Disclosure 2.0: Can Technology Solve Overload, Complexity, and Other Information Failures?

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Disclosure 2.0: Can Technology Solve Overload, Complexity, and Other Information Failures?

Erik F. Gerding*

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I. Introduction

For securities disclosure, it is both the best of times and the worst of times. On the one hand, some scholars, such as former United States Securities and Exchange Commission (SEC or Agency) Commissioner Troy Paredes, Steven Schwarcz, and Henry Hu, have either renewed an old attack on mandatory issuer disclosure or questioned the effectiveness of securities disclosure in the context of modern financial instruments. Paredes claims that mandatory disclosure rules prove ineffective because investors suffer from “information overload.” Schwarcz and Hu argue that disclosure cannot describe the complexity of modern firms and finance. These attacks have coincided with a broader academic critique of mandatory disclosure as a tool for protecting consumers and come after a global financial crisis that stemmed in large part from massive information failures in financial markets, particularly in securitization and derivatives. The academic criticism of mandatory securities disclosure has provided some of the intellectual underpinnings for

5. Paredes, supra note 1, at 419; see also Troy A. Paredes, Information Overload and Mandatory Securities Regulation Disclosure, REGBLOG (June 16, 2015), http://www.regblog.org/2015/06/16/paredes-mandatory-securities-disclosure/ (suggesting that the amount of information disclosed is overwhelming).
6. See Hu, supra note 3; Schwarcz, Disclosure’s Failure, supra note 2; Schwarcz, Rethinking the Disclosure Paradigm, supra note 2.
8. See infra Part II.C.
recent SEC regulatory initiatives, such as the Agency’s “Disclosure Effectiveness” initiative, and proposed legislation in the United States Congress to simplify or cut back disclosure rules.

On the brighter side for mandatory disclosure, the SEC has launched, or is considering launching, new initiatives to use technology to improve the effectiveness of mandatory disclosure in informing investors and helping them analyze issuers and securities issuances. As an early example, the SEC’s “XBRL” initiative required issuers to attach data tags to their disclosures to enable investors to pull similar financial data from a range of issuers and place it in spreadsheets or other analytic tools, enabling investors to compare issuers side-by-side. The SEC followed with a rule requiring that data tags be affixed to loan-level assets in securitization transactions. The Agency has also moved incrementally towards requirements for more real-time disclosure.

These technological approaches might be taken a step further, including by borrowing from work done by the Consumer Financial Protection Bureau (CFPB) in improving consumer finance regulation. A next generation of securities rules might promote web-based disclosure with carefully designed, hyperlinked, and nested layouts. The SEC might also pursue other interactive disclosures, such as calculators, to allow investors to adjust the assumptions underlying disclosure or tailor disclosure for their particular investment priorities.


15. See infra Part III.B.2. Some commentators have proposed “layering” as a way to insulate certain types of disclosure from antifraud liability. Daniel M. Gallagher, Comm't,
Still more ambitious reforms might require issuers to disclose more granular information about their investment portfolios or to make the risk models they use open-source.

These two sides of disclosure—a deep skepticism combined with a technological optimism—raise questions about whether technology can address some of the potential information failures involved in mandatory disclosure. Can new technologies help investors understand complex firms, particularly financial institutions, as well as complex financial instruments and markets, while not overtaxing the cognitive abilities of individuals? Investors need a rich set of information to value firms and securities, but the fear is that they cannot process too much information or that too much information will exacerbate behavioral biases and prompt cognitive errors.

In order to answer these questions, it is crucial first to interrogate the overload and complexity critiques. First, the overload critique lacks extensive empirical data on what kinds or items of disclosure are superfluous or impose excessive cognitive taxes on investors. Indeed, the ratio of the overload critique’s political traction in Washington D.C. to the empirical evidence that overload is a problem for investors is remarkably high. Both the overload and complexity critiques are not entirely persuasive when they grapple with the efficient market hypothesis (EMH). Efficient capital markets prove quite good at impounding complex information that might overload even significant subsets of the investor population. The response of some scholars who make these critiques is that many securities markets exhibit profound informational inefficiencies. However, the markets that are least informationally efficient are generally also those subject to the least amount of mandatory disclosure. Moreover, some of the most severe information failures in both the “Enron era” and the subprime financial crisis stemmed from too little disclosure, not too much. Despite these concerns, it would be wrong to dismiss the overload and


17. See infra Part III.C.2.
18. See infra text accompanying note 121.
20. See infra notes 55-56 and accompanying text.
21. See infra Part II.C.
complexity critiques out of hand and not to search for ways to improve the effectiveness of issuer disclosure rules.

The search must start, however, with a more nuanced and tractable sense of what "complexity" means. This Article describes three types of complexity: contractual complexity, which describes the intricate contractual terms or structural features that certain financial instruments may have;\(^{22}\) derivative complexity, which describes how certain securities derive their value from other assets or multiple layers of assets;\(^{23}\) and systemic complexity, which describes how the value and risks of any security may depend not only on underlying assets, but also on changes elsewhere in financial markets.\(^{24}\)

When paired, the overload and complexity critiques highlight a deep tension between the need for rich and extensive information, on the one hand, and the needs of investors for cognitively digestible information, on the other. Researchers in psychology, computer science, and software have long grappled with similar tensions between users' demand for access to volumes of information and their need to navigate through information easily and to drill down to particular areas of concern.\(^{25}\) This research and some of the technologies it has fostered hold promise for improving disclosure rules.

However, securities disclosure has some unique challenges not necessarily present in other information contexts.\(^{26}\) First, early problems with the XBRL initiative underscore the importance of comparability for issuer disclosure.\(^{27}\) Indeed, even prominent critiques of mandatory disclosure admit that mandatory disclosure fulfills an important standardizing function that enables investors to compare like pieces of financial or other information across different issuers to make investment decisions.\(^{28}\) At the same time, drafters of the

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22. See infra Part II.B.
23. See infra Part II.B.
24. See infra Part II.B. Instead of creating a typology of forms of complexity, some scholars have looked to create an extended catalogue of various features of financial instruments, issuers, and markets that make disclosure more complex. See, e.g., Steven L. Schwarz, Regulating Complexity in Financial Markets, 87 Wash. U. L. Rev. 211, 216-36 (2009). The downside of that approach, compared to the kind of typology created in this Article, is that it becomes harder to generalize about types of problems or market failures and to find overarching solutions.
25. See infra notes 149-151 and accompanying text.
26. For an excellent and comprehensive account of the functions and informational challenges of issuer securities disclosure, see Onnig H. Dombalagian, Chasing the Tape: Information Law and Policy in Capital Markets (2015).
27. See infra notes 135-136 and accompanying text.
28. See, e.g., Easterbrook & Fischel, supra note 4, at 687, 701.
disclosure rules (as have drafters of accounting standards) have long grappled with the need for investors to drill down to the assumptions and methodologies that underlay a particular disclosure or a discretionary choice by an issuer.\(^\text{29}\) Most problematic of all, issuers sometimes face strong incentives to game disclosure rules to accentuate the positive and eliminate (or at least obscure) the negative aspects of their businesses and financial condition.\(^\text{30}\)

Technological improvements to disclosure also raise old challenges that any mandatory disclosure regime must face. For example, issuers fear that mandatory disclosure may force them to reveal proprietary information.\(^\text{31}\) In a variation on this theme, some technology proposals, such as improving asset-backed securities disclosure via tagging loan-level information on mortgages and other consumer debt contracts, may compromise the privacy of individual borrowers.\(^\text{32}\) Increasing the speed of disclosure may make it harder for issuers and intermediaries (such as auditors) to verify information and make it more difficult for investors and other intermediaries (such as stock analysts and credit rating agencies) to analyze that information intelligently.\(^\text{33}\) This could make disclosure more prone to error and manipulation and securities markets more volatile.\(^\text{34}\)

Many of these technological enhancements to mandatory disclosure face other, deeper challenges. First, many do not necessarily address the most pressing information failures at the root of the financial crisis. Second, they do not necessarily reflect what investors, institutional and otherwise, would use to evaluate securities. Indeed, there is a risk that the SEC or other policy makers may craft enhancements that meet hypothetical, rather than real, investor demands and that may thus be underused. Initiatives either to prune or

\(^{29}\) See infra Part III.A.1.


