

Information Gaps and Shadow Banking

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A financial system is fragile when small shocks can trigger large effects. The 2007-2009 financial crisis revealed the shadow banking system to be exceptionally fragile and capable of bringing down the rest of the financial system, yet the reasons for this fragility remain incompletely understood. This paper provides new insights into the mechanisms through which small shocks can trigger significant market dysfunction in the shadow banking system and the challenges impeding efforts to design a regulatory regime capable of supporting shadow banking.

This paper argues that information gaps—pockets of pertinent and knowable information that is not actually known to any party, private or public—contribute to fragility and help to explain the systemic risk posed by shadow banking. It makes two claims. First, there are structural reasons to expect sizeable information gaps in the shadow banking system. Second, those information gaps make panics more likely and exacerbate the magnitude of market dysfunction likely to arise from a panic.

In undertaking the structural analysis required to identify information gaps, the paper also sheds light on why attempts to reform the shadow banking system have been so contentious and unproductive thus far. The shadow banking system is a true hybrid. It earns its “shadow” status because it operates in the capital markets, and therefore outside the prudential regulatory regime that governs banks. Yet it also merits its status as a “banking system” because it performs many of the economic functions historically fulfilled by the banking system and poses similar threats to systemic stability. In situating the shadow banking system at the nexus of these two historically distinct regimes, the analysis helps explain why policymakers and other experts often come to the table with different, and sometimes contradictory, assumptions about how markets work and how regulation can most effectively promote market functioning. By laying this foundation, clarifying how shadow banking contributes to fragility, and identifying ways to reduce that fragility, the paper also forges the beginnings of a more productive path forward.

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Introduction

Traditionally, the United States had two parallel and largely independent regimes for moving capital from persons who have it to persons who need it—the capital markets and the banking system. Both regimes served the socially useful function of providing financing for productive undertakings, but each raised 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 came from the issuance of money claims.¹ Equity claims, such as common stock issued by a public corporation, are typically perpetual claims, the value of which can fluctuate significantly and is typically realized only through trading in a secondary market. In contrast, money claims, which include standard instruments like demand deposits issued by a bank and

¹ See *infra* Part I.A.

more innovative instruments like short-term commercial paper backed by highly rated collateral with a value in excess of the commercial paper issued, are typically very short-term instruments that allow the holder to walk away, at par. The prominent role played by these different types of financial claims helped enable the two systems to play distinct additional roles: The capital markets produced information and facilitated corporate governance while banks served as the backbone of the payment system and facilitated liquidity and maturity transformation.² It also resulted in two very different regulatory regimes.³ 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 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.⁴ With the benefit of hindsight, it is evident that this system had been growing for decades prior to the Crisis.⁵ 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 and other experts began to recognize its distinctiveness and importance.⁶ Recent estimates suggest that the shadow banking system in the United States is larger than banking system and poised for further growth.⁷

² See *infra* Part I.B.

³ *Id.*

⁴ How best to define the shadow banking system is a matter of ongoing debate. This paper makes no effort to resolve this issue, as the dynamics here at issue are widely recognized as core to shadow banking however defined. *E.g.*, MORGAN RICKS, *THE MONEY PROBLEM: THE MONETARY ORIGINS OF FINANCIAL INSTABILITY* 103-45 (forthcoming 2016) (on file with author) (explaining that the term “‘shadow banking’ ... has come to mean different things to different people,” but at the Treasury Department during the Crisis, “the term meant ... the financial sector’s use of vast amounts of short-term debt [i.e., money claims] to fund portfolios of financial assets”); ZOLTAN POZSAR ET AL., FED. RESERVE BANK OF N.Y., STAFF REP. NO. 458, *SHADOW BANKING*, at 1 (2010), available at <http://ssrn.com/abstract=1645337> (explaining how “the shadow banking system provide[s] sources of funding for credit by converting opaque, risky, long-term assets into money-like, 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, 626 (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’”).

⁵ See *infra* Part II.A.

⁶ *E.g.*, Morgan Ricks, *Shadow Banking and Financial Regulation* (Columbia Law Sch. Law & Econ. Working Paper Grp., Paper No. 370), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1571290 (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.”); 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* 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”). See also *infra* Part IV.

⁷ INTERNATIONAL MONETARY FUND, *GLOBAL FINANCIAL STABILITY REPORT: RISK TAKING, LIQUIDITY, AND SHADOW BANKING—CURBING EXCESS WHILE PROMOTING GROWTH* 66 (2014) (stating that “only in the United States do shadow banking assets exceed those of the conventional banking system”); see also *infra* Part II.A (summarizing recent data on the size and growth of shadow banking).

Beyond its size and systemic importance, experts and policymakers have yet to reach a consensus on numerous fundamental issues. Why the shadow banking system exists, the value that it creates, the nature of the systemic and other risks that it poses, and the role that regulation can and should play in addressing those risks are all matters that remain incompletely understood and often contested.⁸ Beyond disagreeing about the best path forward, experts accuse others of fundamentally misunderstanding that which they are seeking to regulate.⁹ As a result, many important elements of the system have been largely overlooked in the post-Crisis reforms.¹⁰ And, even in the sectors of the shadow banking system where reform is underway, those efforts have been slow and remain contentious.¹¹

This paper helps forge a more productive path forward. By marrying insights from historically distinct fields with an understanding of the regulatory architecture, it identifies an important and largely overlooked mechanism through which shadow banking contributes to systemic risk. It first shows that there are structural reasons to expect massive information gaps in the shadow banking system. By juxtaposing the information-related incentives of the primary providers of capital against the default regulatory regime governing shadow banking, the paper reveals that it will often be the case that no one has the incentive and means to develop a robust understanding of the financial assets funded through the shadow banking system and how risks are allocated across that system. The paper identifies such “information gaps” as an important category of informational dynamic and one that has yet to be identified and examined in the literature. Second, the paper argues that while information gaps have no adverse effect

⁸ See *infra* Part V.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” at 6 (BIS Working Papers No 479, 2015) available at <http://www.bis.org/publ/work479.pdf> (arguing that “[t]he 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* (working paper, 2013), available at <http://ssrn.com/abstract=2232016> at 1-2 (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”).

¹⁰ E.g., William C. Dudley, President, Fed. Reserve Bank of N.Y., Remarks at the New York Bankers Association’s 2013 Annual Meeting & Economic Forum: Fixing Wholesale Funding to Build a More Stable Financial System (Feb. 1, 2013) (“[W]e have not come close to fixing all the institutional flaws in our wholesale funding markets,” a core component of the shadow banking system); Ben. S. Bernanke, Chair, Bd. Of Governors of the Fed. Reserve, Speech at the 49th Annual Conference on Bank Structure and Competition (May 10, 2013) available at <http://www.federalreserve.gov/newsevents/speech/bernanke20130510a.htm> (stating that “regulators and the private sector need to address remaining vulnerabilities” in the shadow banking system); Viral V. Acharya et al., *Prologue: A Bird’s-Eye View, the Dodd-Frank Wall Street Reform and Consumer Protection Act, in REGULATING WALL STREET: THE DODD FRANK ACT AND THE NEW ARCHITECTURE OF GLOBAL FINANCE*, 1, 8 (Viral V. Acharya et al. eds., 2010) (noting that the Dodd-Frank Act “makes important omissions in reforming and regulating parts of the shadow banking system”).

¹¹ See *infra* Parts II and V.

on market functioning so long as markets are functioning well, they amplify the degree of market dysfunction that is likely to result from any shock to that system. Information gaps increase the probability of a widespread panic and impede the market and regulatory processes required to achieve a new equilibrium once panic takes hold. The greater the information gaps, the greater the dysfunction we should expect.

The structural analysis that underlies this paper's two claims also helps to explain why the debate over shadow banking has been so contentious and unproductive thus far. Because of the historical separation between the capital markets and banks as providers of financing and the different assumptions that animate securities law and prudential regulation, most regulators and other experts have a deep understanding of only one of the two domains. This leads to different, and sometimes contradictory, inclinations about the optimal regulatory response to a given challenge.¹² The hybrid nature of the shadow banking system means that the value it creates and the risks that it poses cannot be fully understood or effectively addressed within either of the established paradigms for financial regulation. This paper illuminates the ways that capturing the benefits of this new system while managing the systemic and other risks that it poses requires insights and tools from both domains.

The paper begins by providing the first comprehensive account of how securities and bank regulation have evolved to address the distinct informational needs of the equity and money claimants, respectively. Equity claimants are strongly incentivized to gather and analyze information.¹³ Securities regulation harnesses and facilitates these inclinations through a regime that relies on market participants to engage in the hard work of assessing the value of assets underlying equity claims. The primary role of regulation is to facilitate these market-based processes.¹⁴ Money claimants, by contrast, tend to be skittish and minimally informed.¹⁵ 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.¹⁶ 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 operates largely in the capital markets. This means that the institutional arrangements that issue the money claims through which capital flows to the rest of the shadow banking system are regulated, if all, by the disclosure-oriented regime that designed to govern equity claims and other investments.¹⁷ But money claimants do not have the same incentives as investors—they will walk away before engaging in

¹² See *infra* Part I (contrasting securities regulators' predilection for disclosure and enforcement with bank regulators' predilections toward confidentiality and forbearance).

¹³ See *infra* Part I.A.1.

¹⁴ See *infra* Part I.B.1.

¹⁵ See *infra* Part I.A.2.

¹⁶ See *infra* Part I.B.2.

¹⁷ See *infra* Part II.A.

meaningful information collection and analysis.¹⁸ This has little to do with the nature of the claimants, who are often the same sophisticated parties that engage in the information-generating activities that promote efficiency in the equity markets. Rather, it is inherent in the nature of money and the reason why holders acquire money claims. Money claims cease to fill this function if a money claimant perceives there to be any meaningful credit risk, or even if the holder is uncertain about the amount of credit risk a claim poses.¹⁹ Yet, in contrast to the banking system, there is no body of informed and powerful regulators who can step in to assure money claimants or minimize the effects of their departure because there is no comparably robust oversight regime. As a result, it will often be the case that *no one* has high-quality information about assets underlying the shadow banking system and how risks are allocated across that system.

In undertaking this structural analysis, this paper reveals a shortcoming in the extensive literature on information, ignorance, and market functioning. One of the frames most commonly used to examine these dynamics focuses on how information is distributed among parties. When one person has information, a second lacks it, and costs or other frictions limit the first person's ability to credibly convey that information to the second the result is an "information asymmetry." As George Akerlof famously demonstrated with respect to the used car market, in a world where some cars are lemons, others are cherries, and a seller knows more than would-be buyers about which type of car she is selling, information asymmetries can prevent otherwise efficient transfers.²⁰ A second common paradigm builds on a dichotomy proposed by Frank Knight for categorizing information that is pertinent but lacking. In Knight's analysis, when the "the distribution of the outcome in a group of instances" is known, it is a risk; uncertainty, by contrast, is "not susceptible to measurement."²¹ The risk-uncertainty dichotomy is useful because there are tools that can be used to manage risks that are not available when one is instead confronting an "unknown unknown." While there is a large body of literature working within and going beyond these basic frames, the continued importance of information asymmetries and uncertainty in efforts to understand market dysfunction is

¹⁸ See *infra* Part I.A.2.

¹⁹ *Id.*

²⁰ George 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 incentivizing market participants to engage in costly information collection and analysis. See *infra* Part III.B.

²¹ FRANK H. KNIGHT, RISK, UNCERTAINTY AND PROFIT 232 (2006 republication of 1957 ed.). True Knightian uncertainty is usually presumed to be unknowable. E.g., 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"); Daniel A. Farber, *Uncertainty*, 99 GEO. L.J. 901, 901 (2011) ("Economists distinguish between 'uncertainty' (where the likelihood of the peril is nonquantifiable) and 'risk' (where the likelihood is quantifiable)."); MILTON FRIEDMAN PRICE THEORY: A PROVISIONAL TEXT 282 (1976 ed.) ("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."). This may elide aspects of Knight's original analysis.

affirmed by the frequency with which these two concepts were invoked by policymakers throughout the Crisis.²²

The shadow banking system creates an informational challenge that does not fit neatly in either of these frames and which has yet to be developed in the more extensive literature. Because much of the capital flowing into the system comes from minimally informed money claimants and yet there is no robust oversight regime, there are large and often growing pockets of pertinent and theoretically knowable information not actually known by any market participant or regulator. This paper identifies such “information gaps” as a distinct and important informational dynamic. The analysis here further reveals that even when policymakers used the terms information asymmetry and uncertainty during the Crisis, they often were seeking to describe dynamics that are more accurately characterized as information gaps.²³ The distinction, while sometimes subtle, is critical, as the types of market forces that will be operational and the policy levers available to regulators are different when the challenge is one of knowable but unknown information.²⁴

A primary reason that information gaps can grow so large in the shadow banking system is that the ways these gaps affect market functioning are often state contingent. Because the shadow banking system is built on money claims, a high degree of ignorance among claimants is the norm. Information gaps thus do little to detract from market functioning so long as confidence reigns and may even facilitate it.²⁵ In the face of a signal indicating that some money claims may not be backed by sufficient collateral to merit being treated as if information insensitive, however, the situation changes dramatically. Information gaps increase the probability of widespread panic because money claimants will run not only when the 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 greater risk than previously believed.²⁶ Further accentuating the systemic risk arising from information gaps, those gaps impede the market and regulatory processes that can blunt the adverse effects of a run and help the market achieve a new equilibrium.²⁷ Holders of informed, loss-bearing capital will not enter to counteract the vacuum created by the disappearance of money claimants without information about the actual value of the underlying assets. The less information such market participants have and the greater the costs of that due diligence, the longer it is going to take for such capital to enter the greater the probability such investors will remain on the sidelines rather than undertaking the necessary diligence.²⁸ Similarly, the government cannot readily deploy information injections, appropriately priced guarantees, and the other devices it can use to mitigate the systemic repercussions of these dynamics when it too lacks high-quality information.²⁹ Recognizing and understanding the importance of

²² See *infra* Part IV.C.

²³ See *infra* Part IV.C.

²⁴ See *infra* Part III.C.

²⁵ See *infra* Part III.B.

²⁶ See *infra* Part III.C.

²⁷ *Id.*

²⁸ *Id.*

²⁹ *Id.*

information gaps are thus critical steps in efforts to address the systemic risk arising from shadow banking.

This paper 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 shadow banking—what it is and why it does not fit comfortably in the current regulatory regime. 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 and sustainable equilibrium once panic sets in. Part IV draws on critical episodes from the Crisis to establish that the data available is consistent with this paper’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 both types of claims. In so doing, it synthesizes insights from disparate bodies of scholarship that have yet to be well integrated. 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 when it comes to corporate governance and securities regulation, this type of 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 many differences in banking and securities regulation.

A. Equity v. money

There are a wide variety of financial instruments that can be used to raise capital and money claims and equity claims, in some regards, are merely two ends of a long and very rich spectrum. In focusing just on these two types of claims while ignoring the range of other debt instruments that are regularly issued and in invoking equity as the paradigmatic claim trading in the capital markets prior to the rise of shadow banking, this paper is necessarily presenting a stylized account of the markets and regulatory regimes it is describing. At the same time, the paper invokes this stylized account because there are some dimensions along which equity and money claims and the public and private institutions supporting the issuance of each differ in more fundamental ways. This paper assumes and seeks to show that particularly when systemic dynamics are taken into account, money markets are sufficiently distinct to be different in kind.

