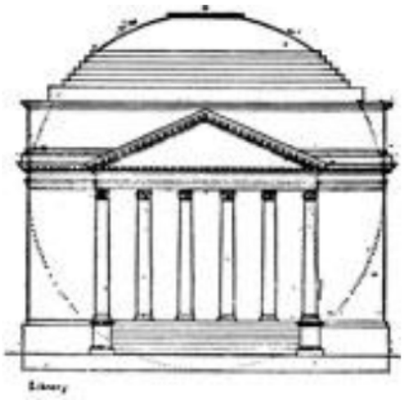

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ARTICLES

INFORMATION GAPS AND SHADOW BANKING

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This Article argues that information gaps—pockets of information that are pertinent and knowable but not currently known—are a byproduct of shadow banking and a meaningful source of systemic risk. It lays the foundation for this claim by juxtaposing the regulatory regime governing the shadow banking system with the incentives of the market participants who populate that system. Like banks, shadow banks rely heavily on short-term debt claims designed to obviate the need for the holder to engage in any meaningful information gathering or analysis. The securities laws that prevail in the capital markets, however, both presume and depend on providers of capital to perform these functions. In synthesizing insights from diverse bodies of literature and situating those understandings against the regulatory architecture, this Article provides one of the first comprehensive accounts of how the information-related incentives of equity and money claimants explain many core features of securities and banking regulation.

The Article's main theoretical contribution is to provide a new explanation for the inherent fragility of institutions that rely on money claims. The existing literature typically focuses on either coordination

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problems among depositors or information asymmetries between depositors and bank managers to explain bank runs. This Article provides a third explanation for why reliance on short-term debt leads to fragility, one which complements the established paradigms. First, information gaps increase the probability of panic by increasing the range of signals that can cast doubt on whether short-term debt that market participants had been treating like "money" remain sufficiently information insensitive to merit such treatment. Second, information gaps impede the market and regulatory responses that can dampen the effects of a shock once panic takes hold. Evidence from the 2007–2009 financial crisis is consistent with the Article's claims regarding the ways shadow banking creates information gaps and how those gaps contribute to fragility.

INTRODUCTION

TRADITIONALLY, the United States has had two parallel regimes for moving capital from persons who have it to persons who need it—the capital markets and the banking system. Both regimes serve the socially useful function of providing financing for productive undertakings, but each raises capital through the issuance of different types of financial claims. The paradigmatic claim issued in the capital markets is an equity claim, while most of the capital in the banking system comes from the issuance of "money" claims.[1] Equity claims, such as common stock issued by a public corporation, are perpetual. The value of an equity claim can fluctuate significantly and typically is realized only through trading in a secondary market. In contrast, money claims, which include familiar instruments like the demand deposits issued by banks and more innovative instruments like commercial paper backed by highly rated collateral, are very short-term instruments. The value of a money claim is fixed, and most money claims are structured to allow the holder to walk away at any time without penalty.

These differences between money claims and equity claims contribute to two very different informational environments. Equity markets, like the New York Stock Exchange, typically "level up" the informational playing field through publicly observable prices that contain meaningful information about the value of underlying assets. This works because the same processes that reward sophisticated investors for engaging in costly information gathering also move prices to more efficient levels. Money markets, by contrast, "level down" the informational playing field

[1] See infra Section I.A. While one could consider all financial claims as existing along a spectrum with longer-term debt residing between these two extremes, there are reasons to treat these two ends of the spectrum as qualitatively distinct. Id.

through claim structures that make it costly and unrewarding for claimants to acquire superior information about the underlying assets. A person acquiring a money claim relies, instead, on a proxy indicating that the claim is exceptionally low risk coupled with a right to exit quickly and at face value as a substitute for perfect information. This makes money markets highly liquid most of the time, but it also contributes to their inherent instability. Securities and bank regulation address the unique informational dynamics in the domains they govern.[2] As reflected in the stability of the financial system between the Great Depression and the 2007–2009 financial crisis ("the Crisis"), this overall scheme worked exceptionally well for a long period of time.

The Crisis wreaked havoc on the financial system and revealed a third systemically important regime—the shadow banking system. The shadow banking system is an intermediation regime that resides in the capital markets while serving many of the economic functions traditionally fulfilled by banks.[3] With the benefit of hindsight, it is evident that this system had been growing for decades prior to the Crisis.[4] Nonetheless, it was not until the Crisis revealed this regime to be inherently fragile and capable of bringing down the rest of the financial system, that policymakers, market participants, and other experts started to appreciate its

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[2] Id.

[3] How best to define the shadow banking system is a matter of ongoing debate. This Article makes no effort to resolve this issue, as the dynamics at issue here are widely recognized as core to shadow banking, however defined. E.g., Morgan Ricks, The Money Problem: Rethinking Financial Regulation ix (2016) [hereinafter Ricks, The Money Problem] (recognizing that the term "'shadow banking' . . . has come to mean different things to different people," while taking the position, based on the author's experience at the Treasury Department during the Crisis, that the term is best understood to refer to "the financial sector's use of vast amounts of short-term debt" (emphasis omitted)); Zoltan Pozsar et al., Fed. Reserve Bank of N.Y., Staff Rep. No. 458, Shadow Banking, at Abstract (2010), http://ssrn.com/abstract=1645337 [https://perma.cc/A5TP-XABX] (explaining how "the shadow banking system provide[s] sources of inexpensive funding for credit by converting opaque, risky, long-term assets into money-like and seemingly riskless short-term liabilities"); Steven L. Schwarcz, Regulating Shadow Banking: Inaugural Address for the Inaugural Symposium of the Review of Banking & Financial Law, 31 Rev. Banking & Fin. L. 619, 623, 625–26 (2011–12) (noting that "we lack a concrete definition of shadow banking" while also emphasizing that "a high level of institutional demand for (especially) short-term debt instruments" was a critical factor in the growth of what is now "known as the 'shadow banking system'" (emphasis added) (citations omitted) (quoting Donald C. Langevoort, Global Securities Regulation After the Financial Crisis, 13 J. Int'l Econ. L. 799, 803 (2010))).

[4] See infra Part II.

distinctiveness and importance.[5] Recent estimates suggest that the shadow banking system in the United States is larger than the banking system and poised for further growth.[6] Among the factors contributing to this growth is that companies and institutional investors currently hold massive amounts of cash that they want to store for future use,[7] but banks are not suited to accept deposits in such large amounts.[8] How best to regulate this system is one of the most pressing issues in financial regulation today.[9]

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[5] E.g., Tobias Adrian & Hyun Song Shin, Fed. Reserve Bank of N.Y., Staff Rep. No. 439, The Changing Nature of Financial Intermediation and the Financial Crisis of 2007-09, at 4 (2010) (observing "that those institutions involved in [shadow banking] were precisely those that were at the sharp end of the financial crisis that erupted in 2007"); Morgan Ricks, Shadow Banking and Financial Regulation 4 (Columbia Law & Econ., Working Paper No. 370, 2010), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1571290 [https://perma.cc/7TG5-ZWH3] (explaining that "at the height of the crisis, very nearly the *entire* emergency policy response was designed to prevent shadow bank defaults through a series of 'temporary' and 'extraordinary' interventions"); see also infra Part IV.

[6] Int'l Monetary Fund, Global Financial Stability Report: Risk Taking, Liquidity, and Shadow Banking—Curbing Excess While Promoting Growth 66 (Oct. 2014) (stating that "only in the United States do shadow banking assets exceed those of the conventional banking system"); see also infra Section II.A (summarizing recent data on the size and growth of shadow banking).

[7] E.g., Adam Davidson, Why Are Corporations Hoarding Trillions?, N.Y. Times Mag. (Jan. 20, 2016), https://www.nytimes.com/2016/01/24/magazine/why-are-corporations-hoarding-trillions.html [https://perma.cc/Z9UK-5PJ3] (noting that "American businesses currently have $1.9 trillion in cash, just sitting around . . . [a] state of affairs unparalleled in economic history").

[8] See infra Section II.A.

[9] E.g., Jonathan Macey, Reducing Systemic Risk: The Role of Money Market Mutual Funds as Substitutes for Federally Insured Bank Deposits, 17 Stan. J.L. Bus. & Fin. 131, 174 (2011) [hereinafter Macey, Reducing Systemic Risk] (arguing that proposed changes to money market mutual funds threaten to "destabilize an industry that has been remarkably stable" and would "plac[e] broader capital markets in substantial and unnecessary danger"); Bengt Holmstrom, Understanding the Role of Debt in the Financial System 3 (Bank for Int'l Settlements Monetary and Econ. Dep't, Working Paper No. 479, 2015), http://www.bis.org/publ/work479.pdf [https://perma.cc/H59A-PFJW] (arguing that "the logic behind transparency in stock markets does not apply to money markets" and this "matters because a wrong diagnosis of a problem is a bad starting point for remedies"); Perry Mehrling et al., Bagehot was a Shadow Banker: Shadow Banking, Central Banking, and the Future of Global Finance 1–2 (Dec. 6, 2013) (unpublished manuscript) http://ssrn.com/abstract=2232016 [https://perma.cc/4BA2-BTMX] (arguing against "the widespread impulse to frame the question of appropriate oversight and regulation of shadow banking as a matter of how best to extend the existing system of oversight and regulation as it is applied to traditional banking," and suggesting that shadow banking should instead be viewed as "the centrally important channel of credit for our times, which needs to be understood on its own terms").

This Article makes two contributions to the effort to devise a regime for regulating shadow banking. First, it demonstrates why neither of the existing paradigms for financial regulation can address the distinct challenges posed by shadow banking. Second, it shows how the information gaps that this Article identifies as endemic to the shadow banking system contribute to its fragility. In the process of exploring these issues, the Article reveals an important shortcoming in current understandings of how the distribution of information affects market functioning. And it provides a novel explanation for the inherent fragility of institutional structures that rely heavily on money claims.

The Article begins by explaining how securities and bank regulation have evolved to address the informational needs of the equity and money claimants, respectively. Equity claimants are strongly incentivized to gather and analyze information.[10] Securities regulation harnesses and facilitates these inclinations through a regime that relies on market participants to assess the value of assets underlying equity claims. The primary role of regulation is to facilitate these market-based processes.[11] Money claimants, by contrast, tend to be skittish and minimally informed.[12] The banking system addresses these dynamics through the creation of a powerful body of regulators authorized to limit bank activities, supervise bank operations, provide liquidity to a healthy bank facing excessive withdrawals, and close a bank down if its financial health becomes too precarious.[13] In each case, someone has high-quality information about the undertakings being funded by the capital coming into the system, the nature of the associated risks, and the ability to take actions responsive to those risks.

The same is not true with respect to shadow banking. The shadow banking system is an interconnected web of institutions that operates largely in the capital markets. This means that the default regulatory regime governing the shadow banking system is the disclosure-oriented regime designed to govern equity claims and other investments.[14] But money claimants do not have the same incentives as equity holders or other long-term investors; they will walk away before engaging in mean-

[10] See infra Subsection I.A.1.
[11] See infra Subsection I.B.1.
[12] See infra Subsection I.B.1.
[13] See infra Subsection I.B.2.
[14] See infra Section II.A.

ingful information collection and analysis.[15] This has little to do with the claimants, who are often the same sophisticated parties that undertake the information-generating activities that promote efficiency in the equity markets. Rather, it is inherent in the nature of money. A financial claim ceases to function as money if the holder perceives there to be any meaningful credit risk, or even if the holder is uncertain about the amount of credit risk a claim poses.[16] In contrast to the banking system, however, there is no body of informed and powerful regulators who can step in to assure money claimants or minimize the effects of their departure when doubts arise. As a result, it is often the case that *no one* has high-quality information about the assets underlying the shadow banking system, how risks are allocated across that system, and other pertinent information.

In undertaking this structural analysis, this Article reveals a shortcoming in the conceptual toolkit used to analyze how information and ignorance affect market functioning. One frame commonly used to examine these dynamics focuses on how information is distributed among parties. When one person has information, a second lacks it, and frictions limit the first person's ability to convey that information to the second, an "information asymmetry" results. As Professor George Akerlof famously demonstrated using the used car market, in a world where asset quality varies and sellers know more than buyers, information asymmetries can prevent otherwise efficient transfers.[17] A second common paradigm builds on the difference between "risks" and "uncertainty." As Professor Frank Knight explained, risks arise when "the distribution of the outcome in a group of instances" is known. Uncertainty, by contrast, is "not susceptible to measurement."[18] The risk-uncertainty dichotomy is useful

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[15] See infra Subsection I.A.2.

[16] Id.

[17] George A. Akerlof, The Market for "Lemons": Quality Uncertainty and the Market Mechanism, 84 Q.J. Econ. 488, 495–96 (1970). Others have shown that modest information asymmetries can actually facilitate market functioning, as the ability to capitalize on informational advantages can play a critical role by incentivizing market participants to engage in costly information collection and analysis. See infra Section III.B.

[18] Frank H. Knight, Risk, Uncertainty, and Profit 232–33 (Cosimo Classics 2006) (1957). True Knightian uncertainty is usually presumed to be unknowable. E.g., Milton Friedman, Price Theory 282 (rev. ed. 1976) ("In his seminal work, Frank Knight drew a sharp distinction between risk, as referring to events subject to a known or knowable probability distribution and uncertainty, as referring to events for which it was not possible to specify numerical probabilities." (emphasis omitted)); Daniel A. Farber, Uncertainty, 99 Geo. L.J. 901, 901 (2011) ("Economists distinguish between 'uncertainty' (where the likelihood of the peril is

because there are tools that can be used to manage risks that are not available when one is confronting an "unknown unknown."

The shadow banking system creates an informational challenge not captured in either of these frames. Because much of the capital flowing into the system comes from minimally informed money claimants but there is no robust regulatory oversight, shadow banking results in large pockets of information that are pertinent and theoretically knowable but not actually known by any market participant or regulator. This Article identifies such "information gaps" as a distinct type of information dynamic and an important mechanism through which reliance on money claims contributes to fragility. This is the Article's theoretical contribution.

Because the shadow banking system is built on money claims, a high degree of ignorance among persons holding money claims is the norm. Information gaps thus do little to detract from, and may even facilitate, market functioning so long as confidence reigns.[19] In the face of a signal that raises doubt about whether money claims are backed by sufficient collateral to obviate the need for due diligence, however, the situation changes dramatically. Upon such a change in state, information gaps increase the probability of widespread panic. This fragility arises because money claimants will run not only when increased credit risk so justifies, but also when information gaps prevent money claimants from being able to assess, with the minimal effort they can rationally invest, whether the claims they hold are among those exposed to the newly revealed risk.[20] A lack of information can thus lead to runs, even on solvent institutions. This mechanism is different than the more established coordination and information asymmetry challenges, and one that likely operates in conjunction with such dynamics to increase the probability and size of panics.[21]

Accentuating the systemic risk emanating from information gaps is the way those gaps impede the market and regulatory processes that can

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nonquantifiable) and 'risk' (where the likelihood is quantifiable)."); Eric L. Talley, On Uncertainty, Ambiguity, and Contractual Conditions, 34 Del. J. Corp. L. 755, 759 (2009) (explaining that "'[r]isk' refers to randomness whose probabilistic nature is extremely familiar and can be characterized with objective probabilities" whereas uncertainty "refers to randomness whose probabilistic behavior is extremely unfamiliar, unknown, or even unknowable"). This may elide aspects of Knight's original analysis.

[19] See infra Section III.B.

[20] See infra Subsection III.C.1.

[21] Id.

blunt the adverse effects of a run and help the market achieve a new equilibrium.[22] Ignorance on the part of market participants limits the entry of loss-bearing capital, which is often critical to deterring further runs. At the same time, the government cannot provide market participants the information they require, provide appropriately priced guarantees, or deploy the other stability-inducing devices because it too lacks high-quality information.[23]

Focusing on information gaps sheds new light on the systemic risk arising from shadow banking and the reforms required to address it. Most importantly, because complexity increases the pool of potentially pertinent information and the costs of acquiring that information, the analysis provides fresh support for structural reforms that seek to simplify financial instruments and institutions. Additionally, by revealing that information production will inevitably be, and ought to be, incomplete, this Article demonstrates the value of having mechanisms that can ramp up information production in response to early signals of systemic distress.

This Article proceeds in five parts. Part I addresses the differences between equity claims and money claims and the regulatory architecture that traditionally supported the capital markets and banks. Part II introduces the shadow banking system—what it is and why the current regulatory regime is ill suited to support it. Part III explores current understandings of the ways that the distribution of information affects market functioning and the importance of delineating information gaps. Part III also provides a conceptual account of how information gaps contribute to systemic risk and adversely affect the processes required to establish a new equilibrium once panic sets in—the Article's main theoretical contribution. Part IV shows that evidence from the Crisis is consistent with this Article's claims regarding the presence of information gaps in the shadow banking system and the tendency of such gaps to increase fragility. Part V addresses implications.

I. FOUNDATION

This Part lays out, in simplified terms, the differences between money and equity claims and the regulatory regimes that arose to support the issuance and trading of each. In so doing, it synthesizes insights from

[22] Id.
[23] Id.

disparate bodies of scholarship. One byproduct of the historical separation of banking and capital markets is that policymakers, academics, and other experts tend to specialize in just one of these two domains. An additional challenge is that in contrast to the relatively robust dialogue between legal academics and financial economists on matters of corporate governance and securities regulation, a similar exchange is only in its infancy in discussions of banking and shadow banking. In distilling key insights from experts in various fields and showing how those insights help to explain the current regulatory architecture, this Part provides the first comprehensive account of how the information-related incentives of money and equity claimants explain key differences in banking and securities regulation.

A. Equity v. Money

A wide variety of financial instruments can be issued to raise capital, and money claims and equity claims, in some regards, are merely two ends of a long spectrum. In focusing just on these two types of claims, this Article largely ignores longer-term debt and the wide range of other financial instruments that lie between these two extremes, resulting in a stylized account of the markets and regulatory regimes it describes. The nuance lost in this approach is important and additional examination of the markets that lie between these extremes could further illuminate the issues here raised. Nonetheless, even this coarse analysis suffices to establish the core challenges here at issue.

1. Equity Claims

Equity claims are investments. Persons acquire equity in hopes that the value of the claim they hold will go up and are quite aware of its potential to go down. The expected return on the investment is the reason animating the deployment of capital. Contributing to the information sensitivity of equity claims is that they are perpetual, meaning that the holder can receive cash in exchange for a claim only by finding a third party willing to acquire the claim. These characteristics, and holders' desire for liquidity, have prompted the creation of secondary markets, many of which are robust and public.