\(^{33}\) DOMBALAGIAN, *supra* note 26, at 47-48 (explaining the importance of verification of issuer disclosure); see infra notes 96-97 and accompanying text.

\(^{34}\) See infra Part III.A.3.
technologically enhance mandatory disclosure should be subject to empirical and experimental testing.

This Article proceeds as follows. Part II summarizes and critiques the information-overload and complexity criticisms of mandatory disclosure, provides a thumbnail sketch of some of the information failures in the recent financial crisis, and outlines recent regulatory and legislative initiatives to “simplify”—or roll back—regulations requiring issuer disclosure. Part III examines several of the initiatives and proposals to use technology to improve mandatory issuer disclosure and describes the advantages and drawbacks to each. Part IV concludes by advocating for more empirical and experimental testing of proposals either to remove or technologically enhance disclosure. It also argues that old-fashioned disclosure on the purposes for certain securities issuances, the due diligence performed by issuers and intermediaries, and the incentives of those parties might have a far more profound effect on the understanding of investors and the disciplining of issuers and intermediaries than either rollbacks of disclosure regulations or hi-tech disclosure solutions.

II. THE MODERN CRITIQUE OF MANDATORY DISCLOSURE: OVERLOAD, COMPLEXITY, AND INFORMATION FAILURES

A. Overload and Complexity

Mandatory securities disclosure has endured periodic attacks by legal scholars who have focused on whether required disclosure adds any information that investors and financial markets could not demand or otherwise obtain.35 In the twenty-first century, several legal scholars have either revived this critique or otherwise questioned the effectiveness of modern securities disclosure, but with two contemporary twists. The first strand of this renewed critique argues that investors now suffer from overload, and the second argues that disclosure cannot capture the complexity of modern issuers and their securities.

35. Easterbrook & Fischel, supra note 4; see also Homer Kripke, The SEC and Corporate Disclosure: Regulation in Search of a Purpose (1979) (arguing that corporate disclosure requirements have yet to find a useful purpose); George J. Benston, Required Disclosure and the Stock Market: An Evaluation of the Securities Exchange Act of 1934, 63 AM. ECON. REV. 132 (1973) (examining “the economic rationale for the regulation of the securities markets”).
1. Information Overload

Former SEC Commissioner and law professor Paredes argues that securities disclosure overloads investors with too much information. The cognitive limitations and behavioral biases of investors and the costs of processing massive amounts of financial disclosure, according to Paredes, mean that securities disclosure has not only become less effective in informing the investing public, but also has become counterproductive. Investor decision making can become suboptimal, Paredes contends, because investors take mental shortcuts to sift through the massive amount of information that a securities issuer is required to disclose. Investors inevitably select only a portion of any issuer’s disclosure to process and on which to base their investment decisions. Often, investors pick the wrong information. Paredes concludes from his findings that policy makers should consider pruning securities regulations on disclosure to reduce information overload and improve investor decisions.

Paredes’s arguments have significant limitations. Paredes recognizes that less sophisticated investors may free ride off more sophisticated investors who can better process voluminous securities disclosure. Yet he responds with arguments that sophisticated investors can also face information overload from disclosure. He also concedes that the EMH suggests that it does not matter that certain individual investors may be overwhelmed by information; the marketplace collectively will process information. He responds to the EMH in part by noting that behavioral finance has shown that there are limitations to the EMH and that, at times, many securities markets are not informationally efficient.

His response has two problems. First, Paredes does not provide much empirical evidence of which markets suffer from informational inefficiencies, nor evidence of when and to what extent. Second, as I explain below, the securities markets that are the least informationally efficient—Rule 144A and private placement markets—are also subject

36. See Paredes, supra note 1.
37. See id. at 441-43.
38. See id. at 440-42.
39. Id. at 442.
40. See id. at 484.
41. See id. at 452-53.
42. See id. at 453-58.
43. See id. at 480; see also Gilson & Kruleman, supra note 19 (analyzing the application of the EMH to law).
44. See Paredes, supra note 1, at 481-83.
to much lower disclosure regulations than public markets. This means that the scope of the overload problem may be limited. It also raises an interesting question of causation: perhaps markets are less efficient and overload is more of a problem because of too little required disclosure, rather than too much.

In general, Paredes relies much more on theoretical arguments from behavioral finance and intuition and less on empirical evidence that investors cannot process mandatory disclosure. The Paredes critique does not specify how much information is optimal and how much is overload. Paredes, in fact, admits that empirical evidence would be necessary to determine which items of financial disclosure are helpful for investors and which are superfluous or counterproductive. Paredes also recognizes that this, in turn, begs the question of how to address the demands of different investors for different kinds of information. Lastly, some information overload may stem not from regulation, but rather from issuer efforts to bury disclosure. Issuers looking to hide information that might depress the value of their securities might adopt the “disclose the phonebook” strategy. Both SEC regulatory actions and judicial doctrines attempt to counteract this perverse incentive to overdisclose.

2. Schwarcz on Complexity

In a series of articles, Schwarcz does not attack mandatory disclosure as a general matter, but questions its effectiveness in the face of complex financial instruments and markets. He argues that securities disclosure fails to capture the “complexity” of modern financial instruments and markets. In a 2004 article, he argues that the demise of Enron revealed a larger failure of securities disclosure to remedy information asymmetries in securitizations, derivatives, and

45. See id. at 473-74.
46. See id. at 459-60.
47. See sources cited infra note 126.
48. For example, courts have developed the “buried facts” doctrine. As one court explained:

Under the “buried facts” doctrine, a disclosure is deemed inadequate if it is presented in a way that conceals or obscures the information sought to be disclosed. The doctrine applies when the fact in question is hidden in a voluminous document or is disclosed in a piecemeal fashion which prevents a reasonable shareholder from realizing the “correlation and overall import of the various facts interspersed throughout” the document.

other structured finance transactions because of the growing complexity of those transactions. In a similar vein as Paredes, Schwarcz argues that markets and policy makers should not necessarily take comfort from the ability of sophisticated institutional investors and their experts to process complex information; he contends that institutional investors do not hire sufficient experts and that experts themselves are subject to behavioral biases and cognitive limitations. Like Paredes, Schwarcz also argues that the EMH may have limited application to many markets, such as asset-backed securities markets. Moreover, Schwarcz posits that the complexity of structured finance transactions may prevent a critical mass of sophisticated investors from sufficiently understanding particular transactions and driving market prices to an efficient level. After the financial crisis took root, Schwarcz, in a 2008 article, analyzed how complexity frustrated the ability of parties to a securitization to understand a transaction. Schwarcz concludes that because complexity decreases the effectiveness of mandatory disclosure, policy makers should focus attention on regulations other than disclosure, such as third-party certification of securities.