1. Equity claims

Equity claims are investments. Persons deploy capital into equity in hopes that the value of the claim they are acquiring will go up, and 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—the issuer has no right to redeem the claim and the holder has no right to put the claim to the issuer—so the value that a holder can realize is entirely dependent on what another market participant is willing to pay for the claim.

These characteristics contribute to equity markets being information-rich environments. A primary way that investors seek to maximize the probability that their investments will go up more than down (and, ideally, go up more than other equally risky investments) is by gathering and analyzing information relevant to the value of possible claims. 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.³⁰ Nonetheless, the prices at which securities trade are set largely by relatively informed investors.

As Ronald Gilson and Reiner Kraakman explained in their landmark article on the mechanisms of market efficiency and subsequent work on the topic, 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.”³¹ “The lower the cost of information, the wider its distribution, the more effective the operative efficiency mechanism and, finally, the more efficient the market.”³² 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.³³

Critical to the analysis here is that Gilson and Kraakman’s analysis presumes numerous, dispersed traders, often with the aid of reputational and other intermediaries, engaging in ongoing “efforts to acquire additional information, efforts to refine forecasts and deepen the predictive value of information already in hand, and efforts to determine

³⁰ 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.”). *See also* Sanford J. Grossman & Joseph E. Stiglitz, *Information and Competitive Price Systems*, 66 AM. ECON. REV. 246 (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.”).

³¹ 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 [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

³² Ronald J. Gilson & Reinier Kraakman, *The Mechanisms of Market Efficiency Twenty Years Later: The Hindsight Bias*, 28 J. CORP. L. 715, 716-17 (2003).

³³ *See infra* Part III.A. (examining these dynamics).

the accuracy of information already in hand.”³⁴ Traders undertake these efforts, even though they are costly, because they are rewarded for doing so; and, critically, the processes through which they are rewarded are the same mechanisms that enhance price accuracy. These processes are continuous and iterative. Market prices are constantly—and contiguously—moving up and down as traders obtain new information, revise their analyses, and buy or sell in light of that information. As described by economist Bengt Holmstrom, “[e]very piece of information about the value of a firm is relevant for pricing its share,” “[t]his is reflected in the billions of dollars that investment banks and other[s]... spend on learning about firms,” and the result is “[a] continuous flow of information ... into the stock market.”³⁵

That the primary reason a person puts capital into equity is the expected return on that investment does not mean that claim holders are indifferent to other attributes of the claims that they hold. Even here, liquidity matters.³⁶ Nonetheless, investors are often willing to accept a high degree of variance and reduced liquidity when justified by the expected return on an investment. Just as importantly, the perpetual nature of equity claims means that whenever one claimant seeks to exit, another person must come in to acquire the claim. There is no direct impact on the issuer or change in the financial claims outstanding as a result of the transaction.

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.³⁷ 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 a small but influential group of financial economists are starting to highlight, the economics and function of money claims are dramatically different than equity claims. Persons deploy capital into money claims when they place a premium on being able to convert that claim into cash quickly and at par. They are so deploying the capital because they prioritize liquidity and safety over the expected rate of return on their capital.³⁸

³⁴ Gilson & Kraakman, *MOME*, *supra* note 30, at 565.

³⁵ Holmstrom, *supra* note 11, at 7.

³⁶ E.g., Viral V. Acharya, Yakov Amihud, & Sreedhar T. Bharath, *Liquidity Risk of Corporate Bond Returns: A Conditional Approach*, 110 J. of FIN. ECON. 358 (2013); Yakov Amihud & Haim Mendelson, *Asset Pricing and the Bid-Ask Spread*, 17 J. of FIN. ECON. 223 (1986).

³⁷ E.g., Jeffrey N. Gordon, *The Rise of Independent Directors in the United States, 1950-2005: Of Shareholder Value and Stock Market Prices*, STAN. L. REV. 1465, 1469 [hereinafter Gordon, *Independent Directors*]; John C. Coffee, Jr. and Hillary A. Sale, *Redesigning the SEC: Does the Treasury Have a Better Idea?*, 95 VA. L. REV. 707, 709, n.5 (2009) (arguing that “transparency improves corporate governance”); Mark J. Roe, *Corporate Law’s Limits*, 31 J. LEGAL STUD. 233, 243-44 (2002); Paul Mahoney, *Mandatory Disclosure as a Solution to Agency Problems* 62 U. CHI. L. REV. 1047 (1995); Marcel Kahan, *Securities Law and the Social Costs of “Inaccurate” Stock Prices*, 41 DUKE L. J. 977 (1992).

³⁸ E.g., 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 and credit unions, expect to be able to obtain cash from their funds virtually on demand, and they expect that the value of their investments will not decline in nominal terms.”); Gary B. Gorton, Andrew Metrick & Lei Xie, *The Flight from Maturity* at 10 (NBER Working Paper No. 20027, 2015) *available at*

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,³⁹ but a person will only treat a claim like money, rather than an investment, when he expects to be able to exit at par.⁴⁰ 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.⁴¹ It also changes the effects of any decision by a money claimant to exit, as it is the issuer rather than the claimant that bears the burden of seeking a replacement if needed to counteract the effects of that loss of capital.

Like equity claims, money claims serve a number of socially useful functions, including facilitating transactions and serving as reliable store of value over time.⁴² 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 right about one-third of all financial assets in the U.S. system since 1952, despite dramatic changes in the size and composition of that system.⁴³

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, money markets tend to be information sparse. This in part a byproduct of the structure of money claims—because they are exceptionally low-variance instruments, holders typically little reason to incentive to generate private information and anything beyond quite modest information-generating activities are cost prohibitive.⁴⁴ It further reflects the fact that these markets often overcome the classic challenge that information asymmetries can inhibit market functioning in quite different ways. 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

www.nber.org/papers/w20027 (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”).

³⁹ *E.g.*, GARY B. GORTON, MISUNDERSTANDING FINANCIAL CRISES: WHY WE DON’T SEE THEM COMING 19 (2012) (noting that “only the government is able to provide completely riskless collateral”).

⁴⁰ *Id.*, at 28 (explaining that “in order for [a financial claim] to be used as money ... it must not trade at a fluctuating discount to and it must not be vulnerable to the fear of a sudden discount from par if information about a coming recession arrives”). *See also infra* Part III.B., Fig. 1 (graphically depicting how this is possible).

⁴¹ The omnipresent exit right can also play an important role disciplining issuers of money claims. *E.g.*, Charles Calomiris & Charles M. Kahn, *The Role of Demandable Debt in Structuring Optimal Banking Arrangements*, 81 AM. ECON. REV. 497 (1991).

⁴² *See generally* Douglas W. Diamond & Raghuram G. Rajan, *Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking*, 109 J. POL. ECON. 287 (2001); BENGT HOLMSTRONG & JEAN TIROLE, *INSIDE AND OUTSIDE LIQUIDITY* (2011).

⁴³ Gary Gorton, Stefan Lewellen & Andrew Metrick, *The Safe-Asset Share*, 102 AM. ECON. R. 101, 104-05 (2012).

⁴⁴ As explained by Calomiris and Kahn, one reason for the sequential service constraint on money claims issued by banks is to reward those money claimants who engage in information-generating activities and thus to incent the optimal degree of discipline. Calomiris & Kahn, *supra* note 41.

information.⁴⁵ 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.⁴⁶

As Holmstrom has explained, “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.”⁴⁷ Economist Gary Gorton and others similarly suggest that the defining characteristic enabling a claim to function as money is that it is effectively “information insensitive.”⁴⁸ As Gorton and his co-author George Pennacchi explained in a paper that shed critical addition light on the concept of “information sensitivity,” one can define a “liquid security,” the critical feature of a money claim, as one “that it can be traded by uninformed agents, without loss ... to anyone with private information.”⁴⁹

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 the capital markets promote the dissemination and analysis of information. While other details vary,⁵⁰ the supporting institutions share in common design features that make it unrewarding and 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.”⁵¹ Focusing on banks, Gorton similarly argues that “[t]he efficient use of bank claims as money entails *eliminating* informative financial markets, so that banks are opaque,” and this is what enables the money claims banks issue to be “accepted at par.”⁵² In other work, Holmstrom, Gorton and other co-authors show that debt is the optimal instrument to underlie money claims because it is less sensitive to public or private information than equity.⁵³

Another reason money claims are often collateralized by debt is that so long as there is no default on the money claim, accurate information about the value of the underlying debt instrument is not required at the time the money claim is created or when it is paid off.⁵⁴ That the value of assets underlying a money claim never need to be

⁴⁵ E.g., Holmstrom, *supra* note 9, at 6 (explaining how a “blissful state of ‘symmetric ignorance’” can create a “market will ... free of fears of adverse selection and therefore very liquid”).

⁴⁶ *Id.*

⁴⁷ *Id.* at 2.

⁴⁸ There are important limitations in this framing. See *infra* Part III.C.

⁴⁹ Gary Gorton & George Pennacchi, *Financial Intermediaries and Liquidity Creation*, 45 J. FIN. 49, 50 (1993). This work builds on insights from Douglas Gale & Martin Hellwig, *Incentive-Compatible Debt Contracts: The One-Period Problem*, 52 REV. ECON. STUDIES 647 (1985).

⁵⁰ Compare, e.g., Part I.B.2 (describing how banks produce money claims) with Part II.A. (describing how shadow banks produce money claims).

⁵¹ Holmstrom, *supra* note 9, at 3.

⁵² Gary Gorton, *The Development of Opacity in U.S. Banking*, 31 YALE J. ON REG. 825 (2013). See also Tri Vi Dang, et al., *Banks as Secret Keepers* (NBER Working Paper No. 20255, 2015) at <http://www.nber.org/papers/w20255>.

⁵³ Tri Vi Dang, Gary Gorton & Bengt Holmstrom, *Ignorance, Debt and Financial Crises* 3 (Yale University working paper, 2015) at http://www.columbia.edu/~td2332/Paper_Ignorance.pdf.

⁵⁴ *Id.* It has long been recognized that one advantage of debt generally is that such claims can be satisfied without having to precisely assess the value of the firm or underlying assets. Robert M. Townsend, *Optimal Contracts and Competitive Markets with Costly State Verification*, J. OF ECON. THEORY 265 (1979);

valued precisely, so long as everything goes well, is important in part because short-term refers to the nature of the commitment that the 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. This is important to the economics of these relationships, as even without due diligence, deciding what type of money claim to acquire can entail costs. It is also has important systemic ramifications, as money claims typically fund longer term and less liquid assets. The net effect is that money claims can provide a seemingly stable source of financing. 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 feature 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 adverse systemic disruptions.⁵⁵ The most famous illustration of these dynamics comes from Diamond and Dybvig who showed that in the context of banks, coordination problems alone can theoretically explain runs.⁵⁶ 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 some 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 others to withdraw en masse.⁵⁷

This inherent fragility and the externalities that typically 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, despite the inherent fragility of any intermediation system that relies on money claims to fund less liquid assets. The informational dynamics highlighted here shed helpful additional light on the when and why of runs and can provide an information-related explanation for specific runs that have, perhaps incorrectly, been characterized as “sunspots” brought about by coordination problems.⁵⁸

That money claimants prioritize certainty does not mean that holders care about nothing else. Just as equity claimants are not indifferent to liquidity, money claimants are not indifferent to return. Holding all else equal, holders of money would prefer to earn a slightly higher rate of return. They may even be willing to accept a slightly greater level of risk in exchange for the higher rate of return. Nonetheless, variation along these

Douglas Gale & Martin Hellwig, *Incentive Compatible Debt Contracts: The One-Period Problem*, 52 REV. ECON. STUD. 647 (1985).

⁵⁵ RICKS, THE MONEY PROBLEM, *supra* note 4, at ____.

⁵⁶ Douglas W. Diamond & Philip H. Dybvig, *Bank Runs, Deposit Insurance, and Liquidity*, 91 J. POL. ECON. 401, 402 (1983).

⁵⁷ *Id.*

⁵⁸ See *infra* Parts III.C and IV.A.

dimensions is always constrained by the overarching requirement that the claims be exceptionally low risk and short-term.

This brief summary of the differences between equity markets and money markets is descriptive, not normative. Just because concerns about adverse selection can be overcome either through mechanisms that make everyone informed or through mechanisms that facilitate mutual ignorance does not mean that the two approaches are normatively equivalent. Each has distinct advantages and drawbacks.⁵⁹ The aim of this section is merely to highlight the magnitude of the differences in the conditions required to support the production of money claims and those that support the creation and trading of 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.⁶⁰ The banking system and the capital markets each suffered some setbacks, and banking and securities regulations were revised accordingly, but the fundamental tenets underlying each regime largely remained intact. This Part suggests that one reason for this extended period of stability is that each regulatory regime was well suited to support the distinct informational needs and incentives of the persons providing the capital that supported the regime.

Historically, equity claims were the paradigmatic claim of the capital markets and banks were the primary source of money claims. Thus, securities regulation evolved to support the creation and trading of equity claims. Bank regulation, meanwhile, largely evolved to support the production of money. This resulted in two effective, but also very different, regulatory regimes. The focus here is on how those regimes functioned prior to the rise of the shadow banking system.⁶¹

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.⁶² By making it easier for an investor to obtain timely information about a firm's performance and prospects, and by requiring that such information be provided in a form that is standardized across issuers, these requirements are designed to promote informational efficiency by reducing the costs that investors incur to obtain and analyze pertinent information.⁶³

⁵⁹ For a further discussion of both, *see infra* Part III.

⁶⁰ Ben S. Bernanke, Governor, Fed. Res., The Great Moderation (February 20, 2004) *available at* <http://www.federalreserve.gov/BOARDDOCS/speechES/2004/20040220/default.htm> (describing how output volatility “declined significantly between 1955 and 1970”); GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, at 4 (noting that the “‘Quiet Period’ in U.S. history: the years 1934–2007 saw no systemic financial crises”).

⁶¹ *See infra* Part V.C.

⁶² *See* JOHN C. COFFEE, JR., HILLARY A. SALE & M. TODD HENDERSON, SECURITIES REGULATION: CASES AND MATERIALS 155–200 (13th ed. 2015).

⁶³ *E.g.*, 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

These mandatory disclosure obligations are buttressed by rules that impose liability for noncompliance and prohibit fraud and manipulation.⁶⁴ 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.⁶⁵ A third component of U.S. securities regulation prohibits insider trading, limiting the ability of management to profit from their superior access to information.⁶⁶ Even these rules may support the processes through which share prices come to contain information about a firm's relative value.⁶⁷

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 actual value of claims issued.⁶⁸ The role of securities regulators is, instead, to promulgate and enforce rules that ensure investors have access to timely and accurate information.⁶⁹ As 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."⁷⁰

There has been debate about the need for law to play the roles that it currently does facilitating the dissemination of information, 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.⁷¹ That share prices

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"); John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 745 (1984) (explaining why even in an efficient market "a case can still be made for a mandatory disclosure system").

⁶⁴ COFFEE ET AL., *supra* note 62, at 921-37.

⁶⁵ E.g., Zohar Goshen & Gideon Parchomovsky, *The Essential Role of Securities Regulation*, 55 DUKE L. J. 711, 715 (2006) [hereinafter Goshen & Parchomovsky, *Securities Regulation*] (arguing that securities regulation should and does benefit primarily "information traders, [who] . . . specialize in gathering and analyzing general market and firm-specific information [and who are the group of traders] . . . that can best underwrite efficient and liquid capital markets"); see also Merritt B. Fox, *Civil Liability and Mandatory Disclosure*, 109 COLUM. L. REV. 237, 241 (2009) (explaining the value of civil liability for fraud and how the regime could be reformed to better reflect modern understandings of the benefits of mandatory disclosure).

