’s size, leverage, maturity mismatch, and other relevant characteristics).

*Human Processing Failure.* I also have separately examined how to mitigate human thought processing failures.<sup>132</sup> The problem here is fundamental to its core: the human brain's limited ability to accurately correlate perceived and actual risk, and its susceptibility to discontinuities and misdirection. By increasing complexity, risk dispersion exacerbates these biases and limitations. Regulation nonetheless can be designed to make market participants more vigilant against these biases and limitations, especially when they are engaging in risk-related decisions. For example, the authority and compensation of a firm's risk managers could be increased in order to attract managers with the nuanced cognition that is necessary to understand the complexity,<sup>133</sup> and risk managers could be required to assess risk on a firm-wide, not compartmentalized, basis.<sup>134</sup> Regulators could also require market participants to inform them of risks that are not fully captured by internal models. Additionally, regulators could require market participants to qualitatively analyze risks that cannot be fully quantified.<sup>135</sup> At the end of the day, though, human processing failures can only be mitigated, not eliminated. That makes the question of whether risk dispersion itself should be limited even more relevant.<sup>136</sup>

## 2. *Regulating the Collective Action Failures*

Risk dispersion also can create collective action failures—such as TOC failures and incentive failures—that cause second-order consequences. This Article next examines how regulation should be designed to help correct these failures. The following discussion focuses on regulation because firms are unmotivated to self-regulate against collective action failures and because these failures more often lead to second-order consequences.

*TOC Failure.* TOC failure occurs because individual market participants are self-regarding when making risk-taking decisions, whereas those decisions can have externalities.<sup>137</sup> The most direct way to correct this failure is to require market participants to internalize those

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132. See Anabtawi & Schwarcz, *supra* note 43.

133. See *supra* note 77–78 and accompanying text (describing that human processing failure).

134. Cf. Dodd-Frank Act, Pub. L. No. 111–203, § 165(h), 124 Stat. 1376, 1429–30 (2010) (to be codified at 12 U.S.C. § 5365(h)) (requiring certain publicly traded bank-holding or financial companies to establish board-level risk committees having enterprise-wide risk management responsibilities and including at least one risk management expert).

135. Anabtawi & Schwarcz, *supra* note 43.

136. For an examination of this question, see *infra* Part III.B.3.

137. See *supra* notes 98–101 and accompanying text.



externalities. This could be done, for example, by regulation requiring at least systemically important market participants<sup>138</sup> to contribute to a systemic risk fund.<sup>139</sup> The fund could then be used as a source of bailout monies or as a source of market liquidity.<sup>140</sup> Ideally, any such fund should be international to avoid anti-competitively “taxing” market participants in any given jurisdiction.

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138. This Article does not purport to determine which market participants should be deemed to be systemically important. In a slightly different context, the Dodd-Frank Act effectively defines a systemically important market as “any bank holding company with total consolidated assets equal to or greater than \$50 billion.” Dodd-Frank Act, Pub. L. No. 111-203, § 210(o)(1)(A), 124 Stat. 1376, 1509 (2010). Beyond this financial threshold, the Act differentiates between banks, which are automatically considered systemically important, and “nonbank financial companies,” which may be selected for supervision by the Board of Governors. *Id.* § 113(a)(1). In making its determination, the Board of Governors must consider (inter alia) whether “the nature, scope, size, scale, concentration, interconnectedness, or mix of the activities of the U.S. nonbank financial company[] could pose a threat to the financial stability of the United States.” *Id.* Commentators have argued that additional factors should also tie into a determination of “systemic importance.” Professors Gordon and Muller argue, for example, that for purposes of contributing to a systemic risk fund, private hedge funds and money market funds should be deemed systemically important because they “depend on the stability of the financial sector for their daily activity.” 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, 205 (2011). Of course, any definition of “systemically important” would almost certainly have to adjust over time to reflect the variable nature of the concept’s defining factors, from inflation’s effect on the \$50 billion financial threshold to changing perceptions of systemic risk. Another consideration in settling upon a definition is that market participants may attempt to avoid a “systemically important” classification by reorganizing themselves to fall outside the definition. It is therefore important that the definition be broad enough to avoid being inappropriately gamed. On the other hand, any definition should encourage otherwise systemically important market participants to reorganize themselves to significantly reduce their systemic risk profiles.