Schwarcz's critique has several weaknesses. Asset-backed securities and credit derivative markets are not the best examples to critique disclosure requirements. Both of these markets are far from efficient. Most asset-backed securities issuances are not SEC-registered, but are instead Rule 144A offerings. These securities trade in relatively illiquid markets compared to SEC-registered and exchange-listed securities. Credit derivatives generally trade over-the-counter, which means that these markets are even less informationally efficient. The lower levels of efficiency in these markets make it problematic to draw conclusions for more liquid and informationally efficient markets. Moreover, publicly issued, SEC-registered securities are subject to vastly more disclosure rules than

49. See Schwarcz, Rethinking the Disclosure Paradigm, supra note 2, at 4-6.
50. See id. at 13-15.
51. See id. at 18.
52. Id.
53. See Schwarcz, Disclosure's Failure, supra note 2.
54. See id. at 1121.
55. Indeed, law firms advise that issuers disclose this to investors notwithstanding the fact that Rule 144A was created to make a more liquid market for unregistered securities. See, e.g., Lloyd S. Harmetz, Frequently Asked Questions About Rule 144A, MORRISON & FOERSTER 7, 15 (2016), http://media.mofo.com/files/Uploads/Images/FAQRule144A.pdf.
Rule 144A or over-the-counter derivative markets. These disclosure rules improve the efficiency of public markets. Improved efficiency—and by extension disclosure rules—might make the complexity that Schwarcz describes in financial products much less worrisome because more sophisticated investors can analyze the products and less sophisticated investors can free ride off the market price. As with the overload critique, there is a causality question here: more, not less, disclosure might remedy the complexity problem.

In addition, Schwarcz’s use of Enron as an example of disclosure failing in the face of complexity in one of his earlier articles fails to persuade. Enron’s complex off-balance-sheet financings were not naturally complex phenomena. Enron executives designed them to be complex to deceive investors and create artificial revenues. The company’s minimal disclosure of these transactions was designed to obfuscate their true purpose. The problem was not that it was impossible for disclosure to describe a complex energy company’s financial position, but rather that this company designed its financial position and wrote its disclosure in order to perpetrate a fraud, and Enron’s auditors failed to stop it.

3. Hu on Complexity

Hu argues that the risks and rewards of issuers may be “too complex to depict.” He makes a more conceptual and epistemological argument against disclosure than Schwarcz. Hu argues that issuers and financial intermediaries stand between investors and objective reality and that their depictions of that objective reality cannot capture adequately all its nuances. Like Schwarcz, Hu extensively uses asset-backed securities to demonstrate his point.

Hu points out that as new parties enter at each step in the securitization process, they suffer from worsening asymmetries.

57. See Susan Chaplinsky & Latha Ramchand, The Impact of SEC Rule 144A on Corporate Debt Issuance by International Firms, 77 J. Bus. 1073, 1073-74 (2004); Dodd, supra note 56.

58. See Schwarcz, Rethinking the Disclosure Paradigm, supra note 2.


60. See Hu, supra note 3.

61. See id. at 1633, 1642.
compared to parties that entered earlier in the process. Originators of loans sold into a securitization know far more about those assets than the intermediaries that arrange the securitization. These arrangers, in turn, know far more about the quality of the underlying assets than asset managers (those that might actively manage a securitization vehicle’s portfolio) or credit rating agencies. Investors in asset-backed securities know even less. Hu describes one of the side effects of these dynamics—what this Article labels “derivative complexity”—namely, the progressive deterioration of information about underlying assets within a securitization, to say nothing of the further deterioration when asset-backed securities are themselves securitized.

Hu points out several additional problems with disclosure for asset-backed securities. First, this disclosure typically only summarizes the characteristics of the underlying assets. These summaries may obscure important nuances about the risk characteristics of those assets. This is another facet of what this Article calls “derivative complexity.” Hu considers whether giving investors more granular information about underlying assets might resolve this problem. This Article considers how technology might help achieve that result in Part III.A.2, below.

Hu also describes how the disclosure to investors of how waterfall payment rules in a securitization work may diverge from both the original design of the arrangers who created the securitization as well as the computer program that ultimately allocates cash flows from underlying assets to the various tranches of asset-backed securities. Divergence of the computer program (what Hu correctly identifies as the real way that cash flows are allocated) from the waterfall of payments as disclosed can mislead investors. This divergence from the original design of the arrangers means that those parties may misunderstand the “bugs” in their creation. Hu briefly considers whether this problem could be remedied by giving investors greater information or even access to the computer programs that govern securitization waterfalls. This Article elaborates on that possibility in

62. See id. at 1635.
63. Id. at 1634-35.
64. See id.; infra Part II.C.1.
65. Hu, supra note 3, at 1636.
66. See id. at 1643-46.
67. See id. at 1646-47.
68. See id. at 1641.
69. See id. at 1636-41.
70. See id. at 1646-47.
Part III.C.2, which argues that some of these programs could be made open-source.

Hu's argument does share a weakness with that of Schwarcz. Like Schwarcz's use of Enron, Hu's argument downplays the fact that issuers and financial intermediaries actively create the reality that they then must describe. Moreover, issuers and financial intermediaries may construct that reality (e.g., the complex waterfall payment rules and other elaborate structures of securitizations) for dubious purposes, including to hide "lemons" in the underlying assets, otherwise obscure the true risks of a securitization, or even defraud investors. As this Article explores in Part II.C.2, these perverse incentives explain some of the most scandalous transactions in the crisis. In addition, intermediaries often made securitizations complex for the benefit of issuers in order to help them game bank capital regulations.

Even short of attempting to defraud investors, the various parties to securitization transactions—including originators, the investment banks that arranged the transactions, and reputational intermediaries (notably, rating agencies)—had perverse incentives. The structure of securitization motivated them all to take shortcuts in evaluating the risk of underlying assets and passing quality information regarding that risk to each other and ultimately on to investors.

B. Types of Complexity

Despite this shared weakness in the Schwarcz and Hu critiques, they both describe legitimate concerns that securities disclosure may not adequately describe to investors complicated issuers and securities. This Article attempts to create a framework to identify and differentiate various complexity problems. It argues that securities—and particularly asset-backed securities, derivatives, and other structured products—may exhibit at least three kinds of complexity.

First, securities may exhibit contractual complexity in that they may have numerous contractual terms that define the rights of

71. William W. Bratton & Adam J. Levitin, A Transactional Genealogy of Scandal: From Michael Milken to Enron to Goldman Sachs, 86 S. CAL. L. REV. 783 (2013) (describing how special-purpose entities were used for deceptive purposes or to game regulations in both the Enron and subprime-crisis eras).

investors. Preferred stock typically has more contractual features (e.g., liquidation and dividend preferences) than common stock. Investors may need to spend additional time reading the certificate that creates preferred stock to understand this additional complexity. By contrast, investors in bonds may need to spend even more time reading the bond indenture to understand its provisions governing interest and principal payments, covenants, events of default, and so on. Contractual complexity increases even further with asset-backed securities. Investors in those instruments will need to understand the provisions in the relevant indenture that govern the payment waterfall (i.e., the allocation of cash flows from underlying assets to the various classes of securities being issued) and the collateral (i.e., the underlying assets). Contractual complexity in an asset-backed-securities issuance might be measured by the number of tranches of securities being issued, the number of steps in the waterfall provisions, or the presence or absence of other contractual structures. I have argued elsewhere that boilerplate language and standardization of contractual provisions allows investors to economize on reading and understanding these provisions. Standardization allows for modularity, such that certain patterns of contractual provisions can form standardized agreements (like indentures or notes) and certain patterns of agreements can form standardized transactions (like secured lending or asset-backed securities).