These characteristics contribute to equity markets being information-rich environments. A primary way that investors seek to maximize the probability that their investments will be profitable, and ideally more

profitable than other similarly risky investments, is by gathering and analyzing information relevant to the value of claims they might acquire. This does not mean that all investors have or believe they have superior information about the value of claims being traded; there are many noise investors who do not, and the presence of such investors is actually critical for enabling more sophisticated investors to profit despite the resources they expend gathering and analyzing information.[24] Nonetheless, informed trading drives equity prices most of the time.

As Professors Ronald Gilson and Reinier Kraakman explain in their work on the mechanisms of market efficiency, in public equity markets, the degree of informational efficiency "depend[s] on the costs of information and the costs of arbitrage—that is, the costs of trading on information."[25] In a later work, they explained that "[t]he lower the cost of information, the wider its distribution, the more effective the operative efficiency mechanism and, finally, the more efficient the market."[26] And, because the defining feature of an informationally efficient market is that the price at which a claim is trading conveys meaningful information about its relative worth, even a trader that has undertaken no due diligence has high-quality information about the value of claims he is buying or selling.[27]

Critical to the analysis here is that Gilson and Kraakman presume numerous, dispersed traders, often with the aid of reputational and other intermediaries, engaging in ongoing "efforts to acquire additional infor-

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[24] Ronald J. Gilson & Reinier H. Kraakman, The Mechanisms of Market Efficiency, 70 Va. L. Rev. 549, 578 (1984) [hereinafter Gilson & Kraakman, MOME] ("It is only because uninformed traders cannot infer all information from price—i.e., because prices are "noisy"—that informed traders enjoy a return on their information up to the point at which further trading moves prices beyond the noise threshold." (emphasis omitted)). See also Sanford J. Grossman & Joseph E. Stiglitz, Information and Competitive Price Systems, 66 Am. Econ. Rev. 246, 248 (1976) ("[I]t is only because prices do not accurately represent the true worth of the securities (i.e., the information of the informed is not fully conveyed through the price system, to the uninformed) that the informed are able to earn a return to compensate them for the costs associated with the acquisition of the information.").

[25] Ronald J. Gilson & Reinier Kraakman, Market Efficiency After the Financial Crisis: It's Still a Matter of Information Costs, 100 Va. L. Rev. 313, 330 (2014) [hereinafter Gilson & Kraakman, Information Costs]. Their work has significant explanatory power across all markets, and actually can help explain many of the features seen in money markets, as well. Nonetheless, their framework initially focused on "the relatively well-functioning and continuous markets for public equities." Id. at 330.

[26] Ronald J. Gilson & Reinier Kraakman, The Mechanisms of Market Efficiency Twenty Years Later: The Hindsight Bias, 28 J. Corp. L. 715, 717 (2003).

[27] See infra Section III.A (examining these dynamics).

mation, efforts to refine forecasts and deepen the predictive value of information already in hand, and efforts to determine the accuracy of information already in hand."[28] Traders undertake these costly efforts because they are rewarded for doing so. Critically, the processes through which they are rewarded include the same mechanisms that enhance price accuracy. These processes are continuous and iterative. Market prices are constantly—and continuously—moving up and down as traders obtain new information, revise their analyses, and buy or sell in light of that information. As described by Professor Bengt Holmstrom: "Every piece of information about the value of a firm is relevant for pricing its shares. This is reflected in the billions of dollars that investment banks and other[s] . . . spend on learning about firms," and results in "[a] continuous flow of information . . . into the stock market."[29]

These characteristics of equity claims also underlie the social functions played by equity markets—facilitating the efficient allocation of capital among competing projects and promoting firm governance.[30] The capacity to produce price signals that compound heterogeneous views on a firm's prospects is core to the utility of equity markets.

2. Money Claims

As banking experts have long known and some influential financial economists are starting to highlight, the economics and function of money claims are dramatically different than equity claims. Investors acquire money claims when they place a premium on being able to convert that claim into cash quickly and at par. They deploy their capital because they prioritize liquidity and safety over the expected rate of return on that capital.[31]

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[28] Gilson & Kraakman, MOME, supra note 24, at 565.

[29] Holmstrom, supra note 9, at 7.

[30] See, e.g., Jeffrey N. Gordon, The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices, 59 Stan. L. Rev. 1465, 1469 (2007) (arguing that independent boards of directors maximize shareholder value); Paul G. Mahoney, Mandatory Disclosure as a Solution to Agency Problems, 62 U. Chi. L. Rev. 1047, 1048 (1995) (arguing that mandatory disclosure of information related to securities leads to efficient allocation of capital).

[31] See, e.g., Gary B. Gorton et al., The Flight from Maturity 10 (Nat'l Bureau of Econ. Research, Working Paper No. 20027, 2014) (explaining that "[m]oney market instruments [that] are not insured . . . resemble demand deposits" in that they function as a "fairly safe store of value and easy access to the cash because of their short maturities"); Macey, Reducing Systemic Risk, supra note 9, at 135 ("People who keep their money in MMFs, like those who keep their money in federally insured depository institutions such as commercial banks

Money-like claims have two related characteristics that enable them to serve this function—they are very low-risk and very short-term. Low risk does not mean no risk,[32] but a person will only treat a claim like money, rather than an investment, when he expects to be able to exit at par.[33] This is related to the short-term nature of the claims, as the ability to exit at par at any sign of trouble—or even an increase in uncertainty—helps to explain why holders treat money claims as virtually risk-free when markets are functioning well.[34] It also means that if a money claimant chooses to exit, it is the issuer rather than the claimant that bears the burden of finding a third party willing to acquire a comparable claim.

Like equity claims, money claims serve a number of socially useful functions, including facilitating transactions and serving as a reliable store of value over time.[35] The important role of such claims is reflected in new evidence suggesting that money claims and other exceptionally low-variance—"safe"—assets have consistently constituted at least one-third of all financial assets in the U.S. financial system since 1952, despite dramatic changes in the size and composition of the financial system over the same period.[36]

One of the greatest differences between money and equity markets relates to the depth and distribution of information among market participants. In particular, while equity markets tend to be information rich,

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and credit unions, can expect to obtain cash from their funds virtually on demand, and can expect that the value of their investments will not decline in nominal terms.").

[32] See, e.g., Gary B. Gorton, Misunderstanding Financial Crises: Why We Don't See Them Coming 19 (2012) [hereinafter Gorton, Misunderstanding Financial Crises] (noting that "only the government is able to provide completely riskless collateral").

[33] Id. at 28 (explaining that "in order for [a financial claim] to be used as money . . . it must not trade at a fluctuating discount and it must not be vulnerable to the fear of a sudden discount from par").

[34] The omnipresent exit right can also play an important role disciplining issuers of money claims. See, e.g., Charles W. Calomiris & Charles M. Kahn, The Role of Demandable Debt in Structuring Optimal Banking Arrangements, 81 Am. Econ. Rev. 497, 497 (1991) (showing how the distinct discipline imposed by short-term debt can help deter malfeasance by bank managers).

[35] See, e.g, Douglas W. Diamond & Raghuram G. Rajan, Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking, 109 J. Pol. Econ. 287, 289 (2001) (recognizing that both borrowers and lenders want liquidity, albeit for different reasons, and showing how banks can satisfy the demand on both sides in ways that direct lending cannot); Bengt Holmström & Jean Tirole, Inside and Outside Liquidity 27 (2011) (providing a unified theory of the demand for liquidity based on the assumption that firms are unable to pledge all of their returns to investors).

[36] Gary Gorton et al., The Safe-Asset Share, 102 Am. Econ. Rev. 101, 104–05 (2012).

money markets tend to be information sparse. This is in part a byproduct of the structure of money claims. Because money claims are exceptionally short-term, low-variance instruments designed to be redeemable at par, holders have little incentive to generate private information and any effort to do so is quickly cost prohibitive.

The different information dynamics that underlie money and equity markets reflect the fact that these markets often overcome the classic challenge that information asymmetries can inhibit market functioning in quite different ways.[37] Equity markets primarily rely on mechanisms that reduce asymmetries by ensuring all market participants are relatively well informed. Money markets, by contrast, often overcome the challenge of adverse selection through structures predicated on mutual ignorance or by obviating the relevance of private information.[38] Liquidity in both markets thus depends on relative symmetry in the information possessed by both parties, but the information-gathering behavior that is required to support the functioning of equity markets can actually inhibit the functioning of money markets.[39]

As Holmstrom explains, "[A] state of 'no questions asked' is the hallmark of money market liquidity; this is the way money markets are supposed to look when they are functioning well."[40] Professor Gary Gorton and others similarly suggest that the defining characteristic enabling a claim to function as money is that it is effectively "information insensitive." According to Gorton and Professor George Pennacchi, one can define a "liquid security," the critical feature of a money claim, as one that "can be traded by uninformed agents, without loss to insiders."[41]

The information-thin nature of money markets is supported and accentuated by the institutions that underlie the production of money claims, just as the institutions that support equity markets promote dissemination and analysis of information. While institutional procedures

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[37] For further discussion of this challenge, see infra Section III.A.

[38] See, e.g., Holmstrom, supra note 9, at 6 (explaining how a "blissful state of 'symmetric ignorance'" can create a "market . . . free of fears of adverse selection and therefore very liquid").

[39] Id.

[40] Id. at 2.

[41] Gary Gorton & George Pennacchi, Financial Intermediaries and Liquidity Creation, 45 J. Fin. 49, 50 (1990). This work builds on insights from an earlier work by Douglas Gale and Martin Hellwig. See generally Douglas Gale & Martin Hellwig, Incentive-Compatible Debt Contracts: The One-Period Problem, 52 Rev. Econ. Studies 647, 648 (1985).

vary,[42] these institutions typically incorporate common design features that make it unrewarding or costly for market participants to gather the information about the actual value of the assets underlying a money claim. As Holmstrom explains, "Opacity is a natural feature of money markets."[43] Focusing on banks, Gorton similarly argues that "[t]he efficient use of these liabilities as money necessarily entails *eliminating* informative financial markets," and this is what enables the money claims banks issue to be "accepted at par."[44] In another work, Professors Dang Holmstrom, and Gorton show that debt is the optimal instrument to underlie money claims because it is less sensitive to public or private information than equity.[45] As they point out, investors need not accept the strongest claims regarding the benefits of ignorance to recognize the advantages of structuring money claims to obviate the need for parties to ever agree on the value of the underlying instruments, so long as everything goes well.[46]

It is also important to recognize that short term refers to the nature of the commitment that a money claimant makes, not the nature of the relationship. Capital often sits in money claims for extended periods. Individuals who place capital into a checking account, for example, may make regular withdrawals, but they often also make countervailing deposits. Similarly, institutional investors who acquire asset-backed commercial paper or provide capital through a sale and repurchase agreement ("repo") often roll over those commitments when they nominally mature.

The modest stickiness of money claims during normal times is important to parties on both sides of these relationships. For money claimants, this reduces the need to evaluate options and regularly make new decisions about which money claim to acquire. For the institutions that

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[42] Compare Subsection I.B.2 (describing how banks produce money claims) with Section II.A. (describing how shadow banks produce money claims).

[43] Holmstrom, supra note 9, at 3.

[44] Gary Gorton, The Development of Opacity in U.S. Banking, 31 Yale J. on Reg. 825, 827 (2014) (emphasis added). See also Tri Vi Dang et al., Banks as Secret Keepers 1 (Nat'l Bureau of Econ. Research, Working Paper No. 20255, 2014) (arguing that banks are, and should be, opaque institutions).

[45] Tri Vi Dang et al., Ignorance, Debt and Financial Crises 3 (April 2015) (unpublished manuscript) (on file with Columbia University).

[46] Id. at 4. It has long been recognized that one advantage of debt is that claims can be satisfied without having to precisely assess the value of the firm or underlying assets. See Gale & Hellwig, supra note 41; Robert M. Townsend, Optimal Contracts and Competitive Markets with Costly State Verification, 21 J. Econ. Theory 265, 271 (1979).

issue money claims, this allows them to use capital from money claims to fund longer-term and less-liquid assets. The net effect is that money claims can provide a seemingly stable source of financing most of the time. But at no point, even in a long-term relationship, must the holder of the money claim obtain accurate information about the value of the assets underlying that claim.

That money claims can exit quickly and at par underlies the other distinctive features of money markets—the inherent fragility of any regime that relies on money claims and the potential for widespread withdrawals to lead to value-destroying fire sales and other systemic disruptions.[47] As Professors Douglas Diamond and Philip Dybvig showed in the context of banks, coordination problems alone can explain bank runs.[48] Because money claims are usually backed by less-liquid assets, if a large number of money claimants exercise their right to exit simultaneously—a run—the entity issuing the claims will have to sell assets at distressed fire-sale prices, reducing the value of claims not redeemed and giving all claimants an incentive to be first in line if they expect widespread withdrawals.[49] Although there is good evidence that panics are not random and there are competing accounts of the reasons for runs—a literature to which this article contributes[50]—the inherent fragility of institutions that rely on money claims is uncontested.[51]

This inherent fragility of money markets and the externalities that arise when money claimants run help explain why most banking systems are heavily regulated, as governments often feel compelled to provide support during crisis periods regardless of whether they have limited risk taking or imposed other regulations ex ante. At the same time, runs are the aberration, not the norm. The informational dynamics highlighted here shed light on the when and why of runs and can provide an information-based explanation for specific runs that have, perhaps incorrect-

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[47] Ricks, The Money Problem, supra note 3, at 110.

[48] Douglas W. Diamond & Philip H. Dybvig, Bank Runs, Deposit Insurance, and Liquidity, 91 J. Pol. Econ. 401, 402 (1983).

[49] See id.

[50] See infra Section III.C.

[51] See generally Kathryn Judge, The Importance of "Money," 130 Harv. L. Rev. 1148, 1150 (2017) (book review) (noting that a defining characteristic of banks and many shadow banks is reliance on short-term debt to fund longer-term liabilities, and this system is inherently fragile).

ly, been characterized as "sunspots" brought about by coordination problems.[52]

That money claimants prioritize certainty while equity holders seek to maximize their risk-adjusted returns does not mean that either group is indifferent to other attributes of the claims that they hold. Equity holders also value liquidity and, holding all else equal, money claimants prefer a slightly higher rate of return.[53] Nonetheless, as reflected in the growth of funds that limit exit rights, equity claimants are often willing to forego liquidity in exchange for a higher expected rate of return. Similarly, any variation in other terms of money claims are always constrained by the overarching requirement that the claims be so low-risk and short-term that most information would not affect the value of the claim.

This brief summary of the differences between equity and money markets is descriptive, not normative. Just because adverse selection can be overcome either through mechanisms that level up or level down the informational playing field does not imply equivalence between the two approaches. Each has distinct advantages and drawbacks.[54] The aim here is merely to highlight the very different conditions required to support the production and trading of money and equity claims.

B. Two Sustainable Systems: Securities v. Banking Regulation

Between the Depression and the Crisis, financial markets in the United States were remarkably stable and well-functioning.[55] The banking system and the capital markets each suffered some setbacks, and banking and securities laws were revised accordingly, but there were no major crises. As this Section shows, one reason for this stability is that the regulatory regime governing each domain was well-suited to support the distinct informational needs and incentives of the persons providing the capital that supported the regime: Securities laws were suited to support equity markets, as equity was the paradigmatic claim traded in the capi-

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[52] See infra Sections III.C and IV.A.

[53] See, e.g., Viral V. Acharya et al., Liquidity Risk of Corporate Bond Returns: Conditional Approach, 110 J. Fin. Econ. 358, 358 (2013); Yakov Amihud & Haim Mendelson, Asset Pricing and the Bid-Ask Spread, 17 J. Fin. Econ. 223, 224 (1986).

[54] For a further discussion of both, see infra Part III.

[55] See Ben S. Bernanke, Governor, Fed. Reserve Sys., Address at the Meetings of the Eastern Economic Association: The Great Moderation (Feb. 20, 2004) (describing how output volatility "declined significantly between 1955 and 1970"); Gorton, Misunderstanding Financial Crises, supra note 32, at 4 (noting that during "the 'Quiet Period' in U.S. history[,] the years 1934–2007 saw no systemic financial crises").

tal markets, and banking law addressed the distinct needs of money claimants who provide the bulk of capital on which banks rely.[56]

1. Securities Regulation

At the heart of U.S. securities regulation is a set of mandatory disclosure obligations. Any firm that raises capital from the public must commit to provide, on an ongoing basis, detailed information about the firm's operations and financial health.[57] By making it easier for investors to obtain timely information about a firm's performance and prospects, and by requiring that such information be provided in a standardized form, these requirements promote informational efficiency by reducing the costs that investors incur to obtain and analyze pertinent information.[58]

These mandatory disclosure obligations are buttressed by rules that impose liability for noncompliance and prohibit fraud and manipulation.[59] By reducing the costs investors would otherwise incur verifying the accuracy and completeness of the information so disclosed, these regulations further facilitate the dissemination of information and promote informed trading.[60] A third component of U.S. securities regulation prohibits insider trading, limiting the ability of management to profit

[56] The focus here is on how securities and bank regulation functioned prior to the rise of the shadow banking system. For a discussion of how the rise of shadow banking has changed these paradigms, see infra Section V.C.

[57] See John C. Coffee, Jr. et al., Securities Regulation: Cases and Materials 156–57 (13th ed. 2015) (listing the information that a bank must regularly report).

[58] E.g., John C. Coffee, Jr., Market Failure and the Economic Case for a Mandatory Disclosure System, 70 Va. L. Rev. 717, 747 (1984) (explaining why even in an efficient market "a case can still be made for a mandatory disclosure system"); Merritt B. Fox et al., Law, Share Price Accuracy, and Economic Performance: The New Evidence, 102 Mich. L. Rev. 331, 381 (2003) (providing empirical support for the notion "that the enhanced disclosure requirements under the recently adopted Sarbanes-Oxley Act may bear real fruit in terms of the better functioning of the underlying economy" and "that proposals to eliminate mandatory disclosure with reforms such as issuer choice of regulatory regime should be approached with caution").

[59] Coffee et al., supra note 57, at 921.