139. Although this Article does not purport to determine how the contribution rate should be calibrated, some observations may be made. The contribution rate should presumably depend on a firm’s systemic importance, which in turn should be a function of at least two variables: the extent of the firm’s direct importance to other market participants (through, for example, its counterparty relationships), and the extent of the firm’s indirect importance to other market participants resulting from the degree of correlation of its assets with market assets. Anabtawi & Schwarcz, *supra* note 43. The Dodd-Frank Act authorizes regulators to create a “risk matrix” for this purpose, taking into account factors such as “economic conditions generally affecting financial companies” and “the risks presented by the financial company to the financial system.” Dodd-Frank Act, Pub. L. No. 111-203, § 210(0)(4), 124 Stat. 1376, 1510–11 (2010) (to be codified at 12 U.S.C. § 5390(0)(4)). In analyzing the “risks presented” by a financial company, specific factors such as the company’s capital and liquidity that directly impact the “systemic risk load” should be considered to complete a risk-adjusted assessment of the firm’s appropriate contribution. Gordon & Muller, *supra* note 138, at 206. In the related context of the Basle III capital adequacy proposals and new leverage ratios, the Basel Committee has stated that “[s]ystemically important banks should have loss absorbing capacity beyond the standards [it has announced],” but it has not yet developed standards for such firms. *Basel iii Accord: The New Basel iii Framework*, BASEL III, <http://www.basel-iii-accord.com/> (last visited Jan. 8, 2012).

140. *Cf.* Anabtawi & Schwarcz, *supra* note 43 (arguing for creation of such a market liquidity provider of last resort and for a market-participant fund to support it); Gordon & Muller, *supra* note 138.

A systemic risk fund funded by market participants not only can mitigate externalities resulting from TOC failure but also can help minimize the potential that market participants who believe they are too big to fail will engage in risky behavior. The too-big-to-fail problem is effectively an externality imposed on governments (and ultimately taxpayers) by market participants who engage in risky behavior. A privately funded systemic risk fund would help to internalize that externality. Furthermore, the ability of governments to require additional contributions to this type of fund should motivate fund contributors not only to monitor themselves but also to monitor each other to reduce the potential for risky behavior.<sup>141</sup> Contributors could be further motivated to monitor if at least a portion of the fund, if unused, could be returned to them over time and also by requiring the fund, if sufficient levels are maintained, to pay a periodic rate of return in the form of interest to the contributors.<sup>142</sup> If smaller fund contributors still had insufficient incentives to monitor, regulation could require establishment of a trade-type organization, funded by the contributors, that would monitor the fund on the contributors' behalf.

The bill that would become the Dodd-Frank Act<sup>143</sup> originally included the concept of a systemic risk resolution fund, to be sourced by large banks and other systemically important financial institutions and used as a possible bailout mechanism in lieu of taxpayer funds.<sup>144</sup> The concept was dropped after certain politicians alleged that it would “weaken market

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141. Although it may have superficial appeal, I do not believe that regulation could address TOC failure by requiring market participants who disperse risk to align their interests with those of society. The Dodd-Frank Act, for example, attempts such an alignment by requiring securitization sellers to retain risk (or, more colloquially, to keep “skin in the game”) in the form of at least a 5 percent credit risk for certain assets. § 15G(c)(1)(b)(i). However even if a larger percentage of risk were retained, such retention would only mitigate conflicts between the parties retaining some risk and those taking on the majority of the risk. The TOC is ultimately a conflict between financial-market participants and non-financial-market participants, the latter bearing the burden of externalized risk in a systemic collapse of the financial system.