75. Gerdng, supra note 74, at 1345-47. Making contracts more standardized and more modular also creates risks. Contracts may become too rigid and prevent parties from adapting to changed economic circumstances. For example, rigidity built into certain securitization contracts prevented mortgage services from agreeing to restructure mortgage loans. Id. at 1352 (citing Anna Gelpern & Adam J. Levitin, Rewriting Frankenstein Contracts: Workout Prohibitions in Residential Mortgage-Backed Securities, 82 S. CAL. L. REV. 1075, 1087-89 (2009)). Even when attorneys have the ability to change standardized contracts to adapt to economic or legal shocks, they may surprisingly fail to do so. MITU GULATI & ROBERT E. SCOTT, THE THREE AND A HALF MINUTE TRANSACTION: Boilerplate and the Limits of Contract Design (2013) (describing this phenomenon as contract "stickiness").
Second, some securities may exhibit derivative complexity in that asset-backed securities, derivatives, and other structured products derive their value from underlying assets. For example, mortgage-backed securities pay out according to payments received on the mortgages underlying the securities. Often, asset-backed securities may be backed by other securities, which might in turn be backed by additional layers of securities. This layering of securitization upon securitization has an analogue in derivatives: a counterparty to a derivative contract can hedge various risks by entering into a second derivative contract with yet another counterparty. Derivative complexity increases with (1) the number of layers of assets underlying a particular financial instrument, (2) the diversity of assets in each layer, and (3) the complexity of each of those underlying assets (which itself can be measured along the dimensions of the three kinds of complexity outlined in this Subpart).

Third, these financial products may exhibit systemic complexity. The value and risks of any product depend not only on underlying assets and the contractual terms governing the product, but also on changes in the marketplace. Most basically, the financial instrument may have a market price, which may depend in part on the market prices of substitute instruments. The potential loss from changes in market prices is often labeled as market risk. Financial instruments are also subject to liquidity risk (i.e., the risk that the number of willing buyers for a particular product will suddenly plummet, causing the market to dry up). Finally, both issuers and their securities are subject to systemic risk (i.e., the risk of market-wide losses, against which...
diversification offers no protection).\textsuperscript{79} Systemic complexity captures all three forms of risk—market, liquidity, and systemic—each of which is more difficult to evaluate and model than the last.\textsuperscript{80} Systemic complexity increases when the value of a financial instrument or security is more heavily dependent on the price movements of a greater number of other financial instruments (other than underlying assets).

Of these three forms of complexity, sophisticated investors may have the least difficulty navigating contractual complexity. Retail investors might have difficulty reading through a prospectus and indenture for an asset-backed security, but sophisticated investors are likely to have considerable experience with the contractual terminology and structures involved in such a financial product. Systemic complexity may pose the greatest challenges. To evaluate liquidity risk, for example, investors need information not just on issuers and securities in their own portfolios, but also on the securities in the portfolios of other investors. Improving disclosure of investment portfolios, particularly with regard to institutional investors, becomes critically important for investors to understand liquidity risk and systemic complexity. I address how technology might improve this kind of disclosure in Part III.C., below.

The systemic-risk component of systemic complexity is less of a concern for investors. After all, if diversification offers no protection against market-wide shocks, disclosure to the market matters less. However, prudential regulators and central banks can take steps to mitigate systemic risk by regulating financial institutions and markets and setting overall macroeconomic policies. However, securities disclosure might give these policy makers an additional regulatory tool to gather and double-check information on systemic risk. For example, greater information about the investment portfolios of various institutional investors (many of which might lie outside the jurisdictional silo of a particular financial regulator) can help regulators identify worrying correlations and herd behavior.


\textsuperscript{80} See Gerding, supra note 77, at 138-39.
C. Information Failures in the Financial Crisis

These three forms of complexity provide a framework for understanding the information failures in the subprime financial crisis. The financial crisis, in turn, provides indications of which forms of complexity may prove the most worrisome for financial disclosure. The following does not attempt to describe the financial crisis soup to nuts. Rather, it highlights key information failures and some of the most important problems that disclosure, including technologically enhanced disclosure, might address.

1. Information Destruction: Tracing and Granularity

The discussion above previewed some of the problems with long chains of asset-backed securities and credit derivatives. For one, long chains of these financial instruments cause information about the ultimate underlying assets—the debt that determines the cash flows that feed all the subsequent layers of asset-backed securities or derivatives—to deteriorate. Small errors in measuring potential loss correlations and pricing assets that occurred early in the chain became magnified at each subsequent link in the chain. When mortgages began defaulting, unexpected loss correlations materialized.\(^8\) For asset-backed-securities investors, the problem was less that their asset-backed securities defaulted en masse and more that they could not tell whether their securities would be affected. The difficulty tracing back which cash-producing assets ultimately underlay their particular securities made it extremely difficult for asset-backed-securities investors to value their holdings.\(^9\) It was akin to small traces of poison entering the base of the food chain; the poison would become potentially more toxic as it moved up the chain, but it was difficult to track the food supply. All of this was courtesy of derivative complexity. As Hu points out, tracing became difficult in part because disclosure on the assets underlying any particular securitization was not sufficiently granular; investors could access only aggregated information about the collateral.\(^10\)

Faced with the uncertainty of valuing their holdings and with ratings downgrades, investors began fire sales of asset-backed securities just as liquidity in those markets evaporated. Liquidity risk

\(^{81}\) See Coval, Jurek & Stafford, supra note 76, at 15.
\(^{83}\) See Hu, supra note 3, at 1636.
and systemic complexity reared their fearsome heads. Institutional investors had not factored in the correlations between their investment portfolios of asset-backed securities and derivatives and those of other institutions.  

2. Incentive Problems

Going back a step, information deteriorated along chains of asset-backed securities not merely because the chains were long, but also because the institutions that created and structured asset-backed securities had dulled incentives to collect and pass along information on underlying assets. Much ink has been spilled about the reduced incentives of originating lenders to check the creditworthiness of those mortgage borrowers whose mortgages the originators expected to sell into a securitization. Originating lenders or any firm selling assets into a securitization (e.g., a financial institution selling asset-backed securities into a collateralized debt obligation) also had strong incentives to cherry-pick and sell the worst assets—the lemons (to mix fruit metaphors). Gatekeepers—the investment banks arranging and underwriting asset-backed-securities transactions and credit rating agencies—were supposed to have screened out these lemons, with the gatekeepers’ reputations on the line. After the crisis, these investment banks paid billions of dollars to settle lawsuits alleging that the banks did not adequately disclose their lack of diligence in screening the assets that went into securitizations. Credit rating agencies, long criticized for conflicts of interest (because issuers paid their bills) and for enjoying a regulator-granted monopoly, have themselves been

84. See Brunnermeier, supra note 82, at 81.
86. See Ashcraft & Schuermann, supra note 85, at ii.
sued for misrepresenting the level of efforts they expended in evaluating asset-backed securities.\textsuperscript{89}

Investment banks not only have been accused of lack of diligence, they also have paid billions to settle lawsuits alleging darker conflicts of interest. For example, Goldman Sachs (Goldman) settled the SEC lawsuit\textsuperscript{90} that stemmed from the infamous ABACUS transaction. This was the subject of the United States Senate Permanent Subcommittee on Investigation hearings that reignited support for the then-stalled Dodd-Frank Wall Street Reform and Consumer Protection Act\textsuperscript{91} (Dodd-Frank) legislation.\textsuperscript{92} That lawsuit alleged that Goldman created some securitizations to benefit short-selling hedge funds that were betting against asset-backed securities.\textsuperscript{93} The lawsuit further alleged that Goldman and its employees misrepresented the conflict of interest at the heart of the transaction to the investors purchasing asset-backed securities: the hedge fund betting against the securities helped pick the underlying pool of mortgages.\textsuperscript{94} Goldman eventually settled for $550 million, while one of its employees was found civilly liable.\textsuperscript{95}

The hundreds of billions of dollars of settlements in these disclosure lawsuits has a profound implication for disclosure and the overload and complexity critiques. These settlements suggest that simple, nontechnologically enhanced, but robust, disclosure about issuer and intermediary incentives, conflicts of interest, and levels of diligence might be one of the most desirable disclosure fixes of all. I return to this point in Part IV.C.