[60] E.g., Zohar Goshen & Gideon Parchomovsky, The Essential Role of Securities Regulation, 55 Duke L.J. 711, 714–15 (2006) [hereinafter Goshen & Parchomovsky, Securities Regulation] (arguing that securities regulation does and should benefit "information traders, who specialize in gathering and analyzing general market and firm-specific information . . . . [and who] can best underwrite efficient and liquid capital markets" (emphasis omitted)).

from their superior access to information.[61] Even these rules may support the processes through which share prices come to contain information about a firm's relative value.[62]

In contrast to many of the state securities law regimes in place prior to the federalization of the securities laws in the early 1930s, the federal regime does not ask, or even allow, regulators to make any substantive judgments about the value of claims issued.[63] Instead, the role of securities regulators is to promulgate and enforce rules that ensure investors have access to timely and accurate information.[64] As Professors John Coffee and Hillary Sale have explained, "By culture and philosophy, the SEC is a disclosure regulator, whose concerns with risk and leverage are normally satisfied once full disclosure is made."[65]

There has been debate about the need for law to play the roles it currently does in facilitating information dissemination, but even those who question mandatory disclosure typically do so on the basis that private institutions would suffice to ensure that information is disclosed and compounded into share price.[66] That share prices contain information about the value of the claims traded and that it is market participants, not

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[61] Donald C. Langevoort, 18 Insider Trading: Regulation, Enforcement and Prevention §§ 1:4, 1:6 (2014, rev. 2016).

[62] E.g., Henry G. Manne, Insider Trading and the Stock Market 148 (1966); Zohar Goshen & Gideon Parchomovsky, On Insider Trading, Markets, and "Negative" Property Rights in Information, 87 Va. L. Rev. 1229, 1234 (2001) (arguing that "analysts outperform insiders in providing efficiency to both [information and capital] markets"); Goshen & Parchomovsky, Securities Regulation, supra note 60, at 715 (arguing that securities do and should favor information traders over insiders for a number of policy reasons, including the more competitive environment in which they operate relative to insiders, the "economies of scale and scope in gathering and analyzing general market and firm-specific information" enjoyed by information traders, and the "positive externalities for the information market" and "reduc[tion in] corporate governance agency costs" their efforts generate). Other scholars have argued that prohibiting insider trading reduces share price accuracy. See, e.g., Dennis W. Carlton & Daniel R. Fischel, The Regulation of Insider Trading, 35 Stan. L. Rev. 857, 861 (1983) (arguing that insider trading "may be an efficient way to compensate corporate managers").

[63] Joel Seligman, The Transformation of Wall Street: A History of the Securities and Exchange Commission and Modern Corporate Finance 70 (3d ed. 2003).

[64] E.g., John C. Coffee, Jr. & Hillary A. Sale, Redesigning the SEC: Does the Treasury Have a Better Idea?, 95 Va. L. Rev. 707, 778 (2009).

[65] Id. at 777–78.

[66] E.g., George J. Benston, Required Disclosure and the Stock Market: An Evaluation of the Securities Exchange Act of 1934, 63 Am. Econ. Rev. 132, 153 (1973); Edmund W. Kitch, The Theory and Practice of Securities Disclosure, 61 Brook. L. Rev. 763, 856–57 (1995); Roberta Romano, Empowering Investors: A Market Approach to Securities Regulation, 107 Yale L.J. 2359, 2373 (1998).

regulators, who make the substantive assessments about the value of those claims is widely assumed and expected.[67] This assumption marries well with the nature of equity claims: By giving holders significant downside and unlimited upside, holders of equity claims can enhance their expected returns by generating superior information about the value of those claims. Equity claimants are thus strongly incentivized to engage in information gathering and analysis, and they would be irrespective of the regulatory regime. The regulatory regime works because it harnesses and facilitates the preexisting incentives of equity claimants.

The net effect of the private and public forces at work in equity markets is that, at any point in time, the price at which an equity claim is trading contains significant information about its value relative to other claims. This is why equity markets are often characterized as being informationally efficient, at least on a relative basis, most of the time.[68] One ramification of this combination of complementary institutions is that even an investor who does not undertake any due diligence can rely on the price to aggregate the different views of disparate, sophisticated traders about a firm's expected performance and other factors that could affect share value. Collectively, market structure and regulation thus work together to facilitate a range of processes that encourage sophisticated investors to gather and analyze information and enable other investors to piggyback on the hard work of the sophisticates.

2. Bank Regulation

Bank regulation rests on an entirely different set of premises than securities regulation and is undertaken by an entirely distinct group of regulators. Whereas the Securities and Exchange Commission ("SEC") and the Commodities Futures Trading Commission have primary responsibility for ensuring the integrity and functioning of the capital markets, the Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation ("FDIC") are the bank regulators in the United States. While securities regulators are stereotyped as always favoring more disclosure and strong enforcement, bank regulators are stereotyped as always leaning toward confidentiality and un-

[67] E.g., Gilson & Kraakman, MOME, supra note 24.
[68] E.g., Gilson & Kraakman, Information Costs, supra note 25, at 318.

derenforcement.[69] Bank regulators are also regularly required to make the type of substantive, judgment-laden decisions that the securities regulatory regime allocates exclusively to market participants.

Banking is among the most heavily regulated activities in which a firm can engage.[70] To become a bank, a firm must undergo an intensive chartering process.[71] Thereafter, banks are subject to significant limitations on the types of activities in which they can engage and the types of assets they can hold. Traditionally, these restrictions both limited the risks that banks could assume and facilitated the ability of bank supervisors to understand those risks.[72] All banks and bank holding companies are also subject to an extensive oversight regime. As reflected in the lengthy supervisory manuals issued by each of the bank regulators, bank examiners regularly undertake a close examination of virtually every aspect of a bank's operations.[73] These processes provide bank regulators with a comprehensive picture of a bank's operations and risk exposures.[74] Bank regulators also have authority to address any deficiencies they detect during the examination process. If a bank violates a statute or regulation or is engaged in other activities that threaten the bank's safety and soundness, bank regulators can obtain a cease and desist order, impose civil monetary penalties, have employees and other affiliates removed, and take other enforcement actions to address the issue.[75]

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[69] See, e.g., Coffee & Sale, supra note 64, at 778 ("Instinctively, securities regulators favor full disclosure and transparency, while banking regulators fear that adverse information may alarm or panic investors and depositors, thereby causing a 'run on the bank.'").

[70] Richard Scott Carnell et al., The Law of Financial Institutions 57 (5th ed. 2013) ("Banking is among the world's most heavily regulated industries.").

[71] Id. at 71–73 (describing the chartering process).

[72] See, e.g., Helen A. Garten, Regulatory Growing Pains: A Perspective on Bank Regulation in a Deregulatory Age, 57 Fordham L. Rev. 501, 520 (1989) (discussing the ability of bank supervisors to develop expertise in one area as a result of confining banks to particular activities); Kathryn Judge, Interbank Discipline, 60 UCLA L. Rev. 1262, 1264 (2013).

[73] Bd. of Governors of the Fed. Reserve Sys., Div. of Banking Supervision and Regulation, Commercial Bank Examination Manual (2016) (1881 pages); Fed. Deposit Ins. Corp., Compliance Examination Manual (2016) (1261 pages).

[74] Empirical evidence suggests that, at least temporarily, this process provides bank regulators superior information about a bank's financial health. See Judge, supra note 72, at 1270 and sources cited therein (discussing the unique resources afforded to bank examiners and the advantages these resources provide).

[75] Carnell et al., supra note 70, at 444–45 (examining the enforcement actions regulators can take against banks and their employees).

Also critical to this regime is the ability of bank regulators to close a financially distressed bank.[76] Bank regulators need not wait for a bank to be insolvent or unable to pay its debts to force a bank into receivership. Rather, they can close a bank on a range of bases that suggest a bank is unlikely to regain its health.[77] This regime gives bank regulators significant authority to intervene if a bank does get into trouble and further buttresses their authority to extract useful information in connection with their examinations. Moreover, if a bank's primary regulator determines the bank should be closed, a bank regulator—the FDIC—controls the receivership process.[78] Overall, "[t]he FDIC enjoys a level of control that a dominant creditor could only dream of obtaining in bankruptcy."[79]

The scope of this regime can largely be explained by the incentives of money claimants and the systemic ramifications of banking panics. The massive regulatory regime governing banks makes it easier for the money claimants who provide the great bulk of a bank's capital to remain only minimally informed. This is in part because the government's ongoing oversight reduces the need for depositors to engage in comparable monitoring. Just as importantly, oversight enables widespread deposit insurance, which significantly curtails the downside risks to which most money claimants are exposed and makes them less likely to run.[80] These programs benefit depositors, who are now freed from having to engage in costly diligence, but they also benefit society more generally by reducing depositors' incentive to run, thus making a banking crisis less likely.

The extensive regulatory regime governing banks also facilitates the government's ability to respond appropriately during periods of systemic distress. For example, to further discourage depositors from panicking and to reduce the adverse consequences if they do, qualified banks can readily access fresh liquidity from the Federal Reserve's discount win-

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[76] Id. at 244–45 (explaining that under 12 U.S.C. § 1831o, a bank faces increasingly stringent treatment from regulators as its capitalization decreases, and under this statute, regulators may place critically undercapitalized banks in receivership).

[77] Id. at 249 (discussing the example in which regulators may appoint a conservator or receiver for an undercapitalized institution that fails to submit a timely and acceptable capital restoration plan).

[78] E.g., Richard M. Hynes & Steven D. Walt, Why Banks Are Not Allowed in Bankruptcy, 67 Wash. & Lee L. Rev. 985, 988–89 (2010) (describing the receivership process that the FDIC controls).

[79] Id. at 989.

[80] Diamond & Dybvig, supra note 48, at 413, 416.

dow.[81] By conditioning access to its primary discount window on a bank's confidential supervisory rating, the Federal Reserve reduces the moral hazard that arises from such access and the credit risk to which it is exposed.[82] Similarly, if bank assets prove insufficient to justify the amount of information-insensitive capital on which they had come to rely—that is, if the banking system is inadequately capitalized—the information produced by the oversight regime can provide policymakers with information about the costs and risks of closing or recapitalizing troubled institutions.

To be sure, banks also rely on nonmoney claims to fund their operations. Holders of equity and subordinated debt issued by a bank, as well as a bank's other creditors, impose important market discipline, and there are informational benefits to regulatory strategies that require a bank to increase such capital cushions.[83] Banks are also subject to numerous disclosure requirements.[84] Nonetheless, banks are more opaque than other firms, and disclosure requirements have lagged far behind the changing nature of banking.[85] The banking system historically may thus be understood as a regime that limits the degree of information production that the providers of capital need to undertake, and limited private information production counterbalances a supervisory regime that provides bank regulators detailed information about, and control over, bank activities.

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[81] 12 C.F.R. § 201.3 (2016).

[82] Id. §§ 201.2–3. See infra note 86 and accompanying text (discussing the opacity of banks).

[83] Bank for Int'l Settlements, Standards: Revised Pillar 3 Disclosure Requirements, 1 (Basel Comm. on Banking Supervision 2015) available at http://www.bis.org/bcbs/publ/d309.pdf [https://perma.cc/KF5A-PUZW] ("Market discipline has long been recognized as a key objective of the Basel Committee on Banking Supervision . . . . Pillar 3 of the Basel framework aims to promote market discipline through regulatory disclosure requirements.").

[84] E.g., 17 C.F.R. 229 (2017) (describing reporting and disclosure requirements under Regulation S-K); Fed. Financial Institutions Examination Council, Frequently Asked Questions, https://cdr.ffiec.gov/Public/HelpFileContainers/FAQ.aspx [https://perma.cc/D4DB-B7EC] (describing Uniform Bank Performance Reports, or Call Reports).

[85] E.g., Anne Beatty & Scott Liao, Financial Accounting in the Banking Industry: A Review of the Empirical Literature, 58 J. Acct. & Econ. 339, 342 (2014) (explaining that the "asymmetric information paradigm has provided an explanation for both the usefulness of accounting and the role of banks in the economy" and reviewing the relevant literature); Mark J. Flannery et al., The 2007–2009 Financial Crisis and Opaqueness, 22 J. Fin. Intermediation 55, 67 (2013) (finding that during times of crisis, but not normal times, large banks are more opaque than otherwise similar firms).

The assurances that the government provides to persons holding money claims issued by banks are not costless. Deposit insurance and implicit guarantees give rise to moral hazard, reduce market-based discipline, and can result in significant government liabilities.[86] There are also fewer mechanisms for checking errors and protecting against biases and capture than in a market-based regime.[87]

At the same time, the inherent fragility of any intermediation regime that issues money claims and the externalities that arise when those fragilities become manifest are important considerations when assessing the moral hazard and other drawbacks of regulating banks so extensively. That runs by money claimants can have significant adverse effects on the real economy curtails the capacity of the government to credibly commit that they will not intervene to help stop runs even without ex ante regulation. As reflected in the debates over "too big to fail," failing to regulate does not eliminate moral hazard and can create other challenges.[88] The aforedescribed banking regulatory regime that limited the creation of banks, imposed significant restrictions on them, and created a large body of regulators charged with monitoring bank activity was quite stable for a remarkable length of time.[89]

The aim here is not to provide an exhaustive account of bank regulation or securities regulation, but rather to highlight how key differences in the two regimes can be explained by the different information-related incentives of the critical providers of capital. In the capital markets, regulators' primary role is to promote relative efficiency and facilitate effective governance by reducing the costs that market participants incur gathering pertinent information. At no time are regulators making any

[86] Jonathan R. Macey & Maureen O'Hara, The Corporate Governance of Banks, 9 FRBNY Econ. Pol'y Rev. 91, 97 (2003) (describing how FDIC insurance "gives the shareholders and managers of insured banks incentives to engage in excessive risk-taking").

[87] E.g., Carnell et al., supra note 70, at 243 (examining the problem of regulatory forbearance, which occurs when regulators "fail[] to take timely and appropriate action to reduce the risk an unhealthy institution poses to the deposit insurance fund"); Rachel E. Barkow, Insulating Agencies: Avoiding Capture Through Institutional Design, 89 Tex. L. Rev. 15, 21–22 (2010) (describing how industry groups are better able to influence regulators than their public counterparts because of the resources they can devote to monitoring agencies and contributing to political campaigns).

[88] Gorton, Misunderstanding Financial Crises, supra note 32, at 169–74 (discussing costs of financial crises).

[89] Id. at 4 (noting that no panics took place during the 1934–2007 "Quiet Period" and arguing that the "Quiet Period shows that properly designed bank regulations can prevent financial crises for a significant period of time").

substantive assessments regarding the business models of the firms raising capital or the value of the equity claims they issue. By contrast, it is the role of bank regulators to gather significant information about banks' assets and activities and exercise judgment with respect to the riskiness of the activities and value of those assets. Historically, bank regulators were aided in these undertakings by rules that limited bank activities and investments to ones regulators could readily understand.[90]

Juxtaposing these regimes also brings to the fore differences in the relationship between when information is produced in each regime and when, if ever, that information becomes public. In both domains, information about the value of firm assets and expected future performance is constantly produced by persons who can discipline firms in light of what they learn. In public equity markets, this is an entirely public process, as the purchases and sales that discipline a firm simultaneously move its share price. By contrast, bank regulation occurs largely behind a shroud of confidentiality. Bank regulators regularly assess multiple dimensions of each bank's operations and issue supervisory letters identifying areas for improvement, but all of this information remains confidential, typically indefinitely.[91] This, again, is consistent with the notion that prudential regulation seeks to obviate the need for smaller money claimants to have any information about the actual value of the assets underlying their claims, while securities regulation encourages and facilitates the very due diligence and valuation efforts banking regulation discourages.

II. SHADOW BANKING

A. The Rise

The dramatic differences between the banking system and the capital markets mattered little historically because each regime operated largely independent of the other. This started to change in the 1970s with the rise of an array of market-based mechanisms that collectively fulfill many of the economic functions long performed by banks. Today, these mechanisms are known as the shadow banking system. In stark contrast to banks, which undertake the full amount of liquidity and maturity transformation within individual institutions, the shadow banking system accomplishes these undertakings through a series of interrelated

[90] Carnell et al., supra note 70, at 71–144.

[91] Id. at 442 (explaining that "examination reports and examiners' workpapers remain confidential").

market transactions and structures which are often consummated at different points in time, even though reliant on the others.[92] The institutions that issue money claims are just a subset of these arrangements.[93] Nonetheless, the money claims issued by the shadow banking system are critical, as the functioning of the overall system depends on capital that flows through money claims.[94] As the Crisis revealed all too vividly, when money claimants make large-scale withdrawals from shadow banks, the effects are felt throughout the shadow banking system, and widespread market dysfunction often follows.[95]

That the Crisis emanated from the shadow banking system and revealed that many of the money claims issued in that system were less safe than holders previously believed did cause the system to contract.[96] Yet this contraction proved short-lived. The shadow banking system has since reestablished its pre-Crisis size and is poised for further growth.[97] According to one measure, the size of the worldwide shadow banking system currently stands at $75 trillion.[98] The rapid growth of the shadow banking system has been particularly pronounced in the United States,

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[92] Francesca Carapella & David C. Mills, Information Insensitive Securities: The Benefits of Central Counterparties 23 (March 9, 2012) (unpublished manuscript) http://www.bankofcanada.ca/wp-content/uploads/2012/07/Carapella-Francesca-paper.pdf [https://perma.cc/XSX7-6ZRK] (describing multilateral netting, the "agreed offsetting of positions or obligations among three or more trading partners").

[93] While framed in slightly different terms, in other work, I show that the proliferation of other core components of the shadow banking system pre-Crisis—securitization structures that bundled mortgages with other mortgages and then bundled securitized assets with other securitized assets—also led to information gaps and thereby increased systemic risk. See Kathryn Judge, Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk, 64 Stan. L. Rev. 657, 690–97 (2012) [hereinafter Judge, Fragmentation Nodes].

[94] Pozsar et al., supra note 3, at "The Shadow Banking System" (figure after the Abstract visually illustrating the position of money claims within the broader shadow banking system).

[95] See infra Part IV.

[96] See, e.g., Schwarcz, supra note 3, at 629–30.

[97] See id. at 620 (noting "[s]hadow banking [sic] has also grown rapidly" between 2008 and 2011); Financial Stability Board, Global Shadow Banking Monitoring Report 2014, 8–9 (2014) (reporting shadow banking assets as a share of GDP rose by "6 percentage points to 120% of GDP in 2013, approaching the peak of 124% of GDP in 2007").