⁶⁶ DONALD C. LANGEVOORT, INSIDER TRADING: REGULATION, ENFORCEMENT & PREVENTION §§ 1:1-6 (2014).

⁶⁷ See, e.g., Goshen & Parchomovsky, *Securities Regulation*; Zohar Goshen & Gideon Parchomovsky, *On Insider Trading, Markets, and "Negative" Property Rights in Information* 87 VA. L. REV. 1229 (2001). 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 (1983); HENRY G. MANNE, INSIDER TRADING AND THE STOCK MARKET (1966).

⁶⁸ JOEL SELIGMAN, THE TRANSFORMATION OF WALL STREET: A HISTORY OF THE SECURITIES AND EXCHANGE COMMISSION AND MODERN CORPORATE FINANCE 70 (3d ed. 2003).

⁶⁹ E.g., Coffee & Sale, *supra* note 37.

⁷⁰ *Id.* at 777-78.

⁷¹ E.g., EDMUND W. KITCH, THE THEORY AND PRACTICE OF SECURITIES DISCLOSURE, 61 BROOK. L. REV. 763, 846-57 (1995); Roberta Romano, *Empowering Investors: A Market Approach to Securities Regulation*, 107 YALE L.J. 2359 (1998); George Benston, *Required Disclosure and the Stock Market: An Evaluation of the Securities Exchange Act of 1934*, 63 AM. ECON. REV. 132 (1973).

contain information about the value of the claims traded and that it is market participants, not regulators, who make the substantive assessments about the value of those claims is widely assumed and expected. This assumption marries well with the nature of equity claims—by giving holders a 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 would be irrespective of the regulatory regime. The regulatory regime works because it harnesses and facilitates the pre-existing 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.⁷² And, one ramification of this combination of complementary institutions is that even an investor who does not undertake any due diligence to 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 work thus 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 under-enforcement.⁷³ 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.⁷⁴ To become a bank, a firm must undergo an intensive chartering process.⁷⁵ 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

⁷² *E.g.*, Gilson & Kraakman, *Information Costs*, *supra* note 31.

⁷³ *See, e.g.*, Coffee & Sale, *supra* note 37, 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.”).

⁷⁴ RICHARD CARNELL, JONATHAN MACEY & GEOFFREY MILLER, *THE LAW OF FINANCIAL INSTITUTIONS* 57 (5th ed. 2013) (“Banking is among the world’s most heavily regulated industries.”)

⁷⁵ *Id.* at 71-73 (describing the chartering process).

supervisors to understand those risks.⁷⁶ 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 bank regulators, bank examiners regularly undertake a close examination of virtually every aspect of a bank's operations.⁷⁷ These processes provide bank regulators a comprehensive picture of a bank's operations and risk exposures.⁷⁸ 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.⁷⁹

Also critical to this regime is the ability (and, sometimes obligation) of bank regulators to close a financially distressed bank.⁸⁰ Notably, bank regulators do not need to wait for a bank to be insolvent or unable to pay its debts as they become due to force a bank into receivership. Rather, they can close a bank on a range of different bases that suggest a bank is unlikely to regain its health.⁸¹ This regime gives banks 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.⁸² Overall, “[t]he FDIC enjoys a level of control that a dominant creditor could only dream of obtaining in bankruptcy.”⁸³ This is justified in significant part by virtue of insuring many of a bank's money claims, is usually the dominant residual claimant when a bank fails.⁸⁴

The scope of this regime can largely be explained by the incentives of money claimants and the systemic ramifications of banking panics. Put succinctly, 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. Just as importantly, it reduces the systemic risk arising from the other mechanism that enables

⁷⁶ See, e.g., Kathryn Judge, *Interbank Discipline*, 60 U.C.L.A. L. REV. 1262 (2013); Helen A. Garten, *Regulatory Growing Pains: A Perspective on Bank Regulation in a Deregulatory Age*, 57 FORDHAM L. REV. 501, 520 (1989).

⁷⁷ BD. OF GOVERNORS OF THE FED. RESERVE SYS., DIV. OF BANKING SUPERVISION AND REGULATION, COMMERCIAL BANK EXAMINATION MANUAL (2015) (1947 pages); FED. DEPOSIT INS. CORP., COMPLIANCE EXAMINATION MANUAL (2015) (1219 pages).

⁷⁸ Empirical evidence suggests that, at least temporarily, this process provides bank regulators greater information than the market possesses about a bank's financial health. See Judge, *supra* note 76, at 1270 and sources cited therein.

⁷⁹ CARNELL ET AL., *supra* note 74, at 444-45 (examining the enforcement actions regulations can take against banks and their employees).

⁸⁰ *Id.* at 244-252 (under 12 U.S.C. § 1831o, a bank faces increasingly stringent treatment from regulators as its capitalization decreases. Pursuant to this statute, regulators may place critically undercapitalized banks in receivership).

⁸¹ *Id.* at 249 (for example, regulators may appoint a conservator or receiver for an undercapitalized institution that fails to submit a timely and acceptable capital restoration plan).

⁸² E.g., Richard M. Hynes & Steven D. Walt, *Why Banks Are Not Allowed in Bankruptcy*, 67 WASH. & LEE L. REV. 985, 988 (2010) (describing the process).

⁸³ *Id.* at 989.

⁸⁴ *Id.* at 991-92 (finding that “the FDIC appears to have been the residual claimant in nearly all of the bank insolvencies... between January of 1995 and the end of May of 2009”).

money claimants to remain minimally informed even in the absence of regulation—their omnipresent right to exit, at par (such as the ability of a bank depositor to withdraw his funds at any time). The central way the regulatory regime serves these two aims is by enabling widespread deposit insurance, which significantly curtails the downside risks to which most money claimants are exposed and makes them less likely to run.⁸⁵ Yet, uninsured money claimants also benefit from this massive oversight regime. The FDIC commonly makes even uninsured depositors whole and uninsured depositors may rely on bank examiners to identify and respond to problems at a bank.⁸⁶

The massive 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 window. 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.⁸⁷ Similarly, when greater governmental support is required to restore stability, the massive regulatory regime reduces the associated moral hazard and the credit risk. 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 information about the costs and risks of closing or recapitalizing troubled institutions. This is critical because runs by money claimants can have significant adverse effects on the real economy. As a result, even without *ex ante* oversight, policymakers may well feel obliged to bail out banks or otherwise intervene in the face of a panic.⁸⁸ That money claimants are predisposed to exit in the face of potential trouble, and that money claimants can impose costs on others when they do so, help explain why the banking sector is so heavily regulated.

To be sure, banks also rely on non-money claims to fund their operations. Banks' ability to issue money depends on their also issuing other capital that is informed, longer term and capital of bearing losses. Holders of equity and subordinated debt a bank issues, 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.⁸⁹ Banks are also subject to disclosure requirements that can help mitigate some of the informational challenges described here.⁹⁰ Nonetheless, banks are

⁸⁵ Diamond & Dybvig, *supra* note 56.

⁸⁶ CARNELL ET AL., *supra* note 74, at 29-30 (describing bailouts where the FDIC has made uninsured depositors whole); *Id.* at 486 (describing political pressure the FDIC faces to protect uninsured depositors).

⁸⁷ 12 C.F.R. § 201 (2009).

⁸⁸ GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, at 169-177 (discussing costs of financial crises, using U.S. savings and loans crisis as case study and noting political problems posed by government intervention).

⁸⁹ BASEL COMMITTEE ON BANKING SUPERVISION, STANDARDS, REVISED PILLAR 3 DISCLOSURE REQUIREMENTS, 1 (2015) available at <http://www.bis.org/bcbs/publ/d309.pdf> ("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")

⁹⁰ E.g., FED. FINANCIAL INSTITUTIONS EXAMINATION COUNCIL, FREQUENTLY ASKED QUESTIONS, <https://cdr.ffiec.gov/Public/HelpFileContainers/FAQ.aspx> (describing Uniform Bank Performance Reports,

more opaque than other firms and the disclosure requirements to which they are subject have lagged far behind the changing nature of banking.⁹¹ The banking system historically may thus be understood as a regime that reduced the degree of knowledge production that the suppliers of capital needed to undertake by subjecting banks to a supervisory regime that provides bank regulators detailed information about, and control over, bank activities. This regulatory regime also played an important role reducing the instability that would otherwise arise from banks' heavy reliance "information-insensitive" money claims.

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.⁹² There are also fewer mechanisms for checking errors and protecting against biases and capture than in a market-based regime.⁹³ Nonetheless, the aforescribed banking 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.⁹⁴

The aim here is not to provide an exhaustive account of bank regulation or securities regulation, but rather to highlight how the informational dynamics that enable banks to attract money claimants differ from the conditions that allow firms to raise capital by issuing equity claims in the capital markets. In the capital markets, regulators' primary role is to promote efficiency and facilitate effective governance by reducing the costs that market participants incur gathering pertinent information. At no time are regulators making any substantive assessments regarding the business models of the firms raising capital or the appropriate value of the equity claims they issue. By contrast, it is the role of bank regulators to gather significant information about the actual value of bank assets and whether the value of those assets exceed the money claims a bank issues. Historically, bank regulators were aided by their ability to limit bank activities and investments to ones they could readily understand.⁹⁵ This gives rise to another important difference between banking and securities regulation—bank regulation occurs largely

or Call Reports); Regulation S-K, item 801, Guide 3, reprinted in 1 Fed. Sec. L. Rep. (CCH) W 3827 (industry guide of additional disclosures required of all public bank holding companies).

⁹¹ 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); Mark J. Flannery et al., *The 2007-2009 Financial Crisis and Opacity*, J. FIN. INTERMEDIATION 22 (2013) 55–84; Mark J. Flannery et al., *Market Evidence on the Opacity of Banking Firms' Assets*, 71 J. FIN. ECON. (2000) 419, 419–460.

⁹² Jonathan R. Macey & Maureen O'Hara, *The Corporate Governance of Banks*, 9 FRBNY ECONOMIC POLICY REVIEW, 91, 97 (2003) (describing how FDIC insurance "gives shareholders and managers of insured banks incentives to engage in excessive risk taking").

⁹³ E.g., CARNELL ET AL., *supra*, note 74, at 243–44 (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 Barkow, *Insulating Agencies: Using Institutional Design To Limit Agency Capture*, 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).

⁹⁴ GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, at 4 (noting no panics took place during 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").

⁹⁵ CARNELL ET AL., *supra* note 74, at 71–144.

behind a shroud of confidentiality. While bank regulators rate multiple dimensions of each bank's operations and regularly issue supervisory letters identifying areas for improvement, all of this information remains confidential.⁹⁶ This type of confidential treatment is anathema to the disclosure-oriented premises that underlie securities regulation but it is core to bank regulation. This can be explained, in part, by the fact that prudential regulation seeks to largely obviate the need for smaller money claimants to have any information about the actual value of the assets underlying their claims while securities regulation operates to encourage investors to undertake the very due diligence and valuation efforts banking regulation operates to discourage. Even in the stylized accounts provided here suffice to illustrate how the distinct informational dynamics at work in equity and money markets help explain many of these differences.

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 independently of the other. This started to change in the 1970s with the rise of an array of market-based mechanisms that fulfill many of the economic functions long performed by banks, including using money claims to fund longer term undertakings. Today these mechanisms are collectively known as the shadow banking system. One of the many ways that shadow banks differ from banks is that the liquidity and maturity transformation that are conducted entirely within a single institution when undertaken by a bank are accomplished through a series of interrelated market transactions and structures which are often consummated at different points in time even though reliant on the others.⁹⁷ The institutions that issue money are just one subset of these arrangements.⁹⁸ Nonetheless, the money claims issued by the shadow banking system represent a critical component of the overall regime, as much of the regime depends directly or indirectly on capital that flows through money claims.⁹⁹ As the Crisis revealed all too vividly, when money claimants make large-scale withdrawals, the effects are felt throughout the system, and widespread market dysfunction often follows.¹⁰⁰

That the Crisis emanated from the shadow banking system and revealed many of the money claims issued in that system to be less safe than holders had previously

⁹⁶ *Id.* at 442 (explaining that “examination reports and examiners’ workpapers remain confidential”).

⁹⁷ Francesca Carapella & David C. Mills, *Information Insensitive Securities: The Benefits of Central Counterparties* 23, 23–29 (Fed. Reserve N.Y. Working Paper, 2012) http://www.ny.frb.org/research/conference/2012/MP_Workshop/Carapella_Mills_information_insensitive_securities.pdf (describing multilateral netting, the “agree offsetting of positions or obligations among three or more trading partners”).

⁹⁸ 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. Kathryn Judge, *Fragmentation Nodes: A Study in Financial Innovation, Complexity, and Systemic Risk*, 64 STAN. L. REV. 657 (2012) [hereinafter Judge, *Fragmentation Nodes*].

⁹⁹ *Id.* at Fig. 1 (visually illustrating the position of money claims within the broader shadow banking system).

¹⁰⁰ See *infra* Part IV.

believed did cause the system to contract.¹⁰¹ Yet, this contraction proved short lived. The shadow banking system has recently re-established its pre-Crisis size and is poised for further growth.¹⁰² According to one measure, the size of the worldwide shadow banking system currently stands at \$75 trillion.¹⁰³ The rapid growth of the shadow banking system has been particularly pronounced in the United States, the only country where the size of the shadow banking system exceeds the size of the regulated banking sector.¹⁰⁴ The reasons for this growth remain incompletely understood, but include legal and financial innovations enabling the production of new methods of pooling and new types of financial claims, regulatory arbitrage, a strong demand for money claims in amounts that cannot readily be created by the banking system, and a demand for the credit the system created.¹⁰⁵

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.¹⁰⁶ That figure fell to just 24.22% by 2005.¹⁰⁷ Other metrics tell a similar story. For example, using flow of funds data from the Federal Reserve, Tobias Adrian and Hyun Song Shin document the dramatic rise of market-based sources of capital, i.e., capital coming from the shadow banking system, as a source of funding for home loans. In 1980, banks provided the great bulk of the capital used to fund home loans; by 1990, market-based sources of capital had roughly caught up with banks; and, by 2009, the value of homes loans financed through the capital markets was more than twice the value of home loans financed by banks.¹⁰⁸ 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.¹⁰⁹

B. The money claims

Among the most important ways that 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

¹⁰¹ See, e.g., Schwarcz, *supra* note 4, at 629–30.

¹⁰² See, *id.*, *supra* note 4, at 620 (noting “shadow banking has grown rapidly” between 2008 and 2011); FINANCIAL STABILITY BOARD, *supra* note 103, at 8–9 (reporting shadow banking assets as a share of GDP rose by “six percentage points to 120% of GDP in 2013, approaching the peak of 124% of GDP in 2007”).

¹⁰³ E.g., Sam Fleming, *Shadow Banking Nears Pre-Crisis Peak*, FIN. TIMES (Oct. 30, 2014, 7:23 PM), <http://www.ft.com/intl/cms/s/0/71f5fd1e-6045-11e4-98e6-00144feabdc0.html#axzz3cYaMzYmM>; FINANCIAL STABILITY BOARD, GLOBAL SHADOW BANKING MONITORING REPORT 2014 2 (2014).