\textsuperscript{93} Press Release, SEC, supra note 90.

\textsuperscript{94} Id.

3. The Perils of Periodic Disclosure

The subprime crisis revealed other, less headline-grabbing information failures. One failure reveals a new spin on the problems with traditional SEC-required periodic reporting. Periodic reporting, when combined with the snapshot nature of a balance sheet, can fail to capture significant changes in an issuer's financial and other conditions in between periodic reports. Some evidence shows that securitizations may have been timed to take advantage of intermittent securities disclosures. Securitization transactions before the crisis appeared generally to have been timed to take place in the last several days of a financial period. When a snapshot of a balance sheet or quarterly report of an originating lender (or another institution selling assets into a securitization) would have been taken, the assets would be gone. The risk associated with those assets would not appear in a disclosure, even if the issuer held that risk for much of the interval in between periodic disclosures.\(^\text{96}\) The crisis laid bare the dangers in this timing: when asset-backed-securities markets froze and new securitizations shut down, originating lenders could no longer sell their mortgages or other assets into a securitization. Risk (in this case, taking the name “warehouse risk”) suddenly materialized on these issuers’ balance sheets.\(^\text{97}\)

4. The Failures of Risk Models

The financial crisis proved the models that firms use to price asset-backed securities and derivatives and to set investment and risk-management strategies to be dangerously opaque. These pricing models exhibited phenomenal failures in measuring risk in the current financial crisis, as did the models that financial institutions relied on to price loans, manage investment portfolios, set overall firm risk-management policies, and even establish regulatory capital.\(^\text{98}\) These models failed in part because of faulty assumptions, which were largely hidden from investors.\(^\text{99}\) Opacity of risk models has other

\(^{96}\) Patricia M. Dechow & Catherine Shakespeare, Do Managers Time Securitization Transactions To Obtain Accounting Benefits?, 84 ACCT. REv. 99 (2009).


\(^{98}\) Gerding, supra note 77, at 164-67. Under the Basel II Accord, certain large banks were allowed to set their own regulatory capital requirements according to internal risk models. Id. at 154-57. The SEC extended this privilege to several large investment banks under its now-defunct Consolidated Supervised Entities program. Id at 158-59.

\(^{99}\) Id. at 182-83.
negative consequences. It hides potential gamesmanship of models by individuals within a financial institution. For example, traders in financial institutions engaged in trading strategies that involved low-probability, but high-magnitude, risks to evade detection by their firm's risk models (a practice called "stuffing risk into the tails"). In addition, the fact that the details of any financial institution's risk models remain largely secret prevents other financial institutions from adequately evaluating their counterparty risk to that institution. The marketplace cannot necessarily rely on regulators to police risk modeling and risk management because regulators may lack necessary resources and expertise. Moreover, regulators may lack motivation; from an international perspective, one nation's regulators may wish to allow their home-country financial institutions to use looser models to take on more risk, earn greater profits, and gain a competitive advantage over institutions in other countries. The opacity of risk models and regulatory auditing of those models obscures the failures of regulators and can undermine international efforts to ensure minimum standards across countries for financial institution regulation.

In addition, opacity of risk models hides potentially dangerous levels of homogeneity in the risk modeling and risk management of financial institutions. If financial institutions employ similar investment and risk-management strategies, they may purchase the same assets at the same time (causing prices to surge and creating liquidity) and sell those assets simultaneously (causing prices to plummet and liquidity to evaporate). There is some indication that this homogeneity exacerbated the current financial crisis; many financial institutions began suffering losses and selling assets at the same time. In short, opaque risk models exacerbate systemic complexity.

102. *Id.* at 185. Hu has examined some of the potential errors in asset-backed-securities disclosure where disclosure of cash-flow waterfalls does not match the actual allocation of cash flows conducted by the computer programs used in a securitization. He also explores a proposal to fix this disparity that resembles making risk models open-source: investors might be given more direct access to these computer programs. Hu, supra note 3, at 1640-42. This proposal might have many of the advantages and drawbacks of open-source risk models discussed infra Part III.C.2.
103. See GERDING, supra note 72, at 185.
104. *Id.* at 184-85.
5. Remaining Puzzles

This Subpart's thumbnail sketch of information failures during the financial crisis should not give the impression that all information failures are well understood. Deep puzzles remain. For example, Professor Bobby Bartlett documents a bizarre information inefficiency during the crisis in the market for the securities of monoline bond insurers.105 These firms insured many asset-backed-securities issuances against default. However, even when asset-backed securities known to be insured by these firms began to suffer ratings downgrades and it looked probable that these insurers would have to make payment on their policies and thus suffer significant losses, the securities of these insurers did not experience significant price drops for an extended period of time. It is unclear why investors were not able to make use of readily available information and sell or begin shorting the insurers' securities. Bartlett speculated that behavioral biases of investors may hold one answer.106 Perhaps the overload or complexity critiques might have some bite here.

D. Regulatory Rollback?

The idea that mandatory disclosure is not only too costly for issuers, but also ineffective and potentially counterproductive, has fueled regulatory action and proposed legislation in Congress to simplify, streamline, and roll back securities disclosure requirements. The overload critique, in particular, has been explicitly invoked by legislators and regulators seeking to reduce disclosure burdens on issuers.

A brief recent history provides some context to the efforts to pare back mandatory disclosure. In the 2012 Jumpstart Our Business Startups Act107 (JOBS Act), Congress took several steps to roll back or simplify mandatory disclosure requirements. First, Congress reduced the disclosure requirements for companies with total annual gross revenues under $1 billion (what the statute labels "emerging growth companies").108 This move appeared to have been driven by an effort to reduce the regulatory burden on corporations, instead of being grounded in the needs of investors or in financial theory. Generally

106. See id. at 53.
speaking, the securities of smaller companies are less likely to trade in informationally efficient markets than larger companies. Indeed, the SEC’s decades-old integrated disclosure system, which allows larger issuers to conserve on filing new disclosures with the SEC, is premised on evidence that the securities of these larger companies trade in more efficient markets. Thus, much of the information that would otherwise go into new filings and mandatory disclosure has already been digested by capital markets and impounded into the price of those securities. The JOBS Act’s “emerging growth” provisions turn this logic on its head and give smaller companies exemptions from disclosure rules.

Against this backdrop, in the JOBS Act, Congress also required that the SEC review a core mandatory disclosure rule, Regulation S-K. Congress told the SEC that the purpose of the review was “to . . . determine how such requirements can be updated to modernize and simplify the registration process and reduce the costs and other burdens associated with these requirements for issuers who are emerging growth companies.” The SEC Staff responded with a report that reviewed several decades of SEC initiatives to streamline mandatory disclosure requirements, including for smaller businesses. The report concluded with a proposal for the SEC to review, and possibly revise, Regulation S-K, including simplifying risk-related disclosure (such as disclosures on market risk) as well as disclosures related to a registered issuer’s business and operations, corporate governance matters, executive compensation, and offering-related matters. The SEC Staff also recommended review of a wide range of other regulations, including “Industry Guides” that govern disclosure by issuers in particular industries, such as banking or real estate, and

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114. See id. at 97-102.
Regulation S-X, which governs financial reporting.\textsuperscript{115} These recommendations cover a vast swath of mandatory disclosure rules.