[98] E.g., Financial Stability Board, supra note 97, at 2; Sam Fleming, Shadow Banking Nears Pre-Crisis Peak as Regulation Hits Mainstream Lenders, Fin. Times (Oct. 31, 2014), http://www.ft.com/intl/cms/s/0/71f5fd1e-6045-11e4-98e6-00144feabdc0.html#axzz3cYaMzYmM.

the only country where the shadow banking system is larger than the regulated banking sector.[99]

The importance of the shadow banking system in the United States is reflected in the declining importance of regulated banks. In 1970, commercial banks, savings institutions, and credit unions collectively held 54.41% of the assets in the financial sector, roughly the same amount they had held a decade earlier.[100] That figure fell to just 24.22% by 2005.[101] Other metrics tell a similar story. For example, in 1980, banks provided the great bulk of the capital used to fund home loans; by 1990, market-based sources of capital (i.e., shadow banking) had roughly caught up with banks; and, by 2009, the value of home loans financed through the capital markets was more than twice the value of home loans financed by banks.[102] These figures may overstate the decline of banks, as implicit and explicit guarantees from banks played a critical role supporting the shadow banking system, but they accurately convey how shadow banks are overtaking banks as providers of money claims and providers of capital for productive undertakings.[103]

The reasons for this growth remain incompletely understood.[104] It is clear that this system could not exist but for an array of legal and financial innovations that enabled new methods of pooling and the issuance of new types of financial claims. Given the economic equivalence between much of what the shadow banking system accomplishes and the functions long served by the banking system, regulatory arbitrage is clearly among the driving forces. Yet, there are also indicia that the system has grown in part to satisfy demands that the banking system cannot address.[105] In particular, recent empirical work shows a strong demand for money claims in amounts that the banking system cannot readily produce.[106] Apple, Inc., for example, currently has over $237 billion in

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[99] Financial Stability Board, supra note 97, at 11, Exhibit 3.1.

[100] Korkut Ertürk & Gökçer Özgür, The Decline of Traditional Banking and Endogenous Money, *in* Banking, Monetary Policy and Political Economy of Financial Regulation: Essays in Honor of Jane D'Arista 275, 278, Table 14.1 (Gerald A. Epstein, Tom Schlesinger & Matias Vernengo eds., 2014).

[101] Id.

[102] Adrian & Shin, supra note 5, at 3, Figure 4.

[103] Pozsar et al., supra note 3, at 2.

[104] See infra Subsection V.B.1.

[105] See infra Section IV.B and sources cited therein.

[106] E.g., Gorton et al., supra note 36, at 103, 105, Figure 2 (showing "that the demand for safe or information-insensitive debt exceeds the supply of US Treasuries outstanding"); Zoltan Pozsar, Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System,

"cash equivalents" that it needs to park somewhere.[107] Particularly in an era in which policymakers are seeking to ensure that no bank is "too big to fail," banks are not suited to produce money claims in the amounts required to satisfy the needs of Apple, other large firms, and institutional investors. Recent work by Professor Zoltan Pozsar shows how the global savings glut, whereby U.S. Treasuries and similar assets are in short supply in the United States because of foreign demand for such assets, coupled with the increasingly sophisticated cash management systems used by firms and institutional investors, is contributing to the mismatch between the demand for safe assets like money claims and assets that are inherently safe without the credit enhancement devices used in shadow banking.[108] In short, while still incompletely understood, the shadow banking system appears to be playing important economic functions in today's financial system, including a number that could not readily be satisfied in other ways.

B. Information in the Shadow Banking System

1. Money Claims

One way the shadow banking system resembles the banking system is that much of the capital flowing into the regime—while subsequently channeled through layers of complex arrangements—enters via the issuance of money claims.[109] The money claims issued in the shadow banking system share the same general characteristics of all money claims described above—they are structured to be sufficiently low-risk and short-term that holders need not engage in meaningful due diligence. They are also akin to the money claims issued by banks in that the assets backing the claims are longer-term, less-liquid investments, and the

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22 Fin. Markets, Institutions, & Instruments 283, 284 (2013) (finding that "between 2003 and 2008, institutional cash pools' demand for insured deposit alternatives [i.e., money claims] exceeded the outstanding amount of short-term government guaranteed instruments *not* held by foreign official investors by . . . at least $1.5 trillion" and probably far more).

[107] Christine Wang, Apple's Cash Hoard Swells to $237.6 billion, a Record, CNBC.com (Oct. 25, 2016), http://www.cnbc.com/2016/10/25/apples-cash-hoard-now-nearly-238-billion.html [https://perma.cc/3H9E-DXE4] ("Apple's enormous cash hoard grew to $237.6 billion in the fiscal fourth quarter, up $6.1 billion from the previous quarter.").

[108] Pozsar, supra note 106, at 284.

[109] Pozsar et al., supra note 3, at "The Shadow Banking System" (figure after the Abstract visually illustrating the position of money claims within the broader shadow banking system).

claims are structured to obviate the need for the parties to agree on the value of the underlying assets at any stage in the relationship.

Often, but far from always, money market mutual funds intermediate the creation of money claims in the shadow banking system. Money market mutual funds, which first appeared in the United States in 1970, held total assets of approximately $3.8 trillion by 2008.[110] Unlike most mutual funds, money market mutual funds are subject to stringent regulatory restrictions on the types of assets they can hold, many of which are themselves money claims.[111] In exchange for abiding by these restrictions, money market mutual funds traditionally were allowed to report a share price of exactly one dollar under most circumstances.[112] This regime intentionally reduced price accuracy, yet it worked remarkably well for an extended period of time. Prior to the Crisis, only one money market mutual fund, and a small one at that, had ever redeemed shares at less than one dollar per share.[113]

Looking past and within money market mutual funds reveals other institutional arrangements that enable the creation of money claims outside of banks. Overcollateralization, the use of highly rated (and often securitized) assets as collateral, and backup commitments from issuers and sponsors are both devices deployed—often in conjunction with one another—to assure money claimants that the issuer would be able to redeem their claims at par. One reason that these devices are so useful is that they expand, significantly, the capacity of the nonbank financial system to issue claims that are insensitive to most information.

Asset-backed commercial paper ("ABCP"), a common type of money claim pre-Crisis, illustrates how this works. A common structure for creating ABCP started with a bank or other type of financial institution creating a bankruptcy-remote entity. That entity would hold relatively long-term and often securitized assets, like mortgage-backed securities and

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[110] Money Market Fund Reform, SEC Release No. IC-28807 5 (2009), http://www.sec.gov/rules/proposed/2009/ic-28807.pdf [https://perma.cc/Y6CJ-NLYA] (citing Investment Company Institute, Trends in the Fees and Expenses of Mutual Funds, 2008 (Apr. 2009), http://www.ici.org/highlights/trends_04_09 [https://perma.cc/N3RK-3TT2]) (proposed rule).

[111] Investment Company Act of 1940, Pub. L. No. 76–768, 54 § Stat. 789, 789 (codified as amended at 15 U.S.C. §§ 80a-1–80a-64 (2012)); SEC Money Market Funds, 17 C.F.R. § 270.2a-7 (2016).

[112] Money market mutual funds achieve this by using the amortized cost of the assets they hold, declaring daily dividends for interest earned and rounding to the closest penny. See 17 C.F.R. § 270.2a-7.

[113] Id.

collateralized loan obligations, which would be funded through the issuance of ABCP, which typically had very short maturities and some longer-term securities.[114] This arrangement was often supported by explicit or implicit commitments by the sponsoring bank to provide the entity liquidity support if needed, and sometimes there was also an expectation that the sponsor would provide credit support if required to protect the value of the ABCP issued.[115] The holders of the ABCP issued were not entirely ignorant; they were not willing to acquire the ABCP without meaningful assurances that it was exceptionally low risk. Yet the information they relied on to make that determination, such as the credit ratings of the securitized assets held by the issuing entity and the degree of over-collateralization, were proxies that are probative but imperfect indicators of credit risk. The costs of acquiring more accurate, first-hand information about the value of the assets underlying their claims were prohibitively expensive in light of the nature of the claims they were holding.[116] That holders were only minimally informed does not mean that they were naïve or dumb. They were willing to rely on probative but imperfect proxies of actual credit risk because they enjoy the other privilege that holders of money claims always enjoy—the ability to walk away at par.

Just as in the banking system, the capacity of the persons supplying capital to walk away, quickly, at any sign of trouble is a mixed blessing.

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[114] Tobias Adrian & Adam B. Ashcraft, Fed. Reserve Bank of N.Y., Staff Rep. No. 580, Shadow Banking: A Review of the Literature 6 (Oct. 2012) ("The maturity of ABCP is between one and 180 days . . . ."); Daniel Covitz et al., The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market, 68 J. Fin. 815, 824 (2013) (noting that in 2007, "average maturity of new-issue paper dropped to about 21 days on average in the last 5 months of 2007, from 33 days on average in the first 7 months of the year"). Just as in the banking system, the need for information-sensitive, loss-bearing capital to support the issuance of money claims creates a friction on the rate of money creation and results in some information production, but that alone does not suffice for stability.

[115] Adrian & Ashcroft, supra note 114, at 5–6. See also Viral V. Acharya et al., Securitization Without Risk Transfer, 107 J. Fin. Econ. 515, 516 (2013) (finding that "the crisis had a profoundly negative effect on commercial banks because banks had (in large part) insured outside investors in ABCP by providing explicit guarantees to conduits, which required banks to pay off maturing ABCP at par"); Bank for Int'l Settlements, Report on Special Purpose Entities 2–3 (2009), http://www.bis.org/publ/joint23.pdf [https://perma.cc/7AGD-8TSA] (explaining that "high risk retention (implying a need for potential credit support on the part of the sponsor or originator) is generally more likely with programs such as . . . certain ABCP conduits").

[116] Bank for Int'l Settlements, supra note 115, at 34 ("There was little independent due diligence undertaken by a large portion of the investor community into the SPEs in which they invested . . . .").

The short-term nature of the commitment enables a distinct form of discipline, one that is sometimes optimal.[117] And, like the free banking era, the vibrancy of the shadow banking system attests to the capacity of a wholly private regime to create viable money claims.[118] Yet, one reason that banks are now so heavily regulated is that the incentives of individual money claimants often deviate substantially from those that are socially optimal. The same walk-away rights that enable money claimants to rationally remain only minimally informed simultaneously render any system that relies heavily on money claims inherently fragile. And when money claimants exercise their exit rights en masse, value-destroying fire sales and other adverse systemic repercussions often follow.

2. Beyond Money Claims

A brief look at how the capital flowing through money claims funds longer-term projects brings into relief the distinct information dynamics at play in the shadow banking system. Recall that, in the banking system, liquidity transformation and maturity transformation occur entirely within a single firm. In contrast, shadow banking achieves that same degree of liquidity and maturity transformation through multiple layers of interconnected, market-based structures. Starting with the description just provided, money market mutual funds would obtain capital by issuing shares. The money market mutual fund would then acquire ABCP and other financial claims that are sufficiently short-term and sufficiently safe that they often are themselves money claims, and that capital, in turn, would enable the issuing entity to hold asset-backed securities ("ABS"). Those ABS are, in turn, the product of a securitization transaction that enabled the capital from various tranches of ABS issued to be used to acquire underlying credit instruments.

ABCP conduits and ABS structures are both examples of fragmentation nodes.[119] Fragmentation nodes are structures that bundle financial claims, such as home loans or securitized assets, together and then divvy out rights to the cash flows from those assets to various classes of claimholders.[120] Fragmentation nodes enable the inherently risky and longer-term loans that borrowers require to be repackaged into assets

[117] E.g., Calomiris & Kahn, supra note 34, at 497.
[118] Carnell et al., supra note 70, at 20–22.
[119] Judge, Fragmentation Nodes, supra note 93, at 659.
[120] Id.

that have less credit risk, are shorter in duration, or are otherwise more liquid than the underlying loans. In making it possible for these types of transformations to occur outside the banking system, fragmentation nodes are critical to shadow banking. No magic is required. So long as the underlying assets are diverse and their performance is imperfectly correlated, the process of pooling existing assets and issuing different tranches of new instruments can facilitate credit, liquidity, and maturity transformation. The pervasiveness of fragmentation nodes in today's financial landscape can be attributed, at least in part, to the way such structures enable risks to be redistributed among different classes of holders in accordance with their relative capacity to bear particular risks.

At the same time, the spread of fragmentation nodes and the other support mechanisms that enable the issuance of money claims in the shadow banking system dramatically increase the range of information potentially pertinent to the value of the financial instruments created in that system and the health of the financial institutions operating within it. The value of an ABS, for example, depends not only on the quality of the underlying loans, but also on factors that are specific to the securitization structure issuing that ABS, such as the correlation among the underlying assets and the contractual terms determining how interest and principal paid on the underlying assets will be allocated to the various classes of securities issued.[121] Prior to the creation of the securitization structure, these were not pertinent to anyone.[122] The relationship between the degree of correlation among the underlying assets and the value of a newly created ABS also varies significantly across the different tranches of ABS issued. As a result, the interests of the investors who acquire the lower-rated tranches, which are information sensitive, do not align with the interests of the holders of the AAA-tranche that typically back money claims.[123] That the expected return on the underlying assets may be more correlated than assumed in the model used to create the se-

[121] For a more thorough explanation of these dynamics, see id. at 678–81.

[122] To be sure, the correlation between the expected performance of a mortgage and the expected performance of the overall market mattered with respect to the pricing of that mortgage, and if, as was sometimes but not always the case, the mortgages packaged into a securitization structure were all originated by the same bank, then that bank would care about the correlation among their expected returns. In each instance, however, the reference group would be a much larger and more diverse group of assets. The importance of the correlation among the specific mortgages placed together into a securitization structure is contingent on the creation of that structure.

[123] Judge, Fragmentation Nodes, supra note 93, at 693–94.

curitization structure, for example, is information that would adversely affect the values of the AAA-tranche while increasing the value of the lowest tranches. This is an example of information that no one involved had both the incentive and means to produce at the time a securitization transaction was consummated. It also explains why the presence of some informed, loss-bearing capital in the shadow banking system does not suffice to counteract the ignorance of money claimants.

ABCP programs and many of the other entities that issue money claims are also fragmentation nodes. They similarly bundle together assets that previously had no connection to one another and issue claims that have different rights with respect to the cash flows from the underlying assets. As with ABS, the process of creating such fragmentation nodes can create value by facilitating liquidity and maturity transformation. But, again, it is a process that makes factors that were once not relevant to anyone or anything, like the correlation among the underlying assets and the circumstances in which the sponsoring bank will provide support to the program, highly pertinent to the value of the ABCP and other instruments created to fund the program.

These information dynamics and the structure of ABCP programs also demonstrate the ways complexity and ignorance may sometimes promote market functioning. For the reasons just described, the securitized assets underlying the ABCP were often exceptionally complex.[124] The complexity of the assets underlying many ABCP programs not only made it uneconomical for the ABCP holders to engage in the due diligence required to produce private information about the value of those assets, it also made it exceptionally costly for the sponsoring banks to produce such information. This likely helped convince ABCP holders that the sponsoring bank had not undertaken those efforts and thus did not have superior information about the quality of the assets that it could use, to the detriment of the ABCP holders.[125] The complexity thus may have enhanced the capacity of the ABCP issued to operate like money by reducing the probability of adverse selection.[126]

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[124] See, e.g., Gorton, Misunderstanding Financial Crises, supra note 32, at 50 ("The structure of asset-backed securities can be very complicated and opaque. The idea is that they make good collateral because of their lack of secrets.").

[125] Id. (explaining how before the 2007–08 financial crisis, ABCP frequently used asset-backed securities with complex and opaque structures as collateral).

[126] Id. at 49–50.

C. Information Gaps

Juxtaposing this brief glimpse of the money markets that feed the shadow banking system and the plumbing that enables that system to create money claims with the regulatory architecture set forth in Part I reveals a core informational challenge. Because the shadow banking system operates in the capital markets, to the extent these activities are regulated at all, the default rules governing their operation come from securities regulation. The default regulatory regime is thus one that presupposes claimants who are incentivized to engage in meaningful information gathering and analysis.[127] The market and payoff structures for money claims, however, provide no reward for acquiring superior information. Like bank deposits, the money claims produced by shadow banks are structured to obviate the need for the holder to have high-quality information about the value of the underlying assets at any stage in the relationship. By examining the incentives of the persons providing a significant swath of the capital flowing into the shadow banking system and the structures that populate that system against the default regulatory regime governing this system, this analysis reveals that there are structural reasons to expect significant information gaps in the shadow banking system.

The shadow banking system enables the growth of large information gaps, in part, because the value of the information that resides in those gaps varies significantly in different states of the world. The identified information gaps typically have little adverse impact on market functioning so long as confidence reigns—and may even facilitate it—but the ramifications of these gaps change precipitously if that confidence begins to wane.[128] Post-Crisis reforms have mitigated, but are far from eliminating, these dynamics.[129]

Another insight that arises from examining shadow banking against the background regulatory architecture and the information-related incentives of the providers of capital is that there may be structural reasons to expect far greater complexity in the shadow banking system than in either banks or the capital markets as historically constituted. A core

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[127] To be clear, much of shadow banking falls into exemptions built into the securities laws, but the need to fit into those exemptions is an important way that securities laws affect shadow banking, and the contours of those exemptions can be explained in much the same terms as the rationales for the overall regime.

[128] See infra Parts III and IV.

[129] See infra Part V.

component of traditional bank regulation entailed limitations on banks' activities and investments. The complexity-limiting effect of these regulations was a critical component enabling bank regulators to understand the risks to which banks were exposed. Similarly, a sophisticated investor acquiring a financial claim as an investment will typically be wary of any product that is too complex for him to understand, which traditionally limited the complexity of instruments trading in the capital markets. As a result, the regulatory and market forces that ensured someone had high-quality information about the value of assets and their associated risks simultaneously operated to limit the complexity of the instruments created. These limitations were never perfect and they appear to have become potentially much weaker over time,[130] yet shadow banks operate in an entirely different paradigm. In the shadow banking system, even under normal circumstances, there are often few or no market-based or regulatory forces limiting the complexity of the claims created, and that complexity may even facilitate liquidity in some states of the world. This is relevant to the analysis here, as the degree of complexity directly affects the size of information gaps that are likely to arise and the cost of filling those gaps should subsequent events require them to be filled.[131]

III. THE NEW INFORMATIONAL CHALLENGE

Framed in terms of information, the existing regulatory apparatus was designed to support two distinct regimes: A banking system that enables most providers of capital to remain minimally informed and mitigates the associated systemic risk and potential moral hazard through a massive regulatory regime; and, separately, a capital markets regime that relies on capital providers who are incentivized to gather and analyze information wherein the primary role of regulation is to reduce the costs of those efforts. The shadow banking system does not fit either paradigm.