¹⁰⁴ FINANCIAL STABILITY BOARD, *supra* note 103, at 11, Exhibit 3-1.

¹⁰⁵ See *infra* Part IV.B.2 and sources cited therein.

¹⁰⁶ Korkut Ertuk & Gokcer Ozgur, *The Decline of Traditional Banking and Endogenous Money*, in BANKING, MONETARY POLICY AND POLITICAL ECONOMY OF FINANCIAL REGULATION: ESSAYS IN HONOR OF JANE WEBB D’ARISTA 278, Tbl. 14.1 (Gerald Epstein, Thomas Schlesinger, & Matias Vernengo, eds., 2014).

¹⁰⁷ *Id.*

¹⁰⁸ ADRIAN & SHIN, *supra* note **Fejl! Bogmærke er ikke defineret.**, at 2, Figure 4.

¹⁰⁹ POZSAR ET AL., *supra* note 4, at 2.

claims.¹¹⁰ 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 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 2008.¹¹¹ Unlike other mutual funds, money market mutual funds are subject to a stringent regulatory restrictions on the types of assets they can hold, many of which are themselves money claims.¹¹² In exchange for abiding by these restrictions, money market mutual funds traditionally were allowed to use accounting rules that allowed them to report a share price of exactly \$1.00 under most circumstances.¹¹³ This regime intentionally reduced price accuracy, yet it also 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 \$1.00 per share.¹¹⁴

Looking past and within money market mutual funds reveals other institutional arrangements that enable holders to believe a claim is exceptionally low risk without undertaking meaningful diligence. Overcollateralization, the use of highly rated (and often securitized) assets as collateral, and backup commitments from issuers and sponsors are all devices deployed—often in conjunction with one another—to provide money claimants the necessary level of assurance. One reason that these devices are so useful is that they expand, significantly, the range of issuers capable of issuing claims that are sufficiently low variance as to justify treatment as if they are information insensitive. Asset-backed commercial paper (ABCP), a common type of money claim pre-Crisis, illustrates how this can work.

A common structure for creating ABCP started with a bank or other type of financial institution creating a bankruptcy-remote, and sometimes off-balance sheet, entity. That entity would hold relatively long term and often securitized assets, like mortgage-backed securities and collateralized loan obligations, which would be funded through the issuance of ABCP, which typically had very short, e.g., thirty-day, maturities and some longer term securities.¹¹⁵ This arrangement was often supported by explicit

¹¹⁰ *Id.*, at 2, Figure 1.

¹¹¹ Money Market Fund Reform, SEC Release No. IC-28807, *available at* <http://www.sec.gov/rules/proposed/2009/ic-28807.pdf> (citing Investment Company Institute, *Trends in Mutual Fund Investing*, Apr. 2009, at 5 *available at* http://www.ici.org/highlights/trends_04_09).

¹¹² Investment Company Act of 1940, Pub. L. No. 76-768, 54 § Stat. 789 789 (codified as amended at 15 U.S.C. §80a-1 to 80a-64 (2012)); 17 C.F.R. § 270.2a-7 (2014).

¹¹³ 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. *Id.*

¹¹⁴ *Id.*

¹¹⁵ Daniel M. Covitz et al., *The Evolution of a Financial Crisis: Panic in the Asset-Backed Commercial Paper Market*, 68 J. FIN. 815, 824 (2013) (noting 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

and/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 also provide credit support if required to protect the value of the ABCP issued.¹¹⁶ ABCP programs also typically obtained a rating from one of the leading credit ratings.¹¹⁷ The holders of the ABCP issued were thus 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 typically took the form of 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 was prohibitively expensive in light of the nature of the claims they were holding.

The structure of ABCP programs also demonstrates one way that money markets address the risk of adverse selection. The securitized assets underlying the ABCP were often exceptionally complex, with values that depended on a large pool of underlying assets,¹¹⁸ the correlation among those assets, and the specific contractual terms setting forth the rights of the various classes of instruments backed by that pool of assets.¹¹⁹ 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 banks 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.¹²⁰ The complexity thus may have enhanced the capacity of the ABCP issued to operate like money by reducing the probability of adverse selection.¹²¹

Collectively, these support mechanisms, the credit ratings of the underlying assets, a structure that reduced the probability of adverse selection, and the short-term nature of the commitment led many sophisticated parties to treat the ABCP so issued like money.¹²² Because the claims functioned like money, the holders of the ABCP typically did not engage in meaningful due diligence regarding the value of the assets underlying

year”); TOBIAS ADRIAN & ADAM B. ASHCRAFT, FED. RESERVE BANK N.Y. STAFF REPORT NO. 580, SHADOW BANKING: A REVIEW OF THE LITERATURE 6 (2012) (“The maturity of ABCP is between one and 180 days.”).

¹¹⁶ *Id.*; see also BANK FOR INTERNATIONAL SETTLEMENTS, REPORT ON SPECIAL PURPOSE ENTITIES (2009), available at <http://www.bis.org/publ/joint23.pdf>; Viral V. Acharya, Philipp Schnabl & Gustavo Suarez, *Securitization Without Risk Transfer*, 107 J. FIN. ECON. 515; Benjamin H. Mandel, Daniel Morgan & Chenyang Wei, *The Role of Bank Credit Enhancements in Securitization*, 18 FEDERAL RESERVE BANK OF NEW YORK ECONOMIC POLICY REVIEW no. 2, at 35–46.

¹¹⁷ *E.g.*, Covitz et al., *supra* note 115, at 822 (noting that “the vast majority of ABCP programs carry the highest rating, designated as P1 by Moody’s Investors Service”).

¹¹⁸ *See, e.g.*, GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, 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.”).

¹¹⁹ *See generally* hereinafter Judge, *Fragmentation Nodes*.

¹²⁰ GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, at 50 (explaining how before 2007–2008 financial crisis, ABCP frequently used asset-backed securities with complex and opaque structure as collateral).

¹²¹ *Id.*

¹²² POZSAR ET AL., *supra* note 4, at 22 (explaining that money claims so issued were “perceived [to be] risk-free”).

their claims.¹²³ That holders were only minimally informed does not mean that they are 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. The short-term nature of the commitment enables a distinct form of discipline, one that is sometimes optimal.¹²⁴ 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.¹²⁵ 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. When money claimants exercise their exit rights en masse—as they do during a run—value-destroying fire sales and other adverse systemic repercussions often follow. This Part concludes by clarifying the information gaps produced by shadow banking and the next two Parts explore how these gaps affect the systemic risk arising from shadow banking.

C. The information gap

Juxtaposing even this brief glimpse of the money markets that feed the shadow banking system with the regulatory architecture set forth in Part I reveals an important information dynamic that has yet to be identified elsewhere. Because the shadow banking system operates in the capital markets, to the extent these activities were regulated at all, the default rules governing its operation come from securities regulation. The default regulatory regime was thus one that presupposes claimants who are incentivized to engage in meaningful information gathering and analysis.¹²⁶ 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 swathe of the capital flowing into the shadow banking system against the default regulatory regime governing this system, this analysis shows that there are structural reasons to expect significant information gaps in the shadow banking system.

The shadow banking system enables the growth of quite significant information gaps arise in part because the value of the information that resides in those gaps and the ramifications of those gaps varies significantly in different states of the world. The identified information gaps typically have little adverse impact on market functioning so

¹²³ BANK FOR INT’L SETTLEMENTS, *supra* note 116, at 34 (“There was little independent due diligence undertaken by a large portion of the investor community into the SPEs in which they invested.”).

¹²⁴ *E.g.*, Calomiris & Kahn, *supra* note 41, at 497.

¹²⁵ CARNELL ET AL., *supra* note 74, at 20–22.

¹²⁶ To be clear, much 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.

long as confidence reigns—and may even facilitate it—but the ramifications of these gaps changes precipitously if that confidence begins to wane.¹²⁷ Post-crisis reforms have mitigated, but far from eliminated, these fundamental dynamics.¹²⁸

To be sure, just like the banking system, in both its regulated and unregulated forms, has always required banks to have some equity, the shadow banking system was also supported, in part, by capital flowing through equity and other information-sensitive claims.¹²⁹ The need for some such capital is an important friction in the production of the assets that underlie shadow banking and helps mitigate the moral hazard that can arise from the presence of so much uninformed capital as well as the size of information gaps that result.¹³⁰ But, just as with banks, the nature of the information-sensitive claims supporting the regime have very different terms than the money claims backed by the same assets; characteristics beyond asset quality, like the correlation among the assets backing a claim, can pull in countervailing directions—increasing the value of information sensitive claims at the expense of the safety of the assets underlying the money claims issued. Moreover, while using the money claims through which much capital flows into the rest of the shadow banking system as the focal point necessarily results in a significantly truncated analysis of the relevant information dynamics, taking a broader view of that system reveals numerous features, including sparse secondary markets and few mechanisms for information aggregation or for taking short positions, that are also conducive to large information gaps.¹³¹ Thus the presence of some information-sensitive claims, like the presence of bank equity will reduce the magnitude of the information gaps that arise. Nonetheless, the presence of some informed, loss-bearing capital is far from sufficient to fully counteract the information gaps that arise when much of the capital supporting a regime comes from minimally informed money claimants.

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 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

¹²⁷ See *infra* Parts III and IV.

¹²⁸ See *infra* Part V.

¹²⁹ E.g., Judge, *Fragmentation Nodes*, *supra* note 119, at 690–96.

¹³⁰ *Id.*

¹³¹ *Id.* at 684–90 (describing factors for complexity in fragmentation nodes, whose proliferation causes information loss); Gary B. Gorton, *The Subprime Panic*, 15 EUR. FIN. MGMT. 1 at 11 (2009) (noting none of the shadow banking claims “traded in markets that resemble...the secondary market for equities. Nor does the banking system...look very much like what is taught in courses on ‘banking’”); Gilson & Kraakman, *Information Costs*, *supra* note 31, at 319 (noting “information of great relevance to pricing some of the instruments associated with the Subprime Crisis was very costly” and “over most of the relevant period there was no secondary market at all”).

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,¹³² 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.¹³³

III. The New Informational Challenge

Framed in terms of information, the existing regulatory apparatus was designed to support two distinct regimes: (1) 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 (2) 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 regulatory regime that evolved before its rise and the information gaps that arise from this mismatch give rise to a range of policy issues. One set of challenges arises from the dispersion of expertise that accompanies the existing regulatory frames.¹³⁴ A second set of policy issues relate to the ways that the structure of the shadow banking system and the pervasiveness of information gaps in that regime affects the quality of assets produced and the degree of monitoring that occurs once credit is extended. The low-quality of many of the mortgages originated in the years leading to the crisis and indications that the rate and structure of mortgage modifications may be suboptimal to maximize their value are just two of the many indicia suggesting that these types of issues may have arisen pre-Crisis. The third set of issues, and the ones that are the focus of the remainder of the analysis here, relate to how the information gaps that arise from the shadow banking system affect market functioning and the implications for policy.

The recognized costs of systemic instability and the ongoing confusion about the ways that the shadow banking system threatens stability make this a particularly important focus of inquiry. This part explains the shortcoming in existing understandings that is filled by identifying information gaps and explores the relationship between information and market functioning before developing this paper's claim—that information gaps directly contribute to the systemic risk arising from shadow banking. Part IV tests this claim against evidence from the Crisis.

¹³² See *infra* Part V.C.

¹³³ See *infra* Part III.C.

¹³⁴ See *infra* Part V.

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 bodies of literature addressing these dynamics. To grossly oversimplify, that literature tends to operate within one of the frameworks: one focused on how information is distributed within a system and a second focusing on the nature of the information that is missing.

Current understandings of the importance of how information is distributed among parties often build on George Akerlof's insight that when information is distributed asymmetrically between parties to a potential transfer and buyers rely on "some market statistic to judge the quality of prospective purchases," "there is an incentive for sellers to market poor quality merchandise."¹³⁵ 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.¹³⁶

At distinct but related set of insights about the significance of the ways information is often unevenly distributed among parties focuses on the benefits that can arise as a result. In equity markets in particular, information asymmetries can play a critical role powering the mechanisms through which prices become more efficient. 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.¹³⁷ John Coffee's work on gatekeepers, such as accountants and credit rating agencies, similarly reveals how the ability for such parties to profit from superior information about the financial health or other characteristics of an issuer plays a critical role compensating them for the costly effort of producing that information.¹³⁸ 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.¹³⁹

A separate vein in the literature on how incomplete information affects financial and other decision-making shifts the focus from how information is dispersed among parties within the system to the nature of the information that a person lacks. Much of this work builds on the risk-uncertainty dichotomy first articulated by Frank Knight

¹³⁵ Akerlof, *supra* note 20, at 488.

¹³⁶ *Id.* at 490–91. According to Google Scholar, 22,060 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> (last visited Jul. 1, 2015).

¹³⁷ Gilson & Kraakman, *MOME*, *supra* note 30, at 623 (using this to explain why Sanford Grossman's efficiency paradox is not a paradox in practice).

¹³⁸ JOHN C. COFFEE, JR., *GATEKEEPERS: THE PROFESSIONS AND CORPORATE GOVERNANCE* (2006).

¹³⁹ See *supra* Part I.B.2 and sources cited therein.

nearly a century ago.¹⁴⁰ As Knight explains, “[t]he ... 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).”¹⁴¹ By contrast, “true uncertainty” is “not susceptible to measurement.”¹⁴² This distinction has profound implications for decision-making. As Knight further explained, unknowns that represent risks can be “converted to effective certainty” by grouping similar instances together.¹⁴³ In Knight’s analysis, insurance played a central role enabling such conversion, as he assumed that “if the actuarial chance of a gain or loss is ascertainable... the burden of bearing the chance can be avoided by the payment of a small fixed cost limited to the administrative expense of providing insurance.”¹⁴⁴ The same mechanisms are not available to mitigate the effects of unknown unknowns.

While Knight may have assumed markets to be more complete than they are and formal analyses of contracting and other forms of decisionmaking have found ways to minimize the importance of Knightian uncertainty by introduction the notion of “subjective probability,”¹⁴⁵ his core insight remains relevant influential. Economists and others regularly invoke the notion of Knightian uncertainty as a way of acknowledging the inevitability of unknowable unknowns.¹⁴⁶ There is now a rich body of literature, much of it building off of a thought experiment by Daniel Ellsberg, examining how uncertainty affects decisionmaking, which establishes that individuals tend to be “ambiguity averse,” and explores the ramifications of that tendency in an array of settings.¹⁴⁷ A number of efforts to better understand the causes of the Crisis similarly identify uncertainty as a significant factor contributing to its depth. Katharina Pistor, for example, has shown that because of the omnipresence of uncertainty and fluctuating liquidity conditions, the legally constituted modern financial system premised on a series of commitments that cannot all be honored simultaneously is destined to self-destruct.¹⁴⁸ A number of financial economists similarly have identified uncertainty as potentially an

¹⁴⁰ KNIGHT, *supra* note 21.

¹⁴¹ *Id.* at 233.

¹⁴² *Id.* at 232.

¹⁴³ *Id.* at 46.

¹⁴⁴ *E.g., id.* at 46.

¹⁴⁵ See generally Itzhak Gilboa et al., *Probability and Uncertainty in Economic Modeling*, 22 J. ECON. PERS. 173 (2008).