The SEC Commissioners took up this invitation and launched the Agency's Disclosure Effectiveness initiative.\textsuperscript{116} The SEC's Division of Corporation Finance began by requesting comments on certain parts of Regulation S-X.\textsuperscript{117} Some Commissioners,\textsuperscript{118} including the SEC Chair, have indicated that a thrust of this Disclosure Effectiveness initiative is to review whether disclosure has become "too much," repetitive, or duplicative of information available on the Internet or has strayed from its original purpose.\textsuperscript{119} SEC Chair Mary Jo White frames the potential pruning of mandatory disclosure in terms of the securities law concept of materiality.\textsuperscript{120} The Commissioners in favor of Disclosure Effectiveness have explicitly linked their views on pruning disclosure to Paredes's information-overload argument.\textsuperscript{121} Similarly, members of Congress have cited the overload argument as justification for proposed legislation to roll back the SEC rules on mandatory issuer disclosure.\textsuperscript{122} The SEC initiative has coincided with proposals from the

\textsuperscript{115} See \textit{id.} at 102-04. In 2015, Congress passed the Fixing America's Surface Transportation Act, Pub. L. No. 114-94, 129 Stat. 1312 (2015) (FAST Act), which requires the SEC both to revise and scale back disclosure for emerging growth companies and certain small issuers and to study further amendments to Regulation S-K to modernize and simplify mandatory issuer disclosure and remove duplicative and immaterial disclosure requirements.


\textsuperscript{118} \textit{E.g.}, Gallagher, \textit{supra} note 15.


\textsuperscript{120} See \textit{id.}


\textsuperscript{122} See, \textit{e.g.}, H.R. REP. NO. 113-642 (2014).
Financial Accounting Standards Board to make disclosure more "effective" by giving issuers more discretion to determine what is material. The sum total of these initiatives and the statements of SEC Commissioners has led some commentators to worry that the SEC and other policy makers are pursuing an aggressive deregulatory agenda, including rolling back mandatory issuer disclosure.

III. TECHNOLOGICAL FIXES

To the extent that overload and complexity—including its contractual, derivative, and systemic forms—is a problem for investors, the question is whether technology can offer a partial remedy. Can technologies help break down the complex reality of modern firms and their securities into information that can be understood by investors? The SEC has a history of using technology to improve the dissemination of issuer information, going back at least to the introduction of the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system, its electronic filing platform. It also has a history of efforts to make disclosure more understandable. Lastly, the Agency also has also recognized the importance of market efficiency in tailoring mandatory disclosure.

The ensuing discussion evaluates how the following technologies might improve securities disclosure: developing data-tagging disclosure, including the SEC’s XBRL initiatives; giving granular disclosure about investment portfolios, including tagging loan-level assets in a securitization; moving towards real-time disclosure; making disclosure web-based and improving its organization and layout accordingly; making securities disclosure more interactive, including via the use of calculators; and making parts of issuers’ risk models


127. Langevoort, supra note 109, at 874-76.
open-source. Each technological fix addresses a different combination of overload and complexity problems.

In evaluating these technologies, it is important to note that understandability to investors is not the only policy objective. Securities disclosure must also achieve comparability to allow investors to make decisions among multiple investments and multiple issuers. Issuer information also may have to be capable of being encapsulated in a summary format for use by other informational intermediaries in financial markets. However, if the encapsulated information fails to capture enough important information or loses sufficient nuance about the issuer, summary information may mislead investors and lead to investment errors. At the same time, disclosure must factor in some heterogeneity in terms of types of issuer businesses and different investment needs. Disclosure must also be capable of verification both within an issuer and by gatekeepers—third-party intermediaries, such as auditors who certify the accuracy of disclosure.

For issuers, increased mandatory disclosure brings with it the specter of increased antifraud liability. This raises a thorny dilemma for policy makers. On the one hand, safe harbors from liability might encourage more disclosure and more innovation from issuers. On the other hand, insulation from liability might create incentives for sloppiness, puffery, or deception on the part of issuers.

A. Existing Initiatives

1. XBRL

The SEC’s XBRL initiative provides a useful launching point for analyzing how technology might enhance and reform disclosure.

128. DOMBALAGIAN, supra note 26, at 3.
129. Id.
130. Id. at 47-48, 51-52.
132. Some commentators lauded the potential of the XBRL Rule to increase transparency in financial markets and allow an “army of citizen regulators” to police risk in financial markets. E.g., Daniel Roth, Road Map for Financial Recovery: Radical Transparency Now!, WIRED (Feb. 23, 2009, 12:00 PM), http://www.wired.com/2009/02/wp-reboot/.
The XBRL initiative builds off the decades-old SEC EDGAR regulations, which require firms and individuals who must submit filings with the SEC to do so in an electronic format. EDGAR filings are then available and searchable on the SEC's online EDGAR database. The XBRL rules now require SEC registrants to begin embedding data “tags” in their electronic filings using a particular computer language. These tags identify key items (called “elements” in the relevant regulatory language) in financial statements using a standardized taxonomy. These data tags allow investors to download these separate pieces of financial statement information directly into spreadsheets or other analytical software. Investors can then make side-by-side comparisons of financial information—for example, cost of goods sold, loans more than ninety days delinquent, or cash flow from operations—from different issuers.

The XBRL initiative has engendered some controversy because some issuers see compliance costs, but see little use for the new data format. Some commentators have identified a problem with issuers choosing to customize the elements that they tag, which undermines comparability across issuers. Others have noted a deep tension in XBRL that is common throughout disclosure: the need for consistency in applying data tags to enable comparability must be balanced against investor needs for rich, nuanced data that reflects the differences in how issuers conduct business.

Data tags might give the illusion that the financial information being downloaded is complete. However, the footnotes to an issuer’s financial statements may contain material qualifications to a given piece of standardized financial information. This presents an age-old tension in financial disclosure. On the one hand, regulators want to


allow issuers to present these nuances that might reveal critical assumptions, methodologies, or limitations to standardized data. Footnotes capture the heterogeneous nature of firms and allow for more customized data. However, footnotes also frustrate comparison and allow gamesmanship because issuers can bury key facts.  

Early on, the SEC and issuers grappled with errors in data tagging, particularly as the process of tagging became increasingly automated. The possibility of errors has led to calls for third-party verification of the accuracy of data tagging. At the same time, industry groups that created the XBRL standards and offer services to help issuers comply stand to gain from keeping and enhancing the XBRL rules. These groups have become a ready-made political interest group for entrenching this largely obscure set of rules. Automating data tagging and the resulting potential for errors will become larger concerns should high-frequency traders use XBRL data.

2. Loan-Level Tagging in Asset-Backed Securities

The SEC decided to use the same computer language in XBRL to meet a congressional mandate under Dodd-Frank requiring asset-backed-securities issuers to disclose standardized loan-level data on the assets underlying their securities. This disclosure includes data

137. But see Frank D. Hodge, Jane Jollineau Kennedy & Laureen A. Maines, Does Search-Facilitating Technology Improve the Transparency of Financial Reporting?, 79 ACCT. REV. 687 (2004) (arguing that search technologies using XBRL can also improve the transparency of footnotes). This assumes, however, that the footnote disclosure can be sufficiently standardized and reduced to quantified elements.


tags that investors could use to assess the quality of these assets, whether mortgages, auto loans, or other debt. This rule aims to lower the cost to investors in getting higher-quality information on the underlying assets, even through multiple layers of securitization and hedging. This tracing could improve the ability of investors to map the web of securitizations and hedging in a nuanced fashion. By understanding underlying assets, investors can analyze how risks—including credit and market risk—affecting underlying assets course through the system all the way to the securities they purchase. This addresses some of the derivative complexity of asset-backed securities.

However, some of the same challenges that affect the XBRL rules also affect this loan-level tagging initiative. Issuers may not use the data tag in a standardized way or may make significant errors in tagging information. The categories of information captured by the data tags may not capture significant pieces of information about the credit risk of mortgages or other loan pools. Issuers may hide significant loan terms in parts of the mortgages or other loan-level assets that are not tagged or not susceptible to tagging. To ensure reliability, these loan-level data tags ought to be subject to third-party verification. Automation of data tagging might economize on costs, but lead to undiscovered errors. In short, loan-level data tagging might give investors the illusion that they have verified, accurate, and complete information about the credit characteristics of underlying loans.