142. Cf. Eric Dash, *Bank Losses Drain Deposit Fund*, *F.D.I.C. Reports*, N.Y. TIMES, Aug. 28, 2009, at B3 (explaining that the amount of money in the government's deposit insurance fund rises and falls with the success of its contributors). The fund established by the IMF to help bail out defaulting member-nations, for example, pays a periodic rate of return to the contributing nations. Steven L. Schwarcz, *'Idiot's Guide' to Sovereign Debt Restructuring*, 53 EMORY L.J. 1189, 1195–96 (2004). Unfortunately, though, the IMF pays those nations less than a market rate of interest on their contributions. *Id.* at 1196. The FDIC contribution fund works somewhat in this manner.

143. Restoring American Financial Stability Act of 2010, S. 3217, 111th Cong. § 210(n) (2010).

144. *Finance-Overhaul Bill Would Reshape Wall Street*, BLOOMBERG.COM (MAY 20, 2010, 11:40 PM), <http://www.bloomberg.com/news/2010-05-21/u-s-financial-overhaul-legislation-would-reshape-wall-street-washington.html> (reporting that the Senate committee's proposal for a \$50 billion resolution fund, paid for by the financial industry, was removed from the Senate bill).

discipline.”<sup>145</sup> That view is somewhat incongruous given that, as discussed above, a systemic risk fund should actually have the opposite effect, minimizing the moral hazard potential of firms that believe they are too big to fail.<sup>146</sup>

More recently, the European Commission has been contemplating the possibility of a systemic risk fund in connection with its proposal to tax the financial sector.<sup>147</sup> Although the issue of the ultimate use of the tax revenues is currently unresolved,<sup>148</sup> news reports indicate that an originally contemplated use was for “funds [that] could be tapped to resolve bank failures in an orderly fashion” and “prevent fire sales of assets.”<sup>149</sup> The International Monetary Fund (IMF) appears to be using the European Commission’s tax proposal as a platform to announce, “new taxes on banks [are] needed to provide an insurance fund for future financial meltdowns and to curb excessive risktaking.”<sup>150</sup> Whatever the ultimate use of tax revenues, the European Commission recognizes that to avoid making the EU financial sector uncompetitive, any such tax “should be applied in all financial centres.”<sup>151</sup>

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145. *Id.* Although Dodd-Frank contemplates possible ex post funding of a systemic risk fund, query whether any such fund could be created quickly enough to be effective or even whether financial institutions would be able to provide such funding at the time of systemic crisis. *Cf.* Gordon & Muller, *supra* note 138 (making this argument).

146. *See* John Armour, Bank Resolution Regimes: Designing the Right Model? 24 (Aug. 3, 2010) (unpublished manuscript) (on file with author) (arguing that a resolution fund that is paid for by systemically important financial institutions “has the potential greatly to reduce the problems of moral hazard associated with bailouts. By placing the responsibility on the shoulders of financial institutions, it generates a degree of potential cross-monitoring, with firms having incentives to encourage each other not to place the others at risk.”).

147. European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Taxation of the Financial Sector, COM (2010) 549 final (July 10, 2010), [http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CBsQFjAA&url=http%3A%2F%2Feur-lex.europa.eu%2FLEXUriServ%2FLEXUriServ.do%3Furi%3DCOM%3A2010%3A0549%3AFIN%3AEN%3APDF&ei=CGbJTqmhGOnnsQKssY1A&usq=AFQjCNFzn8JwjknH7ZYVzp\\_v\\_Sowc41H3w&sig2=7wVfstLqb1D65TB\\_qX\\_o7w](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CBsQFjAA&url=http%3A%2F%2Feur-lex.europa.eu%2FLEXUriServ%2FLEXUriServ.do%3Furi%3DCOM%3A2010%3A0549%3AFIN%3AEN%3APDF&ei=CGbJTqmhGOnnsQKssY1A&usq=AFQjCNFzn8JwjknH7ZYVzp_v_Sowc41H3w&sig2=7wVfstLqb1D65TB_qX_o7w).