This mismatch and the information gaps that arise from this mismatch give rise to a range of policy issues. The remainder of the analysis will focus on an important subset of those issues—how the information gaps that arise from shadow banking affect fragility. This Part explains the shortcoming in existing frames for analyzing the production and distribution of information that is filled by identifying information gaps. It then explores the relationship between information and market function-

[130] See infra Section V.C.
[131] See infra Section III.C.

ing before developing this Article's claim—that information gaps contribute to the systemic risk arising from shadow banking and are an important independent mechanism contributing to the fragility of institutions that rely on money claims. Part IV tests this claim against evidence from the Crisis.

A. Information Gaps in Context

Economists and other experts have long recognized that information and lack of information can have profound implications for market functioning. Much of the analysis thus far rests upon the rich literature addressing these dynamics. To grossly oversimplify, that literature tends to operate within one of two frameworks: one focused on how information is distributed within a system and a second focusing on the nature of information that is missing.

Current understandings of the importance of how information is distributed among parties often build on Akerlof's insight that when information is distributed asymmetrically and buyers rely on "some market statistic to judge the quality of prospective purchases," sellers have an "incentive . . . to market poor quality merchandise."[132] Buyers, anticipating this adverse selection, discount what they are willing to pay accordingly, with the net result that no trade will take place even when an exchange would be welfare enhancing.[133]

Other scholars have shown that modest asymmetries in how information is distributed among parties can positively impact market functioning. A central insight in Gilson and Kraakman's original analysis of the mechanisms of market efficiency is that it is only when "prices do not disclose all information" that there can "be an 'equilibrium degree of disequilibrium' somewhere short of full efficiency" that enables sophisticated investors to profit from engaging in costly information gathering and analysis even in relatively efficient capital markets.[134] Coffee's work on gatekeepers, such as accountants and credit rating agencies, similarly reveals how the ability for such parties to profit from superior infor-

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[132] Akerlof, supra note 17, at 488.

[133] Id. at 490–91. According to Google Scholar, 37,200 subsequent academic works cite Akerlof's classic article. Google Scholar, https://scholar.google.com/scholar?espv=2&biw=1241&bih=750&bav=on.2,or.&bvm=bv.96041959,d.b2w&ion=1&um=1&ie=UTF-8&lr&cites=8622278700871890196 [https://perma.cc/H9MC-8NLJ] (last visited March 3, 2017).

[134] Gilson & Kraakman, MOME, supra note 24, at 623 (using this to explain why Sanford Grossman's efficiency paradox is not a paradox in practice).

mation about the financial health or other characteristics of an issuer plays a critical role in compensating them for the costly effort of producing that information.[135] Much of the literature explaining the rationales for mandating disclosure in securities markets and prohibiting activities like insider trading similarly shed light on how the distribution of information affects market functioning, and how market structure and other institutional arrangements can promote and blunt incentives to produce information that is disaggregated or otherwise not yet known.[136]

A separate vein in the literature shifts the focus from how information is dispersed among parties within the system to the nature of information that is missing. Much of this work builds on the risk-uncertainty dichotomy first articulated by Knight nearly a century ago.[137] As Knight explains, "The . . . difference between the two categories, risk and uncertainty, is that in the former, the distribution of the outcome in a group of instances is known (either through calculation *a priori* or from statistics of past experience)."[138] By contrast, "true uncertainty" is "not susceptible to measurement."[139] This distinction has profound implications for decision making. As Knight further explained, unknowns that represent risks can be "converted into effective certainty" by insurance and similar schemes that group similar instances together and enable individuals to pay a risk-adjusted fee to mitigate adverse outcomes.[140] The same mechanisms are not available to mitigate the effects of unknown unknowns.

While Knight assumed markets to be more complete than they are, his core insight remains relevant and influential. Economists and others regularly invoke the notion of Knightian uncertainty as a way of acknowledging the inevitability of unknowable unknowns.[141] There is now a rich

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[135] John C. Coffee, Jr., Gatekeepers: The Professions and Corporate Governance 1–8 (2006).

[136] See supra Subsection I.B.1 and sources cited therein.

[137] Knight, supra note 18.

[138] Id. at 233.

[139] Id. at 232.

[140] Id. at 46.

[141] Knight recognizes that because of uniqueness, there is some irreducible uncertainty, but his analysis is largely framed by reference to a particular market actor, and his initial framing treats risk as a changing subset of uncertainty. See Knight, supra note 18, at 233–63. For further discussion on gaps between Knight's original analysis and ways the notion of Knightian uncertainty are typically employed, see, for example, Geoffrey T.F. Brooke, Uncertainty, Profit and Entrepreneurial Action: Frank Knight's Contribution Reconsidered, 32 J. Hist. Econ. Thought 221, 223–24 (2010); Itzhak Gilboa et al., Probability and Uncertainty in Economic Modeling, 22 J. Econ. Persp. 173, 173–74 (2008); Stephen F. Leroy & Larry D.

body of literature, much of it building off of a thought experiment by Professor Daniel Ellsberg, examining how uncertainty affects decision making, which establishes that individuals tend to be "ambiguity-averse," and explores the ramifications of that tendency in an array of settings.[142] A number of efforts to better understand the causes of the Crisis similarly identify uncertainty as a significant factor contributing to its depth.[143]

Each of these frames and other bodies of inquiry that have evolved alongside them enhance our ability to understand the dynamics here at issue, yet none provide an easy way to delineate situations where the relevant information is theoretically knowable or otherwise conducive to measurement but not actually known by any party. Implicit in the notion of an information asymmetry is that *someone* has the information. Information asymmetries can impede market functioning if the probability of adverse selection is too great, but trading on superior information is how private market actors profit from that information. Thus, so long as someone has the information, that information will usually be revealed, even if indirectly, and the market will move toward a new equilibrium that incorporates that information.

The situation changes significantly when pertinent information is not fully known to any party in the system. Market participants must make a threshold determination of whether to engage in the requisite data gathering and analyzing before they can engage in informed trading. The higher the costs the less often it will be rational for them to incur these threshold expenses.[144] The government similarly cannot make credible

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Singell Jr., Knight on Risk and Uncertainty, 95 J. Pol. Econ. 394, 394 (1987). Formal analyses of contracting and other forms of decision making have found ways to minimize the importance of Knightian uncertainty by introducing the notion of "subjective probability." Larry G. Epstein & Jiankang Zhang, Subjective Probabilities on Subjectively Unambiguous Events, 69 Econometrica 265, 265–66 (2001).

[142] See generally Talley, supra note 18, at 763–71 (citing Daniel Ellsberg, Risk, Ambiguity, and the Savage Axioms, 75 Q. J. Econ. 643 (1961)) (providing an overview of this literature and Ellsberg's influence).

[143] See, e.g., Katharina Pistor, A Legal Theory of Finance, 41 J. Comp. Econ. 315, 318 (2013) ("[P]re-determined, binding, non-negotiable legal commitments can hasten a financial crisis and in the extreme case the financial system's demise."). See also Ricardo J. Caballero & Arvind Krishnamurthy, Collective Risk Management in a Flight to Quality Episode, 63 J. Fin. 2195, 2197 (2008) (examining how an increase in uncertainty can generate flight to quality effects); Viral V. Acharya et al., Rollover Risk and Market Freezes 29 (Nat'l Bureau of Econ. Research, Working Paper No. 15674, 2010) (providing an account of market freezes that depends, in part, on "periods of increased Knightian uncertainty").

[144] Gilson & Kraakman, Information Costs, supra note 25. See also infra Section III.C.

signals about information it lacks, and it cannot accurately price insurance-like information substitutes.[145] Situations where no party has pertinent information thus pose challenges that are different in kind than the ones that arise when information is asymmetrically distributed among market participants or regulators.

When no party has relevant information, the gap that results operates like an unknown unknown. Information gaps thus increase the effective uncertainty in any system. Yet these gaps do not fit neatly into the dichotomy promulgated by Knight. Knightian uncertainty is generally an exogenous variable outside of anyone's capacity to control. By contrast, when pertinent information is knowable but lacking, policymakers and market participants can undertake activities that reduce those gaps. Delineating situations where missing information is knowable from other types of uncertainty is thus a critical threshold step to understanding the private and public mechanisms available when the challenge is one of unknowns.

One reason for this conceptual gap and the minimal attention that has been paid to information that is knowable but unknown may be that information gaps can only be identified through structural analyses of the type performed in Parts I and II. Analyses that focus on the parties to a transaction—the focal point of most studies of financial and other forms of contracting—or that examine the nature of pertinent but missing information are never going to identify this type of information dynamic. Accentuating the challenge is that this type of structural analysis will typically be an inductive exercise that requires probabilistic inferences. It is rarely possible to establish with certitude that particular information was not actually known to any party, private or public, at any juncture in a large and complex intermediation regime. This does not mean empirical evidence is irrelevant. Part IV undertakes a close analysis of how this Article's claims regarding the existence of information gaps and their effects on market functioning comport with the data available about how market participants actually behaved at critical points during the Crisis. Nonetheless, these challenges help to explain why this important category of information dynamics has not been identified and examined more closely until now.

[145] See infra Section III.C.

B. Incomplete Information and Market Functioning

To understand why information gaps matter, it is helpful to review what we already know about the relationship between information and market functioning. As reflected in the disparate assumptions animating securities and bank regulation, however, there is no universal "we" in this space. This Section, accordingly, creates the required common ground. It identifies four core understandings that build upon one another and lay the foundation for this Article's contributions regarding the importance of information gaps.

A threshold issue, which is often misunderstood, is that lack of information does not necessarily impose any friction on market functioning. This is illustrated in the stylized used-car market made famous by Akerlof's work on how information asymmetries can inhibit efficient transfers. The reason Akerlof focused on used cars—rather than new cars—is that even though the cars for sale in *both* markets entail a mix of cherries and lemons, a dealer selling new cars is not assumed to possess private information about the categorization of any particular vehicle.[146] In Akerlof's analysis, whether a car is a lemon could be known only with extended use.[147] And so long as a new car dealer does not possess superior information about whether a vehicle is a lemon, he has no ability to discriminate on that basis.

When information is lacking, rather than asymmetrically distributed, both the buyer and seller can use probabilistic estimates to gauge the likelihood that a particular vehicle is a lemon, and both can discount the expected value of a vehicle accordingly.[148] Ex post, the utility that the buyer enjoys will depend on whether he receives a lemon or cherry, but that fact should not inhibit the transfer.[149] While a stylized car market is quite different from today's financial markets, this simple example reflects a fundamental point—mutual ignorance is just as effective as mutual understanding at preventing adverse selection.

In many markets beyond new cars, functioning depends on market participants *not* having all pertinent information, and there are benefits

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[146] Akerlof, supra note 17, at 489.

[147] Id.

[148] Id.

[149] While not the focus of Akerlof's analysis, there are also a variety of contractual tools, like warranties, that a dealer who sells a high volume of new cars could more readily deploy in order to signal quality and to divorce the transfer of the car from the anticipated costs that will arise if it is a lemon.

from this type of market structure. Mutual ignorance can facilitate the provision of liquidity and can be critical to sustaining pooling equilibria.[150] Moreover, because information gathering and analysis is costly and sometimes socially wasteful, there can be welfare gains from market structures that reduce the need for such activities.[151] These benefits and the cost of producing information lead to the second building block—the level of information production that will be optimal in a given market cannot be determined in the abstract. There may well be market structures that are viable but socially suboptimal for information-related reasons, as information-thin market structures are more fragile and encouraging information production may produce positive externalities. Nonetheless, virtually all markets can tolerate some information gaps, and some may require such gaps.[152]

The third building block is that the effect of new information on market functioning and the processes through which markets incorporate new information depend on market structure. This supposition is illus-

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[150] E.g., Michael J. Fishman & Jonathan A. Parker, Valuation, Adverse Selection, and Market Collapses, 28 Rev. Fin. Stud. 2575, 2576 (2015) (finding that "[t]he private benefits to valuation exceed its social benefits so that, when both are possible, the equilibrium without valuation is always more efficient than the equilibrium with valuation is"); Holmstrom, supra note 9, at 12–15 (noting that "[i]ntentional opacity is a rather ubiquitous phenomenon" and describing a wide array of markets that use structures that rely on limited access to information); André Stenzel & Wolf Wagner, Opacity and Liquidity 4 (Ctr. Econ. and Policy Research, Discussion Paper No. 10665, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2621569 [https://perma.cc/G4KH-CCVA] (formally modeling why "it can be (privately and socially) optimal to issue opaque assets such as to deter information acquisition" and that "[i]t can even be desirable to artificially increase an asset's opacity beyond its natural level"); Carapella & Mills, supra note 92, at 36–37 (arguing "information insensitivity is desirable because it allows trades to occur *easily*"). The importance of pooling equilibria is also discussed frequently in the literature on insurance.

[151] E.g., David Andolfatto et al., Optimal Disclosure Policy and Undue Diligence, 149 J. Econ. Theory 128, 128 (2014); Daniel G. Goldstein, Undue Diligence?, 20 Bus. Strategy Rev. 16, 16 (2009) ("[C]ollecting and analysing all available data may turn out to be *undue* diligence."); Jack Hirshleifer, The Private and Social Value of Information and the Reward to Inventive Activity, 61 Am. Econ. Rev. 561, 573 (1971) (showing that "[p]rivate information that remains private . . . [has] no social value—in the sense of being purely redistributive, not leading to any improvement in productive arrangements" and "[t]here is an incentive for individuals to expend resources in a socially wasteful way in the generation of such information").

[152] Even equity markets, where information gaps tend to be quite small and short-lived, depend on those modest gaps to incentivize the information gathering and analysis required to help them remain informationally efficient. This insight from Gilson and Kraakman enabled them to explain why Professor Sanford Grossman's efficiency paradox is not a paradox in practice. Gilson & Kraakman, MOME, supra note 24, at 623.

trated by returning to the differences between equity and money markets. These markets typically achieve the relative parity in information required for trade in quite different ways. Equity markets "level up" the informational playing field through publicly observable prices that contain meaningful information about the value of the underlying assets. This works because the same processes that reward sophisticated investors for engaging in costly information gathering and analysis simultaneously push prices to relatively more efficient levels. At the same time, public and private institutions that enhance the efficiency of these markets promote market functioning, as the more accurate an otherwise uninformed investor perceives prices to be, the more rational it will be for him to acquire an equity claim without engaging in costly diligence.

Money markets, by contrast, often "level down" through claim structures that make it costly and unrewarding for claimants to acquire superior information about the underlying assets. Such arrangements are both necessitated and facilitated by the payoff structure of money claims; as is the case with all debt instruments, money claimants receive no additional return if the value of the assets backing their claim exceed the par value of that claim.[153] This means, for example, that the holder of a money claim with a par value of $10,000 who has access to a reliable proxy indicating that the value of the assets backing that claim is between $20,000 and $30,000 has no reason to gather the information required to more precisely value those assets. The lack of any upside removes any incentive to engage in due diligence so long as a claimant has reason to believe the value of the underlying assets comfortably exceeds the value of her claim. These are among the reasons that money claimants rely on proxies suggesting that a claim is exceptionally low risk coupled with a right to exit, quickly and at face value, as a substitute for high-quality information.

This lays the foundation for another important difference between money and equity markets—how they respond to new information. Equity prices typically respond to new information in an incremental fashion, going up or down proportionately as new information enters.[154]

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[153] See Holmstrom, supra note 9, at 8.

[154] Bubbles represent an important exception to this general rule. Yet, bubbles are the exception rather than the norm and, as reflected recently by the popping of the dot-com bubble, even large stock market bubbles can burst without necessarily inflicting the type of adverse effects on the real economy that follow dysfunction in money markets. E.g., Ben S. Bernanke, Chair, Fed. Reserve Sys., Some Reflections on the Crisis and the Policy Response, Ad-

Money markets operate quite differently. In information-thin money markets, new information will either have no observable impact or trigger dysfunction. Put differently, information that accords with the assumptions that underlie a money claimant's willingness to rely on a particular proxy as strongly indicative that her claim is exceptionally low risk should have little impact on pricing or market functioning. By contrast, information that suggests that her claim is higher risk than she previously believed or that casts doubt on the accuracy of a proxy on which she had been relying might well cause her to walk away. This leads to significant nonlinearities in how money markets respond to new information, in stark contrast to equity markets. This also leads to the fourth and final building block—the effect of information and information gaps on market functioning can be state contingent.

C. Information Gaps and Systemic Stability

Building on these four understandings, this Article argues that information gaps accentuate the fragility that arises whenever an institution relies on money claims as a significant source of funding. Information gaps make panics more likely and they exacerbate the degree of market dysfunction that results when confidence gives way to panic. This Section explains why the range of signals that might trigger a change of state are expanded and the process of restoring confidence should panic take hold is hampered when information gaps are large. Part IV establishes that the conjectures made here are consistent with quantitative and qualitative information about how events unfolded during the Crisis. The different issues discussed here all arise from the common challenge posed by information gaps—it is costly to produce information and, when those costs are high because the gaps are large, this can result in significant frictions limiting the capacity of market participants and regulators to respond in a timely and appropriate way to new developments.

The analysis that follows focuses first on whether money claimants are likely to run and then on the ways that other market participants and regulators will respond if and when money claimants withdraw, but this

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dress at the Russell Sage Foundation and The Century Foundation Conference on Rethinking Finance 3 (Apr. 13, 2012) ("[A]ny theory of the crisis that ties its magnitude to the size of the housing bust must also explain why the fall of dot-com stock prices just a few years earlier, which destroyed as much or more paper wealth—more than $8 trillion—resulted in a relatively short and mild recession and no major financial instability.").

breakdown is used merely for purposes of exposition. Each set of developments is closely intertwined with and to some extent contingent upon the others. If money claimants expect government backstops, for example, this could halt a run before it begins. Similarly, if loss-absorbing capital could instantly come in to fill the shortfalls created when money claimants exit, this would obviate the need for fire sales and the market dysfunction that arises when money claimants run. Thus, this Article's claims about the probability of a panic and the scope and duration of the market dysfunction that arises as a result are really just variations on a common claim—the frictions imposed on the capacity of an intermediation regime to acclimate to certain types of information can significantly exacerbate the market dysfunction that results from such a trigger.