Furthermore, tagging mortgages creates a problem that the XBRL initiative does not. If the information on mortgages or other consumer loans is sufficiently granular and complete, the privacy of consumers might be compromised. Privacy scholars have called into question whether this kind of information could be anonymized. Other scholars have suggested that information intermediaries might be used to protect consumer privacy, but this would add to the complexity and cost of tagging loan-level assets. One consolation,

143. See Hu, supra note 3, at 1652-53.
144. See, e.g., Paul Ohm, Broken Promises of Privacy: Responding to the Surprising Failure of Anonymization, 57 UCLA L. Rev. 1701 (2010).
which might be even more depressing to consumers, is that this private information might already be deducible, even absent SEC regulation.\footnote{146}{Paul Ohm & Scott Peppet, \textit{What If Everything Reveals Everything?}, \textit{in Big Data Is Not a Monolith} (Cassidy R. Sugimoto, Hamid R. Ekbia & Michael Mattioli eds., forthcoming 2016).}

3. Real-Time Disclosure

Advances in information systems will enable more rapid and frequent disclosure than current quarterly and other periodic reports. It is conceivable that even more financial disclosure could be made practically in real time. This would mimic how exchange trades are reflected in real-time stock quotes. More frequent disclosure would curtail the accounting gamesmanship of many issuers, noted above, which is facilitated by the periodic and intermittent nature of current disclosure.\footnote{147}{See supra Part II.C.3.} Higher speed of disclosure may increase market efficiency.

However, technologically enhanced disclosure, particularly more frequent or real-time disclosure, will challenge the ability of issuers and gatekeepers to verify and the ability of investors to process information carefully. Real-time disclosure raises the following questions:

\textit{Would disclosure be sufficiently audited?} Audit firms could not realistically audit financial information disclosed in real time (i.e., as transactions occur). Some information may be important enough to merit slower disclosure to enable auditors to catch potential accounting errors, whether deliberate or intentional.

\textit{Would higher-speed disclosure promote greater market volatility?} Under the semistrong form of the EMH, real-time material disclosure would have immediate effects on the market price of an issuer’s securities. This could make prices more volatile and exacerbate noise trading.

\textit{Would higher volatility be gamed by issuers, market intermediaries, and sophisticated traders?} Instantaneous disclosure, higher volatility, and higher levels of noise trading could allow sophisticated players in the marketplace to take advantage of retail investors by using superior access to information to trade ahead of the market, engage in insider trading, or manipulate prices.
B. Borrowing from Consumer Finance

For XBRL, loan-level data tagging, and incremental movements towards real-time disclosure, the future is now. However, the SEC also could consider a next generation of technologically enhanced disclosure. In so doing, the SEC could learn lessons from the CFPB’s interdisciplinary research, in which the CFPB engaged research in psychology, graphic design, technology, and social science in efforts to redesign consumer financial disclosures.

1. Web-Based Disclosure and Rethinking Layout

If disclosure would be increasingly delivered in electronic and interactive formats, regulators, issuers, and securities lawyers could rethink the overall presentation of disclosure to make it more accessible, malleable, and “user friendly.” Securities disclosure could become increasingly web-based and hyperlinked. This would allow users to click through disclosure, starting with more general information. Investors could then click through the disclosure to access more detailed information on particular disclosure items. This might help investors navigate complex information and manage the risk of information overload.

This accords with research from psychology, behavioral economics, and law on how to help individuals overcome cognitive limitations and behavioral biases. Indeed, heuristics might be used to improve the decision making of investors and other individuals. One strand of this literature focuses on using regulations to improve the “menu design” for consumer and investment choices available to

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149. This academic movement was popularized in RICHARD H. THALER & CASS R. SUNSTEIN, NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS (2008). However, the idea of using heuristics to improve individual decision making has a much longer intellectual history. See, e.g., GERD GIGERENZER, PETER M. TODD & ABC RESEARCH GRP., SIMPLE HEURISTICS THAT MAKE US SMART (1999) (discussing “fast and frugal heuristics”).
This approach on improving individual decisions can also be applied to improving the layout and presentation of disclosure to consumers. The “menu” metaphor is quite apt; software designers have gleaned valuable experience on making software more user-friendly. Drop-down menus and other interactive devices have been introduced and progressively improved in software since the advent of the graphical user interface (GUI). These devices allowed software to perform more complex tasks and to be used by a greater range of consumers.

As with other technologically enhanced disclosure, the challenge with moving to a web-based, hyperlinked disclosure layout is ensuring that data remains comparable. Who controls the layout is also critical. There is a risk that some issuers might use complex layouts to frame information in ways that unduly accentuate the positive and practically eliminate the negative.

2. Interactive Disclosure: Calculators

Web-based disclosure might also enable a next generation of interactive disclosure. Disclosure might enable investors to change particular assumptions behind certain financial presentations and then see how the results would change. For example, issuers have to disclose the extent to which they are subject to market risk. This disclosure might be made interactive, so that investors could see how market risk changes across a range of assumptions or confidence intervals. This technology resembles the interactive calculators that many financial firms’ websites now offer. The United States Department of the Treasury has endorsed calculators as part of its reform of consumer financial regulations, and the CFPB has begun offering online calculators to help citizens shop for and understand consumer loans.

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152. 17 C.F.R. § 229.305.
C. The Future

More radical technological changes to disclosure might help investors navigate systemic complexity.

1. Investment Portfolio Information

Data tags used for tracking mortgages, asset-backed securities, and derivatives also could enable investors to see with more granularity the assets and liabilities in a firm’s balance sheet. This kind of granular disclosure would allow investors to spot accounting gamesmanship or risks in a firm’s financial statements that are masked by more aggregated information. It would also allow investors to comb through balance sheets of individual firms and then make comparisons among firms. These comparisons might uncover potentially dangerous areas of homogeneity lurking in the balance sheets and risk profiles of multiple firms. The ability to drill down into balance sheets might prove particularly helpful for investors seeking to analyze the portfolios of investment funds.

2. Open-Source Risk Models?

Regulators might consider requiring that issuers, particularly financial institutions, disclose much greater detail on the methodologies and assumptions behind the models used to price asset-backed securities and derivatives and to measure and manage an issuer’s overall risk. A more radical approach would force disclosure of the algorithms in these models, in essence making this software open-source. This would allow investors to analyze the models in greater detail and spot limitations, bugs, and the potential for dangerous homogeneity among the models of different firms.155

An open-source approach would come with several costs. First, being forced to disclose proprietary information might discourage firms from investing in innovative risk models. Second, disclosure of risk models might open issuers to exploitation from other market participants. For example, there is some evidence that when rating agencies disclosed their models for rating asset-backed-securities issuances, savvy investment bankers devised new ways to game the models and gain higher ratings for riskier mortgages.156 Third,

155. Gerdinger, supra note 72, at 189-91.
enhanced disclosure of risk models might encourage more copycatting and thus dangerously increase the homogeneity of investment behavior.  

D. Technological Enhancements: An Appraisal

The smorgasbord of technological enhancements outlined in this Part face several common and deep challenges. First, these enhancements do not directly answer the questions raised by the overload critique. More particularly, it is not clear that technological enhancements will be used by investors or would be effective in helping them sift through data on issuers and securities. Whether investors would demand, use, and use effectively many of these enhancements requires evidentiary support, which might be obtained through surveys or empirical and experimental testing, a subject that I return to in Part IVA. Furthermore, many of these enhancements do not directly address some of the information failures at the heart of the financial crisis. The unraveling of structured finance and derivative markets had much to do with the poor incentives of issuers and market intermediaries to create, verify, and pass along quality information about securities and underlying assets. In some cases, market participants had incentives to obscure, misrepresent, or destroy that information. I return to these problems and look at how disclosure might address them in Part IV.C.

