Regulation and Investor-Driven Financial Innovation

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In response to the 2007-2009 financial crisis, regulators have imposed new or heightened capital and liquidity requirements on banks, insurance companies, and even mutual funds. These requirements are designed to improve the financial resilience of institutions that could pose a threat to financial stability. This paper examines one of the most compelling and yet least examined critiques of this type of prudential regulation: The possibility that these reforms could so increase the demand for certain types of financial instruments as to drive the spread of financial innovations that introduce new sources of fragility to the financial system.

This paper suggests that prudential requirements that explicitly require or incentivize regulated institutions to hold particular types of financial instruments may increase the amount of constrained capital in the system in ways that spur innovation. Yet it also shows that because these regulations operate, in part, as a substitute for private ordering, their net impact on innovation less significant than commonly believed. At the same time, other reforms that have been outside of this debate thus far may have powerful, even if indirect, effects on investor preferences and innovation. The paper thus provides important new insights into the types of rule changes most likely to spur innovation.

This paper makes two complementary contributions. The first is to provide a descriptive account of investor-driven financial innovation—what it is, when it arises, and why it matters. The article draws on a growing body of empirical work documenting discontinuities in the pricing of certain types of financial assets coupled with examples to illustrate how and when investor demand spurs financial innovation and the consequences that flow from the spread of those innovations. This account suggests that investor-driven financial innovations can enhance efficiency, but they can also increase the complexity, interconnectedness, and rigidity of the financial system in ways that exacerbate its fragility.

The paper’s second contribution is to lay a foundation for understanding the relationship among legal rules, investor preferences, and financial innovation. The frame proposed is an effort to return to first principles. The paper argues, first, that for a legal rule to spur financial innovation, the intervention must increase the aggregate demand for a particular type of financial instrument. Hence, one can only assess the impact of a legal rule by developing a baseline that takes into account the private ordering that would occur in the absence of the intervention. The paper’s second claim is that for an intervention to spur innovation, it must not only increase aggregate demand, that heightened demand must have a price impact. This reflects the fact that innovation remains costly. This aspect of the claim highlights the importance of focusing on settings where the demand for particular assets exceeds the volume that can be readily produced through primary issuances and the need to assess the impact of an intervention over the credit cycle.

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Today, much of the capital flowing into financial markets is subject to constraints that alter the incentive or capacity of the person providing the capital to acquire particular types of financial instruments. A bank, for example, can lower its capital burden by
holding assets rated AAA in lieu of unrated loans that pose an equivalent risk of default. A mutual fund can attract capital by precommitting to a particular investment strategy, like holding a portfolio that replicates the S&P 500. An industrial firm undertaking a long-term project may hoard cash to minimize the risk that adverse systemic developments or informational or commitment challenges might impair the firm’s ability to obtain fresh capital in the future when the firm will need it to support the project.

When investors place a premium on financial instrument characteristics other than risk-adjusted returns, innovative methods that increase the effective supply of the desired instruments become potentially profitable. This can entail repackaging cash flows from existing financial instruments, using derivatives to create new instruments with the desired characteristics, or combining these and other innovative techniques. By finding new ways to connect capital, on the one hand, and value-creating projects on the other, financial innovations driven by investor demand generally promote price efficiency and lower financing costs, just like traditional arbitrage. Other ramifications, however, are quite different. Whereas arbitrage requires capital that is flexible and responsive, investor-driven financial innovations tend to increase rigidity in ways that can limit future responsiveness. In contrast arbitrage, which primarily involves the purchase and sale of existing financial instruments, investor-driven innovation often requires the creation of complex new structures and new types of instruments. And unlike arbitrage, which encourages information generation, investor-driven innovation often leads to information gaps. These gaps grow both because the complexity of the financial arrangements increase the pool of potentially pertinent information and because the new structures are often designed to discourage information production among many of the holders of the new instruments created. Investor-driven financial innovations can thus contribute to systemic fragility and, at times, may even inhibit efficiency.

Of particular importance given the massive financial reforms sparked by the 2007-2009 financial crisis (the Crisis), the recent backlash to those reforms, and the prospect of further changes to the regulatory landscape is the role that legal interventions play in dampening or accentuating these dynamics. On the one hand, a number of commentators recognize that the law can shape investor demand for particular types of financial instruments and have identified the prudential requirements imposed on banks as among the factors that contributed to the spread of many of the financial innovations that were at the heart of the Crisis. On the other hand, the post-Crisis reforms have

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1 See infra Part I.A. [Barr et al textbook]
2 See infra Part I.A. One of the first studies to document a price discontinuity revealed that an announcement that a company would be added to the S&P 500 resulted in a statistically significant capital gain of roughly 3% in that company’s stock price. Andrei Shleifer, Do Demand Curves for Stocks Slope Down?, The Journal of Finance, Vol. 41, No. 3, p. 579. 583 (1986).
3 See infra Part I.A.
4 See infra Part I.
5 See generally [Kathryn Judge, Information Gaps].
6 See infra Part III.C.
7 Id.
8 E.g., Stijn Claessens, Lev Ratnovski, & Manmohan Singh, IMF Staff Discussion Note: Shadow Banking: Economics and Policy 12-13 (2012) (identifying banks, especially in Europe, as a major source of demand for securitized assets pre-Crisis and explaining how banks could use these assets to reduce regulatory burdens); Gerding & Gelpen, 33 Yale J. on Reg. 363, at 398 (explaining how regulatory requirements that
increased the range of institutions subject to such regulations and have heightened the demands imposed on banks and other regulated entities. Moreover, as this paper reveals, policymakers have also implemented other reforms, and are contemplating yet further changes, that will likely increase private demand for particular types of financial instruments. Nonetheless, most of these reforms have been adopted with little consideration of their potential to impact investor preferences or how those preferences affect the spread of innovative financing structures.

Recent work by the Securities and Exchange Commission (SEC) illustrates these dynamics. In 2014, SEC staff prepared a memorandum on “safe assets” that identifies the need “to fulfill prudential requirements” as a notable source of the pre-Crisis demand for seemingly safe assets, such as the AAA-rated mortgage-backed securities (MBS) and collateralized debt obligations (CDO). The memorandum further recognizes that “monetary policies and regulatory reforms in the wake of the … Crisis … have increased the demand for safe assets.” And it acknowledges that recent reports from the International Monetary Fund (IMF) and others suggest that the demand for such assets may well outstrip supply. (The natural supply of safe assets consists primarily of sovereign debt, assets backed by a credible sovereign (like insured deposits), and the highest quality corporate debt.) Nonetheless, the memorandum suggests that the SEC need not be overly troubled by these reports when contemplating reforms that could exacerbate the purported shortage. Among other considerations, the memorandum suggests that “sustained excess demand for safe assets should increase the price of safe assets,” which “should attract new private-label safe assets to the market” and should incentivize “market participants … to identify new sources of safe assets and ways to transform asset risk.” In other words, the memorandum assumes that the possibility of triggering new financial innovations is a reason not to worry, rather than a reason to worry about regulatory interventions that accentuate the mismatch between the supply of and demand for safe assets. Additionally, in explaining the increased demand for safe assets post-Crisis, the memorandum completely ignored a number of regulatory changes that this paper suggests may have a powerful, even if indirect, impact on that demand.

Few other regulators have celebrated the possibility that their post-crisis reforms could promote the spread of new types of financial instruments. But, like the SEC, they mandate or incentivize regulated entities to holder particular types of assets “tell potential buyers that an asset is safe, or at least safe enough for their purposes,” and “can deter market-based information discovery, promote information insensitivity, and boost the liquidity of labeled assets”;

See infra Part __.

9 See infra Part __.

11 Id.
14 Id. at 5.
15 See infra Part II.C.
have adopted numerous reforms that increase the demand for certain types of financial instruments with little apparent regard for how the financial system will produce an adequate supply of the favored instruments. 16 Many academics and nongovernmental actors have demonstrated a similar tendency to ignore these dynamics. For example, a 2015 review of “Empirical Research on the Design and Impact of Regulation in the Banking Sector” describes the findings of over 120 studies on the impact of bank regulation, including many conducted after the Crisis. Despite its breadth, the review does not even mention the possibility that capital adequacy or similar requirements could impact the propensity of the financial system to produce innovative financial instruments. 17 Among the academics that have addressed the matter, most focus almost exclusively on regulations that expressly mandate or incentivize firms to hold particular types of assets or interventions in which a governmental actor is acquiring such assets; and, they have tended to speculate or assume more than investigate the ramifications of such interventions. 18

This paper seeks to cut through the morass. It shows why financial policymakers ought to be concerned about the innovations their actions can spur and it sheds new light on the relationship among constrained capital, investor-driven financial innovation, and the law. Part of the contribution is descriptive. The paper brings together empirical evidence demonstrating that investor demand affects financial asset pricing in ways not captured in standard asset pricing models with an institutional account of the reasons for demand discontinuities, how these discontinuities have led to particular financial innovations, and the consequences of those innovations. This descriptive account also serves as the foundation for developing a more robust understanding of the types of interventions most likely to trigger innovation.

The paper makes two claims regarding the ways that government action affect investor-driven financial innovation. This paper’s first claim is that for a government intervention to lead to innovation, the intervention must increase aggregate demand for a particular type of financial instrument, taking into account what private demand would be in the absence of the government regime. The second claim is that because innovation remains costly, heightened demand will spur innovation only when it has a price impact. This allows discrimination across settings, by highlighting the importance of environments where there is a limit on the range of primary issuances with the desired characteristics and the demand is approaching, or exceeds, the upper bound of that supply. It also highlights the importance of considering the impact of demand over the credit cycle, as the impact of a regulation is likely to differ during periods of froth than during recessions and periods of normal. Although some of the inputs are dynamic and

16 [citations - rule proposals, Basel consultation documents, etc]
18 See, e.g., http://scholar.harvard.edu/files/stein/files/reg_reform_20170209_final.pdf at 7 (stating that “because the [new liquidity coverage ratio] may consume large quantities of high-quality liquid assets like Treasuries, it could potentially create a costly and unnecessary shortage of such assets”); IMF Global Stability Report (identifying liquidity and capital requirements as among the forces likely to lead to excess demand for safe assets); [other cites]
not easily measured directly, this conceptual framework lays the groundwork for thinking systematically about relationships that thus far have eluded satisfying critical scrutiny.

This formulation also leads to some surprising insights about the types of regulations most likely to contribute to the spread of investor-driven financial innovations. The regulatory schemes imposed on banks and insurance companies, for example, entail meaningful restrictions on the types and mix of assets these institutions can hold. The role each regime plays in shaping investor preferences is thus widely recognized and a source of ongoing policy debate. This paper suggests that these constraints may be less important that they first appear, at least with respect to the tendency of such regimes to drive investor-driven financial innovations. This is because the constraints are imposed, at least in part, to address the agency costs that would otherwise arise from the separation between the person making the investment decision and the person who stands to gain or lose from those decisions. As a result, these entities would almost assuredly be subject to private constraints on their investment activity even in the absence of regulation. And to the extent a legal intervention serves as a substitute for equivalent private monitoring, the regulation does not itself alter the aggregate demand for a particular class of financial instruments. These types of interventions still matter, as these regimes likely do have an impact on the location and size of discontinuities in investor demand for various financial instruments, but using an appropriate baseline puts the magnitude of the issue at stake in perspective.

The framework proffered here simultaneously reveals that other regulatory interventions are far more transformative than is commonly appreciated. Efforts to reduce externalities by imposing portfolio or other asset restrictions on entities, for example, can fundamentally alter investor preferences. Even more striking, and more overlooked, are the ways that interventions that encourage firms (or sovereigns) to self-insure against the need for liquidity in the future can dramatically increase the aggregate demand for money-like instruments and other safe assets. Legal changes that make it more costly for banks to provide liquidity insurance, like credit lines, to nonfinancial firms and changes that make it more difficult for banks to rely on government-backed liquidity, like rules proscribing the capacity of the Federal Reserve to serve as the lender of last resort, illustrate this dynamic. Each change may be justified by other considerations, but they nonetheless have the effect of fundamentally altering the quantity of money claims and other safe assets that nonfinancial and financial firms, respectively, must hold on their individual balance sheets to cover uncertain future funding needs. The paper thus provides the first comprehensive frame for understanding how seemingly disparate legal interventions interact with market forces to promote demand-driven financial innovation.

Foundational to this paper is the assumption that investor preferences, which are assumed away in many models of how financial markets work and financial instruments are priced, have a first-order impact on both. Just as importantly, investor demand is often the byproduct of both private and public forces, and quite often interactions between the two. The role of the state in producing constrained capital thus cannot be understood apart from an understanding of the market-based reasons there may be

19 Id.
20 See infra Part II.
21 See infra Part II.B.3.
outsized demand for particular types of financial instruments. Shifting from the existence of constrained capital to its effects, the paper uses case studies along to demonstrate why regulators should care about investor-driven financial innovation. These examples suggest that although investor-driven financial innovation is socially useful, the spread of these innovations can make the financial system more complex, interconnected, and rigid, increasing systemic risk.

One theme that emerges is that regulators may be better served embracing risk than seeking to avoid it. Credit creation and liquidity transformation are socially useful undertakings. Some of the associated risks are inherent in those activities; others depend on the nature of the institutions performing the activity. This paper suggests that when prudential and other regulators seek to minimize the credit and liquidity risk to which the firms they oversee are exposed, they can inadvertently incentivize suboptimal institutional design choices.

This paper proceeds in four parts. Part I presents the paper’s claim and uses a couple of examples to bring the dynamics at issue to life. It also situates this paper in relation to the various bodies of literature on which it draws and to which it contributes. Part II examines the origins of investor preferences and the ways that financial regulation and other government interventions shape the nature and amount of constrained capital in the system. Part III examines the types of financial innovations that arise and spread in response to investor preferences, in addition to providing an overview of the benefits and risks that accompany the proliferation of those financial innovations. Parts II and III also examine, in turn, the implications of this paper’s claim that interventions will only spur innovation when they both increase aggregate investor demand around a particular threshold and when that increased demand has a price impact. Part IV addresses bigger picture implications.

The Framework

A. Two stories

In the 1950s, as the director of the Corporate Bond Research Project sponsored by the National Bureau of Economic Research, Braddock Hickman undertook a large-scale study of the bond market and the factors influencing the returns investors earned on corporate bonds. In a report on his findings, Hickman observed that “[t]he most popular measures of prospective bond quality are the ratings assigned by the … investment agencies”--Moody’s, Fitch, and Standard & Poor’s.22 He found that ratings were relatively accurate proxies of risk, in the sense that loss rates went up as ratings declined, but he also found that “[o]n the average and over long periods of time, the … yields realized on high-grade bonds were below those on low-grade bonds, with the result that investors, in the aggregate, obtained better returns on the low grades.”23

23 Id. at 14. Subsequent research has found that “during periods of stability in the economy and financial markets, the volatility of HY bond returns has been very similar to that of investment-grade bonds” but that “during periods of political or economic uncertainty, the volatility of HY bonds … approach[es] the volatility of common stocks.” Frank K. Reilly, David J. Wright & James A. Gentry, Historic Changes in the High Yield Bond Market, 21 J. Applied Corp. Fin. 65, 76 (2009).
Hickman also evaluated the way legal interventions beyond those tied to ratings affected investor demand and returns. At the time, mutual savings banks in many states were only allowed to hold bonds that appeared on lists promulgated by the relevant state authority. Hickman found that demand for bonds on these lists was sufficient to “push[] up the prices of legal bonds and push[] down their promised yields.” He concluded “that legal bonds taken individually were safer than nonlegal bonds but that in the aggregate the promised and realized returns on legals were markedly lower.” Although his methodology was rudimentary by today’s standards, his findings were sufficient to suggest that investor preferences can lead to pricing inefficiencies and that regulations can accentuate those inefficiencies. (As techniques have improved, including the use of standard-asset pricing models and other devices to develop baselines for the appropriate return on an instrument, recent research has reaffirmed these early findings.)