148. *Id.* at 2 (describing possible uses as including “financ[ing] development cooperation, help[ing] developing countries combat climate change[,] and contribut[ing] to the EU budget”). A press release issued by the European Commission explains that “[a]ny debate on what should be done with the revenue would come much later. Ultimately, it is for [EU] Member States to agree on how such revenue would be spent.”). Press Release, European Commission, Questions and Answers: Financial Sector Taxation (Oct. 7, 2010), *available at* <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/10/477&format=PDF&aged=1&language=EN&guiLanguage=en>.

149. “Polluter Parp” Principle for Banks, EUROPEAN COMM’N (May 26, 2010), [http://ec.europa.eu/news/economy/100526\\_en.htm](http://ec.europa.eu/news/economy/100526_en.htm).

150. Larry Elliott & Jill Treanor, *IMF: Tax Banks or Risk Renewed Crisis*, THEGUARDIAN.COM (Oct. 7, 2010, 3:33 PM), <http://www.guardian.co.uk/business/2010/oct/07/imf-strausskahn-banks-crisis-warning> (paraphrasing an announcement by IMF Managing Director Dominique Strauss-Kahn).

151. European Commission, *supra* note 147, at 6; *see also* Sarah Collins, *Trichet: Transaction*

*Incentive Failure.* The most obvious way to address incentive failure would be to require investments and other financial products to be more standardized, so that market participants do not need to engage in as much due diligence.<sup>152</sup> Standardization can make financial products more cognizable,<sup>153</sup> thereby reducing due diligence costs. The overall economic impact of standardization is unclear, though, because standardization can interfere with the ability of parties to achieve the efficiencies that arise when firms issue securities tailored to particular needs of investors.<sup>154</sup> Moreover, standardization is likely to face opposition by market participants because commoditizing financial products reduces profitability.<sup>155</sup> It is therefore preferable to address incentive failure through means other than standardization.

Another potential approach would be to centralize the exercise of due diligence, thereby concentrating expertise. Centralization can produce cost efficiencies in the production of research and analysis through specialization and economies of scale.<sup>156</sup> But recent experience with rating agencies, which are a type of centralization, raises questions as to the

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*Tax "Not Advisable,"* EUROPOLITICS (Sept. 28, 2010), <http://www.europolitics.info/trichet-transaction-tax-not-advisable-art282386-8.html> (reporting that European Central Bank President Jean-Claude Trichet is concerned that a unilateral financial sector tax by the EU "would force the financial sector out of Europe" and that although Trichet observes that any such tax "has to be done on a global level," currently there is "enormous opposition to a global tax, especially from the US, Canada and Australia").

152. Incentive failure should be distinguished from cases where decisions by market participants to invest in or underwrite innovative types of securities are not market failures, but instead represent a market learning process. Markets develop by a process of learning, and any new financial instrument can have problems because information may be insufficient. See, e.g., Charles R. Hickson et al., *Corporation or Limited Liability Company*, in *ENCYCLOPEDIA OF WORLD TRADE SINCE 1450* (John J. McCusker ed., 2005) (discussing market problems resulting from the advent of the joint-stock corporation).

153. Cf. Scott Moss, *Technology and Vertical Integration in Exchange*, in *AN ECONOMIC THEORY OF BUSINESS STRATEGY* (1981), available at <http://www.scott.moss.name/bus-strat/chapter6/ch6.html> (explaining how commodities can be made more "cognizable").

154. Compare Schwarcz, *Regulating Complexity in Financial Markets*, *supra* note 46, at 241 n.165 and accompanying text (arguing that regulatory attempts to limit uncertainty by standardizing transactions and financial products would likely have unintended negative consequences) with Judge, *supra* note 47 (arguing that standardization could reduce the informational burden on investors, facilitate coordination in the face of changed circumstances, and make it easier for investors to compare securities issued in different transactions) and NOURIEL ROUBINI & STEPHEN MIHM, *CRISIS ECONOMICS: A CRASH COURSE IN THE FUTURE OF FINANCE* 193–94 (2010) (examining effect of increasing standardization in securitization).