1. Tendency to Run

Recognizing that money claimants almost always have radically incomplete information about the assets underlying their claims is critical to understanding when they are likely to exercise their right to exit, and thus when we are likely to see destabilizing runs. Switching and other costs create a small friction on money claimants' disposition to make withdrawals in situations where they continue to prefer holding some type of money claim to cash. Nonetheless, money claimants are holding money claims because they are seeking an instrument that is so low risk they do not need to engage in any meaningful due diligence. Thus, even a modest amount of credit risk or an inability to be confident that the credit risk is low could trigger withdrawals.

Economists often explain runs using one or both of two paradigms.[155] One view, espoused most famously by Diamond and Dybvig, posits that runs arise from coordination problems among money claimants.[156] Because this view depicts runs as self-fulfilling prophecies which can occur independent of any substantive change in the underlying assets or money claimants' beliefs about the same, it is often labeled the "sunspot" theory

[155] See, e.g., Franklin Allen et al., Financial Crises: Theory and Evidence, 1 Ann. Rev. Fin. Econ. 97, 99–102 (2009) (explaining that the literature generally falls into two camps—one of which "maintains that panics are undesirable events caused by random deposit withdrawals unrelated to changes in the real economy" and a "second set of theories describ[ing] banking crises as a natural outgrowth of the business cycle"—and identifying the main contributions to both).

[156] Diamond & Dybvig, supra note 48, at 402.

of runs.[157] A number of subsequent studies provide rich accounts of the mechanisms that might underlie such runs, but they tend to share the common challenge of having little predictive power and no inherent stopping point.[158] An alternative view posits that banking panics are extensions of the business cycle.[159] In this view, panics are "caused by depositor revisions in the perceived risk of bank debt," typically triggered by a signal of a pending economic downturn.[160] Many contributions that depict runs as arising from fundamentals suggest that information asymmetries between banks and money claimants are critical to explaining runs on solvent institutions.[161] While some models lie between these two paradigms,[162] the sunspot and business cycle theories remain the two most influential paradigms for bank runs. This is reflected in the fact that empirical studies of runs by money claimants continue to attribute withdrawals that can be explained by changes in credit risk or other fundamentals to the latter model while attributing run-like behavior that cannot be so justified as evidence of sunspots.[163]

Recognizing information gaps suggests another mechanism that could cause runs to exceed the scope justified by the increased credit risk while nonetheless being driven by information, or rather, lack thereof. As a starting point, subject to modest frictions, it is rational for a money claimant to withdraw when new evidence (1) reveals that a claim has appreciable credit risk, and thus is information sensitive; or (2) renders it

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[157] Franklin Allen et al., Introduction to Financial Economics 149 J. Econ. Theory 1, 2 (2014).

[158] E.g., Gary Gorton & Andrew Winton, Financial Intermediation, *in* 1 Handbook of the Economics of Finance 431, 508 (George M. Constantinides, Milton Harris & René M. Stulz eds., 2003) (explaining that "a major difficulty is that Diamond and Dybvig (1983) is not a testable theory, since any observed a [sic] phenomenon is consistent with 'sunspots'").

[159] E.g., Charles W. Calomiris & Gary Gorton, The Origins of Banking Panics: Models, Facts, and Bank Regulation, *in* Financial Markets and Financial Crises 109 (R. Glenn Hubbard ed., 1991) (identifying this view as running through a number of models and showing that it is consistent with historical evidence from the period between the adoption of the National Bank Act and the founding of the Federal Reserve); Franklin Allen & Douglas Gale, Optimal Financial Crises, 53 J. Fin. 1245, 1245 (1998).

[160] Calomiris & Gorton, supra note 159, at 111.

[161] E.g., Allen et al., supra note 155, at 100–01 (describing the theories that rely on information asymmetries).

[162] Allen et al., supra note 157, at 2–3 (providing an overview of the two main theories and the recent literature suggesting an intermediate interpretation); Gorton & Winton, supra note 158, at 507–08 (summarizing the alternative theories). In part because the information-based set of theories has tended to be more elastic in what it can reach, one could characterize the intermediate models as instead extensions of the information-based set of theories.

[163] See infra Section IV.A.

unclear whether a claim is sufficiently low risk to justify information-insensitive treatment. Because information gaps make it more difficult for a money claimant to assess whether a signal bears on the value of the specific assets underlying its claim, information gaps increase the types of information that fall into category two. As a result, the larger the information gaps that exist, the greater the range of signals that could trigger a run. To make this more concrete, the types of signals that might trigger a run need not be limited to ones that indicate banks generally will underperform, such as a looming recession.[164] Rather, any signal that suggests some subset of the assets backing some money claims are riskier than previously believed, and which belies the reliability of a proxy on which money claimants had relied to conclude their claims were so low risk as to merit information-insensitive treatment, could trigger widespread withdrawals.

In contrast to many of the other information-based theories of bank runs, the mechanism proposed here does not require information asymmetries and can occur even when money claimants do not anticipate adverse selection.[165] Money claimants run because they are unable—without undertaking due diligence in excess of the amount that is cost justified—to assure themselves that a claim they are holding is sufficiently low risk to justify ongoing treatment as if it is information insensitive. This means that the presumption of mutual ignorance could hold even during a period of widespread withdrawals.[166] While not ruling out the possibility of sunspots, this frame provides a way to understand runs

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[164] Id. See also Gorton & Winton, supra note 158, at 505 (identifying the fact that "a recession is looming" as the paradigmatic signal triggering panic in the information-based theories of bank runs).

[165] In many ways, this view updates the approach taken by Professors Charles Calomiris and Gary Gorton, supra note 159, in identifying a link among the information-based theories by building on their insight that institutions matter and can affect how vulnerable a particular regime will be to a run while extending their intuitions to an environment in which shadow banks rather than banks issue money claims, and the information challenge is one of common ignorance rather than information asymmetries.

[166] This is one of the core ways this Article differs from related work by Professors Samuel Hanson and Adi Sunderam, arguing that insufficient information production may have contributed to the Crisis. In their model, there are some fully informed agents, just too few of them. This distinction creates a state where concern about adverse selection drives would-be buyers from the market. Samuel G. Hanson & Adi Sunderam, Are There Too Many Safe Securities? Securitization and the Incentives for Information Production, 108 J. Fin. Econ. 565, 567 (2013). The analysis here, by contrast, suggests that at least some of the market dysfunction was due not to concerns about adverse selection by the party on the other side of a trade but by simple lack of information revealed to be relevant.

not readily explained by credit risk as nonetheless being driven by information, or rather, lack thereof.

2. Shock Absorbers

The fragility arising from information gaps is exacerbated by the ways information gaps impede the market and regulatory processes that can prevent an adverse signal from triggering a widespread panic and that can help restore stability once panic takes hold. One way for the government to prevent and contain runs is to guarantee money claims.[167] Such a policy can be instituted ex ante, as in the case of FDIC insurance, or ex post, as occurred when the Treasury Department backstopped money market mutual funds to stem withdrawals after the failure of Lehman Brothers caused one fund to break the buck.[168] By rendering both risks and unknown unknowns irrelevant to the expected return on a money claim, insurance and implicit guarantees significantly reduce money claimants' tendency to run.[169] So long as the insurer is creditworthy and committed, no other information matters and the claim becomes effectively information insensitive.

While exceptionally potent, insurance regimes also entail real costs. One challenge is the moral hazard that inevitably results.[170] Another is

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[167] E.g., Gary Gorton, Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007, at 2 (May 9, 2009) (unpublished manuscript), https://www.frbatlanta.org/-/media/documents/news/conferences/2009/financial-markets-conference/gorton.pdf [https://perma.cc/J4JM-68NZ] (prepared for the Federal Reserve Bank of Atlanta's 2009 Financial Markets Conference: Financial Innovation and Crisis) ("The period from 1934, when deposit insurance was enacted, until the current crisis is somewhat special in that there were no systemic banking crises in the U.S."); Ricks, The Money Problem, supra note 3, at 262 ("[W]ith the advent of deposit insurance in 1933, the United States entered an unprecedented Quiet Period of seventy-plus years with no panics and no serious economic disasters.").

[168] See generally Judge, The Importance of "Money," supra note 51 (reviewing a book that proposes a broad ex ante regime and describing the benefits of instead having a more modest ex ante guarantee coupled with the possibility of ex post expansion). See also Macey, Reducing Systemic Risk, supra note 9, at 149; Macey & O'Hara, supra note 86, at 97–98.

[169] Carnell et al., supra note 70, at 271–72 (describing how deposit insurance solves the collective action problem that can cause even healthy banks to fail).

[170] E.g., Macey & O'Hara, supra note 86, at 97 ("Despite the positive effect of FDIC insurance on preventing bank runs, the implementation of deposit insurance poses a regulatory cost of its own—it gives the shareholders and managers of insured banks incentives to engage in excessive risk-taking."); Morgan Ricks, Regulating Money Creation after the Crisis, 1 Harv. Bus. L. Rev. 75, 119 (2011) (noting "[u]nless the government can price deposit insurance premiums perfectly and update them continuously, depository owners and management can extract value from the government's insurance policy by taking greater risks[,]" but "[m]oral hazard is a feature of all insurance markets" (emphasis omitted)).

that when the government provides insurance, it exposes itself to credit risk. The banking system has never fully resolved these challenges, but the extensive supervisory and regulatory regime governing banks goes a long way toward reducing them.[171] Guarantees can play similarly helpful roles promoting stability outside the regulated banking sector, but the associated moral hazard and credit risk increase dramatically in the absence of a comparable ex ante regulatory scheme.

A second way that regulators can promote market functioning when market participants become concerned about information that they lack is to help fill the gaps. As Federal Reserve Governor Daniel Tarullo has explained, once a crisis takes hold, "the only way that market actors are going to start regaining any confidence is if they think they understand what is going on."[172] Injecting credible information into the system can help quell a panic by convincing some money claimants that their claims are still sufficiently low risk to merit treatment as money.[173] Information injections can also play a critical role in reducing the frictions inhibiting the entry of informed, loss-bearing capital by reducing the information generation such capital holders must undertake to assess whether a claim is appropriately priced. Again, this is a technique long employed by bank examiners, alongside their tendencies toward confidentiality. It was even used by private actors seeking to restore stability before banks were as thoroughly regulated.[174] Nonetheless, it is not a viable policy tool when the government lacks credible information.

A third tool frequently employed to mitigate financial crises is for a central bank to provide fresh liquidity to the banks or other entities facing liquidity constraints, reducing the need for the value-destroying fire sales which can otherwise be a powerful mechanism of contagion. The standard way central banks provide fresh liquidity is through collateral-

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[171] See supra Subsection I.B.2.

[172] Donna Borak, The Increasing Leverage of Daniel Tarullo, Am. Banker (July 28, 2013), http://www.americanbanker.com/magazine/123_8/the-increasing-leverage-of-daniel-tarullo-1060538-1.html?zkPrintable=1&nopagination=1 (quoting Tarullo).

[173] Calomiris & Gorton, supra note 159, at 160–62.

[174] For example, in engineering the end of the panic of 1907, J.P. Morgan provided liquidity only to those trusts he had determined were solvent, so when he did provide support, he not only supplied the troubled institution with much needed liquidity, but he also effectively signaled to the public that certain trusts could be trusted. Robert F. Bruner & Sean D. Carr, The Panic of 1907: Lessons Learned From the Market's Perfect Storm 87–95 (2007). See also Alan D. Morrison & Lucy White, Reputational Contagion and Optimal Regulatory Forbearance, 110 J. Fin. Econ. 642, 642 (2013) (formally demonstrating how reliance on regulators can function as a mechanism of contagion).

ized loans, which enable a bank or other entity to post less-liquid collateral in exchange for cash equivalents or other liquid assets.[175] Without high-quality information about the actual value of the assets pledged as collateral, however, or the soundness of the firms pledging that collateral, the line between liquidity support and credit support quickly blurs, and interventions designed to help restore stability can instead exacerbate the fragility, delay necessary transfers, and engender excessive moral hazard.[176]

This leads to a fourth strategy for helping to restore stability, which is to recapitalize the entities issuing the money claims. Concerns about the value of underlying assets often indicate a need for more capital that is able to bear risk. Again, this is a strategy long used to restore stability when banking crises hit. Yet, information gaps again make this strategy more difficult to deploy: The less information policymakers have about asset values, associated risks, and the distribution of risks across a financial system, the less able they are to tailor capital injections to the scale and scope of the problems they are facing. This can lead to delays, increasing the size and scope of a financial crisis. It can also result in the provision of excess capital, increasing moral hazard and the credit risk to which the government is exposed.

Yet to understand why information gaps pose such a challenge during periods of systemic distress, it is important to bear in mind that market participants also lack the pertinent information. This is key because the optimal role for regulators is often to work with, rather than supplant, private actors. When new capital is needed, capital should ideally come from private sources and the influx of loss-absorbing capital should result in the production of some of the missing information. Market participants will not enter, however, unless the expected returns exceed the sum of the expected cost of the assets and the cost of undertaking the information gathering and analysis required to make wise acquisition decisions. Sizeable knowable but unknown unknowns thus create large hur-

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[175] Kathryn Judge, The First Year: The Role of a Modern Lender of Last Resort, 116 Colum. L. Rev. 843, 856 (2016) [hereinafter Judge, The First Year] (describing the Federal Reserve's expanded use of new liquidity facilities in 2008, such as "to help revive the securitization market . . . a facility that allowed users to borrow funds on a nonrecourse basis so long as they provided the requisite collateral").

[176] Id. at 874–75 (noting backstopping by "increasingly creative" regulators "stabilized markets, but it did so primarily by allowing market participants to rely on the creditworthiness of the government in lieu of frank assessments of counterparty risk and asset values"); Calomiris & Gorton, supra note 159, at 160–62.

dles, reducing the likelihood that private capital will enter in a timely fashion or the holders will be willing to sell at the prices such buyers might be willing to offer.[177]

Critically, just as with the explanation provided here for bank runs, understanding these frictions highlights the importance of recognizing information gaps and distinguishing them from the more commonly recognized frictions typically associated with information asymmetries and concerns about adverse selection. The analysis here reveals new dynamics that operate alongside known frictions, ones that are critical for developing a robust understanding of the ways that complexity and incomplete information affect fragility.

IV. THE ROLE OF INFORMATION GAPS IN THE CRISIS

Having established theoretically why information gaps are likely to flourish in the shadow banking system and contribute to its fragility, the question becomes whether the evidence supports this Article's conjectures. This Part uses the Crisis to explore these issues.[178]

A. Escalation

It is widely, though not universally, recognized that the Crisis started in August 2007.[179] The information that eventually triggered the market dysfunction that erupted that August had been building for some time. The housing market started to weaken in late 2006, adversely affecting the demand for mortgage-backed securities ("MBS"), particularly those backed by subprime loans, which were revealed to be riskier than previously believed. By the end of July 2007, the lead credit rating agencies had engaged in record downgrades, downgrading well over a thousand subprime MBS.[180] The ABX index for lower-rated, subprime MBS, an

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[177] Gilson & Kraakman, Information Costs, supra note 25, at 319 ("Information of great relevance to pricing some of the instruments associated with the Subprime Crisis was very costly—too costly, in fact, to enter into the pricing of these instruments.").

[178] For a more detailed analysis of the ways these dynamics shaped the first year of the Crisis, see Judge, The First Year, supra note 175.

[179] See Ricardo J. Caballero & Alp Simsek, Fire Sales in a Model of Complexity, 68 J. Fin 2549, 2571 (2013) and sources cited therein.

[180] Permanent Subcomm. on Investigations, U.S. Senate Comm. on Homeland Sec. & Governmental Affairs, Wall Street and the Financial Crisis: Anatomy of a Financial Collapse 264 (2011), http://www.hsgac.senate.gov/download/report-psi-staff-report-wall-street-and-the-financial-crisis-anatomy-of-afinancial-collapse [https://perma.cc/Q42W-G748].

important mechanism aggregating views on the value of subprime MBS, was also declining throughout 2007.[181] Nonetheless, it was not until August 9, when BNP Paribas announced it was temporarily suspending redemptions in three funds because of a lack of liquidity in the subprime MBS market, that the bad news that had been building all summer led to widespread market dysfunction.[182] The lack of symmetry between the way that the information gradually built up over time and the dramatic, nonlinear shift in the way that information affected market functioning is consistent with the description of how money claimants—as opposed to equity claimants—respond to new information.[183]

Empirical evidence supports that there was a "run" on asset-backed commercial paper ("ABCP") starting in August 2007. Professor Daniel Covitz and coauthors use data on all ABCP issued in the United States in 2007 to show that the market was remarkably stable for the first half of the year despite the accumulating bad news, but it then disintegrated quickly.[184] Covitz and his coauthors found that prior to August, "[r]uns . . . were quite low . . . . Starting in August, the percent of ABCP programs experiencing a run each week climbed sharply."[185] By September, more than "30 percent of all ABCP programs" had experienced a run, and "by the end of 2007, more than 40 percent of programs were in a run."[186] As a result, even though "only 3% of paper defaulted by the end of 2007 . . . ABCP outstanding dropped by about 35%."[187] This means that despite a low default rate, the "ABCP market contracted about $350 billion in the last 5 months 2007," marking a very sizeable reduction in a very short period of time.[188]

On the one hand, the number of programs experiencing a run far exceeded the number of programs that actually ended up defaulting, indicating that holders of ABCP ran on a number of programs that were fundamentally sound or otherwise protected. Moreover, there is no sin-

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[181] Gorton, supra note 167, at 5; Gary Gorton & Andrew Metrick, Securitized Banking and the Run on Repo, 104 J. Fin. Econ. 425, 434–36 (2012).

[182] See Judge, The First Year, supra note 175, at 874.

[183] See supra Part I.

[184] Covitz et al., supra note 114, at 816–17 fig.1, 829 fig.2, 831 fig.3.

[185] Covitz et al., supra note 114, at 828. They define a "run" as occurring when an ABCP program does not issue any new ABCP despite having at least 10% of its outstanding ABCP mature in that week or having experienced a run in a previous week and still not issuing new ABCP. Id. at 827.

[186] Id. at 828.

[187] Id. at 845.