Less than a decade later, a young undergraduate at U.C. Berkeley by the name of Michael Milken came across Hickman’s report. In that report, Milken found empirical support for his longstanding hunch that one could make outsized returns in the market without assuming excessive risk if one knew where to look. Armed with his instincts and Hickman’s findings, Milken took to Wall Street. In the early 1970s, as a trader for investment bank Drexel Burnham Lambert, Milken convinced clients that buying high-yield bonds would allow them to earn higher average returns than they could earn holding investment-grade alternatives, even taking into account the higher risk of default. He gained both credibility and clientele when high-yield bonds proved remarkably resilient even as equities crashed a few years later.

By the end of the decade, Milken began to leverage Drexel’s dominant role in the secondary market for high-yield debt to encourage more companies to issue such debt and to have Drexel underwrite those offerings. The amount of high-yield debt outstanding grew rapidly, much of it underwritten by Drexel. The market ultimately collapsed, bringing both Milken and Drexel down with it, but high-yield debt came back. Milken’s insight, built on Hickman’s findings, that high-yield debt could provide attractive risk-adjusted returns endured and such debt now constitutes approximately a quarter of the outstanding corporate debt in the United States.

This brief story illustrates a number of key dynamics. Hickman’s findings reflect how investor demand can lead to meaningful price and demand discontinuities and the
way regulations can contribute to those discontinuities. Milken’s initial response to those pricing discontinuities illustrates a variation on arbitrage as traditionally understood. Although Milken’s clients were not taking hedged positions and thus were not engaged in classic arbitrage, they were exploiting a statistically proven price anomaly to earn excess returns relative to the risks they were assuming. And, in the process, those investors were changing the prices of the instruments they were acquiring in a way that enhanced market efficiency.

This account also highlights the ways that discontinuities in investor demand can shape the type of financial instruments produced. Until Milken’s activities spurred an interest in high-yield debt, “all new publicly issued bonds [sold in the United States during the twentieth century] were investment grade.”34 The little high-yield debt trading in the secondary market consisted of “fallen angels,” bonds that had been investment grade when issued but subsequently were downgraded.35 The strong preference investors had for investment-grade debt, hence, not only affected pricing during this period, it effectively precluded the issuance of high-yield debt.

This story also sets the stage for a second vignette that illustrates how investor demand can lead to the development and proliferation of even more innovative financial instruments. Investor demand for investment-grade bonds, particularly those rated AAA, not only created a profit opportunity for Milken’s early clients, it is also contributed to the spread of securitization structures leading up to the Crisis.36 Securitization enables unrated credit products, like home loans, to be transformed into rated credit products, like mortgage-backed securities (MBS) backed by those loans.37 It also allows lower rated credit instruments, like a BBB-rated MBS, to be transformed into higher rated ones, like a AAA-rated CDO.

No voodoo is required to achieve these transformations. So long as there is limited correlation among the underlying instruments, the combination of diversification and tranching—the process of creating a hierarchy among the instruments issued—makes it possible to redistribute the credit risk inherent in the underlying assets to produce some instruments that are more risky than the original assets and others that are far less so.38

In the frame proposed here, the pre-Crisis investor demand for AAA-rated assets exemplifies constrained capital. Some of this demand arose independent of legal interventions, but regulatory regimes, like the risk-based capital adequacy requirements

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35 Id.
36 E.g., Ben S. Bernanke et al., International Capital Flows and the Returns to Safe Assets in the United States, 2003-2007 2 (Int’l Fin. Discussion Papers, Paper No. 1014, 2011) (“verify[ing] that the ‘[global savings glut] countries’ … did indeed evince a strong preference for the safest U.S. assets” and explaining that “this preference most likely helped push down yields on MBS relative to other assets, as most MBS were either guaranteed by the Agencies or sold as tranches carrying AAA credit ratings” given the proportion of MBS “carrying AAA credit ratings”).
38 See infra Part III.A.1.a.
imposed on banks, also contributed. Such regimes enabled banks to reduce the amount of capital they had to hold by increasing their holdings of AAA-rated assets and certain sovereign debt. Some such instruments already existed, but there is a limit to the amount of debt that AAA-rated firms and creditworthy sovereigns wanted to issue. Once the demand exceeded that supply, securitization structures could be used to fill the void.

In the short-run, these processes appeared to create significant value and the cost of obtaining a home loan went down as a result. Of course, that was only half of the story. The Crisis revealed that these innovations and the ways these innovations altered the structure of the financial markets also gave rise to new risks and that many assets had been trading at inflated prices. Nonetheless, the basic rationale for securitization remains sound and securitization transactions have rebounded accordingly. More broadly, securitization remains a transaction form that makes no sense in a world where financial assets are priced solely on characteristics such as risk and return. The finance literature has proffered some explanations for these transactions, and the incredible rate at which these transactions spread pre-Crisis is over-determined, with fraud and regulatory arbitrage likely exacerbating the rate of growth. Nonetheless, a notable factor contributing to the proliferation of these transactions was that they converted financial instruments that investors were not particularly keen to hold into instruments that investors were very keen to hold. The development of new forms of securitization and the proliferation of securitization structures thus exemplify investor-driven innovation.

B. The claim

This paper’s main contribution is to provide a frame for understanding the relationship among investor preferences, regulation, and investor-driven financial innovation. The claim has two components. First, for a regulation to spur innovation, it must increase the aggregate demand for financial instruments with particular characteristics. Second, the heightened demand that results must increase the price, and thus lower the yield, on the affected class of financial instruments. This is critical to cover the costs associated with developing and using more innovative structures. Although largely a return to fundamentals, each claim yields new insights about the consequences of ongoing efforts to build a more stable financial system.

The first claim reveals that in order to assess the impact of a given intervention, one must also consider what investor preferences would look like in the absence of the intervention. An intervention that affects a large volume of capital but in an environment

40 See infra Part III.B.
41 See infra Part III.C.
42 E.g., Bd. of Governors of the Fed. Reserve, Consumer Credit- G.19, available at http://www.federalreserve.gov/releases/g19/hist/cc_hist_memos_levels.html (showing that there are currently over $1 trillion in auto loans outstanding); Josh Zumbrun, Total U.S. Auto Lending Surpasses $1 Trillion for First Time, Wall St. J. (Aug. 13, 2015), http://www.wsj.com/articles/total-u-s-auto-lending-surpasses-1-trillion-for-first-time-1439478198. However, the private label MBS market remains thin.
43 [E.g., Bolton et al.; gorton]
44 See Part infra.
45 See infra Part III.A.
where efforts to constrain agency costs would likely result in similar constraints in the absence of government intervention, the impact of the intervention may be modest. Only by first creating an appropriate baseline can it be possible to assess how transformative a regulation actually is. In the same spirit, regulatory interventions that do not directly prescribe the types of assets that firms (or sovereigns) should hold but indirectly alter firm incentives may have a first-order impact on aggregate demand. Policies that affect incentives to self-insure, for example, can have a powerful impact on the demand for safe, liquid assets, which could in turn spur innovation.46

The second claim serves as a filter for identifying, of the interventions that affect aggregate demand, the ones that are most likely to trigger innovation. The key assumption, which is consistent with the literature and the examples here provided, is that innovation remains costly.47 If markets are awash in long-term corporate debt, for example, then a new requirement that incentivizes life insurers to increase their holdings of long-term debt would not suffice to spur innovation.48 To be sure, a regulated entity that seeks to minimize the cost of complying with the constraint may seek assets that satisfy the letter but not the spirit of the constraint by offering a higher return and nominally disguised risk. Nonetheless, when the financial system can readily absorb the increased marginal demand arising from the regulatory intervention, that intervention does not give rise to the type of innovation here at issue. Regulatory arbitrage is an overlapping, but distinct, dynamic.49

This second claim has two important implications. First, it suggests that interventions are most likely to lead to innovation when there is some limit on the volume of the desired instruments that can readily be produced through primary issuances and demand, exclusive of the intervention, is already approaching that limit. For example, insured demand deposits and short-term Treasury instruments are both very useful for persons who want a mechanism for storing value for consumption at some uncertain point in the future.50 There is a limit, however, to the volume of Treasuries outstanding at a given time, and insured deposits are not an option for larger claims.51 There are substitutes, including longer-term Treasury instruments, uninsured deposits, and commercial paper issued by high-quality private issuers or backed by excess collateral, but each involves some cost or compromise.52 This helps to explain why researchers have found that the market participants pay a premium for very safe, short-term

46 See infra Part __.
47 E.g., Lerner & Tufano, supra note __, at 45 (Financial “innovations are not easy or cheap to develop and diffuse…. [I]nvestment banks frequently retain many highly compensated PhDs, MBAs, and lawyers to design new products and services [and] innovator must frequently expend considerable resources developing distribution channels for their products.”). This point also comes through in the examples. See infra Part III.A.
48 This is not to say that such a regulation may not have unintended consequences. To the extent the “natural” supply of an asset is elastic, such an intervention may well induce firms to increase their issuance of assets favored by the regulatory scheme. E.g. [John R. Graham, Mark T. Leary & Michael R. Roberts, How Does Government Borrowing Affect Corporate Financing and Investment? 3-4 (Nat’l Bureau of Econ. Research, Working Paper No. 20581, 2014)].
49 See infra Part __.
50 See infra Part II.A.
51 Id.
52 Id.
instruments, and it also helps to explain why this is has been the locus of so much innovation.53

Focusing on the need for a price impact, and thus on the demand and supply of a given class of financial instruments, also brings to the fore the importance of considering the impact of an intervention over the credit cycle. During boom times, it is not uncommon for the size of the overall financial sector to grow rapidly and the demand for particular types of instruments to increase accordingly.54 U.S. Treasuries, again, demonstrate the type of asset that will often not proliferate at the same rate that the system as a whole, and demand for safe assets, may be increasing. This, in turn, increases the probability that a regulation that requires or incentivizes institutions to hold such instruments will have the necessary price impact.55 Again, this is consistent with experience but not yet broadly understood or taken into consideration when contemplating interventions that could profoundly impact the demand for such instruments.

In order to illuminate the relationship between constrained capital and financial innovation, and the ways legal interventions affect this dynamic, this paper holds constant or delays consideration of a range of other variables. Among the most important variables given secondary status for most of the analysis are the myriad ways the government affects the supply of certain types of financial instruments. The question of which actors are most likely to seek out substitutes and what qualifies as a substitute in different states of the world are also important factors that are addressed only tangentially. These dynamics are too fundamental to be cabined entirely but there are not incorporated into the basic framework in order to make the analysis tractable. The importance and relevance of these considerations and the ways that more sophisticated treatment of these factors could inform further research that builds on the framework presented here are discussed in connection with assessing the implication of this paper’s core claim.56

C. Situating the claim

This paper sits at the intersection of a number of disparate bodies of research. There is a growing body of literature on the constitutive role that law plays in shaping financial markets and the instruments that trade therein.57 This piece provides a complementary perspective, focusing more on the role of law in shaping the demand than facilitating the supply of particular types of instruments. In this sense, and in substance, it most closely resembles work by Anna Gelpern and Eric Gerding on the ways the law shapes both the supply and demand of “safe assets.”58 It also complements much of the work done on regulatory arbitrage, that is, efforts to minimize the cost of regulatory

53 Id.
54 [cites – Gorton, Misunderstanding Financial Crises; others]
55 See infra Part III.C.
56 Id.
57 [Two articles by Katharina Pistor;; others?]  
58 Yale J. Reg; see also Brooklyn piece by same authors. For a further discussion of safe assets, see infra Part II.A.1.
compliance, most often by complying with the letter but not the spirit of a regulatory regime.\[59\]

The literature on safe assets, the more extensive literature on liquidity, and research on the cyclical patterns that characterize changes in what market participants will accept as safe is also core to much of the analysis here.\[60\] Among this paper’s indirect contributions is to provide further support for the value of studying safe assets, and not focusing exclusively on short-term debt instruments that are the focal point of most of the work on liquidity and fragility.\[61\] At the same time, the frame this paper proposes is not limited to safe assets or money claims.\[62\]

This paper also draws on and contributes to the literature on financial innovation.\[63\] In particular, the descriptive account provided here of the effects of innovation aligns closely with formal work by Nicola Gennaioli, Andrei Shleifer and Robert Vishny.\[64\] Gennaioli and his co-authors show that when innovations spread in response to “investor demand for particular cash flow patterns,” particularly safe cash flows, and “investors and financial intermediaries do not attend to certain improbable risks,” the result is excessive issuance of the new instruments and fragility, setting the stage for a crisis.\[65\] This paper also draws upon previous work, both quantitative and qualitative, examining why securitization structures spread and the ramifications of their spread.\[66\]

Notably, recent reviews of the literature on financial innovation emphasize the relative “paucity” of the research despite the fact that “financial innovation is ubiquitous.”\[67\] The contrast is even more striking when compared to the far more extensive body of research on innovation in other domains.\[68\] For example, a 2004 research review could locate only 39 empirical studies of financial innovation, of which only two focused on the origins (rather than diffusion) of innovations.\[69\] In seeking to explain the relatively thin body of work on financial innovation, Peter Tufano and Josh Lerner emphasize that despite meaningful similarities between financial and other forms of innovation, there are also important differences. Perhaps most importantly, because “[t]he financial system is highly interconnected,” “a financial innovation is likely to generate a complex web of externalities” which can make “assessing the social

\[60\] See, e.g., infra Part II.A, Part III.C & Part III.D.
\[61\] For a contrary view, see Morgan Ricks, The Money Problem at __.
\[62\] See, e.g., infra Part II.__ and sources cited therein.
\[63\] For a review of this literature, see Lerner & Tufano, The Consequences of Financial Innovation: A Counterfactual Research Agenda, Annu. Rev. Financ. Econ. 2011.3:41-
\[64\] Nicola Gennaioli a,b, Andrei Shleifer c,d,n, Robert Vishny. 2010. Neglected risks, financial innovation, and financial fragility. NBER Work. Pap. 16068. See also infra Part III.__.
\[65\] Gennaioli et al at 453.
\[66\] See infra Part III.__.
\[67\] Lerner & Tufano, supra note __ at 40; see also Frame WS, White LJ., Empirical studies of financial innovation: Lots of talk, little action? 42 J. Econ. Lit. 116 (2004).
\[68\] Lerner & Tufano, supra note __ at 40.
\[69\] White & Frame, supra note __ at __.
consequences of financial innovation … very challenging.”\footnote{Lerner & Tufano, Annu. Rev. Financ. Econ. 2011.3:41-} Acknowledging these challenges, this paper makes no attempt to quantify the full benefits and costs of any of the innovations it discusses. The aim instead is to develop a more robust account of the mechanisms through which state action affects incentives to innovate through its impact on investor demand. The discussion of the ramifications, including the drawbacks, of innovation serves as context to show why policymakers should be concerned about how their actions may spur innovation, but it is not part of the paper’s core claims.