155. See, e.g., Joseph R. Mason, *Regulating for Financial System Development, Financial Institutions Stability, and Financial Innovation*, in *BANK OF IT* 4 (Apr. 17, 2009), [http://www.bancaitalia.it/studiricerche/convegna/atti/Financial\\_Market\\_Regulation/session\\_c2/Mason.pdf](http://www.bancaitalia.it/studiricerche/convegna/atti/Financial_Market_Regulation/session_c2/Mason.pdf) (arguing that banks may oppose greater standardization because standardization tends to reduce profit margins).

156. Anabtawi & Schwarcz, *supra* note 43.

efficacy and reliability of centralization.<sup>157</sup> As an alternative to the centralization of due diligence, regulation could set minimum standards under which market participants themselves must perform due diligence—the goal being to prevent market participants from making investments that they do not adequately understand or cannot adequately monitor. Imposing regulatory standards can backfire, though. They may be too vague to be of much use, as has been argued, for example, of the “prudent banking” standard.<sup>158</sup> Similarly, regulatory standards may be so detailed that they impair efficient operations.<sup>159</sup>

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157. Cf., e.g., Jerome S. Fons & Frank Partnoy, Op-Ed., *Rated F for Failure*, N.Y. TIMES, Mar. 16, 2009, at A23. The analogy with centralizing due diligence is limited, however, because rating agencies have not historically engaged in due diligence, focusing solely on risk assessment from information provided. See Steven L. Schwarcz, *Private Ordering of Public Markets: The Rating Agency Paradox*, 2002 U. ILL. L. REV. 1, 6 (2002). The Dodd-Frank Act now requires a degree of due diligence from rating agencies, including disclosure of any third parties that are performing due diligence efforts. Dodd-Frank Act, Pub. L. No. 111-203, § 932, 124 Stat. 1376, 1872–83 (2010); see also SEN. COMM. ON BANKING, HOUSING & URBAN AFFAIRS, BRIEF SUMMARY OF THE DODD-FRANK WALL STREET REFORM AND CONSUMER PROTECTION ACT 1, 10, [http://banking.senate.gov/public/\\_files/070110\\_Dodd\\_Frank\\_Wall\\_Street\\_Reform\\_comprehensive\\_summary\\_Final.pdf](http://banking.senate.gov/public/_files/070110_Dodd_Frank_Wall_Street_Reform_comprehensive_summary_Final.pdf) (last visited Jan. 5, 2012).

158. See, e.g., 148 CONG. REC. H545 (daily ed. Apr. 24, 2002) (statement of Rep. Kanjorski) (noting opposition to H.R. 3763, the Corporate and Auditing Accountability, Responsibility, and Transparency Act, because “much of the bill’s language is simply too vague to ensure that essential standards for effective oversight will be met”); Charles Calomiris, *Prudential Bank Regulation: What’s Broke and How to Fix It*, DEFINING IDEAS (Aug. 1, 2009), <http://www.hoover.org/publications/defining-ideas/article/5612> (observing that the “prudential regulation of commercial banks and investment banks has proven to be ineffective”); Martínez Soledad, Martínez Peria & Sergio L. Schmukler, *Do Depositors Punish Banks for Bad Behavior? Market Discipline, Deposit Insurance, and Banking Crises*, 56 J. FIN. 1029 (2001) (same); cf. OLIVER WENDELL HOLMES JR., THE COMMON LAW 112 (1909) (referring to a “prudent man” standard as a “vague” test of care). Indeed, the entire “principles versus rules” debate turns on the tension between standards that are too vague and rules that are too detailed and inflexible. Cf. Kern Alexander, *Principles v. Rules in Financial Regulation: Re-assessing the Balance in the Credit Crisis Symposium at Cambridge University, 10–11 April 2008*, 10 EUROPEAN BUS. ORG. L. REV. 169, 169 (2009) (discussing concerns that the UK Financial Services Authority’s principles-based-regulation approach to financial regulation “contributed significantly to regulatory failure”). Lawrence Baxter proposes that a “fiduciary duty owed directly to the federal regulators would have the effect of enhancing the importance of *federal law* and *agency discretion* in the domain of banking regulation.” Lawrence G. Baxter, *Fiduciary Issues in Federal Banking Regulation*, 56 LAW & CONTEMP. PROBS. 7, 9 (1993).