[188] Id. at 846.

gle variable or combination of variables that predicts which programs would experience a run, and investors had very little information about the specific assets underlying the ABCP they held.[189] These findings suggest that not all of the runs can be attributed to fundamentals. On the other hand, the proportion of ABCP programs that experienced a run is well shy of 100%, and runs that did occur "were not random"—as one might expect if the runs were solely the byproduct of coordination challenges.[190] Rather, as Covitz and his co-authors explain, "[T]he results from the panel regressions of runs suggest that . . . runs were more likely at programs with weaker support, greater exposure to subprime mortgages, and weaker sponsors."[191] These findings are, at the least, consistent with what this Article's claim would predict: Holders of ABCP ran when the fundamentals so justified or when they lacked sufficient information about the program's exposure to problematic assets to be assured with respect to the safety and liquidity of their holdings. That the runs occurred following a signal that suggested problems with respect to only a small subset of the assets backing ABCP is also consistent with this Article's claims regarding the ways information gaps increase fragility by expanding the range of signals that can trigger a run.

Holders of other money claims that had supported the shadow banking system engaged in similar run-like behavior. Gorton and Professor Andrew Metrick, for example, document a run on repo—another money claim issued in the shadow banking system—that also started in August 2007 and became more pronounced following the failure of Lehman Brothers in September 2008.[192] Their focus is on "haircuts," the degree of overcollateralization that holders demanded to treat a claim like money. As Gorton and Metrick explain, rising haircuts function like withdrawals because they reduce the amount of funding that a firm can obtain using particular collateral. Again, the evidence shows significant nonlinearities in how money claimants responded to new information depending on the type of collateral that backed a money claim. The degree of overcollateralization money claimants demanded increased in

[189] Id. at 820 (explaining that "[i]nvestors appeared to have little understanding of the credit quality of ABCP portfolios leading up to the turmoil in August 2007" and providing further evidence to support the notion that investors lacked meaningful information about the specific assets underlying the ABCP they held).

[190] Covitz et al., supra note 115, at 839. See also id. at 832–35 (using cross-sectional regressions and producing similar findings).

[191] Id. at 839. See also id. at 832–35.

[192] Gorton & Metrick, supra note 181, at 448.

accord with rising "uncertainty about collateral values,"[193] and it became virtually impossible for parties seeking to issue money claims to use the most opaque and difficult-to-value assets as collateral.[194] Given that more complex assets are likely to be only incompletely understood by either party to a repo transaction, that haircuts increased most dramatically for such assets is yet another finding that is more consistent with the notion that information gaps drove some subset of the run behavior than theories that depend on information asymmetries to explain runs.

The escalation of the Crisis entailed similar dynamics. For example, among the factors contributing to the magnitude of the adverse ripple effects of the Lehman Brothers failure was the impact of that bankruptcy on money market mutual funds. The day after Lehman's bankruptcy, one money market mutual fund holding commercial paper issued by Lehman Brothers "broke the buck," causing it to redeem shares, at the lowest point, at $0.97 per share, before going through an orderly resolution that provided holders $0.99 for each share that under ideal circumstances would be worth $1.00.[195] Despite the relative modesty of these losses, many money market mutual fund holders reacted by quickly exercising their right to exit. Again, subsequent empirical analysis confirms "run-like behavior," and that this behavior varied across fund types.[196] Institutional investors were more likely to exit and exited more quickly than retail investors; and, although institutional investors withdrew massive amounts of capital from funds holding nongovernment assets, they simultaneously acquired shares in money market mutual funds holding "U.S. Government-backed securities."[197]

In all of these instances, money claimants had been providing capital consistently despite having limited information about the assets underlying their claims and the risks to which those assets were exposed. The withdrawals thus were not triggered by the fact that holders lacked material information; the information gaps predated the runs. Moreover, in most of these instances, there was a notable asymmetry between the incremental buildup of bad news and the way money claimants reacted to

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[193] Id. at 444.

[194] Id. at 440 ("The market disappeared or unpriced CDOs and CLOs, unpriced ABS and MBS, all subprime; and AA-AAA CDO." (emphasis omitted)).

[195] See Macey, Reducing Systemic Risk, supra note 9, at 145–46.

[196] Lawrence Schmidt et. al., Runs on Money Market Mutual Funds 1 (Sept. 11, 2015) (unpublished manuscript), http://ssrn.com/abstract=1784445 [https://perma.cc/D4TE-R976].

[197] Id. at 2 & fig.1.

that information. The claims were structured to be information insensitive, and so money claimants did not respond in any in meaningful way to the first (and second and third . . .) signs of bad news. Nonetheless, when bad news was coupled with information suggesting that the proxies money claimants had relied on were less accurate than previously believed, money claimants exited quickly. And, when they did, they did not withdraw from everything, nor did they withdraw only when doing so was justified by increased credit risk. Rather, the withdrawals followed an intermediate course precisely as the analysis here predicts.

The data examined here represent only a subset of the work that has been done on the Crisis and other periods of systemic distress, but they also represent some of the more important empirical work on the fragility of the shadow banking system. It is thus notable, even if far from conclusive, that this evidence comports with this Article's claims.

B. Restoring Stability

The Crisis also illustrates how information gaps impede the public and private processes that can restore stability when money claimants run. As an initial matter, all of the runs on the shadow banking system occurred in part because there was no insurance scheme or established liquidity facility in place deterring money claimants from running. Similarly, policymakers were not in a position to assure money claimants regarding the value of the assets underlying their claims or to help money claimants discern which claims were most likely to be exposed to problematic assets because the government did not have any superior information about such matters. Additionally, while the government eventually did recapitalize important components of the financial system, it did not intervene to provide capital support until well over a year into the Crisis, and the scope of the Crisis grew significantly during the interim. The lack of information leading policymakers possessed appears to have contributed to that delay.[198] Moreover, the Crisis was escalating throughout 2007 and much of 2008 in part because informed capital was not coming in to counteract the vacuum created as money claimants fled from an ever-expanding array of markets. Concurrent assessments of the

[198] See generally Judge, The First Year, supra note 175 (recounting the Crisis through the lens of information problems).

market dysfunction suggest information gaps were a significant contributing factor.[199]

Policymakers ultimately utilized all of the tools long used to address banking crises—guarantees, liquidity support, information injections, and fresh capital. They did so in significant part because they recognized that failure to do so would have resulted in even greater market dysfunction and more adverse spillover effects on the real economy. The Federal Reserve's many temporary liquidity facilities, its support of Bear Stearns and AIG, the Treasury's provision of explicit insurance policies for money market mutual funds, and the credit and other support that the Treasury provided to banks through the Troubled Asset Relief Program were all mechanisms of assuring short-term and other creditors. Yet—in stark contrast to the banking regime—there was no ex ante system of controlling the activities in which these entities engaged and the assets they could hold, nor was there a supervisory regime providing regulators high-quality information about the risks of the underlying assets.

As reflected in the Dodd-Frank Act and other post-Crisis reforms, the expansion of the government safety net to nonbank firms is widely perceived as having created significant moral hazard, requiring the adoption of extensive and quite costly regulatory reforms.[200] Less commented on but no less important is how the dearth of information that the government possessed when it extended liquidity and credit guarantees increased the effective credit risk that the government assumed. The government, for example, ultimately profited from the interests in AIG it obtained in connection with helping the firm avert bankruptcy, but that by no means alters the accuracy of Treasury Secretary Timothy Geithner's statement that he "thought we were taking enormous, unprecedented risks and that there was substantial risk that we would lose billions of dollars, if not tens of billions of dollars" when the Treasury first took that action.[201]

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[199] Id.

[200] See Janet L. Yellen, Chair, Fed. Reserve Sys., Finance and Society (May 6, 2015), http://www.federalreserve.gov/newsevents/speech/yellen20150506a.htm [https://perma.cc/2LCW-UP8E] ("In the aftermath of the crisis, the Congress tasked the banking regulators with challenging and changing the perception that any financial institution is too big to fail . . . .").

[201] James B. Stewart, Solvency, Lost in the Fog at the Fed, N.Y. Times (Nov. 7, 2014), http://www.nytimes.com/2014/11/08/business/the-feds-ambiguous-definition-of-solvency.html?_r=0 [https://perma.cc/D9XV-5DCQ].

Policymakers also directly targeted the information gaps that were inhibiting market functioning. The most clear-cut example of policymakers using information injections to promote market functioning was the public disclosure of the results of stress tests conducted on the largest banking holding companies.[202] As then-Federal Reserve Chairman Bernanke later explained, the Federal Reserve recognized that "[t]he loss of confidence we have seen in some banking institutions has arisen not only because market participants expect the future loss rates on many banking assets to be high, but because they also perceive the range of uncertainty surrounding estimated loss rates as being unusually wide" and the stress tests were "designed to reduce this uncertainty."[203] In opting to publicly disclose the results of the tests, Federal Reserve policymakers reasoned that, given that uncertainty remained pervasive and was itself adversely affecting market functioning, "[e]ven a mixed bag of information about the actual condition of banks" would enhance market functioning.[204] The market's response to the stress tests supported the conjecture.[205] As Bernanke later opined, the stress tests were "critical turning points in the financial crisis," because they "provided anxious investors with something they craved: credible information about prospective losses at banks."[206] The stress tests are a good example of effective crisis management. Nonetheless, that they occurred only after the Crisis had been underway for a prolonged period of time and after the government had significantly expanded its safety net illustrates the mismatch between the regulatory structures in place and regulators' capaci-

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[202] E.g., Ben S. Bernanke, Chair, Fed. Reserve Sys., The Supervisory Capital Assessment Program (May 11, 2009), http://federalreserve.gov/newsevents/speech/bernanke20090511a.htm [https://perma.cc/HQ4X-AHFN]. The willingness of Federal Reserve officials to undertake tests that were sufficiently robust to be credible, and to commit to disclosing the results, also rested upon the fact that Congress had authorized the Treasury to provide significant capital support to the banking system. As such, it was clear that the government could and would use taxpayer funds to recapitalize any banking organizations revealed to be deficient. See also Donald P. Morgan et al., The Information Value of the Stress Test, 46 J. Money, Credit & Banking 1479, 1482 (2014) (explaining how in the 2009 stress test, "[b]anks with [capital] gaps were required to file capital plans describing how they intended to fill the gap (whether privately, via conversions, or via [a Capital Assistance Plan]) by November 2009").

[203] Bernanke, supra note 202.

[204] Borak, supra note 172 (describing Tarullo's rationale for pushing for disclosure).

[205] See, e.g., Morgan, Peristiani & Savino, supra note 202, at 1498–99.

[206] Ben S. Bernanke, Chair, Fed. Reserve Sys., Stress Testing Banks: What Have We Learned? (Apr. 8, 2013), https://www.federalreserve.gov/newsevents/speech/bernanke20130408a.pdf [https://perma.cc/VEW3-KEU2].

ty to address the challenges they faced. While far from exhaustive, this subsection and related work highlight the ways that information gaps arising from the many things *no one* knew about the shadow banking system affected the capacity of regulators to deter money claimants from running, the drawbacks of the government interventions eventually implemented, and the degree to which they could enlist the help of other market participants in their efforts to restore stability.

C. Qualitative Support and the Importance of Terminology

How policymakers talked about the challenges they were facing during the Crisis provides further support for the importance of delineating information gaps as a distinct dynamic and for the role they played during the Crisis. Even during the early phases of the Crisis, Federal Reserve Governor Frederic Mishkin and others recognized that "[t]he issue is that there's an information problem in the markets."[207] Federal Reserve officials also recognized that the rise of the shadow banking system limited the amount of information they had about those challenges. As Governor Randall Kroszner observed, "In the old days, we used to know where the risks were; unfortunately, we knew that they were all on the bank balance sheets. With the originate-to-distribute model and securitization," core components of the shadow banking system, "the risks are much more dispersed."[208] He further noted that this "leads to potential pockets of uncertainty, and that is exactly what has come up."[209]

Policymakers were even attuned to many of the specific mechanisms through which the information problems were causing the market dysfunction to spread. As Governor Donald Kohn explained: "A critical channel of contagion . . . was the involvement of banks as providers of credit and liquidity backstops in the ABCP market" which caused "uncertainties about real estate markets, the performance of nonprime mortgages, and structured-credit products [to come] to rest as greater uncer-

[207] Transcript of the Fed. Open Mkt. Comm. Conference Call on Aug. 16, 2007, at 30 (statement of Frederic Mishkin).

[208] Transcript of the Fed. Open Mkt. Comm. Meeting on Sept. 18, 2007, at 86 (statement of Randall Kroszner).

[209] Id.

tainty about bank exposures."[210] Other Federal Reserve officials made similar observations.[211]

Because current theories fail to provide a term that conveys the challenge as one entailing information that was pertinent and knowable but not known to anyone, however, Federal Reserve policymakers were forced to describe the challenge in established, but less accurate, terms. For example, Federal Reserve officials often characterized the problem as a challenge of "uncertainty." This is not necessarily wrong, as the challenge was a problem of unknown unknowns. Yet, by failing to distinguish between Knightian uncertainty, which is exogenously determined and outside the power of anyone to control, and information gaps, this framing may have limited policymakers' appreciation of the types of tools that could be brought to bear.

Reflecting the fact that some policymakers recognized that the missing information was knowable and thus not traditional Knightian uncertainty, they at times instead invoked the notion of asymmetries to describe the challenges they were facing. For example, in assessing the market dysfunction that surrounded MBS, Bernanke explained:

> [W]e have seen the breakdown of a particular structure of lending that was based on the credit ratings. The credit ratings have proven to be false. Therefore, there is an informational deficit—an asymmetric information problem, would be my interpretation—which has, in turn, triggered a massive change in preferences.[212]

Bernanke is certainly correct that there was an "informational deficit."[213] Nonetheless, in choosing to frame the problem as an asymmetry, he is using a characterization that elides the fact that no one had the relevant information.

Language alone cannot solve difficult problems and there is no easy solution to the dynamics highlighted here. Nonetheless, that Federal Reserve officials lacked a term that accurately captured the information dynamics they saw as contributing to the market dysfunction during the

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[210] Id. at 74–75 (statement of Donald Kohn).

[211] See Judge, The First Year, supra note 175, at 879–81 (citing statements from the August 16, 2007, Federal Open Market Committee conference call and the September 18, 2007, Federal Open Market Committee meeting).

[212] Transcript of the Fed. Open Mkt. Comm. Meeting on Apr. 29–30, 2008, at 18 (statement of Ben Bernanke).

[213] Id.

Crisis certainly did not enhance, and may well have inhibited, their efforts to respond to those challenges. Expanding the conceptual framework to recognize information gaps and acknowledging how they contribute to fragility are thus critical steps to forging a more productive path toward addressing these issues.

V. LOOKING AHEAD

Identifying information gaps as among the factors contributing to the fragility of the shadow banking system raises a number of policy issues about the optimal level of information production, who should produce that information, when and how it should be disclosed, and the extent to which information-related challenges justify structural limits on shadow banking and other activities.

There are no easy answers to these questions, just as there is no easy way to create a system that fulfills the valuable economic functions currently played by the shadow banking system without simultaneously creating systemic risk, but they are critical questions to address. As reflected in the remarkable stability of the banking sector for most of the last century and the variation in the stability of different banking sectors across different countries, design features can meaningfully affect fragility.[214]

This Part distills some of the key lessons that can be derived from the analysis here. It begins by highlighting the need for a fundamentally new financial regulatory paradigm to govern shadow banking. It then considers the implications of this Article's insights with respect to shadow banking reforms underway and further reforms that may be warranted.

A. A New Regulatory Paradigm

One lesson is that the shadow banking system is a hybrid system, one that shares much in common with the capital markets and banks as traditionally constituted, but which cannot be fully understood within either paradigm. This raises important questions regarding regulatory competencies and the appropriate regulatory framework. It casts doubt, for example, on whether the SEC, as a securities regulator, is the best agency

[214] See generally Charles W. Calomiris & Stephen H. Haber, Fragile by Design: The Political Origins of Banking Crises and Scarce Credit (2014) (exploring how political institutions shape outcomes in banking systems); Calomiris & Gorton, supra note 159 (analyzing the institutional factors that historically contribute to the instability of the banking system).

to oversee money market mutual funds, which pose risks of the type normally addressed through prudential regulation. It also provides fresh support for the importance of institutions like the Financial Stability Oversight Council ("FSOC"), which brings together securities regulators and prudential regulators and asks them to cooperate to identify and address sources of systemic risk.

The analysis also suggests there might be real gains from deeper interdisciplinary engagement among academics and other experts. The different assumptions that various experts implicitly bring to the table are reflected in their distinct diagnoses of the Crisis and competing proposals for further reform. While sometimes glossed over by various framing devices, the differences often run quite deep.

For example, in recent work, Gilson and Kraakman expand the insights on the mechanisms of market efficiency to markets populated by instruments beyond equity claims and domains where primary markets dominate secondary ones. This leads them to conclusions that overlap with this Article's claims—lack of information and the costs of producing that information played important roles contributing to the scope of the Crisis.[215] While engaging in an institutional analysis that recognizes that the holders of many of the instruments issued in the shadow banking system may be disinclined to undertake any due diligence, they nonetheless identify more robust mandatory disclosure requirements as an important component of the optimal policy response.[216] Responding to that suggestion, economist Holmstrom is dismissive. In his view, "the logic behind transparency in stock markets does not apply to money markets."[217] According to Holmstrom, Gilson and Kraakman have the "wrong diagnosis of [the] problem" and that "to minimise the chance of new, perhaps worse mistakes, we need to analyse remedies based on the purpose of liquidity provision."[218]

The analysis here suggests that the optimal route forward may lie between these visions—on a path that incorporates Gilson and Kraakman's insights regarding the importance of information and information costs while also taking into account Holmstrom's insights regarding the distinct characteristics of money markets. Holmstrom's critique likely un-

[215] See Gilson & Kraakman, Information Costs, supra note 25, at 351–57.
[216] See id.
[217] Holmstrom, supra note 9, at 2–3 (citing Gilson & Kraakman, Information Costs, supra note 25).
[218] Id. at 3.

derestimates the fragility that arises from information gaps in financial systems dependent on capital from money claims and, thus, the potential value in reducing the size of those gaps in some settings. Yet Holmstrom's critique has merit. A core rationale for mandatory disclosure in securities regulations is that the issuer is the lowest cost producer of such information. In a world where the issuer of an instrument is a specially created vehicle holding complex assets, and the holders of the money claims that the vehicle will issue are relying on the complexity of the underlying assets to ensure that the issuer and its sponsor have no private information about the value of those assets, such an assumption does not hold.