II. Constrained capital

This Part examines the prevalence of constrained capital in today’s financial system and the role of regulation in contributing to its prevalence. In the first subpart, regulation is intertwined with the discussion of market-based demand to establish the prevalence of constrained capital and some of the reasons for that prevalence. The second subpart disaggregates the role of regulation and develops the first of the paper’s claims regarding the conditions under which a legal intervention changes demand in a manner conducive to innovation. This structure reflects the view that the ramifications of regulatory and other legal interventions can only be understood by reference to what the market would otherwise demand. With respect to scope, the aim is to illustrate rather than exhaust. Focusing on the primary reasons for constrained capital is helpful for understanding where discontinuities are likely to arise and why they may be difficult to eliminate, but there are an array of other sources constrained capital not discussed here.

A. Two sources of constrained capital

A prerequisite for the claim here to have any practical import is that the amount of constrained capital in the financial system be sufficient, both in the aggregate and around particular thresholds, to affect pricing and activity. This Subpart lays the groundwork for this assumption by describing two significant sources of constrained capital in today’s financial system. One way of conceptualizing this assumption is to categorize the capital in the financial system into three buckets—smart capital, noise, and constrained capital. Traditional approaches to finance do not deny the possibility of constrained capital but often lump it with other noise traders, leading to a focus on whether informed trading can drown out that noise, resulting in a relatively efficient market.\footnote{Shleifer & Vishny (1997); Hanson & Sunderam (2013); Grossman & Stiglitz (1980); Gilson & Kraakman (1984)} The core question here is whether investor preferences are sufficiently powerful to create meaningful discontinuities in the types of assets produced and the prices paid for those assets, a result that noise alone could never produce and which has different implications for innovation. The empirical work reviewed here suggests this is the case.

1. Money and other safe assets

Financial instruments that can function like money have long served distinct socially useful functions. These functions include the capacity of money-like claims to facilitate transacting and to serve as a store of value over time.\footnote{These functions are sometimes characterized as the “transaction motive” and “asset motive” for holding money-like claims.} Precious metals, which were the original form of money, and the fiat currencies of modern economies, like dollar...
bills, are the most obvious form of money. At the same time, other financial instruments, from the privately issued banknotes that were common prior to the Civil War to the short-term commercial paper that remains prevalent today, have long served a similar function and have been priced accordingly.\textsuperscript{73} The full range of financial instruments that have money-like qualities, and the relationship between the demand for money and income levels and interest rates all qualifies as “money” remain contested.\textsuperscript{74} There is also disagreement about the relevance of long-term “safe assets,” as most money-like claims are quite short term.\textsuperscript{75} But these disagreements about where and how to draw boundaries are secondary to the core point: There is outsized demand for money-like financial instruments relative to what one would expect if viewing these instruments solely as investments.

One way that economists have empirically established the demand for money-like instruments is by focusing on the premium that investors are willing to pay for financial instruments that have some degree of moneyness relative to the price one would expect such instruments to demand using a standard asset-pricing framework. For example, Arvind Krishnamurthy and Annette Vissing-Jorgensen examine the premium investors are willing to pay for Treasury instruments, which are presumed to be essentially free of credit risk and to have virtually no liquidity risk.\textsuperscript{76} They found a “monetary premium” that averaged 72 basis points between 1926 and 2008.\textsuperscript{77} In subsequent work, they show that the aggregated amount of short-term debt issued by the financial sector is inversely

\textsuperscript{73} See, e.g., Gary B. Gorton, Misunderstanding Financial Crises 10 (2012) (explaining that “[i]n market economies, consumers rely heavily on bank-created money” and providing an array of historical examples); Friedrich Hayek, Prices and Production 113 (2d ed. 1935), available at https://mises.org/files/prices-and-production5pdf/download?token=K4QOXtm- (“There can be no doubt that besides the regular types of the circulating medium, such as coin, notes and bank deposits, which are generally recognised to be money … and … which is regulated by some central authority … there exist still other forms of media of exchange which occasionally or permanently do the service of money.”); Perry Mehrling et al., Bagehot Was a Shadow Banker: Shadow Banking, Central Banking, and the Future of Global Finance at 9 (Dec. 6, 2013), http://ssrn.com/abstract=2232016 (“Why insist on holding genuine Tbills when quasi-Tbills [, i.e., private money,] promise the same liquidity but with a slightly higher yield?”).

\textsuperscript{74} E.g., Stephen M. Goldfeld & Daniel E. Sichel, The Demand for Money, in Handbook of Monetary Economics 299, 300 (Benjamin M. Friedman & Frank H. Hahn eds., 1990) (explaining that “the demand for money in many countries has been subjected to extensive empirical scrutiny” and while “[t]he evidence that emerged … prior to the mid-1970s, suggested that a few variables (essentially income and interest rates …) were capable of providing a plausible and stable explanation of money demand,” it “has been widely documented, … [that] matters have been considerably less satisfactory since the mid-1970s”).


\textsuperscript{77} Id.
related to the aggregate amount of government debt outstanding. Based on this and other findings, they “argue that the amount of short-term debt in the economy, issued by the financial sector, is in large part driven by the non-financial sector’s willingness to pay a premium on liquid/safe debt.”

Others take the position that even within the market for Treasury instruments, shorter duration instruments are more money-like and can demand a premium accordingly. For example, Robin Greenwood and co-authors sought to compare the actual yields on T-bills, which had maturities from 1 to 24 weeks, with the yield one would expect for those instruments if one merely extrapolated the expected yield from a yield curve created of Treasury instruments with yields longer than three months. They found “four-week bills have yields that are roughly 40 bps below their fitted values; for one-week bills, the spread is about 60 bps.” In their view, “these z-spreads ... reflect a money-like premium on short-term T-bills above and beyond the liquidity and safety premia embedded in longer term Treasury yields.”

While short-term Treasuries display an exceptional degree of moneyness, privately produced financial claims can also serve money-like functions. Recent studies, for example, show that the premium that investors are willing to pay for commercial paper and other high-quality debt issued by large U.S. firms is inversely related to the volume of Treasuries outstanding. These findings suggest that such debt can serve as a money-like substitute for short-term Treasuries, but that investors will pay a moneyness premium for such instruments only when the more money-like Treasuries are in short supply relative to aggregate demand.

That private claims serve money-like functions is also illustrated in definitions of what constitutes money. For example, central banks often track at multiple indicators of the aggregate amount of money in the system at any given time: M1, includes only cash and coin in circulation, but M2 also includes short-term bank deposits and money market mutual funds and M3, used by some, goes even further and includes longer-term time deposits and money market mutual funds with more than 24-hour maturity. For purposes of U.S. accounting standards, highly liquid instruments with maturities of up to three months, like commercial paper and money market funds, can generally be

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79 Id. at *32.
80 Greenwood, et al., supra note 75.
81 Id. at 1687, 1688 fig.1; see also Gregory R. Duffee, Idiosyncratic Variation of Treasury Bill Yields, 51 J. Finance 527 (1996), Refet S. Gürkaynak, Brian Sack & Jonathan H. Wright, The US Treasury Yield Curve: 1961 to the Present, 54 J. Monetary Econ. 2291 (2007).
82 Greenwood et al., supra note 75; at 1687.
84 E.g., M0, M1, M2, M3, M4, Fin. Times Lexicon, http://lexicon.ft.com/Term?term=m0,-m1,-m2,-m3,-m4 (last visited Aug. 1, 2016).
characterized as “cash equivalents.” In a provocative new book, Morgan Ricks argues that virtually all debt with a maturity of less than a year should be deemed money-like and should be heavily regulated accordingly.

One challenge with drawing any bright line around money-like claims is that the types of financial claims that enjoy money-like status vary across different states of the world. During boom times, the demand for money-like assets often exceeds the supply of truly safe assets and history suggests that during such periods, private money-like instruments, from bank notes to asset-backed commercial paper, are regularly created and accepted to satiate this excess demand. Times of crisis, by contrast, are characterized by a growing demand for cash and a refusal to accept as money-like instruments that were accorded that status just before the crisis broke out.

Taking a different tack to assessing the demand for money-like instruments, Zoltan Pozsar documents the growth of “institutional cash pools” -- “large, centrally managed, short-term cash balances of global non-financial corporations and institutional investors such as asset managers, securities lenders and pension funds.” Pozsar shows that just “between 2003 and 2008, institutional cash pools’ demand for insured deposit alternatives exceeded the outstanding amount of short-term government guaranteed instruments not held by foreign official investors by … at least $1.5 trillion,” and potentially far more. In his view, “the ‘shadow’ banking system rose to fill this gap.” Pozsar’s work complements the empirical literature described thus far by showing where the demand comes from, how it has changed over time, and how this has contributed to new financial innovations.

In part because of the disagreements about how broadly money ought to appropriately be construed, but also because long-term but exceptionally safe assets can also serve noninvestment functions, a growing number of economists and other academics are studying “safe assets.” Again, a range of techniques have been employed to measure the demand for such assets and a range of explanations have been given for that demand. As Gary Gorton explains in a recent work reviewing the history of safe assets:

For example, the concept of safe assets plays a prominent role in the work done by Ben Bernanke and co-authors on the “global-savings glut” and related efforts to understand global capital flows in the past decade and their impact on systemic stability.

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86 Id. at 230-37; Kathryn Judge, The Importance of Money, 130 Harv. L. Rev. ___ (forthcoming 2017) (reviewing Ricks, supra note 85).
87 See, e.g., Gorton, supra note 73.
88 E.g., Walter Bagehot, Lombard Street: A Description of the Money Market (William Clowes and Sons eds., 14th ed. 1924) (1873) (stating that a financial panic is “a sudden demand for cash”); Gorton, supra note 73, at 6 (“Whatever the form of the bank money, financial crises are en masse demands by holders of bank debt for cash—panics.”).
89 Pozsar, Institutional Cash Pools, supra note 75, at 285.
90 Id. at 284; see also id. at 290 fig. 5.
91 Id. at 288. For an earlier discussion of this relationship, see Zoltan Pozsar, Does the Secular Rise of Wholesale Cash Pools Necessitate Shadow Banking? (2011) (working paper) (on file with author).
92 E.g., Gorton, Lewellen & Metrick, supra note 75; Pierre-Olivier Gourinchas & Olivier Jeanne, Global Safe Assets (BIS Working Paper No. 399, 2012).
Starting with an influential speech delivered in 2005, Bernanke argued that excess savings in certain developing countries and in countries with significant oil wealth were playing a fundamental role reshaping capital flows. In subsequent work, he and co-authors provide a more detailed analysis of the type of assets that these other investors demanded to argue that prior to the Crisis, there was an excess demand for safe assets and that demand helps to explain the growth of securitization and other arrangements and others have built on this thesis.93

Other economists have built upon and provided alternatives to Bernanke’s account while sharing his assessment that investor demand for safe assets played in laying the groundwork for the Crisis. For example, Ricardo Caballero has argued that “the root imbalance” at the core of the Crisis was that “[t]he entire world, including foreign central banks and investors, but also many U.S. financial institutions, had an insatiable demand for safe debt instruments.”94 In Caballero’s assessment, “the surge of safe-assets-demand is a key factor behind the rise in leverage and macroeconomic risk concentration in financial institutions in the U.S. (as well as the U.K., Germany, and a few other developed economies), as these institutions sought the profits generated from bridging the gap between this rise in demand and the expansion of its natural supply.”95 Viral Acharya and Philipp Schnable similarly suggest that dynamics arising from the demand for safe assets but not captured by Bernanke were central to Crisis.96 In their account, discussed further below, banks—rather than overall capital flows—served as the mechanism connecting the demand for safe assets to the Crisis, but innovative financial devices designed to satiate the excess demand for safe, money-like assets remain key.97

Given that empirical work necessarily documents what has gone before, it is worth momentarily looking ahead. Even apart from the cyclical that is common, there are reasons to expect increasing demand for safe assets. Two ways that money claims provide utility apart from their risk-adjusted returns are their capacity to facilitate transactions and to serve as a store of liquidity over time.98 Mervyn King, former Head of the Bank of England, believes that this latter function is increasingly important and will continue to grow in the years ahead.99 In his assessment, in a world plagued radical uncertainty, money-like claims satisfy the desire of individuals, companies and countries to self-insure against this increasingly uncertain future.100 This view also helps to explain why safe assets can sometimes serve as a substitute for short-term claims.101

93 Bernanke et al., supra note 36; Ricardo J. Caballero & Arvind Krishnamurthy, Global Imbalances and Financial Fragility, 99 Am. Econ. Rev. 584 (2009).
95 Id. at 3.
97 Id.
98 E.g., Ricks, supra note 85.
100 Id.
101 E.g., Judge, The Importance of Money, supra note 86.
Safe assets also play an additional and increasingly important function in today’s financial landscape, that is, serving as collateral. As an initial matter, collateralized structures are a primary mechanism for converting safe (and sometimes less safe) assets into money-like claims. But safe assets are also used as collateral in a range of other financial transactions as well. As the financial system becomes increasingly interconnected and market participants increasingly enter into arrangements with others that entail future, contingent payment obligations, there is growing demand for high-quality collateral to reduce the credit risk such arrangements pose and the amount of counterparty monitoring parties must undertake. Post-Crisis regulatory reforms are contributing to and shaping, but not alone in creating, high demand for assets that can readily serve as collateral.

Other post-Crisis regulatory changes further contribute to the demand for safe assets. The most obvious examples are new and heightened regulatory mandates regarding who must hold safe assets and in what amounts. Large banks in the United States and elsewhere, for example, are facing substantially heightened liquidity requirements. While banks have long been subject to reserve requirements designed to ensure that banks could meet short-term liquidity demands, banks are now being asked to hold “high quality, liquid assets” in quantities sufficient to cover the bank’s liquidity needs during a period of market distress, and separately, to enable an orderly resolution of the bank in a bankruptcy proceeding.

The types of institutions subject to regulatory liquidity requirements are also expanding. Mutual funds, for example, which traditionally have been subject only to market-based constraints and disclosure requirements, are now facing liquidity requirements. Less obvious but no less important, other post-Crisis reforms may be contributing to nonfinancial firms’ demand for liquid assets. For example, recent changes make it more costly for banks to issue lines of credit, reducing their incentive to

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102 E.g., Gorton, Lewellen & Metrick, supra note 75.  
103 A range of different transaction structures, from asset and repurchase agreements to asset-backed commercial paper program, can be used to enable this transformation. This dynamic both highlights the value of further research into the relationship between short-term, money-like claims and longer term safe assets and illustrates the challenge of trying to fully disentangle the two.  
do so and increasing the price they will demand to provide this service.\textsuperscript{109} A nonfinancial firm that can no longer depend on a standing line of credit as a means to satisfy its future liquidity needs may well opt to hold additional liquid assets to satisfy those needs.