¹⁴⁶ 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 21, at 233–63. For further discussion on gaps between Knight’s original analysis and ways the notion of Knightian uncertainty are typically employed, see, e.g., Geoffrey T.F. Brooke, *Uncertainty, Profit and Entrepreneurial Action: Frank Knight’s Contribution Reconsidered*, 32 J. HIST. ECON. THOUGHT 221 (2010); Stephen F. Leroy & Larry D. Singell, *Knight on Risk and Uncertainty*, 95 J. POL. ECON. 394 (1987).

¹⁴⁷ See generally Talley, *supra* note 21, 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).

¹⁴⁸ Pistor, *The Legal Theory of Finance* 11 (Colum. Law Sch. Pub. Law & Legal Theory Working Paper Grp., Paper No. 13-348, 2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2262936 (“pre-determined, binding, non-negotiable legal commitments can hasten a financial crisis and in the extreme case the financial system’s demise”).

important contributing force in the adverse spirals that magnified the market dysfunction at the heart of the Crisis.¹⁴⁹

While each of these frames and the numerous other bodies of inquiry that have evolved alongside them enhance our ability to understand the dynamics here at issue, there is no readily available concept 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, so long as someone has the relevant information, there are public and private mechanisms that can facilitate the market finding a new equilibrium that incorporates that information.

The situation changes significantly when 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. When the costs are high or payoffs highly uncertain, it will often be rational for them not to incur these threshold expenses.¹⁵⁰ The government similarly cannot make credible signals about information it is known not to have and it cannot accurately price insurance-like information substitutes.¹⁵¹ 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 and/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, and thus outside 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 verifiable but unknown may be that information gaps can only be identified through structural analyses of the type performed by putting together the various pieces set forth 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—

¹⁴⁹ See, e.g., 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, Douglas Gale & Tanju Yorulmazer, *Rollover Risk and Market Freezes* 5 (Nat'l Bureau of Econ. Research, Working Paper No. 15674, 2009) (providing an account of market freezes that depends, in part, on "uncertainty about credit risk of the underlying asset ... not be[ing] fully revealed by the date of next rollover"); Alan Moreira & Alexi Savov, *The Macroeconomics of Shadow Banking* 1–2 (Nat'l Bureau of Econ. Research Working Paper No. 20335, 2014) available at <http://www.nber.org/papers/w20335> (describing how a rise in uncertainty raises demand for "crash-proof liquidity," leading to a decline in shadow-banking activities and a decrease in liquidity supply).

¹⁵⁰ Gilson & Kraakman, *Information Costs*, supra note 31. See also *infra* Part III.C.

¹⁵¹ See *infra* Part III.C.

or that examine the nature of pertinent but missing information are never going to identify this type of information dynamic. Accentuating the challenge, the type of analysis required to identify information gaps is typically going to be an inductive exercise that requires probabilistic inferences. It would be impossible 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 paper's claim regarding the existence of information gaps and their ramifications on market functioning comport with the data available about how market participants actually behaved at critical points during the Crisis. Nonetheless, these challenges may help to explain why this important category of information dynamics has not been identified and examined more closely until now.

B. Incomplete information and market functioning

Providing new insight into how the identified information gaps affect market functioning requires some common understanding of what is already known regarding the ways that information and lack of information affect market functioning. As reflected in the disparate assumptions animating securities and bank regulation, however, what some view as assumptions to be taken for granted can strike others as wrong. This subpart, accordingly, compiles insights from different fields to create the common ground required. It identifies four core understandings that build upon one another in addition to laying the foundation for this paper's contributions regarding the importance of information gaps.

A threshold issue, which is not novel but which is all too often misunderstood, is that lack of information does not necessarily impose any friction on market functioning and it can even facilitate it. The difference between situations where lack of information will preclude market functioning and where it will not is illustrated by Akerlof's famous used car market. The reason Akerlof focused on the used car market—rather than the market for 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 whether a particular vehicle falls into one category or the other.¹⁵² In Akerlof's analysis, whether a car is a lemon that could be known only with extended use.¹⁵³ So long as a new car dealer does cannot possess superior information about whether a particular vehicle is a lemon, the buyer of a new car need not worry about adverse selection. While that example was necessarily stylized for purposes of analysis, it reflects a fundamental point—mutual ignorance is just as effective as mutual understanding at preventing adverse selection.

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.¹⁵⁴

¹⁵² Akerlof, *supra* note 20, at 489.

¹⁵³ *Id.*

¹⁵⁴ *Id.*

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.¹⁵⁵

In many markets beyond new cars, functioning depends on market participants *not* having all pertinent information and there are benefits from this type of market structure. Mutual ignorance can facilitate the provision of liquidity and can be critical to sustaining pooling equilibria.¹⁵⁶ Another benefit of such market structures is that because information gathering and analysis is costly and sometimes socially wasteful, there can be genuine welfare gains from market structures that obviate or limit the need for such activities.¹⁵⁷ These benefits and the general cost of producing information lead to the second critical building block—the level of information production that will be optimal in a given market cannot be determined in the abstract. This does not negate the possibility of market structures that are viable but socially suboptimal for information-related reasons; information-thin market structures may be particularly fragile and structures that encourage information production may yield significant positive externalities. Nonetheless, virtually all market structures can tolerate some information gaps, many actually require such gaps, and even large information gaps may not be suboptimal.¹⁵⁸

This leads to the third building block: the effect of new information on market functioning and the processes through which markets incorporate new information depend on market structure. This assumption and how it relates to the other two can be illustrated by further examining the differences between equity markets and the money markets that feed the shadow banking system. As a starting point, these markets typically achieve the relative parity in information required for trade in quite different ways.

¹⁵⁵ 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.

¹⁵⁶ E.g., Michael J. Fishman & Jonathan A. Parker, *Valuation, Adverse Selection, and Market Collapses*, 18 REV. FIN. STUD. 1 (2015) (finding that “[b]ecause the private benefits to valuation exceed its social benefits, the equilibria with lower levels of valuation are more efficient”) I Holmstrom, *supra* note 11, at 12, 15–16 (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* (CEPR discussion paper No. DP10665, 2015), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2621569 (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 97, at 36–37 (arguing “information insensitivity is desirable because it allows trades to occur easily”). The importance of pooling equilibria is also much discussed in the literature on insurance.

¹⁵⁷ E.g., David Andolfatto et al., *Optimal Disclosure Policy and Undue Diligence*, 149 J. ECON. THEORY 128–52 (2014); Daniel G. Goldstein, *Undue Diligence*, 20 BUS. STRATEGY REV. 16, 16 (2009) (“[C]ollecting and analyzing all available data may turn out to be *undue* diligence.”) (italics in original); Jack Hirshleifer, *The Private and Social Value of Information and the Reward to Inventive Activity*, 61 AMER. 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 productive arrangements” and “[t]here is an incentive for individuals to expend resources in a socially wasteful way in generation of such information”).

¹⁵⁸ 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 why Sanford Grossman's efficiency paradox is not a paradox in practice. Gilson & Kraakman, *MOME*, *supra* note 30, at 623.

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 simultaneously 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 in which information is not rendered irrelevant through government guarantees or other backstops, by contrast, often “level down” through claim structures that make it costly and unrewarding for claimants to acquire superior information about the value of 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.¹⁵⁹ 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 lies somewhere 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 exceed the value of her claim and simultaneously renders even modest due diligence prohibitively costly in relation to the expected return. 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.

These differences lead to other important differences between equity and money markets. Because equity markets are populated by an array of public and private institutions designed to facilitate informational efficiency and because equity claimants are predisposed to engage in information gathering and analysis, information which is knowable and relevant to the value of the claims being traded will rarely remain unknown for an extended time. Equity markets, at least as traditionally constituted, are thus not conducive to large information gaps. This also means that equity prices will typically respond to new information in an incremental fashion, going up or down proportionately as new information enters.¹⁶⁰

Again, money markets operate quite differently. As a threshold matter, this paper’s first claim arises, in part, from the fact that because money claimants are only minimally informed and minimally incentivized to engage in information gathering, money markets that are not subject to prudential regulations are conducive to the growth

¹⁵⁹ See Holmstrom, *supra* note **Fejl! Bogmærke er ikke defineret.**, at Figure 1 and accompanying text.

¹⁶⁰ Bubbles represent an important exception to this general rule, and asset bubbles often arise in periods before financial crises. Nonetheless, bubbles remain the exception rather than the norm and, as reflected recently the popping of the dot.com bubble, even the corrections that follow sizeable stock market bubbles can occur without causing the same type of adverse effects on the real economy that typically follow dysfunction in money markets. See generally, RICKS, THE MONEY PROBLEM, *supra* note 4.

of information gaps.¹⁶¹ This also means that the effect of new information will be very different than in equity markets. In information-thin money markets, new information is most likely either to have no observable impact or to 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 means we should expect significant nonlinearities in how money markets respond to new information, in stark contrast to what we would expect to see in equity markets. This also leads to the fourth and final building block and the one that is the focus of this paper's claims—the effect of information gaps on market functioning can be state contingent.

C. Information gaps and systemic stability

Building upon these four understandings, this paper argues that information gaps in any regime that relies on money claims for a meaningful amount of capital accentuate the fragility that arises from that reliance and are likely to exacerbate the degree of market dysfunction that follows any signal indicating a potential state shift from a period of confidence to one of panic. This subpart explains why while Part IV establishes that the conjectures made here are consistent with quantitative and qualitative information about how events unfolded during the Crisis.

This paper's core claim is that the types of signals that might indicate a change of state are expanded and the process of restoring confidence should panic take hold is slowed down when information gaps are large. 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 proportionate fashion to certain types of new information.

While the analysis that follows may seem sequential—focusing 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—this 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, or can rely on the government to provide them low-cost information about the risks to which they are exposed, this could halt a run before it begins. Similarly, if informed capital that is capable of bearing losses could instantly come in to fill any gaps created by exiting money claimants, this would obviate the need for fire sales and the market dysfunction that typically arises when money claimants exit en masse. Thus, this paper'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.

¹⁶¹ This is a core component of the paper's first claim. See *supra* Part II.C.

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. As set forth above, there are some switching costs for money claimants should they seek to withdrawal their funds and move them into a different type of money claim, creating a small friction on their tendency to withdraw. But, money claimants are holding money claims because they are seeking an instrument that is exceptionally low risk and with respect to which they do not want to have 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.¹⁶² One view, espoused most famously and clearly by Diamond and Dybvig, posits that runs arise from coordination problems among money claimants.¹⁶³ 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 of runs.¹⁶⁴ A number of subsequent studies have provided richer accounts of the mechanisms that could underlie such runs, but they tend to share the common challenge of having little predictive power and no inherent stopping point.¹⁶⁵ An alternative view posits banking panics are extensions of the business cycle.¹⁶⁶ In this view, panics are "caused by depositor revisions in the perceived risk of bank debt."¹⁶⁷ A number, though not all, of the contributions that depict runs as arising from fundamentals identify information asymmetries between banks and money claimants as playing an important role contributing to runs.¹⁶⁸ While there are some models that lie between these two paradigms,¹⁶⁹ the ongoing influence of the sunspot and business cycle theories is reflected in the fact that empirical studies of runs by money claimants often attribute

¹⁶² See, e.g., Franklin Allen, Ana Babus & Elena Carletti, 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 of banking crises [suggesting] that they are a natural outgrowth of the business cycle" and identifying the main contributions to both).] Gary Gorton & Andrew Winton, 1.A *Financial Intermediation*, in *HANDBOOK OF THE ECONOMICS OF FINANCE* 431–552 at 503-07 (George M. Constantinides et al., eds., 2003).

¹⁶³ Diamond & Dybvig, *supra* note 56.

¹⁶⁴ Franklin Allen et al., *Introduction to Financial Economics* 149 J. ECON. THEORY 1, 2 (2014).

¹⁶⁵ E.g., Gorton & Winton, *supra* note 162, at 508 (explaining that "a major difficulty is that Diamond and Dybvig (1983) is not a testable theory, since any observed a phenomenon is consistent with 'sunspots'").

¹⁶⁶ E.g., Charles W. Calomiris & Gary Gorton, *The Origins of Banking Panics: Models, Facts, and Bank Regulation*, in *FINANCIAL MARKETS AND FINANCIAL CRISES* 107 (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. 1245–1284 (1998).

¹⁶⁷ Calomiris & Gorton, *supra* note 166, at 111.

¹⁶⁸ E.g., Allen, Babus & Carletti, *supra* note 162, at 100 (describing the theories that rely on information asymmetries).

¹⁶⁹ Allen et al., *supra* note 164, at 2–3 (providing a overview of the two main theories and the recent literature suggesting an intermediate interpretation); Gorton & Winton, *supra* note 162, 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.

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.¹⁷⁰

Identifying information gaps suggests another mechanism that could cause runs to exceed the scope justified by changes in measurable fundamentals and nonetheless be driven by information, or rather lack thereof. More specifically, large information gaps make it more difficult for a money claimant to assess whether a particular signal is in fact one that forebodes a change in state of the type that would normally trigger a run, expanding the range of signals that might cause depositors to update their assessments of whether they can continue to treat a particular claim as information insensitive, i.e., as money. Put simply, subject to modest frictions arising from switching costs, it is rational for a money claimant to withdraw when new evidence either (1) reveals that a claim has appreciable credit risk, and thus is information sensitive; or (2) renders it unclear whether a claim is sufficiently low risk that it should still be treated as if it is information insensitive. Information gaps increase the types of signals that might trigger withdrawals by expanding the types of signals that fall into the latter of these two categories.

One implication is that that, in contrast to the macroeconomic vein of the information-based theories, the type of signals that might trigger a run need not be limited to ones that indicate banks assets generally will underperform, such as a looming recession.¹⁷¹ 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 previously relied to conclude their claims were so low risk as to merit information insensitive treatment could trigger withdrawals by money claimants who are unsure if their claims are exposed to the problematic assets. Moreover, in contrast to many of the other information-based theories of bank runs, the mechanism proposed here does not require information asymmetries but can occur in even when money claimants do not anticipate adverse selection.¹⁷² This means that the presumption of mutual ignorance could hold even during a period of widespread withdrawals. While not ruling out the possibility of sunspots, this frame provides a way to understand runs not explained by credit risk as nonetheless being driven by information, or rather, lack thereof.

The fragility arising from information gaps is further exacerbated by the ways that information gaps impede the market and regulatory processes that can prevent a run from becoming a full-fledged panic and that can help restore stability once panic takes hold. One of the most effective tools the government can use to promote and restore stability is to insure or otherwise guarantee money claims.¹⁷³ Such a policy can be instituted ex

¹⁷⁰ See *infra* Part IV.A.

¹⁷¹ *Id.*; see also Gorton & Winton, *supra* note 162, at 505 (identifying the fact that “a recession is looming” as the paradigmatic signal triggering panic in the information-based theories of bank runs).

¹⁷² In many ways, this view updates the approach taken by Charles Calomiris and Gary Gorton 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.

¹⁷³ E.g., Gary Gorton, *Slapped in the Face by the Invisible Hand: Banking and the Panic of 2007*, at 2 (May 9, 2009) (prepared for the Fed. Reserve Bank of Atlanta’s 2009 Fin. Mkt. Conference) (“The period from

ante, as in the case of deposit insurance, or ex post, as occurred when the Treasury Department opted to backstop money market mutual funds to stem withdrawals after the failure of Lehman Brothers caused one fund to break the buck.¹⁷⁴ Put in the frame used here, by rendering both actual risks and unknown unknowns irrelevant to the expected return on a money claim, insurance and implicit guarantees significantly reduce money claimants' tendency to run.¹⁷⁵ So long as a money claimant trusts the creditworthiness of the insurer and its commitment to make claimants whole, no other information matters and the claim becomes effectively information insensitive.