159. See, e.g., ADIL E. SHAMOO & DAVID B. RESNIK, RESPONSIBLE CONDUCT OF RESEARCH 147 (2003) (noting that in “[p]olicies pertaining to the regulation of finance . . . it is presumed that excessive regulations impede competition, efficiency, and consumer choice and result in higher costs for services and products.”); Xavier Freixas & Anthony M. Santomero, *An Overall Perspective on Banking Regulation* 11 (Fed. Reserve Bank of Philadelphia, Working Paper No. 02-1, Feb. 2002), available at <http://www.philadelphiafed.org/research-and-data/publications/working-papers/2002/wp02-1.pdf> (discussing how regulatory constraints can “have ‘general equilibrium’ effects that . . . differ from [effects] expected at the individual level”); Luigi Guiso et al., *The Cost of Banking Regulation* 22 (EUI, Working Paper ECO 2007/43, 2007), available at <http://cadmus.eui.eu/bitstream/handle/1814/7497/ECO-2007-43.pdf?sequence=1> (analyzing bank regulation throughout the world and concluding that “there is little evidence of its welfare effects”); Task Force for the

Management-based (sometimes called process-based) regulation also has the potential to help reduce incentive failure by requiring market participants to develop their own individualized, internal risk-management processes.<sup>160</sup> Certain regulatory approaches already proposed to mitigate human processing failures exemplify management-based approaches.<sup>161</sup> For example, increasing the authority and independence of risk managers could mitigate human processing failure by attracting managers of sufficiently nuanced cognition to understand the complexity.<sup>162</sup> This approach could also help to reduce incentive failure by enabling risk managers to veto investments that promise short-term profits but carry long-term risk.<sup>163</sup> Management-based approaches might not be successful, however, when the behavior that leads to incentive failure is (as may often be the case) truly rational from an individual market participant's standpoint—such as when the market participant needs to make the investment to remain competitive, at least in the short run.<sup>164</sup>

In short, regulation can limit the prevalence of, but probably cannot completely eliminate, incentive failure.

### 3. *Limiting Risk Dispersion*

Because regulatory responses cannot fully solve the problem of incentive failure, the next inquiry is whether risk dispersion itself should be limited. In order to motivate monitoring, for example, should regulation require, at least for some types of large issuances of complex debt securities, that each class of securities have a minimum unhedged position held by a single sophisticated investor?<sup>165</sup> To answer this, one would need

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Implementation of the Environmental Action Programme for Central and Eastern Europe, *Financing Environmental Protection in Eastern Europe, Caucasus and Central Asia (EECCA): Background Report*, ¶ 24, ENVIRONMENT FOR EUROPE MINISTERIAL CONFERENCE (May 21–23, 2003), <http://www.oecd.org/dataoecd/30/5/2511390.pdf> (observing that the statements of policy objectives for the United Nations Economic Commission for Europe were “either too general and vague or—on the contrary—too specific and too long . . . with little sense of priority or implementability”).