In sum, there are a number of ongoing debates in the literature, and further insight into the reasons investors want money-like instruments and the range of instruments that can serve this function will be useful in developing more granular accounts of how this demand drives particular types of financial innovation. Nonetheless, more precise answers to these questions are not necessary to establish the two points critical to the analysis here—(1) the existence of a sizeable amount of capital that is constrained by a preference for assets that are sufficiently safe that they can function like money and (2) that this creates price and demand discontinuities of sufficient magnitude to affect market activity.

2. Use of proxies to facilitate monitoring

Another factor contributing to discontinuities in the demand for particular types of assets is the extensive use of proxies for financial asset quality. Credit ratings issued by the leading rating agencies have long been, and despite some recent changes remain, the most commonly employed proxy for the credit risk of a given financial asset.\textsuperscript{110} As with money-like claims, the rating given to a financial instrument can provide utility apart from the instrument’s risk adjusted return. Investors can rely on proxies like credit ratings for a range of purposes, like reducing the effort they must personally expend acquiring information about a potential investment. But the importance of proxies often increases significantly when there is a separation between the person making the investment decision and the ultimate beneficiary of the funds being invested, as proxies are frequently employed to reduce agency costs and facilitate monitoring.

As Ronald Gilson and Jeffrey Gordon have explained, “the agency costs of agency capitalism” has become a core challenge for financial markets. The rise of institutional investors and the way that they have displaced individuals as the dominant source of capital in the capital markets is vividly illustrated by changes in public equity markets. Gilson and Gordon document that “institutional investors, including pension funds, held only approximately 6.1% of U.S. equities” in 1950; that figure reached 28.4% in 1980; and, “[b]y 2009, institutional investors held 50.6% of all U.S. public equities, and 73% of the equity of the thousand largest U.S. corporations.”\textsuperscript{111} While Gordon and Gilson focus on the implications for firm governance, the trend they document also has important implications on investor preferences.

\textsuperscript{109} See infra Part II.B.3.

\textsuperscript{110} See generally Frank Partnoy & Aline Darbellay, Credit Rating Agencies under the Dodd-Frank Act, 30 Banking & Fin. Services Pol. Report 1 (2011); Frank Partnoy, Historical Perspectives on the Financial Crisis: Ivar Kreuger, the Credit Rating Agencies, and Two Theories about the Function, and Dysfunction, of Markets, 26 Yale J. Reg. 431 (2009).

\textsuperscript{111} Gilson & Gordon, supra note \textbf{Error! Bookmark not defined.}, at 874. See also Avinash D. Persaud, How Not to Regulate Insurance Markets: The Risks and Dangers of Solvency II, Peterson Inst. for Int’l Econ., Policy Brief No. PB15-5 1 (2015) (“With more than $50 trillion in assets worldwide, investment funds run by the insurance industry and pension system are one of the most systemically important elements of the global financial system.”) (citing Bank of England)).
One way institutions investing on behalf of others provide assurances to would-be investors is through self-imposed limits on their holdings and other activities. Mutual funds, for example, regularly make precommitments that limit the types of assets that they can hold and in what amounts. In one of the first academic studies documenting the capacity of investor preferences to influence financial asset pricing, Andrei Shleifer examined the effects of the rise of mutual funds committed to tracking the S&P 500 Index. He found that an announcement that a company would be added to the S&P 500 resulted in a statistically significant capital gain of roughly 3% in that company’s stock price. Although alternative explanations have been proffered, the finding continues to be recognized as indicative of the influence of index funds on stock prices and more recent studies have documented the impact of institutional investors on financial market pricing in other domains.

Other types of mutual funds similarly have self-imposed limits on the types of assets they can hold. The Fidelity Short Term Bond Fund, for example, promises investors geographic diversity while also committing that it will “[n]ormally invest[] at least 80% of assets in investment-grade debt securities” and it will “[n]ormally maintain[] a dollar-weighted average maturity between three years or less.” The most restricted mutual fund type, money market mutual funds, are subject to stringent rules regarding both the quality and duration of the assets they can hold. In exchange for agreeing to these restrictions, the Securities and Exchange Commission (SEC) provides money market mutual funds greater flexibility than other types of funds with respect to accounting and redemption practices, allowing most retail money market funds to maintain a steady net asset value of $1.00. (The size of the money market mutual fund is also another testament to the demand for money-like claims, illustrating one of the ways that efforts to reduce agency costs and demand for money-like instruments can overlap.)

A number of settings fall outside the classic agency model yet give rise to similar challenges. Defined-benefit pension plans, which remain common for government

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113 Id. at 585-88.
115 E.g., Paul A. Gompers & Andrew Metrick, Institutional Investors and Equity Prices, Quarterly Journal of Economics Volume 116, p. 229 (finding that the rise of large, institutional investors contributed to an increase in the price of large-company stocks relative to small-company stocks).
117 17 C.F.R. § 270.2a-7.
employees, are one example. The structure of insurance companies and banks also introduce agency costs. The great bulk of the capital that insurance companies hold and invest will eventually be needed to satisfy claims by policyholders. Those policyholders pay premiums today with the expectation that an insurance company will be able to pay out should the contingency against which they have insured comes to pass. Similarly, bank depositors place money in a bank today with the expectation that it will be available on demand when they need liquidity in the future. Policyholders and depositors thus require some assurance that the firm to whom they are giving money today will be able to pay their claims in the future.

In practice, individual policyholders and depositors do little monitoring of the insurance companies and banks they entrust with their funds. Much of this apathy is a rational response to the fact that most banks and insurance companies are subject to extensive regulation and supervision and government-provided insurance limits the downside risks to which both types of claimants are exposed.119 Examining the regulatory regime governing each type of firm is thus the most direct way of understanding how efforts to restrain agency costs in these domains produces constrained capital.

As an initial matter, banks and insurance control a massive amount of capital. In the case of banks, this is well known. Focusing just on banks—not the larger bank holding companies in which they typically operate—their aggregate assets totaled $15.3 trillion at the end of 2014.120 The U.S. insurance industry is also large and growing.121 The net premiums taken in just on just the two most significant lines of insurance—property & casualty and life, accident & health—well exceeded a trillion dollars a year in each of the last five years.122 According to the Federal Insurance Office, at year-end, life 2015, the accident and health sector of the insurance industry held approximately $6.3 trillion in total assets (including $2.4 trillion in separate accounts) and the property and casualty sector held approximately $1.8 trillion in assets.123 These are significant, potentially market-distorting, amounts of capital by any measure and a number of recent

studies attest to the ways that insurance company investment decisions can have measurable effects on asset prices.124

Turning to the ways this capital is constrained, both banks and insurance companies are subject to investment restrictions and risk-based capital requirements. As such, the analysis will use insurance companies to explore the impact of investment restrictions and banks to examine capital adequacy requirements. Limits on the types of assets that insurance companies can hold, like most insurance regulation, are promulgated at the state level. Most states follow one of two approaches promulgated by National Association of Insurance Commissioners (NAIC) so the regulations are more uniform than the dispersion of authority might suggest. With respect to investment restrictions, the NAIC has issued two model acts, each of which takes a different approach to ensuring that firms pursue an appropriate investment strategy in light of their large, contingent financial obligations.125 As Robert Klein explains, the first model act embraces a “prescriptive approach” and provides “relatively detailed and specific limitations on … the amounts or relative proportions of different assets insurers can hold to ensure adequate diversification and limit risk.”126 In response to concerns that the first model act was too rigid and failed to recognize the importance of portfolio-level analysis, the NAIC promulgated a second model act that allows insurers greater discretion if they can convince regulators that they have developed a sound, individualized plan for managing their portfolio and they will adhere to that plan.127 The great majority of the states that followed one of NAIC’s model acts, however, have opted for the standardized approach embodied in the first act.128 These rules directly give rise to constrained capital.

Risk-based capital adequacy requirements operate slightly different than asset constraints. Rather than requiring firms hold or not hold particular types of assets, capital adequacy rules typically affect incentives by requiring firms to fund themselves with more equity when holding assets deemed to be more risky. The basic rationale for capital adequacy requirements are that a bank with a thicker equity cushion is less likely to fail, and less incentivized to take excessive risk, than an otherwise comparable but less well-capitalized institution.

125 Klein, supra note 119, at 146.
126 Id.
127 E.g., Nat’l Ass’n Insurance Commissioners, IMF Financial Sector Investment Program, supra note 119, at 40 (explaining that in contrast to the first model act which “places restrictions on the amount that may be held in particular types of financial assets (e.g. limits on equities, noninvestment grade bonds, etc) as a means to achieve diversity,” the second model act “utilizes a more principle-based approach” that “require[es] the board of directors to establish and monitor an investment policy that meets the specified criteria of the model”).
128 Klein, supra note 119, at 146.
The first generation of widespread capital adequacy requirements, promulgated internationally through the Basel Accords, used coarse indicators of the riskiness of a particular asset to calibrate the amount of high-quality capital, primarily equity, that a bank must hold. Regulators have also started to require banks to hold additional capital to address the risks that may not show up on a bank’s balance sheet, such as counterparty exposures arising from derivative transactions. Because banks perceive capital to be costly, these regulations give banks a reason to favor assets and activities that have lower capital requirements, holding all else equal. The empirical evidence available suggests that capital adequacy requirements sufficiently impact bank preferences to have material effects on asset pricing. For example, one study found that when the capital adequacy requirements for highly rated MBS were lowered in 2002, the price of commercial MBS went up relative to comparable corporate debt.

Although credit ratings were the primary, although never exclusive, factor determining an asset’s risk weighting, there have been attempts to move away from reliance on ratings. The first widespread attempt to reduce reliance on ratings was the adoption of Basel II. Like the second model act promulgated by the NAIC for restricting insurance company investments, Basel II was designed to encourage firms to develop their own, more sophisticated portfolio-level risk management systems and to reduce reliance on ratings. The Crisis, however, revealed fundamental flaws in this regime as implemented. Banks’ sophisticated internal risk management systems proved to be less sophisticated than they had claimed, regulators failed to identify and understand the weaknesses inherent in banks’ internal risk management regimes, and the thinner capital cushions the Basel II regime enabled proved insufficient to protect banks from the larger than anticipated losses they incurred.

The Crisis revealed that ratings can at times be poor prognosticators of risk and the way pervasive use of ratings for regulatory purposes can create problematic incentives. In response to these concerns, the Dodd-Frank Act prohibits reliance on credit ratings for federal regulatory purposes. The success of this effort at limiting the influence of credit ratings has been mixed. There is little indication that ratings have declined much in their importance. Credit ratings remain a centerpiece of private monitoring efforts and many state and foreign regulatory regimes. At the same time,

130 Barr, et al., supra note 119; Basel Committee on Banking Supervision, Basel III: A Global Regulatory Framework, supra note 129.
134 [cite – DFA]
135 Soroushian, supra note 133.
136 Id.
few federal regulators have found superior alternatives. Many have replaced reliance on credit ratings with metrics that may be even less effective at capturing the risk inherent in a financial instrument, including some metrics promulgated by third party service providers who are less regulated but not necessarily more reliable than the credit rating agencies. This is the most recent manifestation of the ongoing challenge posed by the fact that proxies serve a genuinely useful purpose in facilitating monitoring and oversight despite the associated challenges.

Taking a more global perspective, the broader trend is in the opposite direction—toward greater reliance on proxies. As a result of the perceived failures of relying on banks’ internal models under Basel II, coarser metrics have returned to fashion in banking. They are also expanding in the context of insurance companies. For example, Europe has recently revised its regulatory framework for insurance companies. The centerpiece of the new regime are heightened capital adequacy requirements, in many ways akin to those long-imposed on banks, which are designed to promote the financial health of the institutions. Like Basel II, the directive allows large firms some freedom to individualize the metrics that they use to assess the riskiness of their assets, but many key aspects of the regime remain highly standardized. And implementation of the regime seems likely to alter the mix of financial assets that insurance companies will hold. According to Avinash Persaud, “[f]ollowing a series of quantitative impact assessments and simulations, investment managers of insurers generally accept that, as a result of the disproportionate impact on their aftercapital-charge returns, Solvency II will lead to a switch out of public and private equity, infrastructure bonds, property, and low-rated corporate bonds.”

Taking a step back, this move is emblematic of ways that the post-Crisis regulatory reforms seem likely to increase the amount of constrained capital in the financial system in ways that go beyond increasing the demand for money and other safe assets.

The preceding overview is just that—a brief introduction to some of the reasons that significant swathes of capital flowing into the financial system is subject to private or public constraints that are independent of the metrics used in classic asset-pricing models. Despite the brevity, the analysis shows that constrained capital is sufficiently pervasive to affect financial asset pricing and production, at least some of the time.

B. The role of regulation

The descriptive account above functions as a foundation for further developing this paper’s first claim regarding the conditions required for a legal intervention to spur innovation—that the intervention increase the aggregate demand for a particular type of

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137 Id.
138 E.g., Basel Committee on Banking Supervision, The Basel Committee’s Response to the Financial Crisis: Report to the G20, at 5 (2010) (“Another key element of the Basel III regulatory capital framework is the introduction of a nonrisk-based leverage ratio that will serve … as an additional safeguard against attempts to “game” the risk-based requirements and will help address model risk.”)
financial instrument. Embedded in this claim is the assumption that in order to assess the impact of a regulatory intervention, one first must construct a baseline that takes into account the private ordering that would occur in the absence of the intervention. This subpart adds flesh to this claim. It complements the preceding examples by providing an overview of the different ways that regulation may affect the aggregate amount of constrained capital in the financial system and the amount of capital subject to a particular constraint.

1. Law as substitute for private monitoring

Even in the absence of any regulation, banks, insurance companies, pension funds, and most other financial institutions would face constraints in how they could deploy the capital in their possession. During the “free baking era,” for example, banks had larger capital cushions than they do today and many also stockpiled cash as a way of assuring depositors of the sufficiency of their liquidity reserves. Even today, many banks hold more capital or liquid assets than regulations require. As these patterns reflect, and as a recent IMF Report makes clear: “Banks have intrinsic incentives to hold safe assets…. Safe assets—particularly short-term government securities—play a key role in banks’ day-to-day asset-liability management.” This is because “[s]horter-term safe assets permit banks to curb unwanted maturity mismatches and manage their short-term funding needs.” Banks also have non-regulatory reasons for wanting to be well capitalized. Today, the government is often inextricably intertwined with these institutions, as the government now provides formal guarantees to claim holders in each of these settings, creating moral hazard that can only be mitigated through oversight and risk restrictions. Nonetheless, the overall edifice serves aims that, at least in part, would be addressed through market-based mechanisms in the absence of regulation. And, even in the absence of regulation, banks would hold some liquid assets and would face other market-based constraints on the riskiness of their portfolios.