While exceptionally potent, insurance regimes also entail real costs. One of the greatest challenges is the moral hazard that inevitably results.¹⁷⁶ Another is that when the government provides insurance, it exposes itself to significant credit risk, the scope of which depends on the quality of the underlying assets and how much the government actually knows about those assets. The banking regime has never fully resolved these challenges, but the extensive supervisory and regulatory regime governing banks goes a long way in addressing them.¹⁷⁷ 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 help promote market functioning when market participants become concerned about information that they lack is to help fill the gaps. The rationale, reiterated recently by Federal Reserve Governor Tarullo, is that 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."¹⁷⁸ Injecting credible information into the system can help quell a panic when that information suffices to convince some money claimants that their claims are still sufficiently low risk to merit treatment as money.¹⁷⁹ Information injections can also play a critical role reducing the frictions inhibiting the entry of more informed, loss-bearing capital by reducing the information generation such capital holders must undertake to assess whether a new type of claim is appropriately priced. Again, this is a technique long employed by bank examiners, alongside their tendencies toward confidentiality, and it was even used by

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, *supra* note 4, at 121 (noting "there are costs and benefits associated with *any* approach to the regulation of money-creation" but deposit insurance "inaugurated an unprecedented period of stable, panic-free financial and monetary conditions").

¹⁷⁴ See generally *id.*; Macey, *Reducing Systemic Risk*, *supra* note Fejl! Bogmærke er ikke defineret.; Macey & O'Hara, *supra* note 92.

¹⁷⁵ CARNELL ET AL., *supra* note 74, at 271–72 (describing how deposit insurance solves the collective action problem that can cause even healthy banks to fail).

¹⁷⁶ E.g., Macey & O'Hara, *supra* note 92, 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."); RICKS, *supra* note 4, at 119 (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").

¹⁷⁷ See *supra* Part I.B.2.

¹⁷⁸ Donna Borak, *The Increasing Leverage of Daniel Tarullo*, AM. BANKER, July 28, 2013, available at http://www.americanbanker.com/magazine/123_8/the-increasing-leverage-of-daniel-tarullo-1060538-1.html?zkPrintable=1&nopagination=1 (quoting Tarullo).

¹⁷⁹ Calomiris & Gorton, *supra* note 166, at 160-62.

private actors seeking to restore stability before banks were as thoroughly regulated.¹⁸⁰ Nonetheless, it is not a viable policy tool when the government lacks credible information.

A third tool frequently employed to mitigate the scope of financial crises is for a central bank or other government actor to provide fresh liquidity to the banks or other entities facing liquidity constraints, reducing the need for the value-destroying fire sales and limiting what might otherwise be a powerful mechanism of contagion. The standard way central banks provide fresh liquidity is through collateralized loans, which enable a bank or other entity to post less liquid collateral in exchange for cash equivalents or other more readily marketable assets.¹⁸¹ 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 moral hazard.¹⁸²

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 informed and willing to bear risk. Again, this is a strategy long used to restore stability when banking crises hit. And, for reasons akin to those that arise when the government insures money claims, the amount of moral hazard and credit risk vary in accordance with how much the government knows about the institutions it is supporting and the mechanisms it has in place to limit *ex ante* risk taking by those entities. Thus, information gaps once again makes 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 they will be able to tailor any additional credit injections to the scale and scope of the problems they are facing. This can lead to delay, increasing the size and scope of a financial crisis. It can also result in the provision of excess support, increasing the moral hazard and credit risk.

¹⁸⁰ For example, in of 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, 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 Morrison & Lucy White, *Reputational contagion and Optimal Regulatory Forbearance*, 110 J. FIN. ECON. 642 (2013) (formally demonstrating how reliance on regulators can function as a mechanisms of contagion).

¹⁸¹ Kathryn Judge, *The First Year: The Federal Reserve as Information Coordination Agent* 116 COLUM. L. REV. 1, 9 (forthcoming 2016) (unpublished manuscript) [hereinafter Judge, *The First Year*] (describing Fed's expanded use of new liquidity facilities in 2008, such as that "to help revive the securitization market...a facility that allowed users to borrow funds on a nonrecourse basis as long as they provided the requisite collateral").

¹⁸² *Id.*, at 20–21 (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 frnk assessments of counterparty risk and asset values....simultaneously [giving] rise to significant moral hazard"); Charles W. Calomiris & Gary Gorton, *The Origins of Banking Panics: Models, Facts, and Bank Regulation*, in FINANCIAL MARKETS AND FINANCIAL CRISES 107, 160–62 (R. Glenn Hubbard, ed., 1991).

¹⁸² *Id.*

¹⁸² E.g., Judge, *The First Year*, *supra* note 181 and sources cited therein.

Yet to fully 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, particularly with respect to the latter set of responses, is often to work with rather than supplant private actors. Some of the new capital should come from private sources and the influx of informed capital should result in the production of some of the missing information. Market participants will not enter such domains, however, unless the expected returns exceed the expected costs of undertaking the information gathering and analysis required to make wise acquisition decisions. When there are sizeable knowable but unknown unknowns, those costs can pose large hurdles, significantly reducing the likelihood that private capital will enter in a timely fashion.¹⁸³

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 that typically are associated with information asymmetries and concerns about adverse selection. The claims here by no means eliminate or downplay the importance of such frictions. Nonetheless, the mechanisms through which these different types of frictions arise are distinct, as are the types of interventions required to address them. Understanding the degree of information production that is likely in a given domain and how information is likely to be dispersed among relevant market participants and regulators thus function as threshold inquiries that must be tackled in order to assess the probable effects of possible regulatory interventions.

D. The production of information gaps

A final reason that now is a critical juncture to recognize information gaps is that their size and location are constantly evolving, altering the locus threats to systemic stability and the mechanisms that can be used to restore stability if lost. As defined here, information gaps constitute pockets of information that are (1) pertinent, (2) knowable, and (3) not known to any party, public or private. Innovations and changes in the financial markets are creating dynamism along all three of these dimensions.

As an initial matter, improvements in computing and other technologies are constantly expanding the type of data analysis that is possible. As this happens, matters that might have once been in Knight's category of ones "not susceptible to measurement,"¹⁸⁴ are transformed into ones that are knowable. And, as the frontiers of what is knowable shift, so too do the market forces that will be active in a given domain. Expensive new technology that enables one to quickly test whether any vehicle is a lemon, for example, could alter the types of assurances a buyer would want before buying even a new vehicle. The types of regulatory interventions that may be optimal will similarly evolve as these boundaries change.

The dynamism with respect to the second and third dynamics, what information is pertinent and how pertinent information can remain unknown to any party, come to life

¹⁸³ Gilson & Kraakman, *Information Costs*, *supra* note 31, 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.").

¹⁸⁴ KNIGHT, *supra* note 21, at 232.

through a closer examination of the specific arrangements that enabled the shadow banking system to produce money claims prior to the Crisis. The process of creating financial claims that can operate like money from risky financial instruments without a bank often entails the construction of one or more fragmentation nodes.¹⁸⁵ While the specific design varies, fragmentation nodes typically bundle previously unrelated financial claims together and then divvy out rights to the cash flows from those claims to various classes of claimholders.¹⁸⁶

Examples of fragmentation nodes include the mortgage-backed securities (MBS) that were used as collateral for many money claims produced in the shadow banking system pre-Crisis. The value of a MBS depends on a number of variables including (a) future economic developments, such as housing prices, (b) the quality of the underlying home loans, such as borrower creditworthiness, and (c) factors that are specific to the securitization structure created, 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.¹⁸⁷ The information dynamics inherent in (a) entail a combination of risk and some Knightian uncertainty, as previous patterns provide helpful but incomplete guidance regarding future trends. The dynamics in (b) reflect an information asymmetry, at least initially—the bank that originates a loan will typically know more about its quality than the investors who acquire MBS backed by that loan. Significantly, the mechanisms used to overcome this asymmetry often include warranties and other tools that reduced the adverse consequences to investors should there be problems without requiring a complete transfer of the pertinent information.

The dynamics at issue in (c) are particularly interesting, as they do not fit neatly into any existing informational category. Prior to the creation of the securitization structure, the correlation among the expected performance of the mortgages bundled together in the securitization vehicle may not have been pertinent to anyone.¹⁸⁸ The relationship between degree of correlation among the underlying assets and the value of a newly created MBS also varies significantly across the different “tranches” of MBS issued. As a result, the interests of the informed investors who acquire the information-sensitive lower rated tranches do not align with the interests of the holders of the AAA tranche that typically backed money claims.¹⁸⁹ The possibility that the expected return on the underlying assets may be more correlated than assumed in the model used to create the securitization structure or that expected returns might become increasingly correlated in certain states of the world are thus among the types of information that no one

¹⁸⁵ Judge, *Fragmentation Nodes*, *supra* note 119.

¹⁸⁶ *Id.*

¹⁸⁷ For a more thorough explanation of these dynamics, *see id.* at 678–81.

¹⁸⁸ 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.

¹⁸⁹ *Id.*

involved had both the incentive and means to produce at the time a securitization transaction was consummated.

ABCP programs and many of the other entities that issue money claims are also fragmentation nodes. They similarly entail the bundling together of assets that previously had no connection to one another and issuance of different classes of claims that have different rights with respect to the cash flows from the underlying assets. As with MBS, the process of creating such fragmentation nodes appears to create value, here 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.

The shifting importance of interconnections among financial firms is another dimension along which information gaps can grow along with the expansion of the shadow banking system. These dynamics are reflected in a model by Ricardo Caballero and Alp Simsek showing how “complexity, a feature strongly disliked by investors during downturns for the uncertainty it generates” can arise “endogenously during crises.”¹⁹⁰ In their model, as a financial crisis spreads, “banks face an increasingly complex environment since they need to understand more and more interlinkages.”¹⁹¹ This increases “perceived uncertainty ... and makes relatively healthy banks reluctant to buy since they now fear becoming embroiled in the cascade themselves, and no reasonable amount of research can rule out this option in the time available.”¹⁹² Put in the frame here, the type of information that is pertinent expands, increasing the size of information gaps. And this happens during a period of systemic distress, when market participants view unknown unknowns as reasons to avoid transacting. Their analysis thus illustrates the reasons that information may be pertinent only in certain states of the world, how the financial system produces information gaps, and how the growth of information gaps can exacerbate market dysfunction.

IV. Information Gaps and the Crisis

Having established why information gaps are likely to flourish in the shadow banking system and contribute to the systemic risk that system poses, the question becomes whether the available evidence supports this paper’s conjectures. This Part uses the Crisis to explore these issues, which are also explored in more detail in a parallel piece examining in far greater depth than can be undertaken here the unfolding of the first year of the Crisis.¹⁹³

A. Escalation

It is widely, though not universally, recognized that the Crisis started in August 2007.¹⁹⁴ 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

¹⁹⁰ Ricardo J. Caballero & Alp Simsek, *Fire Sales in a Model of Complexity*, 68 J. FIN. 2549, __ (2013).

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ Judge, *The First Year*, *supra* note 181.

¹⁹⁴ Caballero & Simsek, *supra* note 190, and sources cited therein.

late 2006 and the those declines adversely affected the demand for mortgage-backed securities (MBS) and had a particularly adverse effect on the demand for MBS backed by subprime loans. By the end of July, the lead credit rating agencies had engaged in record downgrades, downgrading well over 1,000 subprime MBS.¹⁹⁵ The ABX index for lower rated subprime MBS, an important mechanism aggregating views on the value of subprime MBS, was also declining throughout 2007.¹⁹⁶ Nonetheless, it was not until August 9th of that year, 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.¹⁹⁷ 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.¹⁹⁸

Empirical evidence supports that there was a “run” on ABCP starting in August 2007. Daniel Covitz and co-authors 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 and then disintegrated quickly.¹⁹⁹ Covitz and his co-authors found that although prior to August, “[t]he percent of ABCP programs in a run... was quite low.... Starting in August, the percent of ABCP programs experiencing a run each week climbed sharply.”²⁰⁰ By September, more than “30 percent of all ABCP programs” had experienced a run and “[b]y the end of 2007, more than 40 percent of programs were in a run.”²⁰¹ Among other ramifications, this resulted in a dramatic decline in the amount of ABCP outstanding.²⁰²

Significantly, while the proportion of ABCP programs that experienced a run is high and represents a significant dislocation in what had been a large and seemingly stable market, the figure is well shy of 100%. “[I]nvestors were more likely to run from programs with substantial exposure to mortgage-related assets,” programs that had terms giving the sponsors the right to extend the term of ABCP, and “programs with greater credit and liquidity risk,” affirming the notion that the money claimants were minimally informed—not uninformed.²⁰³ Additionally, while Covitz and his co-authors claim that in August and September, ABCP holders also engaged “indiscriminate runs,” they base that conclusion on the fact that some of the runs cannot be explained by fundamentals.²⁰⁴

¹⁹⁵ 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), available at <http://www.hsgac.senate.gov/download/report-psi-staff-report-wall-street-and-the-financial-crisis-anatomy-of-a-financial-collapse>.

¹⁹⁶ Gary B. Gorton, *supra* note 131, at 10; Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo*, 104 J. OF FIN. ECON. 425 (2012).

¹⁹⁷ See Judge, *The First Year*, *supra* note 181 and sources cited therein.

¹⁹⁸ See *supra* Part I.C.

¹⁹⁹ Covitz et al., *supra* note 115, at 11, Figures 1, 3, 4, 5.

²⁰⁰ *Id.* at 17. They define a “run” as occurring when an ABCP program does not issue any new ABCP despite having at least ten percent of its outstanding ABCP mature in that week or having experienced a run in a previous week and still not issuing new ABCP.

²⁰¹ *Id.* at 18.

²⁰² *Id.* at 18 and Figure 1.

²⁰³ *Id.* at 20.

²⁰⁴ *Id.* at 26.

Yet, if the runs were truly indiscriminate, it is hard to explain why not all ABCP programs experienced runs. The analysis here suggests a distinct rationale that helps reconcile their finding that not all of the runs can be explained by fundamentals with the finding that ABCP holders did not run from all funds—ABCP holders may have run when either the fundamentals so justified or they were both concerned and uncertain about the program's exposure to problematic assets. That the runs occurred following a signal that suggested problems only with respect to a small subset of the assets backing ABCP yet it did so in conjunction with other signs suggesting that the accuracy of credit ratings on which ABCP holders had so heavily relied provides further support for the notion that the timing and scope of the runs observed are consistent with this paper's claims regarding the ways information gaps affect fragility.

Holders of other money claims that had supported the shadow banking system engaged in similar run-like behavior. Gary Gorton and 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 even more pronounced following the failure of Lehman Brothers in September 2008.²⁰⁵ Their focus is on “haircuts,” that is the degree of overcollateralization that money claimants demanded. 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 and the response varied depending on the type of collateral that backed a money claim. The degree of overcollateralization money claimants demanded increased in accord with rising “uncertainty about collateral values,”²⁰⁶ and it became virtually impossible for parties seeking to issue money claims to use the most opaque and difficult to value assets as collateral.²⁰⁷ Given that the more complex assets were less likely to be understood by the other party to the repo transaction, that haircuts increased most dramatically for such assets is a finding that is again more consistent with the notion that information gaps drove some subset of the run behavior than theories grounded in information asymmetries.