160. See Cary Coglianese & David Lazer, *Management-Based Regulation: Prescribing Private Management to Achieve Public Goals*, 37 LAW & SOC'Y REV. 691 (2003) (examining management-based regulation and its advantages and disadvantages); cf. Kenneth Bamberger, *Technologies of Compliance: Risk and Regulation in a Digital Age*, 88 TEX. L. REV. 669, 704–14, 717–22 (2010) (arguing that the use of technology can obscure the uncertainty of hazards); *id.* at 722–38 (suggesting specific reform measures, including predicting future risks from feedback between predictions and experience rather than from the introduction of sophisticated predictive methodologies).

161. See *supra* notes 134–35 and accompanying text.

162. *Id.*

163. Cf. *supra* note 106 and accompanying text.

164. See *id.* (presenting that example).

165. This Article does not purport to provide specificity of such regulation, except to observe that

to balance the benefits of risk dispersion with its potential costs,<sup>166</sup> offsetting the costs of regulation. That balance, however, would ultimately be empirical.

It nonetheless should be observed that regulation limiting risk dispersion can have significant costs. The prior analysis of standardization, which itself can be seen as a form of regulatory limitation, suggests that limiting risk dispersion can interfere with the ability of parties to achieve negotiated market efficiencies.<sup>167</sup> Another cost of limiting risk dispersion is the potential for regulatory arbitrage—the designing of transactions to try to “reduce costs or capture profit opportunities created by differential regulations or laws.”<sup>168</sup> If market participants are able to structure transactions that appear to disperse more risk than is actually dispersed, the end result could be socially undesirable. The regulatory limitations would be effectively bypassed, but the overall transaction costs would rise due to the expenses of lawyers and other advisors hired for that purpose. Moreover, although it has not been clearly quantified, some degree of risk dispersion can diffuse financial instability.<sup>169</sup> Limiting risk dispersion to

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(i) the types and amounts of regulated issuances should be based on potential second-order consequences, and (ii) the amounts of the minimum unhedged positions should be based on investor motivational studies.

166. Cf. Douglas W. Elmendorf, *Notes on Policy Responses to the Subprime Mortgage Unraveling*, BROOKINGS INST. (Sept. 17, 2007), [http://www.brookings.edu/~media/Files/rc/papers/2007/09subprimemortgageunravelling/09useconomics\\_elmendorf.pdf](http://www.brookings.edu/~media/Files/rc/papers/2007/09subprimemortgageunravelling/09useconomics_elmendorf.pdf); Darrell Duffie, *Innovations in Credit Risk Transfer: Implications for Financial Stability* 1–2 (Bank for Int’l Settlements, Working Paper No. 255, 2008), available at <http://www.bis.org/publ/work255.pdf?noframes=1> (arguing that instruments that transfer credit risk improve financial stability by dispersing risk among investors). Also, it is unclear whether limiting risk dispersion would help protect against the scenario in which investors mistakenly think that they have effectively diversified their investments and therefore will not protect against the risk. Professor Krawiec indeed argues that it is better to know that one has risk and to protect against it, than to fail to protect against risk that one mistakenly thinks has been addressed. See Kimberly Krawiec, *The Return of the Rogue*, 51 ARIZ. L. REV. 127, 130 (2009) (arguing that the Basel Committee’s solution for addressing operational risk, an enforced self-regulatory regime, is unlikely to substantially alter financial institutions’ ability to successfully manage operational risk, thereby posing the danger of high costs, a false sense of security, and perverse incentives).

167. See *supra* Part III.B.2.

168. Frank Partnoy, *Financial Derivatives and the Costs of Regulatory Arbitrage*, 22 J. CORP. L. 211, 227 (1997).

169. See, e.g., E.P. DAVIS, DEBT, FINANCIAL FRAGILITY, AND SYSTEMIC RISK 272 (1992) (observing that diversifying risk “more widely across the financial system, may help to diffuse financial instability and prevent systemic risk.”); Rodrigo Cifuentes et al., *Liquidity Risk and Contagion* 28 (Bank of Eng., Working Paper No. 264, 2005), available at <http://www.bankofengland.co.uk/publications/workingpapers/wp264.pdf> (finding that a credit structure diversified among two or three banks can trigger, in the case of a bank’s default, significant systemic contagion to other banks, whereas that “contagion disappears when the number of interlinkages is high enough to allow banks to stand the losses without selling illiquid assets”); Schwarcz, *Systemic Risk*, *supra* note 16, at 221 (arguing that diversification of risk reduces the likelihood that a default will cause any given market

below that indefinite level could therefore increase instability. Because of these costs, regulators should not, at least without compelling reason and a clear understanding of costs and benefits,<sup>170</sup> limit risk dispersion.<sup>171</sup>