To the extent that regulatory regimes and other legal interventions function as substitutes for private monitoring and discipline, their primary effect may be to alter the thresholds around which demands for constrained capital arise and the size of the demand around those thresholds. Particularly for regulations that affect significant swathes of capital, these effects can be significant. That the price of highly rated commercial MBS fell relative to corporate debt when the capital adequacy requirements applicable to such

141 See infra note 150 and sources cited therein.
142 See, e.g., Jakovljevic et al., A Review of the Empirical Research on the Design and Impact of Regulation in the Banking Sector, 7 Ann. Rev. Fin. Econ 423, 425 (2015) (noting that “the predominant conclusion of empirical work is that the eff of capital regulation might vary accordingly to the level of capital held by the banks that exceeds the regulatory requirement”).
143 https://www.imf.org/external/pubs/ft/gfsr/2012/01/pdf/text.pdf at 91
144 https://www.imf.org/external/pubs/ft/gfsr/2012/01/pdf/text.pdf at 91
145 See, e.g., Jakovljevic et al., A Review of the Empirical Research on the Design and Impact of Regulation in the Banking Sector, 7 Ann. Rev. Fin. Econ 423, 425 (2015) (explaining that banks may hold more capital that regulations require for a range of reasons including “to insure themselves against insolvency risk … or economic recession,” “to satisfy the criteria of rating agencies,” and “to optimize their market value”) (internal citations omitted).
instruments were reduced illustrates how important regulatory effects can be even such spaces. At the same time, as reflected in the mixed results of efforts to reduce regulatory reliance on credit ratings, monitoring risk taking is tricky business. Particularly when a firm’s structure gives its creditors and other senior claimants a reason to be concerned that the firm’s shareholders, and managers accountable to those shareholders, want a firm to assume excessive risk, it is difficult to know whether a lack of regulation would necessarily result in less stringent constraints or less constrained capital. This suggests that many of the regulatory regimes that most obviously produce constrained capital may not be as transformative as they superficially appear.

2. Other policy aims

Much financial regulation serves aims beyond coordinating the protections that stakeholders would otherwise demand. Bank regulation, for example, also seeks to reduce the negative spillover effects on the real economy that arise when banks fail and the banking system faces systemic distress. Although it would be challenging to map these distinctions onto existing regulatory arrangements, from a theoretical perspective, the distinction is important. To the extent that a regulatory intervention is designed to reduce negative externalities or to further other policy aims, the intervention is far more likely to fundamentally alter the amount and type of constrained capital in a system.

Banking is a classic example of a domain where regulatory interventions are serving multiple aims. The capital requirements imposed on banks, for example, function in part as a substitute for what the market would otherwise require, as reflected by the fact that banks tended to have even thicker equity cushions than those mandated today before they were heavily regulated. Today’s bank regulatory regime, however, also aims to reduce the negative externalities that can arise when a bank fails. As a result, capital requirements imposed by reference to the riskiness of a bank’s assets are often more demanding than would be required if the sole function was to substitute for private oversight.

A recent example of the law intervening to replicate private protections while also going beyond those protections because of concerns about spillover effects are the changes underway in the derivatives market. To address concerns about the role derivatives played in the Crisis, the Dodd-Frank Act mandates a number of important changes in how this market operates. Of particular relevance here are a new requirement that standardized derivatives be centrally cleared and heightened collateral requirements for derivatives that are instead executed over-the-counter (OTC), that is, as

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148 See supra Part II.A.2.
149 For further discussion of implications and alternatives, see infra Part IV.
150 E.g., Charles W. Calomiris, How to Regulate Bank Capital, 10 National Affairs 41, 55-56 (2012) (stating that “[b]efore banks’ debts were protected by government deposit insurance and bailouts, markets ensured that banks maintained adequate amounts of capital and cash assets, and rewarded bankers who engaged in better risk management with lower costs for raising funds”); King, supra note 99, at 280 (“A century ago, the [capital] ratio for many banks was 25 per cent!”).
151 Whether derivatives played a significant role in contributing to the Crisis remains contested. See, e.g., Bruce Tuckman, In Defense of Derivatives: From Beer to the Financial Crisis, 781 Cato Institute (2015).
bilateral agreements. These changes reduce the probability that parties will experience losses as a result of counterparty failure, so they clearly overlap with the type of private protections derivative market participants have long demanded. Yet, the requirements are more robust than those the market had demanded previously and in forms that the market had not otherwise embraced on a widespread basis, consistent with policymakers’ belief that derivative exposures can be a mechanism of contagion during periods of financial distress and thus there are externalities that the parties are not incentivized to address.

The long-term ramifications of these changes remain uncertain and staged implementation makes the impact of the regulations difficult to parse, but most initial estimates suggest that the revised regime will require derivatives market participants to post and maintain significantly more collateral than market previously demanded. A recent report by the Comptroller of the Currency, for example, estimates that U.S. banks will need approximately $644 billion in [additional] eligible collateral to satisfy the initial collateral requirements under the new regime. The nature of the collateral that may be used to satisfy these demands has also been the subject of heated debate, as industry participants have argued that the regulatory approach is unduly restrictive and have expressed concerns that the overlap between the type of collateral the new regime requires and the assets that banks and insurance companies are being incentivized to hold pursuant to other contemporaneous regulatory changes.

3. Indirectly altering incentives

The focus thus far has been on regulatory regimes that expressly require or incentivize institutions to hold particular types of financial claims. But the law can also have powerful indirect effects on investor preferences. This is illustrated by the ways the law affects the demand for money and other safe assets. One of the primary reasons that persons demand such assets is as a way of self insuring in anticipation future, and often

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153 E.g., J.P. Morgan, supra note 104.

154 E.g., Letter from International Swaps and Derivatives Association to Elizabeth M. Murphy, Secretary, Securities and Exchange Commission (Jan. 23, 2013) (available at, https://www2.isda.org/attachment/NTI1MA==/ISDA%20Margin%20Response%20to%20the%20SEC.pdf) (arguing that “[t]he list of eligible collateral proposed by the Prudential Regulators is too limited” “[t]he determination of what constitutes appropriate collateral” should instead be made by the centralized clearing body “based on conditions surrounding the relevant swap”).

155 E.g., J.P. Morgan, supra note 104 (stating that “[d]emand will significantly increase for the same high quality collateral called for by Basel III, Solvency II, etc.” and that “the consensus is that there will be a significant reduction in availability” of qualifying high-quality assets).
uncertain, needs. This demand is not determined in a vacuum, but rather is shaped by a person’s expectations regarding its ability to access to external financing when needed and the terms of such financing.

One classic conception of the function of banking is to provide clients liquidity insurance. When a person puts money into a demand deposit account, the bank assumes the obligation to make those funds available to the depositor whenever the depositor needs liquidity in the future. A different way that banks often provided liquidity insurance prior to the Crisis was through lines of credit. Individuals, for example, frequently had home equity lines of credit. This might provide one person the comfort of knowing that if she lost her job and needed to cover expenses for a couple of months, she could do so, while allowing someone else the joy of knowing he could buy his dream car or renovate whenever the time felt right. Companies, similarly, would often pay a regular fee to a bank in exchange for that bank precommitting that it would make a loan, up to a pre-established cap, at the company’s demand. From the company’s perspective, a line of credit from a trustworthy bank could serve as a rough substitute for cash in a deposit account, as both served to assure the company that it would have access to liquidity when it needed it in future periods.

State actors can also play an important role in providing liquidity insurance. One of the primary functions of the Federal Reserve when it was created in 1913 was to provide a form of liquidity insurance to banks by committing to make collateralized loans to banks facing excess withdrawals. This role, commonly referred to as the lender of last resort, is one that the Fed and other central banks continue to play to this day. While less certain and far more conditioned, loans from the International Monetary Fund (IMF) to countries unable to pay their debts are yet another insurance-like product, one that alters the incentives a country faces when assessing the level of liquid reserves it should hold to avert facing such a possibility.

As these examples illustrate, the notion of an insurance policy need not be limited to settings where persons seek to reduce the loss they will incur upon an adverse event. Individuals may value access to liquidity to enable future consumption; firms may want to ensure they can take advantage of attractive investment opportunities when they arise; and countries may want access to IMF liquidity to help smooth out changes in their capacity to access private capital markets. These examples further illustrate the challenge of trying to develop an appropriate baseline from which to assess the effects of an intervention or other rule change. When a central bank stands ready as a lender of last resort, banks have less incentive to carry adequate liquidity to address depositor demands. At the same time, the only way to ensure banks have sufficient reserves to meet depositor demands in the absence of external support—requiring banks to hold 100% reserves against deposit—has been proposed and rejected time and again for more than a century.

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156 See supra Part II.A.1.
seemingly reflecting a consensus that the costs, such as limiting the growth of the money supply and precluding any deposit capital from being deployed in risky but productive undertakings, exceed the stability-enhancing benefits. And the market-only approach, of allowing banks to issue as many money claims as the market will allow but denying any government support in the event of failure, has not been followed by any industrialized nation, presumably because banking panics tend to be correlated with financial crises which result in adverse spillover effects on the real economy. The analysis here by no means requires a conclusion regarding the optimal level of insurance, or self-insurance, for individuals, firms or countries, but it does bring the fore some of the ramifications of efforts to reduce moral hazard by reducing the safety net that are often overlooked.

The key take-away is the importance of taking a broad view in assessing the range of government actions that affect the amount of constrained capital in the financial system. As Bernanke explained, the global savings glut, which appears to have played a significant role shaping pre-Crisis financial markets, arose because emerging market countries sought to build up “war chests’ of foreign reserves” that could “be[] used as a buffer against potential capital outflows” following the financial crises that spread through Asia and Latin America in the 2000s. This heightened demand for safe assets was shaped not only by countries’ increased appreciation of how quickly foreign capital could exit, but also in light of new information regarding the loss of autonomy that a country would face as a result of the onerous conditions that accompanied any effort to address those shortfalls by borrowing from the IMF. Had IMF loans been more forthcoming and less conditioned, the IMF interventions would have resulted in even more moral hazard than they did; but, the magnitude of the global savings glut might also have been smaller, as countries may have felt less compelled to self insure to address future capital needs. Regardless of the merits of the IMF decision, the example illustrates the importance of looking beyond rules that explicitly require or incentivize firms to hold particular types of assets in seeking to assess how state actions affect the amount of constrained capital in the financial system.

The new liquidity coverage ratio (LCR) designed to enhance the capacity of banks to withstand periods of systemic distress further illustrates the challenge of assessing the impact of government interventions and the optimal degree of self insurance. The LCR requires subject banks to hold sufficient high-quality liquid assets to support the bank’s operations for thirty days during a period of systemic distress. It is individualized in the sense that it focuses on that bank’s expected cash inflows and outflows, but it ignores

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163 E.g., King, supra note 99.
164 See Basel III: The Liquidity Coverage Ratio, supra note 105 (“The LCR builds on traditional liquidity ‘coverage ratio’ methodologies used internally by banks to assess exposure to contingent liquidity events. The total net cash outflows for the scenario are to be calculated for 30 calendar days into the future. The standard requires that, absent a situation of financial stress, the value of the ratio be no lower than 100% (i.e the stock of HQLA should at least equal total net cash outflows”).

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a range of other ways that banks differ that would otherwise be material in assessing just how much liquidity a bank should hold. The standardized nature of the requirement suggests it is almost inevitably distortive for some institutions, but whether this is more or less liquidity than an average bank would hold absent any type of government intervention in the banking system or relative to the optimal degree of bank self insurance in light of government support is far from clear. On the one hand, the LCR does require virtually all affected banks to hold more safe assets than they held in the absence of the LCR. On the other hand, a primary rationale for the LCR is that pre-Crisis banks held too few safe assets because of bank expectations that the government would step in to supply additional liquidity when needed, so the higher requirements may be appropriate in light of the externalities that arise from bank failures and the potential for expectations of government support to induce moral hazard.

C. Looking ahead

1. Assessing proposed reforms

The framework provided here provides a useful starting point for assessing whether and to what degree particular decisions already encoded into law affect incentives in ways that impact the amount of constrained capital in the system and, thereby, the probability of innovation. The framework can also be used to assess the probable implications—at least with respect to spurring innovation—of further reforms under consideration.

Interestingly in light of the fact that further financial reform seems imminent, the relationship between the LCR and access to a lender of last resort also illuminates ways that proposals to reduce the regulatory burdens imposed on banks and to reduce moral hazard by making it more difficult for banks to borrow from the government may be working at cross purposes. To make this more concrete, among the proposals currently under consideration are (1) proposals to limit the range of institutions subject to the LCR and (2) changes that would make it far more difficult for the Federal Reserve to provide lender-of-last-resort support to banks and nonbank institutions. The first change would seemingly have the effect of reducing the demand for liquid assets, assuming that in at least some subset of cases the LCR is currently the binding constraint determining the amount and type of liquid assets that banking institutions hold. The second change, by contrast, would have the opposite effect. By reducing the probability that firms will be able to use illiquid assets as collateral to obtain fresh liquidity during periods of distress, imposing new frictions on the Fed’s lender-of-last-resort authority should cause financial

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167 Id.
168 [Choice Act – wait until Choice II]
firms to increase their assessment of the volume of highly liquid assets that they must hold to reduce the probability of a run to an acceptable level.

To be sure, the focus here on the propensity of an intervention to lead to innovation is but one consideration, and potentially far less material than others, in assessing the appropriateness of these types of reforms. Efforts to limit the circumstances in which the Fed can provide lender-of-last-resort support, for example, are meant to address the moral hazard that can arise in anticipation of such interventions and to respond to public concerns about the unfairness of a system that disproportionately protects financial market participants from the negative consequences of their own risk taking. Similarly, mandating that banks treat lines of credit like outstanding loans when calculating capital adequacy requirements was a response to the high rate at which these lines were utilized during the Crisis, and the ways such utilization sapped banks of precious liquidity during a period of widespread distress.\(^{169}\) Nonetheless, the analysis here shows that these types of legal changes may well have costs that are being ignored and which ought to be incorporated into a meaningful effort to assess both the costs and benefits of such changes.

A second contribution of the analysis here is to show why what might seem like the most obvious policy response if there are reasons to be worried about constrained capital—reducing regulatory reliance on proxies like credit ratings—may not prove all that productive. This analysis suggest there may be value in reducing reliance on ratings and encouraging private institutions to use multiple metrics when assessing the value and risks of a financial instrument. Nonetheless, such efforts have been attempted in the past with mixed success.\(^ {170}\) The core challenge is that despite the drawbacks of relying on proxies like credit ratings, the alternatives are often even more flawed. Particularly when regulatory competence and the cost of more nuanced oversight are factored in, history suggests that reliance on coarse metrics may be the best of a variety of imperfect means for monitoring and restraining risk taking.\(^ {171}\) And, the use of private rather than public monitoring will not necessarily reduce the amount of constrained capital or the system’s overall use of proxies. Thus, while the analysis here supports these efforts and the ongoing experimentation in this vein prompted by Dodd-Frank’s mandate to limit reliance on credit ratings, it is far from clear that the additional costs here identified necessarily justify further efforts to limit such reliance. As above, the contribution here is not to provide an answer with respect to the best way forward, but to highlight why simplistic claims are wrong and to provide a more sound foundation from which to assess the relative merits and drawbacks of using particular tools, like proxies, in financial regulation.