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 CP 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 \$1.00.²⁰⁸ Nonetheless, in a response typical of money claimants, many money market mutual fund holders responded by quickly exercising their right to exit. Again, subsequent empirical analysis confirms “run-like behavior,” and that this behavior varied across fund types.²⁰⁹ Institutional

²⁰⁵ Gorton & Metrick, *supra* note 196, at 425–51.

²⁰⁶ *Id.* at 444.

²⁰⁷ *Id.* at 440 (“The market disappeared or unpriced CDOs and CLOs, unpriced ABS and MBS, all subprime; and AA-AAA CDO.”).

²⁰⁸ See Macey, *Reducing Systemic Risk*, *supra* note **Fejl! Bogmærke er ikke defineret.**, at 20.

²⁰⁹ Lawrence D. W. Schmidt, Allan G. Timmermann & Russ Wermers, *Runs on Money Market Mutual Funds* 1 (unnumbered working paper, 2014), <http://ssrn.com/abstract=1784445>.

investors were far more likely to exit than retail investors; and, although institutional investors withdrew massive amounts of capital from funds holding non-government assets, they simultaneously acquired shares in money market mutual funds holding “U.S. Government-backed securities.”²¹⁰

This evidence is consistent with the notion that minimally informed money claimants responded in a nonlinear fashion to new information—the claims functioned as if insensitive to information in most states of the world, but there were large-scale shifts in how claimants behaved once signals arose indicating a possible change in state. Moreover, the scope of the run in each case typically exceeded the scope that one would expect based on traditional information-based theories of why depositors runs, but still were limited in ways that could not have been predicted by the sunspot theory of runs. While far from conclusive, this is consistent with this paper’s claims.

In all of these instances, and numerous others over the course of the Crisis, rapid withdrawals by money ended up having significant spillover effects on other markets. In each situation, 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 simply 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 that information. The claims were structured to be information insensitive, and so the first (and second and third...) signs of bad news were not sufficient to trigger a mass exit. Nonetheless, when bad news was coupled with new information suggesting that the proxies money claimants had relied on were less accurate than previously believed, money claimants begin to exit quickly. And, when they did, they did not withdraw from everything, nor did they withdraw only when doing so was justified by the increased credit risk to which they were exposed. Rather, the withdrawals followed an intermediate course. These patterns would be exceptionally odd in equity markets, where prices can and should regularly adjust to new information, and the scope of the runs are not necessarily what one would predict based on established theories for runs, but they are precisely the types of patterns the analysis here suggests one should expect for money claims issued in an environment with large information gaps.²¹¹

The additional detail regarding the scope of the runs that occurred in these markets illustrates the importance of focusing on the information-related incentives of money claimants. Most of the literature on information sensitivity focuses on the nature of the claim, as reflected in the notion that a claim can be information insensitive. This typology is helpful and informs the analysis here. Nonetheless, as those advocating the information insensitive framing concede, privately created money claims are never risk-free and thus never completely insensitive to information.²¹² The current framing can elide this important fact. We can better understand the behavior of the holders of those

²¹⁰ *Id.* at Figure 1.

²¹¹ While equities and other investment market can exhibit bubbles and crashes, the dynamics are different and the systemic ramifications are typically far more modest. See generally RICKS, *supra* note 4, at 103-45.

²¹² GORTON, MISUNDERSTANDING FINANCIAL CRISES, *supra* note 39, at 50 (“The problem with privately produced collateral is that it is not riskless.”).

claims, and when unknown unknowns will cause them to run, by focusing instead on the reasons that a money claimant believes that a particular claim is in the “information insensitive” zone despite having radically incomplete information about the actual value and risk exposures of the underlying assets.

The data provided here is necessarily a thin subset of the work that has been done on the Crisis and other periods of systemic distress, but it represents 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 paper’s claims. The money claimants that had been providing capital to the shadow banking system acted like money claimants—they were minimally informed and skittish. Their collective responses to new information demonstrated significant nonlinearities and had adverse systemic consequences. The analysis is also consistent with the notion that information gaps in the shadow banking system played an important role contributing to the Crisis.

B. Efforts to restore stability

The Crisis also illustrates how information gaps further increase fragility by impeding the processes through which stability can be restored 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.²¹³ 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 market dysfunction suggest information gaps were a significant contributing factor.²¹⁴

Policymakers eventually did intervene to provide support for both banks and shadow banks, 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. These efforts included all of the tools long used to address banking crises—guarantees, liquidity support, information injections and fresh capital. The Fed’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 Treasury provided to banks through the Troubled Asset Relief Program were all mechanisms of assuring short-term and other creditors that they need not worry about the actual value of the assets underlying their claims because the government would make them whole. 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

²¹³ See Judge, *The First Year*, *supra* note 181.

²¹⁴ *Id.*

they could hold, nor was there a supervisory regime providing regulators high-quality information about the risks of the underlying assets. This substantially altered the moral hazard and credit risk dynamics.

As reflected in 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.²¹⁵ Less commented on but no less important is how the dearth of information that the government often possessed when it extended liquidity and credit guarantees significantly 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 it first took that action.²¹⁶

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 decision by the Fed to undertake and publicly disclose the results of stress tests conducted on the largest banking holding companies.²¹⁷ As then-Fed Chairman Bernanke later explained, the Fed 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 SCAP "was designed to reduce this uncertainty."²¹⁸ In opting to publicly disclose the results of the tests, Fed policymakers reasoned that even though there are risks to disclosing information when markets are functioning well, 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.²¹⁹ The market's response to the

²¹⁵ E.g., Janet L. Yellen, Chair, Bd. of Governors of the Fed. Reserve, Finance and Society, Speech at the [sic] "Finance and Society," a conference sponsored by Institute for New Economic Thinking (May 6, 2015), *available at* <http://www.federalreserve.gov/newsevents/speech/yellen20150506a.htm> ("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....").

²¹⁶ James B. Stewart, *Solvency, Lost in the Fog at the Fed*, N.Y. TIMES, Nov. 8, 2014, at B1.

²¹⁷ E.g., Ben S. Bernanke, Chair, Bd. of Governors of the Fed. Reserve, The Supervisory Capital Assessment Program, Speech at the Fed. Reserve Bank of Atlanta 2009 Financial Market Conference (May 11, 2009), *available at* <http://federalreserve.gov/newsevents/speech/bernanke20090511a.htm>. The willingness of Fed 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 Treasury to provide significant capital support to the banking system, so it was clear that the government could and would use taxpayer funds to recapitalize any banking organizations revealed to be deficient. Morgan et al., *supra* note 220, at 1482 (explaining how in 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 [Capital Assistance Plan]) by November 2009").

²¹⁸ *Id.*

²¹⁹ Borak, *supra* note 178 (describing Tarullo's rationale for pushing for disclosure).

stress tests supported the conjecture.²²⁰ As Bernanke later opined, the stress tests were a “critical turning points in the financial crisis,” because they “provided anxious investors with something they craved: credible information about prospective losses at banks.”²²¹ 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 extended its safety net illustrates the mismatch between the regulatory structures in place and regulators’ capacity 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 that *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

Another way the Crisis helps demonstrates the importance of identifying information gaps as such is by showing what happens in the absence of a precise term to capture these dynamics. 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.”²²² They also recognized that the rise of the shadow banking system limited the amount of information they had about those challenges. As Governor Donald Kohn 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 securitizations[—core components of the shadow banking system—]we have been able to move to a different model in which the risks are much more dispersed.”²²³ And, one ramification of the new regime is that it “leads to potential pockets of uncertainty, and that is exactly what has come up.”²²⁴ Policymakers even were attuned to many of the specific mechanisms through which the information problems were causing the market dysfunction to spread. As Kohn further 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 uncertainty about bank exposures.”²²⁵ Other Fed officials made similar observations.²²⁶ Nonetheless, lacking a concept that conveyed the challenge as one entailing information that was relevant and knowable but not known to anyone, they

²²⁰ *E.g.*, Donald P. Morgan, Stavros Peristani & Vanessa Savino, *The Information Value of the Stress Test*, 46 J. MONEY, CREDIT & BANKING 1479 (2014).

²²¹ Ben S. Bernanke, Chair, Bd. of Governors of the Fed. Reserve, Speech at the financial markets conference sponsored by the Federal Reserve Bank of Atlanta (Apr. 8, 2013), *available at* <http://federalreserve.gov/newsevents/speech/bernanke20130408a.htm#f2>.

²²² Transcript of the Federal Open Market Committee Conference Call of August 16, 2007, at 3, 30.

²²³ Transcript of the Federal Open Market Committee Meeting on September 18, 2007, at 86.

²²⁴ *Id.*

²²⁵ *Id.* at 74–75 (italics added).

²²⁶ *See* Judge, *The First Year*, *supra* note 181.

often tried to fit their description of the challenge into less precise but more familiar terms.

As reflected in these limited excerpts and throughout the discussion by and among Fed officials and other leading policymakers during this period, the problem was regularly framed as a challenge of “uncertainty.” This 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 policymakers recognized that the missing 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 for 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.²²⁷

Bernanke is certainly correct that there was an informational deficit, and he may well have understood that no one actually had the information. Nonetheless, in choosing to frame the problem as an asymmetry, he is using a characterization that elides this fact. Information that no one has cannot create an asymmetry. And, again, this matters because the market dynamics change significantly when someone already has the relevant information.

Language alone cannot solve difficult problems and there is no easy solution to the dynamics highlighted here. Markets that depend on mutual ignorance can serve functions that informed markets cannot; but they are also unstable in ways that information-rich markets are not. Trying to net the benefits enabled by minimally informed transfers when times are good against the systemic costs that can arise if claimants exit en masse is not a straightforward calculation. Nonetheless, understanding the tradeoffs at stake and understanding the unique informational challenge posed by the shadow banking system is a critical first step to addressing the systemic risk the system poses. Expanding the conceptual framework to recognize information gaps thus could go a long way toward helping to promote a more productive dialogue about the best path forward.

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: How large should information gaps be allowed to become? What other positive and negative externalities arise when certain actors possess or lack particular information? To what extent should information gaps be addressed through structural solution, such as limits on the activities and assets of entities that issue money claims, relative to interventions that

²²⁷ Transcript of the Federal Open Market Committee Meeting on April 29–30, 2008, at 18.

promote the production of information? How much of that information production be undertaken by private actors, public actors, or some combination thereof? What is the appropriate role for government guarantees and other similar devices that promote stability but give rise to other distortions? Given that the importance of information is often state contingent, might it be necessary or optimal for the level of information production undertaken or mandated by public actors to vary across different states?

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. Nonetheless, 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.²²⁸ In identifying these as among the key questions that need to be resolved and providing a frame for assessing the tradeoffs at stake, this paper helps lay the foundation for a more productive path forward. This Part distills some of the key lessons by exploring three sets of implications that flow from this paper's analysis and claims. It begins by highlighting why the optimal regime to regulate shadow banking is likely to require participation from experts and policymakers who have not historically engaged deeply with each other. It then considers the implications of this paper's insights with respect to shadow banking reforms underway and proposals for further reform. It concludes by briefly considering why the analysis here likely has ramifications in domains beyond shadow banking.

A. hybrid regulatory regime

A core lesson underlying the analysis here is that the shadow banking system is truly a hybrid system, one that shares much in common with the capital markets and banks as traditionally constituted, but one that also cannot be fully understood within either paradigm. This raises significant questions regarding regulatory competencies and the appropriate regulatory framework. It casts doubt, for example, on whether the SEC is the best agency to oversee money market mutual funds and it provides fresh support for the importance of institutions like the Financial Stability Oversight Council (FSOC), which brings securities regulators and prudential regulators to one table and asks them to work together to identify and address sources of system risk. Yet it also suggests there might be real gains from deeper interdisciplinary engagement among academics and other experts as well.

The different assumptions that different groups of experts implicitly bring to the table are reflected in their different diagnoses of the Crisis and competing proposals for further reform. While sometimes glossed over by framing that seeks to distinguish the optimal response during a crisis and the best policies to prevent crises—a distinction that is legitimate and necessary but can be used to elide the inevitable way that government actions during a crisis, and expectations with respect thereto, fundamentally alter market expectations and activity during non-crisis periods—the differences often run quite deep.

For example, in recent work, legal academics Ronald Gilson and Reinier Kraakman update and expand the insights underlying their work on the mechanisms of

²²⁸ See generally CHARLES W. CALOMIRIS & STEPHEN H. HABER, *FRAGILE BY DESIGN: THE POLITICAL ORIGINS OF BANKING CRISES AND SCARCE CREDIT* (2014); Calomiris & Gorton, *supra* note 166.

market efficiency to worlds populated by instruments beyond equity claims and in which primary markets dominate secondary ones. Thus expanding their analysis leads them to conclusions that overlap with this paper's claims—lack of information and the costs of producing that information played important roles contributing to the scope of the Crisis.²²⁹ 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.²³⁰ Responding to that suggestion, economist Bengt Holmstrom is dismissive. In his view, “the logic behind transparency in stock markets does not apply to money markets.”²³¹ This “matters because a wrong diagnosis of a problem is a bad starting point for remedies” and “to minimise the chance of new, perhaps worse mistakes, we need to analyse remedies based on the purpose of liquidity provision.”²³²

The analysis here suggests that the optimal route forward may lie between these extremes—on a path that incorporates Gilson and Kraakman's insights regarding the importance of information costs while also taking into account the distinct qualities of money markets. In dismissing their analysis and proposed reforms, Holmstrom likely underestimates the important role that more robust disclosure policies could play in limiting information gaps and the fragility that results when such gaps arise in financial systems dependent on capital from money claims. Yet Holmstrom's critique is not without 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 wherein the potential 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 fragmentations nodes in which those instruments are bundled with other instruments and new instruments are created that grant holders specified rights to the cash flows produced by those newly constituted asset bundles.²³³ Yet, animating Holmstrom's response is a concern about the very desirability of such technologies. In his analysis, the process of imposing such requirements could upset the 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 concern 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.

²²⁹ Gilson & Kraakman, *Information Costs*, supra note 31, at 351–57.

²³⁰ *Id.*

²³¹ Holmstrom, supra note **Fejl! Bogmærke er ikke defineret.**, at 2–3 (citing Gilson & Kraakman, *Information Costs*, supra note 31).

²³² *Id.*

²³³ Gilson & Kraakman, *Information Costs*, supra note 31, at 354–55.

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 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.²³⁴ The aim of this hypothetical back of forth is not to resolve this debate but to highlight the important insights that both sides bring to the table.

Taking a step back, the analysis here highlights 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 are likely to 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 at times 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 likely lead to reforms that are suboptimal for different reasons. The fact that shadow banking occurs in the capital markets, and is not intermediated through a bank, raises important questions about the mechanisms for imposing discipline on the processes creating the underlying assets and any subsequent monitoring required to maintain the value of those assets, in addition to introducing the additional fragility issues highlighted here. Many mechanisms that promote stability come at the expense of discipline and the optimal balance is unlikely to be achieved without a deep understanding of how discipline can and has been imposed in various market-based settings. One function of the groundwork laid here with respect to the different types of financial claims and the different private and public institutions that evolved historically to support their issuance is to highlight both the insights and limitations of each of the established paradigms as starting points for addressing the question of how best to regulate shadow banking.²³⁵

²³⁴ *Id.*

²³⁵ This point is not novel, but the analysis adds flesh to the claim. *See, e.g.,* Perry Mehrling, et al., *supra* note **Fejl! Bogmærke er ikke defineret.**, at 1 (explaining “taking of different approach” from “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 Part considers some implications of this paper's insights on the post-Crisis reforms underway, proposals for further reform, and related policy issues.