#### IV. CONCLUSIONS

Risk dispersion, which is widespread in modern finance, can create benefits such as investment diversification and more efficient allocation of risk. Sometimes, however, it can lead to market failures, causing investors and other market participants to underestimate and under-protect against (i.e., marginalize) risk. Marginalization of risk can result in first-order consequences, harming the market participants themselves, and also in second-order consequences, harming third parties.

Regulating risk dispersion that causes only first-order consequences would likely be inefficient because market participants themselves should want to protect against those consequences. But regulating risk dispersion that causes second-order consequences could well be appropriate, and indeed, parallels the traditional regulatory focus of government.

The second-order consequences of risk dispersion arise primarily from two types of collective action failures. The first is a form of tragedy of the commons (a “TOC failure”) in which the benefits of exploiting finite capital resources accrue to individual market participants, each of whom is motivated to maximize use of the resource, whereas the costs of exploitation are distributed more widely. The potential for a TOC failure exists regardless of—but can be greatly exacerbated by—risk dispersion. The second type of collective action failure is akin to a tragedy of the *anticommons*:<sup>172</sup> risk can be so widely dispersed that rational market participants individually lack the incentive to monitor it.

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participant to fail and mitigates the impact of any such failure on other market participants); cf. Hyun Song Shin, *Securitisation and Financial Stability*, 119 *ECON. J.* 309, 331 (2009) (observing that securitization increases financial stability by increasing the credit supply to end-users).

170. A compromise approach might be to limit only the most highly complex risk-dispersing transactions, like ABS CDO, but a question then arises as to how to draw the line.

171. At least until the Dodd-Frank Act, regulatory philosophy in the United States had been shying away from prohibiting categories of transactions. For example, the Commodity Futures Modernization Act of 2000 lifted the ban on over-the-counter derivatives and also eliminated the ban on single security futures contracts. Commodity Futures Modernization Act of 2000, Pub. L. No. 106–554, 114 Stat. 2763A–365 (codified as amended in scattered sections of 7, 11, 12, and 15 U.S.C.).

172. In property law, an anticommons problem arises when a scarce resource has too many owners with the right to exclude others; no individual owner then has an effective privilege of use, and the resource becomes prone to underuse. See Michael Heller, *The Tragedy of the Anticommons*, 111 *HARV. L. REV.* 621 (1998). Similarly, when a class of securities has too many diverse investors, no single investor has a sufficient amount at risk to individually motivate monitoring. The tragedy of the



This Article argues that TOC failure can be addressed by regulation requiring systemically important market participants to contribute to a systemic risk fund, which could then be used as a source of bailout monies or market liquidity. This regulatory requirement would not only mitigate externalities but also would help to minimize the potential that market participants who believe they are too big to fail will engage in risky behavior.

The problem of incentive failure is harder to solve, and indeed all regulatory responses appear to be second best. Imperfect solutions may well be preferable to limiting risk dispersion, however, because any such limitation could inadvertently increase the potential for regulatory arbitrage, increase financial instability, and impair the ability of parties to achieve negotiated market efficiencies.

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anticommons is not a perfect analogy, however, because marginalization of risk does not necessarily involve the right to exclude others. Perhaps a more apt analogy might be the collective action problem of “rational apathy.” See, e.g., Julian Velasco, *Taking Shareholder Rights Seriously*, 41 U.C. DAVIS L. REV. 605, 622–25 (2007) (discussing that problem).