2. Research: Who seeks substitutes and why

One research issue raised but not resolved by the analysis here are the questions of who seeks substitutes, why, and when. In order to develop a workable framework for assessing the impact of regulation on investor-driven financial innovation, the analysis here largely assumes that demand is fungible. Working within this assumption to

\(^{169}\) [cite]

\(^{170}\) See infra Part II.A.2.

\(^{171}\) Id.
develop each of this paper’s claims allows a theoretical line to be drawn between investor-driven innovations, which arise when heightened demand and limited supply require market participants to accept substitutes, and regulatory arbitrage. In this context, regulatory arbitrage entails efforts to minimize the cost of regulatory compliance by seeking out assets that comply with the letter but deviate with the spirit of an applicable regulation, e.g., a bank seeking to lower its capital adequacy requirements by holding AAA-rated assets that offer unusually high returns and pose unusually great risks and thus do not merit a true AAA rating.

In practice, the line between regulatory arbitrage and investor-driven innovation is far from clearcut. As a starting point for further research, it might be useful to distinguish among types of constrained capital by looking at the source of the constraint. Some constraints are internally generated. For example, Firm A may be stockpiling cash equivalents because it has uncertain future capital investment opportunities and it wants to ensure it has the ability to pursue those opportunities when they arise. Other constraints are external to the entity. For example, Firm B may be acquiring cash equivalents because it faces a regulatory requirement to hold such assets.

The demand coming from Firms A and B differ in two ways that are relevant to the analysis here. On the one hand, Firm A has greater flexibility to accept innovative new instruments that are true substitutes for cash equivalents because it faces no rigid, external constraint. On the other hand, Firm B has more of an incentive to seek out substitutes that qualify as cash equivalents under the regulatory scheme even if they are not perfect substitutes. In both cases, the reward for accepting substitutes is likely to be greatest in environments where the yield on cash equivalents is artificially low because of excess demand.

These broad observations are consistent with the patterns observed in the period leading up to the Crisis. The data compiled by Bernanke and his co-authors, for example, suggests that the sovereigns that were seeking safe assets because they were internally motivated to self insure against capital flights by foreign investors and other adverse outcomes. These entities were the ones most willing to pay a premium for assets that were not just highly rated, but genuinely quite safe, like Treasury instruments. By contrast, Bernanke and his co-authors found that European banks facing regulatory requirements that rewarded banks for holding AAA-rated assets had the greatest propensity to acquire the AAA-rated MBS and CDOs that lost value during the Crisis. Other studies similarly find that regulated entities are more inclined to hold more risky assets within a given credit rating. At the same time, banks were incentivized to hold AAA assets long before the pre-Crisis period. It was only when excess demand caused yields on truly safe assets to drop that we saw a proliferation of ultimately low-quality

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172 See infra Part III.C.
173 Bernanke et al., supra note 36, at 9 (noting that “the GSG countries[’] … net purchases of U.S. assets during the period consisted almost exclusively of Treasuries and Agencies”).
174 Id. at 9-12 and accompanying figures (explaining that “Europeans bought a much wider range of assets” than the GSG countries and providing more detailed information about those assets).
175 E.g., Bo Becker & Victoria Ivashina, Reaching for Yield in the Bond Market, 70 J. Fin. 1863 (2015) (finding that insurance companies tended to hold bonds that provided higher rates of return and were more risky, based on CDS prices, than other similarly rated bonds).
AAA assets. This timing suggests that what was going on was not just regulatory arbitrage as commonly understood. Moreover, some of the investor-driven innovations that proliferated during this period produced assets that could not be held by regulated entities and instead placated the market-based demand for money-like instruments that offered slightly higher returns. Auction-rate securities, which were largely treated as safe prior to the Crisis but which were revealed to be far from safe or liquid during the Crisis are a prime example.\(^{176}\) As these findings reflect, there is already some very useful research in this vein, but more remains to be done.\(^{177}\) Developing a more nuanced assessment of the institutional environments that produce constrained capital could enable more accurate forecasting regarding when constrained capital will lead to investor-driven financial innovations and the type of innovations most likely to flourish.

III. Investor preferences and financial innovation

The existence of constrained capital has a number of implications. One of the most important is that countries and firms capable of issuing the type of instruments for which there is outsized demand can raise capital more easily and at a lower cost.\(^ {178}\) These effects can be significant and typically benefit countries and firms that are large, pose modest credit risks, and issue debt in U.S. dollars or another desirable currency.\(^ {179}\) Entities like banks that can readily issue money equivalents enjoy particularly notable benefits in this regard.\(^ {180}\) The focus here is not on the allocation-related implications of constrained capital in settings when primary issuances alone more than suffice to satisfy the demand. Rather, the aim here is to determine when increased constrained capital is likely to spark innovation.

This Part first considers the building blocks of modern financial engineering and some examples of innovations that arose or spread, at least in part, in response to investor demand. It then considers why regulators should care about demand-driven financial innovation, looking both at how these innovations can promote efficiency and lower capital costs and how the spread of these innovations also gives rise to new, and sometimes systemic, risks. It concludes taking a step back and using the understandings developed in the first two subparts to ground this paper’s claim regarding the conditions required for changes in demand to lead to innovation. Like Part II, the aim here is to illustrate rather than exhaust.

A. Investor-Driven Financial Innovation

1. The building blocks
   a. Securitization


\(^{177}\) E.g., Mark Carlson et al., The Demand for Short-Term, Safe Assets and Financial Stability: Some Evidence and Implications for Central Bank Policies, Federal Reserve Board Finance and Economic Discussion Series (2014); Caballero & Krishnamurthy, supra note 93, at 584-85 (noting that, “over the last decade, the US has experienced large and sustained capital inflows from foreigners seeking US assets to store value . . . [t]he external demand for US assets, from foreign central banks for example, is in particular a demand for high-grade debt.”).

\(^{178}\) E.g., Carlson et al., The Demand for Short-Term, Safe Assets and Financial Stability, supra note 178; Caballero & Krishnamurthy, supra note 93.

\(^{179}\) E.g., Ricks, Safety First?, supra note 160.

\(^{180}\) E.g., Ricks, Safety First?, supra note 160.
The first critical tool is securitization. Securitization entails the sale of financial assets from the entity that originated those assets to a new investment vehicle specially created to house those assets. The originator selling the assets is usually required to make an array of representations and warranties regarding the quality of the assets sold and the processes employed during origination, so the originator has a financial interest in the quality of the assets it originates. Nonetheless, the sale extinguishes the originator’s property interest in those assets, and that interest is transferred in its entirety to the newly created vehicle. This is critical, as it enables a financing structure that depends solely on the quality of the financial instruments packaged into the securitization structure, not the creditworthiness of the entity that originated those instruments.181

The other two features that are critical to most securitization structures are diversification and tranching. Tranching entails the creation of multiple different classes of instruments, all of which have different sets of rights to the cash flows produced by the underlying assets.182 While some securitization structures entail specialized tranches, such as interest-only or principal-only securities that have a right to payment only when there is an excess of cash flows of a particular type coming into the securitization structure, the primary function of tranches is to create a hierarchy among the different classes of securities issued. The rights of each class are set forth in a “waterfall,” specific to that securitization structure, which is designed to ensure that the senior tranches receive any interest and principal owed to them before the junior tranches receive any payments while also seeking to make the terms of the junior tranches sufficiently attractive to justify the higher risk they pose. Diversification is key to enabling the senior tranches to enjoy reduced exposure to the credit risk of the underlying instruments.183

This process gives rise to a host of logistical challenges. These challenges include the ongoing monitoring of the underlying financial instruments, the collection of cash flows from those instruments, and the need to address the issues that arise when a party defaults on one of those instruments. Typically, these issues are addressed through the appointment of a servicer who is authorized to exercise many of the rights belonging to the holder of the instrument and who is given instructions with respect to how to handle standard challenges, like managing a foreclosure.184 Another logistical challenge, usually resolved through the appointment of a trustee, entails the distribution of payments to the various holders and enforcing other rights associated with ownership of the underlying instruments, such as pursuing an originator should an asset sold to the securitization vehicle fail to conform to the representations and warranties made by the originator at the time of sale.185 While these challenges are all significant, and there are meaningful limits to the resolutions used to address each, the magnitude of these challenges and the costs associated with addressing them generally declined as securitization structures spread, as

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181 For a more detailed description of how securitization structures work, see, e.g., Kathryn Judge, Fragmentation Nodes: A Case Study in Financial Innovation, Complexity and Systemic Risk, 64 Stan. L. Rev. 657, 672 (2012).
182 See id.
183 E.g., Joshua D. Coval et al., Economic Catastrophe Bonds, 99 Am. Econ. Rev. 628 (2009).
185 Judge, Fragmentation Nodes, supra note 181.
the terms became more standardized and the persons assuming roles like those of a servicer and trustee were already in the business of playing those roles for other securitization structures.

b. Derivatives

The second tool that facilitates investor-driven financial innovation is the derivative, a category of transactions that involve obligations that reference but are otherwise independent of instruments used to raise capital for a productive undertaking. A simplified illustration of a credit default swap demonstrates how these transactions work. Imagine that Company A raises capital by issuing long-term debt. Parties X and Y later enter into an agreement pursuant to which Party X agrees to pay Party Y a fixed amount should Company A default on that debt. In exchange, Party Y pays Party X a recurring premium. Although it is possible that Party Y seeks protection from Party X because it is otherwise exposed to Company A, no such connection is required and often no such connection will exist. As with securitization, parties have devised ways to address the myriad logistical challenges that arise from these arrangements and, apart from regulatory considerations, the associated costs have tended to decline as swaps have become more pervasive and standardized.

Far more than securitization, this is an innovation that serves a number of important socially valuable purposes having little to do with investor preferences. Derivatives, for example, are often used by parties seeking to hedge or to otherwise reallocate risks to parties better suited to bear those risks. At the same time, by allowing the banks involved in securitization and other activities to offset some of the risks to which they would otherwise be exposed, derivatives played a critical role facilitating, directly and indirectly, much of the investor-driven financial innovation that occurred prior to the Crisis. And like securitization, derivatives can give rise to risks that did not previously exist by, for example, increasing interconnectedness.

2. Some examples

The way that securitization and other derivatives may be used to satisfy excess investor demand for particular types of financial instruments is best illustrated by example. This subpart provides highly simplified accounts of four transaction structures that arose and spread, at least in part, in response to investor preferences. The latter examples all build on the first, enabling the examples to further highlight the way the

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186 The term “derivatives” is sometimes used to encompass both ABS and synthetic derivatives and other terms refers exclusively to the latter. This paper adopts the second approach and uses the term to refer to CDS, interest rate swaps and other obligations that reference another financial instrument or index but have no direct stake in it. See, e.g., Tuckman, supra note 151, at 3 (noting that “[d]efining derivatives in a way that excludes MBSs and CDOs is not controversial in the policy context” and providing support from recent policy initiatives).

187 Frank Partnoy & David A. Skeel, Jr., The Promise and Perils of Credit Derivatives, 75 Univ. of Cincinnati L. Rev. 1019, 1025-26 (2007) (describing the role that ISDA has played in facilitating these processes).

188 See generally Tuckman, supra note 151.

189 See infra Part III.A.2.

190 See infra Part III.C.3.
building blocks just described can be layered with each other and other innovations.\(^{191}\) This structure also brings to the light the way some forms of constrained capital can create a demand for other types of constrained capital.

a. MBS

Mortgage-backed securities (MBS) are the instruments issued by securitization structures in which the underlying instruments are home loans.\(^{192}\) The volume of MBS transactions skyrocketed in the early 2000s.\(^{193}\) Although a number of explanations have been given for this growth,\(^{194}\) one of the most frequently cited is excess demand for AAA-rated instruments.\(^{195}\) To understand why the demand for AAA-rated instruments may have been such a powerful force prior to the Crisis, a little context is required beyond the explanations given above. Recall, investor-driven financial innovations are most likely to be cost-justified when the demand for a particular type of financial asset exceeds the naturally available supply. As Bernanke and co-authors, among others, have demonstrated, foreign sovereigns—the so-called global-savings glut (GSG) countries—held a significant portion of Treasury instruments and other agency securities (which enjoyed an implicit government backing) outstanding, and their acquisitions of these instruments increased in the period leading up to the Crisis.\(^{196,197,198}\) These acquisitions increased the aggregate demand for highly rated instruments and reduced the yields and availability of the safest of these assets. As a result, even though the GSG countries were

\(^{191}\) Lerner & Tufano, supra note __, at 47 (explaining that systemically important financial innovation are often embedded in an innovation spiral, such as occurs when “one successful innovation provid[es] the raw material, or building blocks, for another”); Merton R. 1992. Financial innovation and economic performance. J. Appl. Corp. Finance 4(Winter):12–22 (describing “innovation spirals” in which innovations beget further forms of innovation).

\(^{192}\) MBS include two subcategories—those backed by residential home loans (RMBS) and those backed by loans for commercial real estate. In line with most academic work on the topic, this paper uses MBS as shorthand for RMBS.

\(^{193}\) E.g., Miguel Segoviano et al., Securitization: Lessons Learned and the Road Ahead, at 9 and fig. 5 (IMF, Working Paper No. 13/255, 2013), https://www.imf.org/external/pubs/ft/wp/2013/wp13255.pdf (“Private-label residential MBS issuance in the United States increased from US$148 billion in 1999 to US$1.2 trillion by 2006 (Figure 5).”).

\(^{194}\) Another rationale for securitization is that it economizes on information production. See, e.g., Peter DeMarzo, The Pooling and Tranching of Securities: A Model of Informed Intermediation, 18 Review of Financial Studies 1 (2005); Gary Gorton & George Pennacchi, Financial Intermediaries and Liquidity Creation, 45 J. Fin. 49 (1990). As discussed further below, this is not necessarily an efficient outcome, however, as it can result in their being too few informed investors and fragility-enhancing information gaps when the good times end. See, e.g., Judge, Information Gaps and Shadow Banking, 103 Va. L. Rev. __ (forthcoming 2017); Samuel G. Hanson & Adi Sunderam, Are There Too Many Safe Securities? Securitization and the Incentives for Information Production, 108 J. Fin. Econ. 565 (2013).

\(^{195}\) E.g., Fin. Crisis Inquiry Comm’n, Financial Crisis Inquiry Report 119 (2011); Miguel Segoviano et al., supra note 193, at 30-35; Ben S. Bernanke et al., supra note 36, at fig. 5; see also infra, Part III.A.

\(^{196}\) Bernanke et al., supra note 36.

\(^{197}\) Id. at fig. 2 (showing that China, other Asian countries and the OPEC countries all had quite substantial positive current account surpluses between 2003 and 2007); see also Ben S. Bernanke, Chairman, Fed. Reserve, Remarks on the The Global Saving Glut and the U.S. Current Account Deficit (Mar. 10, 2005) (Bernanke’s first discussion on the “global savings glut.”).