1. Post-crisis reforms

The post-Crisis reforms already underway make important progress with respect to a number of the challenges highlighted here. For example, the authority of the FSOC to designate non-bank 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 and one that is directly responsive to the information-related issues highlighted here is the creation of the Office of Financial Research (OFR). The OFR, which supports the work of the FSOC, has broad authority to not only gather information but to mandate standardization with respect to the ways financial institutions collect and report certain data, developments which could go a long way to addressing information gaps.²³⁶

Despite this real progress, core structural challenges remain. Money claims issued by nonbanks remain sizeable in amount and under-regulated,²³⁷ efforts to further reform money market mutual funds remain contested,²³⁸ and regulations implementing provisions of the Dodd-Frank Act targeting other aspects of the shadow banking system seem likely to fall short.²³⁹ 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

²³⁶ OFFICE OF FINANCIAL RESEARCH, *About the OFR*, financialresearch.gov/about (last visited Sept. 18, 2015) (stating mission of OFR is to "promote financial stability by delivering high-quality financial data, standards and analysis for the Financial Stability Oversight Council and public").

²³⁷ Daniel K. Tarullo, Governor, Bd. Of Governors of the Fed. Reserve, Speech at the Americans for Financial Reform and Economic Policy Institute Conference (Nov. 22, 2013), *available at* <http://www.federalreserve.gov/newsevents/speech/tarullo20131122a.htm> ("Banks and broker-dealers currently borrow about \$1.6 trillion, much of this from money market funds and securities lenders."); William C. Dudley, Pres. and C.E.O., Fed. Reserve Bank N.Y., Fixing Wholesale Funding to Build a More Stable Financial System, Remarks at the New York Bankers Association's 2013 Annual Meeting & Economic Forum (Feb. 1, 2013), *available at* <http://www.newyorkfed.org/newsevents/speeches/2013/dud130201.html> (urging further reforms of tri-party repo system and 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").

²³⁸ Compare, e.g., Jonathan R. Macey, *Why Investors Shouldn't Worry About Money Funds*, WALL ST. J., (June 3, 2011), <http://www.wsj.com/articles/SB10001424052748704904604576335392541845616> with Jeffrey N. Gordon, *Why Investors Should Worry About Money Funds*, WALL ST. J., (June 3, 2011), <http://www.wsj.com/articles/SB10001424052702304520804576343093940388186>.

²³⁹ E.g., Ryan Bubb & Prasad Kirshnamurthy, 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.");

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. Both the progress made and the magnitude of the information gaps that remain are reflected in a recent working paper by the OFR that examines the data that is available and that remains missing for two of the most significant nonbank money markets.²⁴⁰ In summarizing the findings, the head of the OFR explained that the “[d]ata available to regulators and market participants have improved since the crisis but remain insufficient to evaluate the risks or even the level of activity in these markets.”²⁴¹ While the OFR has a number of projects underway to address those issues and numerous others, its progress remains slow. More generally, the premise underlying the creation of the OFR is not one for which there is much precedent. In banking, supervisors have often played an important role monitoring bank activity, but the information generation in which they engaged was coupled with the authority to take actions responsive to risks they identified and oversight mechanisms encouraging them to do so.²⁴² 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 long-term 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 for convincing money claimants to treat short-term claims as if they are information insensitive. 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 fueling that growth while nonetheless socially suboptimal given the heightened systemic risk. This core challenge remains.

2. Proposals for structural change

In part because of these dynamics, a number of academics have called for more radical changes to the shadow banking system. Albeit differently structured, Morgan Ricks and Adam Levitin have each proposed reforms that would drastically curtail shadow banking and others, like Andrew Metrick and Gary Gorton, have proposed more

²⁴⁰ Viktoria Baklanova, Adam Copeland & Rebecca McCaughrin, *Reference Guide to U.S. Repo and Securities Lending Markets* (Office of Financial Research Working Paper Series, 2015), http://financialresearch.gov/working-papers/files/OFRwp-2015-17_Reference-Guide-to-U.S.-Repo-and-Securities-Lending-Markets.pdf.

²⁴¹ Richard Berner, *From the Director: Demystifying U.S. Repo and Securities Lending Markets*, OFFICE OF FINANCIAL RESEARCH (Sept. 9, 2015), <http://financialresearch.gov/from-the-director/2015/09/09/demystifying-u-s-repo-and-securities-lending-markets>.

²⁴² See *supra* Part I.B.2.

modest but still significant structural changes.²⁴³ All of the proposed reforms recognize the issuance of money claims as a core source of instability and the analysis here provides fresh support for each. More generally, the fragility this paper contends is inherent in shadow banking as currently constituted raises the question of why shadow banking should be allowed at all.

This question, while critical to ask, is not easily answered. At one level, the political will for radical reform appears to be lacking and there are real questions about whether the more aggressive proposals would actually curtail the targeted activities or merely encourage market participants to find ways to engage in the same activities elsewhere or in modestly different form. At a deeper level, however, it is also far from clear whether the benefits of reforms designed to significantly scale back or kill shadow banking would exceed the associated costs.

Among the many issues that remain only incompletely understood are whether and why shadow banking is a socially valuable undertaking. Given the significant and growing regulatory burdens imposed on banks, shadow banking might seem to be purely the byproduct of regulatory arbitrage, and regulatory arbitrage is clearly among the factors driving its growth.²⁴⁴ This raises legitimate concerns. Yet, trying to kill shadow banking is at least somewhat in tension with another aim that has animated much of the post-Crisis reform agenda—trying to shrink banks so no single institution is too-big-to-fail. More concretely, the post-Crisis efforts to build a more stable banking system has resulted in reforms that impose significant new costs on banks, leading some banks to charge fees for holding large, uninsured deposits.²⁴⁵ This creates real challenges for parties who want money equivalents and the demand for such claims seems high.

Some of the more interesting (and yet still quite limited) data on the growth of shadow banking identify a demand for money claims as among the core drivers. Recent work by Zoltan Pozsar, for example, documents the exponential growth of “institutional cash pools” controlled by entities like “large, global corporations” and asset managers.²⁴⁶ According to Pozsar, the size of institutional cash pools—which are “typically at least \$1 billion in size”—precludes insured deposit accounts from being a viable mechanism for storing this capital.²⁴⁷ Situating the growth of these cash pools in relation to the global savings glut caused by foreign demand for U.S. government securities, Pozsar finds 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

²⁴³ Morgan Ricks, *A Regulatory Design for Monetary Stability*, 65 VAND. L. REV. 1289 (2012); RICKS, *supra* note 4; Gorton & Metrick, *Regulating Shadow Banking*, *supra* note 196; Adam J. Levitin, *Safe Banking*, 83 U. CHI. L. REV. __ (forthcoming 2016).

²⁴⁴ E.g., Schwarcz, *supra* note 4, at 624 (noting that “the fact that shadow banks tend to be less regulated than traditional banks inevitably means that regulatory arbitrage drives the demand for shadow banking to some extent”).

²⁴⁵ Emily Glazer, J.P. Morgan to Start Charging Big Clients Fees on Some Deposits, WALL ST. J. (Feb. 24, 2015, 8:40 AM), <http://www.wsj.com/articles/j-p-morgan-to-start-charging-some-big-clients-deposit-fees-1424743293>.

²⁴⁶ Zoltan Pozsar, *Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System*, 22 FIN. MKTS., INSTS. & INSTRUMENTS 283, 285–86 (2013).

²⁴⁷ *Id.*

\$1.5 trillion” and probably far more.²⁴⁸ Further connecting these findings to the recent work on the seemingly constant level of demand for safe assets in the U.S. financial system over the last sixty years, despite the rapid growth in financial assets outstanding and dramatic changes in the composition and structure of that system, suggests that there are powerful and not yet well understood market forces driving much of the shadow banking system’s growth.²⁴⁹

A distinct but no less important issue is that a primary reason for the longstanding concerns about the fragility of the banking system is that breakdowns in that system often have significant adverse effects on the real economy. When the fragilities in the shadow banking system became manifest in the Crisis, similar dynamics seemed to result. Yet, that may have been due in significant part to the myriad interconnections between shadow banks and banks and the fact that the problems that arose in shadow banks led directly to problems for banks.²⁵⁰ While some mechanisms of contagion—like common exposures to similarly classes of assets—may be inevitable, it remains to be seen whether it is possible to have a shadow banking system that is less connected to the banking system and whether a financial system with both might be able to tolerate greater dysfunction in either with less severe consequences for the real economy. In short, while the analysis here provides yet additional reasons to expect that the optimal path forward for shadow banking may entail significant new restrictions on those activities, it may be premature to pursue some of the more aggressive reforms without a richer understanding of the tradeoffs at stake.

Shifting the focus to more modest structural reforms, this paper provides fresh support for a number of proposals and reform efforts seeking to reduce the complexity of financial instruments and institutions. Complexity can serve socially useful functions and is the byproduct of many legitimate activities, but it also increases systemic risk and inhibits both the public and private mechanisms for restoring stability during periods of systemic distress. 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, regulations that make it more costly for market participants to create relatively more complex instruments may well be justified.²⁵¹

3. State dependent information generation

Given the dramatic changes in banking and the growth of the shadow banking, a complex financial system not fully understood by market participants or regulators may 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, they also impose meaningful frictions on the processes required to restore stability when concerns arise. The analysis here thus supports claims

²⁴⁸ *Id.* at 305.

²⁴⁹ Gorton, Lewellen & Metrick, *supra* note 43, at 101 (“The ‘safe-asset share’ has remained close to 33 percent in every year since 1952.”).

²⁵⁰ See, e.g., Part II.B and sources cited therein (describing how backstops provided by banks played important roles assuring money claimants of the safety of their claims).

²⁵¹ E.g., Judge, *Fragmentation Nodes*, *supra* note 119; Mark Roe, *Structural Corporate Degradation Due to Too-Big-To-Fail Finance*, 162 U. PA. L. REV. 1419 (2014).

that financial regulation will inevitably entail both *ex ante* and *ex post* interventions, and highlights the need for greater advance consideration of the types of *ex post* responses that are most likely to contain a growing financial crisis without engendering excessive moral hazard and exposing taxpayers to excessive credit risk.²⁵²

This paper's insights regarding the fragility arising from information gaps provide particularly strong support for the notion that information generation should be an important component of regulators' *ex post* strategies and the importance of recognizing the need to start implementing such policies in response to any signal indicating a possible change of state, not waiting for the eruption of a full-blown financial crisis.²⁵³ The importance of including *ex post* information production as part of any regulatory strategy to address shadow banking can be defended both at the level of theory or by reference to the messiness of reality.

Focusing first on theory, the analysis here assumes that information is costly to generate and that the value of information, and the effect that a particular information gap will have on market functioning, 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.²⁵⁴ Putting these pieces together suggests that an optimal regulatory approach may entail accepting information gaps as part of the normal state of affairs, 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 information produced.²⁵⁵ Given the logistic and other challenges inherent in information production and the fact that even if designed to be elastic and to rely on participation or support from private market participants, there are going to be limits to how quickly any regulator could, such an 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 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. More concretely, the analysis here supports the claim I have made elsewhere, that during periods of systemic distress the Federal Reserve should

²⁵² E.g., Steven L. Schwarcz & Iman Anabtawi, *Regulating Ex Post: How Law Can Address the Inevitability of Financial Failure*, 92 TEX. L. REV. 75 (2013).

²⁵³ Judge, *The First Year*, *supra* note 197.

²⁵⁴ *Id.*

²⁵⁵ *Id.*

function as an information coordination agent, as well as other strategies that would ask regulators to be more engaged and responsive to early signs of potential trouble.²⁵⁶

C. Beyond shadow banking

The analysis here, while focused on shadow banking, also has 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 no longer fits the mold that worked so well during much of the 20th 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 banks' risk exposures, creating yet new information gaps.²⁵⁷

Policymakers' interventions have not always been helpful on this front. The large bank mergers that helped create stability during the Crisis only increased the challenges that arise from excessive scale and scope. Even the Volcker Rule, which proponents sold as the modern day version of the powerfully simplifying Glass-Steagall wall separating commercial banks and investment banks, makes little progress in this regard. The limits the Volcker Rule imposes 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. Supervisors like the Federal Reserve now recognize that different types of banks require fundamentally different types of supervision, and are restructuring their operations accordingly.²⁵⁸ The ongoing use of stress tests also seems quite helpful, particularly given that regulators seem to be using those tests to push banks to shift toward less complex structures and operations.²⁵⁹ Nonetheless, bank regulation today looks very different than yesteryear, when limits on bank activities had both the intent and effect of

²⁵⁶ *Id.*

²⁵⁷ *E.g.*, MAJORITY AND MINORITY STAFF OF PERMANENT SUBCOMM. ON INVESTIGATIONS OF S. COMM. ON HOMELAND SEC. & GOV. AFFAIRS, 113TH CONG., JPMORGAN CHASE WHALE TRADES: A CASE HISTORY OF DERIVATIVES RISKS AND ABUSES (2013); Roe, *supra* note 251.

²⁵⁸ *E.g.*, Janet L. Yellen, Chair, Bd. Of Governors of the Fed. Reserve, "Improving the Oversight of Large Financial Institutions," Speech At the Citizens Budget Commission (March 3, 2015), *available at* <http://www.federalreserve.gov/newsevents/speech/yellen20150303a.htm>; Daniel K. Tarullo, Governor, Bd. Of Governors of the Fed. Reserve, "Rethinking the Aims of Prudential Regulations," Speech at the Federal Reserve Bank of Chicago Bank Structure Conference (May 8, 2014), *available at* <http://www.federalreserve.gov/newsevents/speech/tarullo20140508a.htm> (recognizing "that the aims of prudential regulation for traditional banking organizations should vary according to the size, scope, and range of activities of the organizations").

²⁵⁹ *E.g.*, Daniel K. Tarullo, Governor, Bd. Of Governors of the Fed. Reserve, "Stress Testing After Five Years," Speech at the Federal Reserve Third Annual Stress Test Modeling Symposium (June 25, 2014), *available at* <http://www.federalreserve.gov/newsevents/speech/tarullo20140625a.htm> ("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.").

also simplifying banking and facilitating meaningful oversight.²⁶⁰ This paper's analysis regarding the ways that information gaps enhance fragility thus also raise 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 do the theoretical frames that have been so helpful in understanding these established modes of financing suffice to allow us to understand shadow banking. Only by recognizing the shortcomings in established theoretical frames and the regulatory architecture can we hope to understand and address the new paradigm embodied in the massive and growing shadow banking system. The information dynamics highlighted here are central to that challenge and illustrative of the broader challenge. These are not challenges for which there is going to be easy fix, but by examining the unique set of dynamics at play in this space, policymakers and other experts can better understand the tradeoffs at stake in the decisions they are making and the ramifications that are likely to follow.

²⁶⁰ See, e.g., Garten, *supra* note 62, at 520 (explaining Glass-Steagall Act of 1933 “permitted the regulators to channel their efforts and expertise more efficiently.”)