Gilson and Kraakman have a partial response to this, as the specific disclosure regime they propose focuses on tracking the underlying credit instruments that provide financing to the real economy, so that those instruments can be more easily traced through the layers of fragmentation nodes in which those instruments are bundled with other instruments and new instruments are created.[219] Yet, in Holmstrom's analysis, the process of imposing such requirements could upset the very infrastructure on which such markets currently rely. Viewed through the lens of the stylized example of Akerlof's car market, the spirit of Holmstrom's critique is that subsidizing the development of technology that would allow buyers in the used car market to more easily identify lemons risks throwing the baby out with the bathwater by undermining the viability of the primary market.

The debate, of course, does not end there—just as a seller of new cars might use warranties or other mechanisms to overcome the introduction of new asymmetries, money markets may evolve in ways that allow money claimants to remain minimally informed despite regulatory changes that would lower the cost of producing pertinent information. Moreover, as Gilson and Kraakman highlight, their proposal is motivated not only by concerns about the markets in which these various financial claims trade, but also by the origination processes that produce the underlying assets. They view greater ongoing scrutiny of origination processes as an important mechanism for ensuring that those practices do not become excessively lax as a result of the information gaps that would otherwise exist.[220] The aim of this hypothetical back and forth is

[219] Gilson & Kraakman, supra note 25, at 354.
[220] See id. at 356.

not to resolve this debate but to highlight the important and quite different insights that both sides bring to the table.

Taking a step back, the analysis here highlights the value and limitations of each approach to assessing the challenges posed by shadow banking. Consistent with Holmstrom, this examination emphasizes the importance of recognizing that the institutional competencies of equity and money holders arise less from the nature of the holder and more from the nature of the claim that they hold. Many large, sophisticated investors hold both equity and money claims, but they hold the claims for different reasons: The equity claims are investments on which they hope to profit; the money claims are ways to store liquidity. No amount of information or other regulatory change is going to transform their approach to money claims to resemble their approach to equity claims. For this reason, reform proposals that expect market participants will engage in meaningful information gathering or that otherwise seek to force money claimants to act like holders of securities that are held for investment will fall short if not coupled with other reforms.

At the same time, the analysis here also suggests that fully embracing the alternative view sometimes advocated by those who understand banking—that we should accept instability as part of how the system works, applaud the massive support provided by the government during the Crisis, and extend the scope of the formal government safety net—would lead to reforms that are suboptimal for different reasons. The fact that shadow banking occurs in the capital markets raises important questions about the mechanisms for imposing discipline on the processes creating the underlying assets and the subsequent monitoring required to maintain the value of those assets, in addition to posing the fragility challenges highlighted here. Many mechanisms that promote stability come at the expense of robust discipline, and the optimal balance is unlikely to be achieved without a deep understanding of how discipline can and has been imposed in various settings. In highlighting the differences between money claims and equity claims and the current regulatory paradigms governing each, the analysis here provides critical groundwork for addressing the question of how best to regulate shadow banking.[221]

[221] This point is not novel, but the analysis adds flesh to the claim. See, e.g., Mehrling et al., supra note 9, at 1 (advocating "taking a different approach" that resists the "widespread impulse to frame the question of appropriate oversight and regulation of shadow banking as a matter of how best to extend the existing system of oversight and regulation as it is applied to traditional banking").

B. Implications for Reform

This Section considers the implications of this Article's insights on the post-Crisis reforms underway, proposals for further reform, and related policy issues. Because this Article is focused on only a subset of the challenges posed by shadow banking and makes no effort to measure the benefits, the aim here is not to chart the optimal path but to show how this Article's insights inform these ongoing debates.

1. Post-Crisis Reforms

The regulatory reforms already underway make important progress with respect to a number of the challenges highlighted here. For example, the new authority of the FSOC to designate nonbank financial institutions systemically significant and subject them to prudential oversight, coupled with the fact that the largest investment banks have all converted into or been acquired by bank holding companies, significantly expands the scope of the government's supervisory authority. This expansion should meaningfully reduce the magnitude of the information gaps arising from the shadow banking system. Another important development is the creation of the Office of Financial Research ("OFR"). The OFR, which supports the work of the FSOC, has broad authority not only to gather information but also to mandate standardization with respect to the ways financial institutions collect and report certain data. Depending on implementation, the OFR's work could go a long way toward addressing information gaps.[222]

Despite this real progress, core structural challenges remain. Money claims issued by nonbanks remain sizeable in amount and largely outside the prudential regulatory umbrella,[223] efforts to further reform mon-

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[222] See Office of Fin. Research, About the OFR, https://www.financialresearch.gov/about/ [https://perma.cc/8UJL-BSLH] (last visited Sept. 18, 2015) (stating the mission of the OFR is to "[p]romote financial stability by delivering high-quality financial data, standards and analysis for the Financial Stability Oversight Council and public").

[223] See William C. Dudley, President and Chief Exec. Officer, Fed. Reserve Bank of N.Y., Fixing Wholesale Funding to Build a More Stable Financial System (Feb. 1, 2013), http://www.newyorkfed.org/newsevents/speeches/2013/dud130201.html [https://perma.cc/PT22-U3GZ] (urging further reforms of the tri-party repo system and the money market mutual fund industry but noting that "even after such reforms, we would still have a system in which a very significant share of financial intermediation activity vital to the economy takes place in markets and through institutions that have no direct access to an effective lender of last resort backstop" (emphasis omitted)); Daniel K. Tarullo, Governor, Fed. Reserve Sys., Shadow Banking and Systemic Risk Regulation (Nov. 22, 2013),

ey market mutual funds remain contested,[224] and regulations implementing provisions of the Dodd-Frank Act targeting other aspects of the shadow banking system seem likely to fall short.[225] Just as importantly, the reforms adopted post-Crisis have done relatively little to reduce the complexity of financial instruments and institutions, and that complexity is a significant factor exacerbating information gaps. Many of the reforms also remain focused on institutions rather than markets, and the process of overseeing the former does not necessarily provide regulators a deep understanding of the latter, a notable shortcoming for reasons here revealed.

Recent work by the OFR on short-term secured lending and repo, two of the most significant nonbank money markets, illustrates both the progress made and the magnitude of the information gaps that remain.[226] In summarizing the findings, the head of the OFR stated: "Data available to regulators and market participants have improved since the [C]risis but remain insufficient to evaluate the risks or even the level of activity in these markets."[227] Although the OFR has a number of projects underway

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http://www.federalreserve.gov/newsevents/speech/tarullo20131122a.htm [https://perma.cc/226C-TM6C] ("Banks and broker-dealers currently borrow about $1.6 trillion, much of this from money market funds and securities lenders . . . ." (citing Fed. Reserve Bank of N.Y., Tri-Party Repo Statistical Data (Oct. 9, 2013), https://www.newyorkfed.org/medialibrary/media/banking/pdf/oct13_tpr_stats.pdf [https://perma.cc/6397-FWAV])).

[224] Compare, for example, Jonathan R. Macey, Why Investors Shouldn't Worry About Money Funds, Wall St. J. (June 3, 2011), http://www.wsj.com/articles/SB10001424052748704904604576335392541845616 (insisting that money funds, when properly managed, are inherently safe and advocating for the extension of deposit-insurance protection to money funds), with Jeffrey N. Gordon, Why Investors Should Worry About Money Funds, Wall St. J. (June 3, 2011), http://www.wsj.com/articles/SB10001424052702304520804576343093940388186 (finding the money-fund system to be "fragile and susceptible to systemic disruption" and arguing for a division of the industry into retail and institutional segments, among other wide-ranging reforms).

[225] E.g., Ryan Bubb & Prasad Krishnamurthy, Regulating Against Bubbles: How Mortgage Regulation Can Keep Main Street and Wall Street Safe—From Themselves, 163 U. Pa. L. Rev. 1539, 1544 (2015) ("The [Dodd-Frank] Act's approach [to addressing problems in the mortgage market] will produce little benefit in terms of improved incentives and will likely increase, rather than reduce, systemic risk by concentrating mortgage risk in systemically important financial institutions.").

[226] Viktoria Baklanova et al., Reference Guide to U.S. Repo and Securities Lending Markets 2 (Office of Fin. Research, Working Paper No. 15-17, 2015), http://financialresearch.gov/working-papers/files/OFRwp-2015-17_Reference-Guide-to-U.S.-Repo-and-Securities-Lending-Markets.pdf [https://perma.cc/37C6-KACH].

[227] Richard Berner, Dir., Office of Fin. Research, Demystifying U.S. Repo and Securities Lending Markets (Sept. 9, 2015), http://financialresearch.gov/from-the-director/2015/09/09/demystifying-u-s-repo-and-securities-lending-markets/ [https://perma.cc/Z5ZM-ZK6Q].

to address these and other informational shortcomings, its progress remains slow. More generally, the premise underlying the creation of the OFR is one for which there is little precedent. In banking, supervisors play an important role in monitoring bank activity, but the information generation in which they engage is coupled with the authority to take actions responsive to risks they identify.[228] The benefits of giving broad information-related powers to an entity that lacks further authority remain unclear.

Taking yet another step back reveals that the shadow banking system continues to grow, and we have yet to develop a workable paradigm that addresses the systemic risk that it poses. A shadow banking system subject to little supervision can work very well for an extended period of time. There are a variety of private mechanisms that can enable the issuance of money claims that are largely insensitive to most incremental information. Yet, over time, subtle shifts in asset quality and other risks can build up in the information gaps that spread along with the growth of the shadow banking system. When money claimants become concerned about the information they lack, the short-term nature of their commitments enable them to exit quickly and without penalty. And when money claimants withdraw en masse, the loss of that capital from a system that had come to rely on it is likely to have far-reaching effects. The growth of the shadow banking system may thus be fueled by decisions that are rational for the persons providing the capital enabling that growth while nonetheless socially suboptimal given the heightened systemic risk. This core challenge remains.

2. Structural Changes

Accepting that further reforms are needed, the question becomes what form should they take. Among the reforms for which this Article provides fresh support are structural reforms aimed at simplifying financial instruments and institutions, and the interconnections among them.[229] Information gaps, by definition, are a subset of pertinent and knowable in-

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[228] See supra Subsection I.B.2.

[229] See, e.g., Daniel K. Tarullo, Governor, Fed. Reserve Sys., Regulating Systemically Important Financial Firms (June 3, 2011), http://www.federalreserve.gov/newsevents/speech/tarullo20110603a.htm [https://perma.cc/N6MP-DKAL] (arguing the Federal Reserve Board's "regulatory structure for [systemically important financial institutions] should discourage systemically consequential growth or mergers unless the benefits to society are clearly significant").

formation. As complexity increases, so too does the amount of potentially pertinent information. Fragmentation nodes, for example, can produce financial instruments that are lower variance than any of the underlying assets.[230] At the same time, these structures transform previously irrelevant issues, like the correlation among the specific assets packaged into that fragmentation node and the contractual terms setting forth the rights of each class of the instruments subsequently issued, into information that is pertinent and not necessarily known by anyone.

Complexity can serve socially useful functions and is the byproduct of many legitimate activities, but it also creates frictions in the public and private mechanisms for dampening the ripples that can emanate from bad news and restoring stability when panic sets in. Particularly considering the significant heterogeneity in the degree and types of complexity embedded in different instruments and the probability that any benefits of opacity taper off beyond a certain point, the analysis thus provides fresh support for regulations that make it costlier for market participants to create relatively more complex instruments and other reforms targeting complexity.

Some structural reform proposals go further. Professors Morgan Ricks and Adam Levitin have each proposed reforms that would drastically curtail shadow banking, and others, like Gorton and Professor Metrick, have proposed more modest but still significant structural changes.[231] Most of these proposals suggest that the government should insure a greater swath of the money claims that get issued. In highlighting the importance of the information-cost savings that can arise through mandated simplicity and the ways that guarantees promote stability by rendering otherwise pertinent information irrelevant, the analysis here provides some new support for these proposals. That said, I remain skeptical that the more extreme reform proposals should be pursued at this juncture. Given the important economic functions the shadow banking system currently plays, the lack of information about the viability and costs of such reforms, and the possibility that having a robust shadow banking system might mitigate the macroeconomic effects of a panic in the banking sector, it is not yet clear that such reforms would be bene-

[230] E.g., Judge, Fragmentation Nodes, supra note 93, at 682; Mark J. Roe, Structural Corporate Degradation Due to Too-Big-To-Fail Finance, 162 U. Pa. L. Rev. 1419 (2014).

[231] See Ricks, The Money Problem, supra note 3, at 1–2; Gorton & Metrick, supra note 181, at 426; Adam J. Levitin, Safe Banking: Finance and Democracy, 83 U. Chi. L. Rev. 357, 357 (2016).

ficial.[232] Right now, we simply do not have the information we need to make an informed assessment of how the benefits stack up against the various costs such reforms could inflict.

3. State-Dependent Information Generation

Given the dramatic changes in banking and the growth of the shadow banking system, a complex financial system not fully understood by market participants or regulators is likely to be the new normal. The analysis here highlights how systemic risk can fester in the backwater of market participants' and regulators' ignorance. Information gaps not only increase the probability of a panic, but they also impose meaningful frictions on the processes required to restore stability when concerns arise. The analysis here thus supports claims that financial regulation will inevitably have an ex post dimension.[233] This Article's insights regarding the fragility arising from information gaps provides further support for the notion that information generation should be an important component of regulators' ex post strategies.[234]

The analysis here assumes that information is costly to generate and that the value of information and the effects of information gaps are state dependent. Less examined here, but developed further in other work, is the fact that there is often a meaningful temporal delay between the first signs indicating (and potentially triggering) a change in state and full-fledged market dysfunction.[235] Putting these pieces together suggests that an optimal regulatory approach may entail accepting information gaps, but then rapidly ramping up information production efforts when trouble first hits. Because the early signs of trouble and the market's response to those signs should provide a roadmap to the specific information gaps that are likely to be most problematic, such an approach might allow significantly greater tailoring with respect to the types of in-

[232] For a more comprehensive analysis of why such reforms may also fail to achieve their purported aims and may not reduce complexity, see Judge, The Importance of "Money," supra note 51.

[233] See, e.g., Iman Anabtawi & Steven L. Schwarcz, Regulating *Ex Post*: How Law Can Address the Inevitability of Financial Failure, 92 Tex. L. Rev. 75, 77 (2013) (arguing that when it comes to financial stability, "while relying exclusively on *ex ante* regulation might at first appear to be a desirable policy objective, it will always have to be supplemented by *ex post* regulation").

[234] See Judge, The First Year, supra note 175, at 843.

[235] See id. at 878.

formation produced.[236] Given the logistic and other challenges inherent in information production and the fact that regulators may well fail to recognize the early indicators of a crisis as such, this type of approach would not displace the need for ongoing information production, but it could alter and lessen that burden.

Other considerations favoring an ex post information production strategy are practical. Almost no one saw the Crisis coming and much of the information that proved critical once the Crisis hit was missing, precisely because no one had previously realized that it would be so pertinent. As reflected in the recent work by the OFR and other studies attempting to gauge the size and scope of the shadow banking system, even today massive information gaps remain, and there are likely other issues that may prove critical to the next period of systemic distress that are not even among those that regulators are now seeking to better understand. Recognizing the inevitability of information gaps and the ways more aggressive information generation activities during the early stages of a financial crisis might meaningfully contain its subsequent growth provide further support for the value of such strategies.[237]

C. Beyond Shadow Banking

Although focused on shadow banking, this Article's insights also have important implications for bank oversight. Simultaneous and intertwined with the growth of the shadow banking system has been the rise of a new breed of bank that does not fit the mold that worked so well during much of the twentieth century. These institutions are large, multinational organizations that engage in a wide array of investment banking and other activities traditionally disallowed for banks and their affiliates. Even apart from their interconnections with the shadow banking system, the scope of these institutions can make it difficult for bank supervisors and even bank management to understand a bank's risk exposures, creating yet new information gaps.[238]

Policymakers' interventions have not always been helpful on this front. Even the Volcker Rule, which proponents depict as the modern

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[236] See id. at 879.

[237] See id.

[238] See, e.g., Permanent Subcomm. on Investigations, U.S. S. Comm. on Homeland Sec. & Gov't. Affairs, 113th Congress, JPMorgan Chase Whale Trades: A Case History of Derivatives Risks and Abuses, 1 (2013); Roe, supra note 230, at 1419.

day version of the powerfully simplifying Glass-Steagall wall separating commercial banks and investment banks, makes little progress in this regard.[239] The Volcker Rule may reduce the risks that banking organizations can assume, but the implementing regulations create a complex maze of restrictions for banking organizations and their supervisors.

There are some helpful developments on the bank supervisory front. The ongoing use of stress tests, for example, seems quite helpful, particularly given that regulators seem to be using those tests to push banks to simplify their structures and operations.[240] Nonetheless, bank regulation today looks very different than yesteryear, when limits on bank activities had both the intent and effect of also simplifying banking and facilitating meaningful oversight.[241] This Article's analysis regarding the ways that information gaps enhance fragility thus also raises concerns about whether the reforms underway for banking are the best ways to enhance the resilience of that system.

CONCLUSION

Understanding the ways that the regulatory regimes that have grown up to govern capital markets and banking address the different incentives of money and equity claimants is critical to understanding the challenges posed by the shadow banking system. The current regulatory architecture was not designed to accommodate market-based institutions that could produce money claims. Nor does any single theoretical frame suffice to capture the benefits and costs of shadow banking. Only by recognizing the limits of established theoretical frames and the shortcomings inherent in the current regulatory architecture can we hope to create the new paradigm required for shadow banking. The information

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[239] See, e.g., The Impact of the Volcker Rule on Job Creators, Part II: Hearing Before the H. Comm. on Fin. Servs., 113th Congress. 100 (2014) (statement of Daniel K. Tarullo, Member, Board of Governors of the Federal Reserve System) (explaining that "the agencies found that a good bit of the complexity in the proposal was hard to avoid in the final rule" and explaining the reasons for that complexity).

[240] See, e.g., Daniel K. Tarullo, Governor, Fed. Reserve Sys., Stress Testing After Five Years, (June 25, 2014), http://www.federalreserve.gov/newsevents/speech/tarullo20140625a.htm [https://perma.cc/TU9X-6PL5] ("Because bank portfolios are often quite opaque and thus difficult for outsiders to value, this information should allow investors, counterparties, analysts, and markets more generally to make more informed judgments on the condition of U.S. banking institutions.").

[241] See, e.g., Garten, supra note 72, at 520 (explaining that the Glass-Steagall Act of 1933 "permitted the regulators to channel their efforts and expertise more efficiently").

dynamics highlighted here are central to that challenge. There is no easy fix, but by understanding the unique set of dynamics at play in this space, policymakers and other experts can begin to appreciate the ramifications of the decisions they are making.