\(^{198}\) Bernanke et al., supra note 36, at fig. 4.
not avid purchasers of privately issued AAA-rated instruments, their activity helps to explain the excess demand for these instruments.199

b. CDOs

Another financial innovation that arose and spread, at least in part, to satisfy the excess demand for AAA-instruments prior to the Crisis is the collateralized debt obligation (CDO) backed by MBS. CDOs, of the type here at issue, are second-level securitization structures in which MBS and potentially other credit instruments are packaged together into a new securitization structure. The rise of CDOs addressed the demand for AAA instruments in two ways. First, CDO transactions directly created more AAA-rated instruments by producing such instruments from lower rated credit instruments. Again, this was possible because of diversification requirements and the creation of hierarchical tranches that gave certain classes of the instruments issued payment priority over others. Second, CDOs served as ready buyers of MBS that did not have a AAA rating. Because the need to find a buyer for these tranches was often a friction on the rate at which MBS transactions could be consummated, the rise of CDOs increased the rate at which MBS could be consummated.200

The important role of CDOs along both dimensions is reflected in the dramatic growth of these transactions, which proliferated even more quickly than MBS, on a relative basis.201 Between 2004 and 2006 alone, the height of the boom, the issuance of new CDOs increased by roughly 250%.202 One indirect effect of this proliferation of CDOs is that many of the banks sponsoring these transactions, which often retained a portion of the instruments issued, sought to hedge those positions using swaps. This led to greater interconnections among financial institutions and, ultimately, plays a critical role explaining why and how insurance company AIG ended up so exposed to the mortgage market.203

c. Synthetic CDOs

Although MBSs and CDO transactions proliferated rapidly before the Crisis, the number of these transactions that could be consummated was constrained by the need for loans or other cash-producing assets. Synthetic CDOs are not so constrained. In contrast to traditional securitization structures that rely on underlying cash-producing assets, these

199 Id.
200 Judge, Fragmentation Nodes, supra note 181, at 694; Fin. Crisis Inquiry Comm’n, supra note 195, at 128-30 (2011) (explaining how “CDOs [became] the dominant buyers of the BBB-rated tranches of mortgage-backed securities” and the effects of this shift).
201 Fin. Crisis Inquiry Comm’n, supra note 195, at 18 (“from the third quarter of 2006 on, banks created and sold some $1.3 trillion in mortgage-backed securities and more than $350 billion in mortgage related CDOs”); id. at 129 (“Between 2003 and 2007, as house prices rose 27% nationally and $4 trillion in mortgage-backed securities were created, Wall Street issued nearly $700 billion in CDOs that included mortgage-backed securities as collateral”); Miguel Segoviano et al., supra note 193, at 9 (“At the global level between 2000 and 2007, issuance of collateralized obligation (CDO) increased more than six times to US$1 trillion, while issuance of CDO-squared product increased eleven-fold to around US$300 billion.”).
instruments are “synthetic” because they are produced primarily through a mix of derivative transactions that create instruments with cash flows that are determined by reference to the actual performance of specified CDOs.\textsuperscript{204} Like MBS and CDOs, this innovative financing technique spread pre-Crisis to satisfy the excess investor demand for highly rated financial instruments but, because counterparties were required in lieu of underlying credit instruments, they also arose to satisfy demand from other investors who wanted instruments that wanted to short the CDO market, i.e., instruments that would go up in value if the value of CDOs declined.\textsuperscript{205} The complexity of these structures and the range of parties involved meant that the investment bank sponsoring the arrangement often remained party to it, and not infrequently even retained some exposure to the performance of the various instruments issued.\textsuperscript{206} Thus, even more than with regular CDOs, synthetic CDOs created complex new interconnections and motivated the banks that structured the transactions to use swaps to hedge their exposures, primarily with AIG.\textsuperscript{207}

d. Asset-backed commercial paper

Although much of demand for AAA-rated instruments came from banks, pension funds, and other investors that intended to hold the instruments, another meaningful source of the demand was from institutions that intended to transform those assets into short-term, money-like instruments. An important financial innovation that used MBS and other asset-backed securities to produce money claims are asset-backed commercial paper (ABCP) programs.\textsuperscript{208} At its height in 2007, total ABCP outstanding reached $1.2 trillion.\textsuperscript{209} This amount exceeded the aggregate value of unsecured commercial paper outstanding, including that issued by financial and nonfinancial firms, and it also exceeded by a good margin the aggregate value of Treasury bills then outstanding.\textsuperscript{210}

\begin{footnotes}
\item[204] E.g., Fin. Crisis Inquiry Comm’n, supra note 195, at 142-46 (explaining the structure of synthetic CDOs and providing examples).
\item[205] E.g., id. at 144 (illustrating how both sets of investors are served, and required, for these transactions to work; Steven M. Davidoff Solomon, Alan D. Morrison William, & J. Wilhelm Jr., The SEC v. Goldman Sachs: Reputation, Trust, and Fiduciary Duties in Investment Banking, 37 J. Corp Law 529, 535 (describing how the now-famous Abacus synthetic CDO served both these purposes).
\item[206] Fin. Crisis Inquiry Comm’n, supra note 195, at 143.
\item[207] E.g., id. (“AIG was effectively the largest unfunded investor in the super-senior tranches of the Abacus deal.”)
\item[209] Financial Conduct Authority, Market-Based Finance: Its Contributions and Emerging Issues, at 9 (2016), available at http://www.fca.org.uk/static/documents/occasional-papers/occasional-paper-18.pdf (explaining that the aggregate value of U.S. ABCP peaked in July 2007 at $1.2 trillion and had fallen to “just $226 billion at the end of 2015”); see also Acharya & Schnabl, supra note 96, at 38 (explaining that the value of outstanding ABCP was roughly $260 billion more than the value of outstanding Treasury bills).
\item[210] Daniel Covitz et al., The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market, 68 J. Fin. 815, 815 (2013); for detailed information about the types and amounts of CP
\end{footnotes}
These structures allow MBS and CDOs, among other assets, to be used to issue money-like claims. They do so through a complex set of arrangements that bear some similarities to securitization structures, in that underlying assets are packaged together in a new vehicle that issues effectively senior claims—in this case, claims with much shorter maturities—and lower priority instruments. These programs, however, also have a number of additional features, such as arrangements with the bank sponsoring the ABPC program that often enabled the vehicle to obtain liquidity support from the bank if needed. These structures also varied in important ways, and benefited from implicit as well as explicit commitments from the sponsoring banks. These details are beyond the scope of this paper, but they are relevant in that they reflect the complexity that arises from investor-driven financial innovations and the ways such innovations can create mechanisms of contagion that may not be readily apparent.

As with most money-type claims, like demand deposits, ABPC holders often provide ongoing financing by rolling over their investments when they mature, but the instruments themselves are very short-term, often with maturities between 1 and 30 days. One ramification is that the issuer of the ABPC does not need to convince a potential holder that the ABPC will continue to perform well in all states of the world to merit money-like status. Rather, the issuer only needs to convince the ABPC holder that the structure can withstand any adverse developments that might arise between the issuance of the ABPC and the maturity date, as the holder can walk away or demand substantially different terms each time the paper nominally matures. Further reducing the need for ABPC to undertake individualized diligence is the fact that most ABPC programs also obtain ratings from a leading credit rating agency. In conjunction with


211 Daniel M. Covitz et al., The Evolution of a Financial Crisis: Panic in the Asset-Backed Commercial Paper Market, Federal Reserve Board Finance and Economic Discussion Series, at 10 (2009) (noting that two Moody’s reports suggested that between 25-27% of the assets underlying structured investment vehicles that that Moody’s rated—a form of ABPC—were highly rated residential MBS); id. at 9 (“There were 36 ABPC CDO programs in July 2007, with ABPC outstanding of $47 billion.”).

212 E.g., id. at 8-9 (“A liquidity bank, typically the conduit’s bank sponsor, provides a liquidity facility for each transaction to address timing mismatches between the payment streams of the assets and the CP maturity dates or to repay CP investors in the event that CP cannot be rolled, namely a market disruption.”); see also Fitch Ratings, supra note 208 (explaining that “sponsors usually retain a financial stake in the ABPC program by providing credit enhancement, liquidity support, or both”).The structure here can be quite different than a securitization structure as many ABPC programs were designed as ongoing, evolving conduits that would regularly acquire new underlying assets as the existing ones matured in addition to regularly issuing nominally new CP as the CP outstanding was constantly maturing.

213 For a description of the different types of programs, see DBRS, supra note 208.

214 See infra Part ____.

215 Covitz et al., The Evolution of a Financial Crisis: Panic in the Asset-Backed Commercial Paper Market, supra note 211, at 7 (stating that “[m]ore than half of ABPC daily issuance has maturities of 1 to 4 days, and the average maturity of outstanding paper is about 30 days.”); DBRS, supra note 208, at 7.

216 This feature is quite effective at minimizing the risks to which ABPC holders are exposed, but can also give rise to systemic risk, by allowing those holders to withdraw from the market or demand markedly different terms to continue to hold ABPC. See Covitz et al., The Evolution of a Financial Crisis: Panic in the Asset-Backed Commercial Paper Market, supra note 211 at 2.

217 Id. at 8 (noting that, “[t]he U.S. asset-backed commercial paper (ABCP) market erupted in late summer of 2007 and played a pivotal role in the global financial crisis that would become increasingly severe. In the
the highly rated nature of the collateral backing ABCP, overcollateralization requirements that ensured the face value of the collateral exceeded the value of the ABCP issued, and the liquidity and other support mechanisms provided by the sponsor, enable the ABCP to function as a money-like claim, these features led holders to treat ABCP as money-like.

The rapid growth of these structures in the years leading up to the Crisis is consistent with the broad patterns regarding investor demand for money-like instruments documented above. Pozsar’s findings regarding the growth of institutional cash pools during this period are particularly relevant. As he explains, “because institutional cash pools’ money demand is not for transaction purposes, but for liquidity and collateral management as well as investing purposes,”218 that demand is usually best satisfied by non-M2 types of money, such as ABCP. In his view, “cash pools’ demand for short-term AAA assets is the principal source of marginal demand for maturity transformation in the financial system.”219

B. The Consequences

1. Some benefits

The pre-Crisis spread of MBS, CDOs, synthetic CDOs, ABCP conduits and other investor-driven innovations yielded many of the same benefits long attributed to arbitrage—appearing to make the capital markets more efficient and reducing the cost of capital. For example, by expanding the types of investors who could provide capital to home loans, securitization should have reduced any premium mortgagees would otherwise have to pay relative to similarly risky corporate loans that such investors were already able to hold.220 A related effect was an increase in, the range of persons who could qualify for a home loan expanded and the terms of those loans often became less demanding.221 This contributed to the overall rate of U.S. home ownership reaching a record-breaking high 69.2% in 2006.222 Another study, outside the mortgage space, found that corporate borrowers paid an interest rate that was 17 basis points lower when

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218 Pozsar, Institutional Cash Pools, supra note 75, at 284.
219 Id.
220 E.g., Lerner & Tufano, supra note __, at 76 (noting that “some early studies suggest that the first decades of securitization led to lower interest rates for borrowers” and providing citations to the relevant studies).
221 E.g., Fin. Crisis Inquiry Comm’n, supra note 195, at 105 (noting that prior to the Crisis, “underwriting standards for nonprime and prime mortgages weakened,” “[c]ombined loan-to-value ratios … rose” and “[d]ebt-to-income ratios climbed”).
their loan was subsequently securitized relative to otherwise similar loans that were not securitized.223

Some of this growth seems likely to be positive and to reflect the genuine welfare gains that can arise from the ability of investor-driven financial innovations to overcome frictions that may limit the capacity of certain pools of capital to fund particular types of undertakings. At the same time, there are reasons to be concerned that the complexity of these arrangements may have contributed to the mispricing of housing risk prior to the Crisis.224 Atif Mian and Amir Sufi, for example, have shown that “subprime ZIP codes [that is, areas where a relatively high proportion of the population has a low credit score] experience strong relative growth in mortgage credit from 2002 to 2005 despite negative relative, and in some cases absolute, income growth.”226 They further show that this pattern was closely correlated with the growth in securitization of subprime home loans.227 The long-term effects for the borrowers and neighborhoods were not favorable. Between 2006 and 2009, “subprime ZIP codes … experienced an increase in default rates … that is more than three times as large as prime ZIP codes in the same metropolitan area.”228 These trends also contributed to the housing boom that preceded the Crisis and the bust that followed.

The question of whether and how securitization, the foundation of each of the innovations just described, creates value is not going to be answered any time soon. As Joshua Lerner and Peter Tufano noted in a recent review of the literature, not only is it difficult to “determin[e] social welfare implications of securitization …, even establishing simpler facts … is not simple.”229 Although there is a “large body of papers … examin[ing] aspects of securitization and attempt[ing] to measure the direct impacts of the practice,” “studies reach contradictory conclusions about” fundamental issues, including “whether riskier banks use securitization, whether they have lower funding costs, or whether securitization increases loan supply.”230 Fortunately, this project delves into these muddy waters merely for the purpose of showing that there are some genuine benefits that arise from the spread of investor-driven financial innovations, but there are also some real costs, only a portion of which are borne by the parties involved. As the next subpart shows, even this provides a sufficient basis for showing that these dynamics ought to be considered by policymakers when taking actions that could spur innovation.

2. The changing risks

223 Taylor Nadauld & Michael Weisbach, “Did Securitization Affect the Cost of Corporate Debt?,” 105 Journal of Financial Economics, 332, 352 (2012) (“Controlling for other factors, including the risk of the loan facility, facilities that are securitized are issued at about a 17 basis point lower spread than an otherwise identical facility that was not securitized.).
224 See infra Part __.
225 Atif Mian & Amir Sufi, The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis 124 Q J Econ 1449, 1459-60 (2009) (explaining that they “split ZIP codes into quartiles based on the fraction of consumers with a credit score below 660,” and defined as subprime,” those zip codes in the bottom quartile).
226 Mian & Sufi, supra note __, at 1492.
227 Mian & Sufi, supra note __, at 1492-93.
228 Mian & Sufi, supra note __, at 1449-1450.
229 Tufano & Lerner, supra note __, at 77.
230 Tufano & Lerner, supra note __, at 77.
a. Identifiable risks borne by the parties involved

Virtually all investor-driven financial innovations create risks that would not otherwise exist. Some of these costs are identifiable and borne entirely by the parties involved. Separating the roles of originating a credit instrument and holding that instrument to maturity, for example, can give rise to moral hazard by reducing the incentives the originator has to ensure that the loan is an appropriate one to extend and the terms are commensurate with the underlying risk. Similarly, the structure of securitization transactions means that the value of the senior instruments issued depends not only on the quality of the underlying assets, but also on the use of appropriate assumptions regarding the degree of correlation among the underlying assets—making an issue that was once meaningful highly relevant. These and other readily identifiable challenges with particular forms of investor-driven financial innovations could be mitigated through contractual and other means, and the incremental cost of using such devices tended to go down as an innovative structure spread. These tools always remained costly—and this is the assumption that animates this paper’s claim that such innovations only arise and spread when investor demand exceeds the more ready sources of supply—but those costs often become less significant over time.