IV. CONCLUSION

Both the critiques of—whether of the overload or complexity variety—and the technological enhancements to mandatory disclosure suffer from similar flaws: a lack of sufficient evidentiary foundation and an oblique connection to the information-incentive problems at the heart of the recent financial crisis. I turn in this Conclusion to ways that disclosure reforms might begin to develop evidence and address incentives. But first, I note that there are regulatory alternatives to disclosure.

Much of the scholarship on information overload and complexity and the rhetoric surrounding the SEC's Disclosure Effectiveness initiative has a strong deregulatory valence. However, there is another potential implication: if the risks of an issuer indeed cause information overload and are "too complex to depict," then perhaps

157. GERDING, supra note 72, at 512.
that issuer’s securities are too complex to sell. One alternative to mandatory disclosure as a regulatory tool is substantive merit-based regulation of issuers and the securities that they can sell. In the last decade, a range of legal scholars across the political spectrum have proposed licensing regimes that would govern the sale of complex financial products.\textsuperscript{158} Although, policy makers often look to disclosure regimes to stave off less politically palatable substantive regulation,\textsuperscript{159} disclosure and licensing regimes need not be either-or options. Furthermore, substantive regulation might also address the incentives of issuers and intermediaries to create, verify, and pass along information. For example, Dodd-Frank’s “skin in the game” regulations require originators of mortgages to retain part of the risk of the assets being fed into a securitization in order to align originator incentives with those of investors in asset-backed securities.\textsuperscript{160}

A. Beta Testing Disclosure

Given the lack of empirical data surrounding the overload critique and much of the complexity critique as well, the SEC should conduct rigorous empirical testing before pruning long-standing disclosure requirements. At the same time, policy makers should conduct empirical testing of technologically enhanced disclosure. As a first step, the SEC should survey investors, particularly institutional investors, to see what pieces of existing disclosure are used and what new information they believe would improve their decision making.

Economists are often skeptical of survey data and instead look for revealed preferences. The SEC could conduct event studies to see whether the revelation of certain pieces of information by issuers had an impact on an issuer’s stock price. However, event studies work best when discrete pieces of information are disclosed. It thus may be hard

\begin{thebibliography}{99}


\bibitem{160} Gerding, supra note 97, at 126-27 (discussing this rule and scholarship on it).
\end{thebibliography}
to test the materiality of bundles of disclosure items.\textsuperscript{161} Web-based disclosure may offer the SEC new and rich data sets on the usefulness of various disclosure items because click-through data can reveal which pieces of information investors are using.

Experimental data might offer other insights into how investors use various pieces of disclosure and how well they understand that data. Legal scholars have increasingly advocated using methodologies from experimental economics to test the effectiveness of various legal rules.\textsuperscript{162} Of course, experiments must be carefully designed to achieve sufficient reliability and validity.

\textbf{B. Code Is Law; Disclosure Is Law}

Both the recent calls to simplify disclosure and the initiatives to technologically enhance disclosure raise a profound question: Who decides what is disclosed to investors and how it is disclosed? Several decades of research in psychology and behavioral economics underscores the fundamental importance of how information is framed as to how decisions are made. The stakes of decisions for mandatory issuer disclosure are high, affecting how capital is allocated in the economy and the extent to which investors are protected from bad decisions and deceptions large and small. The chance to redesign disclosure via technology is more than just technocratic whimsy. As cyberlaw scholars are fond of saying, "code is law."\textsuperscript{163} Seemingly technical decisions about how financial data or loans are tagged and how disclosure is presented can have enormous impacts not only on the compliance costs to issuers, but also on the decisions of investors. Who controls the format of disclosure can shape investor choices. There is a danger that technology and any disclosure reforms, deregulatory or otherwise, might give investors the illusion that they are making independent decisions based on neutral information and that they have more capacity to understand risk than they do.


\textsuperscript{163} \textit{See, e.g.}, LAWRENCE LESSIG, \textit{CODE AND OTHER LAWS OF CYBERSPACE} 3-6 (1999).
C. In Praise of Old-Time Disclosure: On the Incentives of Issuers and Intermediaries

One of the central limitations of the overload and complexity critiques is that both discount the potential for issuers and intermediaries to game disclosure rules and manipulate disclosure. Issuers might intentionally overload investors or make financial transactions and disclosure more complex than they need to be in order to obscure risks from investors or regulators. Some of the biggest information failures in the recent subprime crisis came not because information was destroyed, but because someone destroyed the information. In securitization, originators, investment banks, and credit rating agencies had perverse incentives not to perform due diligence on the riskiness of underlying assets and not to pass on sufficient information on that risk to investors. In some cases, intermediaries deceived investors about the riskiness of assets or conflicts of interest at the heart of transactions. This all argues in favor of reinvigorating the following three old-fashioned staples of mandatory disclosure:

Use of proceeds or the purposes for which a securities issuance is being made. For example, investors should know if an issuer is using an issuance to game regulations (e.g., tax or banking laws). This would inform the market about the incentives of issuers and intermediaries to structure issuances in ways that might diverge from the interests of some or all investors. As noted above, issuers, intermediaries, and even subsets of investors structured securitization tranches to game banking regulations in ways that masked risk from regulators and other investors.164

The level of diligence undertaken by underwriters and other intermediaries. As noted above, investment banks paid billions to settle lawsuits alleging that they failed to disclose the level of screening they performed with respect to the mortgages and other assets that went into securitizations.165 More disclosure about the level of diligence performed by intermediaries would give investors in both securitizations and even plain-vanilla stocks and bonds better information about the efficacy of intermediaries and

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164. See supra note 72 and accompanying text.
165. See supra Part II.C.2.
the gatekeeping function they perform. Gatekeeping is essential to capital markets. 166

Conflicts of interest of intermediaries. The financial crisis also underscored how conflicts of interest could undermine the incentives of underwriters and other gatekeepers to help investors separate wheat from chaff. 167 Policy makers should beef up mandatory disclosure about compensation and business or investment arrangements that might put the interest of an intermediary in conflict with the interests of those investors relying on that intermediary.

These three broad areas for disclosure reform share several characteristics. First, they would be backstopped by the extensive antifraud liability regimes in federal securities laws, which might not be the case for many of the technological fixes outlined in Part III. Second, they reflect the fact that complexity in issuers, financial instruments, and markets is not a natural phenomenon, but rather is created by issuers and their representatives for purposes that, at times, have little benefit for investors (e.g., creating opaque issuers or markets in order to charge higher prices, game regulations, or even deceive investors). Third, understanding the incentives of issuers and intermediaries in creating securities and securities markets remains one of the foundational concerns of securities disclosure and securities regulation. Casting sunlight on those incentives improves them—even if the improvement is imperfect—and helps issuers, intermediaries, and markets perform their proper functions. Rethinking the details of mandatory disclosure in these fundamental areas might do far more to enhance investor information than either taking a chainsaw to disclosure rules or fashioning hi-tech solutions to disclosure problems. Sometimes the best solution to complexity is simplicity.

166. For a small sample of the germinal literature on gatekeepers, see, for example, Reinier H. Kraakman, Gatekeepers: The Anatomy of a Third-Party Enforcement Strategy, 2 J.L. ECON. & ORG. 53 (1986), and John C. Coffee, Jr., Understanding Enron: “It’s About the Gatekeepers, Stupid,” 57 BUS. LAW. 1403 (2002).
167. See supra Part II.C.2.