The Crisis also revealed that many of the tools used to mitigate these costs were less effective than parties appreciated at the time. Despite the legal and reputational devices intended to ensure that originators were equally diligent when originating a loan for securitization as they were when they anticipated retaining a loan, for example, have been revealed in hindsight not to be up to the task. According to one study, loans that could more readily be securitized were 10-25% more likely to default than otherwise similar loans that were not as conducive to securitization. Nonetheless, for the most part, risks that are readily identifiable and internalized by the parties involved are more usefully thought of as among the costs of using innovative instruments than a source of concern for policymakers.

b. Context-dependent risks

Other risks created by the spread of investor-driven financial innovations are borne, at least in part, by the parties to the transaction, but are not readily apparent when the transaction is consummated. One reason for unforeseen risks is that a risk may not arise directly from the transaction but instead from interactions between the transaction or structure it creates and the environment in which the obligations subsequently arise. The risks associated with securitizing home loans illustrate these dynamics. Recall, when a loan is placed into a securitization vehicle, a servicer is employed to collect payments on

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232 Coffee, supra note 133, at 406.
233 Frank Partnoy, Overdependence on Credit Ratings Was a Primary Cause of the Crisis, in The Panic of 2008 Causes, Consequences and Implications for Reform (Lawrence E. Mitchell, Arthur E., Jr. Wilmarth ed., 2010).
234 E.g., Benjamin J. Keys et al., Did Securitization Lead to Lax Screening? Evidence from Subprime Loans, 125 Q. J. Econ. 307 (2010) (finding that loans that could more readily be securitized were 10-25% more likely to default than otherwise similar loans that were not as conducive to securitization.).
the loan and address any logistical challenges that arise but the rights to the cash flows from that loan now belong to the dispersed investors who hold the MBS issued. In recognition of the fact that some borrowers would default on their loans, servicers were authorized to address such defaults but the primary way servicing agreements assumed this would happen was by foreclosing. The best way to maximize the value of the cash flows from an underlying loan, however, changed when housing prices nationwide fell dramatically, and most servicing agreements failed to take into account that modifications might be a superior response than foreclosure and thus often failed to provide servicers the authority and incentives to take that approach. 235 According a study by Tomasz Piskorski and co-authors, even after controlling for a number of factors, securitized loans were foreclosed at significantly higher rates than comparable loans still held by the bank that originated the loan. 236 Because banks are incentivized to maximize the value of the loans they hold, these findings suggest that servicers have modified too few loans relative to number of modifications that would maximize the value of those loans.

This example illustrates two distinct reasons that private mechanisms will not always suffice to address the risks associated with investor-driven financial innovations. First, the inherent complexity and newness of many forms of preference arbitrage increase the probability that the parties will fail to identify and address even quite material risks that might arise in some states of the world. 237 Also notable from a consumer protection standpoint is that because these innovative financial structures often entail multiple steps consummated at disparate points in time, affected borrowers are often not in a position to exercise any voice in those arrangements even though, in theory, they sit within the arrangement. For example, borrowers were often unaware that their home loan would be securitized and thus had little, if any, capacity to avoid or influence those sales, even though the sale of a home loan to a securitization vehicle appears to have materially altered the ability of borrowers to renegotiate the terms of their loan. Second, risks may be inadequately identified and addressed because they impose costs on persons completely outside the regime. By increasing the proportion of home loans in default that were foreclosed upon, securitization accentuated a cycle of further depressing home values, and triggering yet more defaults and more foreclosures. 238 The excess foreclosures thus affected neighboring homeowners, lenders to those homeowners, and other third parties. The parties to a securitization transaction, however, had little incentive to consider the costs that the transaction might impose on such persons.

236 Tomasz Piskorski, et al., Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis, 97 J. Fin. Econ. 369, 370 (2010); id. at 371 (“find[ing] that the foreclosure rate of bank-held loan is lower as compared to securitized loans by around 3% to 7% in absolute terms (13% to 32% in relative terms)”; see also Manuel Adelino, et al., Why Don’t Lenders Renegotiate More Home Mortgages? Redefaults, Self-cures and Securitization (NBER, Working Paper No. 15159, 2009), http://www.nber.org/papers/w15159.
237 For examples in other settings, see Frank Portnoy, Infectious Greed: How Deceit and Risk Corrupted the Financial Markets (2d ed. 2009).
238 See Judge, Fragmentation Nodes, supra note 181 and sources cited therein.
c. Systemic risk

It is not a coincidence that the innovations described here had starring roles in the mechanisms through which the Crisis became manifest and spread through the rest of the financial system. To manufacture financial claims with characteristics that do not otherwise correspond to the characteristics of persons seeking financing necessarily entails steps that increase the complexity and interconnectedness of the financial system, both factors that can increase systemic risk. More generally, as Lerner and Tufano have explained: “Even well-meaning innovations … can lead to unintended consequences in the economy…. These detrimental effects are frequently referred to as systemic risk.”239 Although they also believe that innovations often also have countervailing benefits, they recognize that “[g]iven the interconnected nature of the financial system, it would be surprising if the most widely adopted financial innovations did not contribute to systematic risk.”240

The specific examples here provided brings to life this general concern. The Financial Crisis Inquiry Commission, for example, concluded that CDOs contributed to the Crisis by “fuel[ing] demand for nonprime mortgage securitization and contribut[ing] to the housing bubble.”241 The packaging of home loans into MBS and CDOs also may have accentuated the depths of the bust that followed that boom by creating inadvertent and inefficient rigidities that precluded securitized loans from being modified as often or in the ways that would have been socially optimal.242

Information dynamics also help to explain how MBS, CDOs and other financial innovations contributed to the Crisis. For example, given that CDO managers conducted relatively little with respect to the assets that they placed into CDOs and CDO structures were themselves complex arrangements, the spread of CDOs contributed to growing information gaps, that is, growing pools of pertinent information not known to any party, private or public. So long as confidence reigned, these information gaps had little effect on market functioning. Once questions started to arise about the value of MBS, however, investors became far less willing to acquire MBS, CDOs, or instruments exposed to MBS or CDOs without better information. Because no one had the relevant information and because the pre-Crisis conditions led to an under-investment in the technology required to produce the information,243 these information gaps increased the degree of market dysfunction once panic set in.244 With the benefit of hindsight, Robert Jarrow has argued that in contrast to MBS and derivatives, which have genuinely socially useful functions, CDOs don’t and really never did.245 Regardless of whether one buys this claim, Jarrow’s position highlights the way that the tradeoffs posed by different forms of investor-driven innovation can vary significantly, and a richer understanding of the ways that constrained

239 Lerner & Tufano, supra note __, at 47.
240 Lerner & Tufano, supra note __, at 47.
242 Piskorzi, supra note 236; Judge, Fragmentation Nodes, supra note 181.
243 Hanson & Sunderam, supra note 194.
244 Judge, Information Gaps, supra note 194.
capital may be driving a particular form can be critical to enabling more timely insights into the tradeoffs posed by a particular innovation.246

Synthetic CDOs and the other transactions they motivated similarly contributed to the Crisis. For example, because of the important role of derivatives in these transactions and complexity of these transactions, they increased the interconnections among financial institutions and in ways that were often far from transparent. These interconnections were important, in part, because they served as a mechanism for contagion during the Crisis. These interconnections and the complexity they created also increased the market dysfunction by increasing the pool of potentially pertinent and yet unknown information, i.e., information gaps.247 In a paper formalizing these dynamics, Ricardo Caballero and Alp Simsek explain that “[d]uring normal times, banks only need to understand the financial health of their direct counterparties” but “when a surprise liquidity shock hits parts of the network, a domino effect of bankruptcies becomes possible, and banks become concerned that they might be indirectly hit.”248 These concerns and the lack of information regarding their counterparties’ counterparties motivate banks to “hoard liquidity and turn into sellers”—activities that directly contribute to the spread of a financial crisis.249

ABCP were also central to the Crisis.250 Daniel Covitz and co-authors, for example, show that the ABCP market underwent a swift and sharp contraction during the early stages of the Crisis.251 The “proximate cause” was a concern about exposure to the subprime MBS market, the effects of which were magnified by the lack of information ABCP had about the assets backing the ABCP that they held.252 Other studies reveal that the terms of the ABCP that survived changed materially during this period, with durations generally getting shorter, further increasing the vulnerability of the system to further shocks.253

Viral Acharya and Philipp Schnabl provide further evidence of the way the contraction of the ABCP market contributed to the spread of the Crisis.254 Because of the credit enhancements that the banks sponsoring ABCP programs had provided to the

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246 For further discussion of the relationship between preference arbitrage and regulatory arbitrage, see infra Part IV.B.3.
248 Id. at 2550.
249 Id.
250 Judge, Information Gaps, supra note 194.
251 Covitz et al., The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market, supra note 210, at 815-17 (finding that ABCP outstanding shrunk by nearly $190 billion in just the first month of the Crisis and an additional $160 billion by the end of the 2007).
252 Id. at 829; Judge, Information Gaps, supra note 194.
253 Covitz et al., The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market, supra note 210, at 815-17 (2013) (“in the summer 2007 . . . yields soared and maturities shortened for new issues”); see id. at fig.1 and 824 (“the average maturity of new-issue paper dropped to about 21 days on average in the last 5 months of 2007, from 33 days on average in the first 7 months of the year”); see id. (“overnight ABCP yield spreads over the target federal funds rate across all program types soared to an average of 47 basis points in August, and remained high and volatile through the end of the year, up from monthly averages of between two and six basis points in the first 7 months of 2007.”); Acharya & Schnabl, supra note 96, at fig. 2.
254 Acharya & Schnabl, supra note 96.
conduits in those programs, the contraction in the ABCP quickly resulted in banks having to take many of the conduits they had sponsored onto their balance sheets or in other forms of support flowing out from the banks to those programs. The contraction in the ABCP, even though triggered by concerns about a subset of instruments produced in the United States, thus quickly became a critical mechanism through which the adverse effects of the Crisis spread internationally, including to countries that had not enjoyed capital surpluses prior to the Crisis. In fact, as they point out in other work, the first two large banks that required and received significant government support were not U.S. institutions, but rather were banks based in the Netherlands and Germany, and the trend holds when examining the stock price declines for banks during the Crisis.257 Their work provides yet further evidence of the important role that investor-driven innovations played in contributing to the Crisis.

Shifting the focus momentarily, there are reasons to be concerned that excess constrained capital, by its nature, may contribute to systemic fragility even apart from the innovation-related dynamics that are the focus of this inquiry. Fragility arises when “small shocks have disproportionately large effects.” If an investor is holding a AAA-rated credit instrument primarily because it is required or incentivized to hold such an instrument and that instrument is downgraded, the downgrade can motivate the investor to sell the instrument for reasons quite apart from the informational signal embedded in the downgrade. The potential for fragility goes up when the reclassification affects not only the debt of a single issuer, but a large swathe of outstanding financial instruments, such as the massive downgrades of subprime MBS in July 2007. And it is even more severe, and more likely, when the instruments in question have been used to create money-like assets, as money claimants are particularly reliant on proxies and particularly quick to walk away in the face of any questions about the credit or liquidity risk posed by an instrument. Although these dynamics are not contingent on innovation, they are highlighted to emphasize the way the sources of fragility that emanate from investor-driven innovations may interact with other sources of fragility in ways that exacerbate systemic risk.

As these examples illustrate, investor-driven financial innovations can play an important role bridging the gap when investor demand for a particular type of financial instrument exceeds the natural supply—one of the most obvious examples of a dynamic in which the increased demand will cause prices of the favored assets to rise. The process

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255 Id. at 64-65.
256 Id. at 63 (see figure 8 and accompanying text).
257 Id. at 40 (citing Viral Acharya & Philipp Schnabl, How Banks Played the Leverage “Game,” in Restoring Financial Stability: How to Repair a Failed System, (Viral V. Acharya and Matthew Richardson eds., 2009).
260 Judge, Information Gaps, supra note 194.
of transforming one type of financial instrument into another or manufacturing an instrument without extending credit to an actual borrower entails costs and usually gives rise to new risks. Many of these risks are ones that the parties can readily identify and, over time, learn to address in cost effective ways. The spread of investor-driven financial innovations can thus play an important role enabling constrained capital to flow into new domains in ways that benefit investors and borrowers alike. Securitization, like high-yield debt, is appropriately here to stay.

At the same time, as reflected in the carnage that followed the high-yield debt boom of the 1980s and the far greater recession that followed the boom in housing and mortgage-related securities in the mid-2000s, new financial innovations pose a range of challenges that are often inadequately addressed by the parties involved. Some of these failures can be attributed to the newness of the instrument and lack of information about how it will perform over the business cycle. They may also be disguised by the economic boom conditions in which these innovations often spread. The more important challenge, and the one directly relevant to policymakers, is that the creation and spread of investor-driven financial innovations can increase systemic risk and give rise to other externalities. Investor-driven financial innovations increase the complexity, interconnectedness, and rigidity of the financial system—all changes that have been shown, at least in some environments, to increase systemic risk.

Whether and to what extent these risks justify greater regulation of financial innovation generally is a matter of ongoing debate. This paper contributes to, but by no means seek to resolve, that debate. The issue here is whether policymakers ought to consider these dynamics when taking actions that affect the amount of constrained capital in the system. In light of the relationship between constrained capital and investor-driven financial innovations and the costs that can arise from the spread of those innovations, the analysis here suggests that they should.

C. Price impact as a prerequisite for innovation

This discussion allow us to return to the fundamental question motivating this paper—what are the conditions under which state intervention will spur investor-driven financial innovation? The second condition this paper identifies as necessary for a legal intervention to spur innovation is that the heightened demand have a price impact. This is required because innovations are costly to produce and costly to deploy. These costs take different forms. Some, like the fees paid to the lawyers, servicers, and other parties involved when a securitization transaction is consummated, are readily identifiable as costs. Others, like the new risks that arise from a transaction structure and the tools deployed to minimize those risks, are not as readily monetized. Nonetheless, to the extent they are known or suspected by the parties at the time a transaction is consummated, they effectively function as a cost that will cause the parties to discount the innovative technique relative to the original.

Sometimes this price impact will be empirically verifiable. As reflected in Part II, recent work confirms that investors are willing to pay a premium, a convenience yield as

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it were, for money claims and other safe assets. This is also a domain where recent work by the IMF confirms that there are reasons to expect demand to exceed readily available supply, which may help to explain the price impact and suggests it is unlikely to disappear in the near future.\footnote{IMF Report, supra note \_____, at \_____.} This is also a domain that has been rife with innovation throughout history\footnote{See generally Gary Gorton, History of Safe Assets (providing an overview the range of innovations used through history to try to increase the effective supply of safe assets).} and one which may be somewhat unique in that, even apart from the associated costs, the financial assets produced through private ordering are always second-best relative to assets, like sovereign debt and insured deposits, that have a direct government backing. Collectively, this evidence more than suffices to demonstrate that when the government intervenes in ways that affect the demand for money claims or safe assets more generally, two of the critical prerequisites for innovation are likely to be satisfied. In the frame proposed here, this means that policymakers should exercise extra care to understand the innovation-related repercussions of their actions when taking actions that increase the demand for such assets. Despite the obvious importance of this domain in light of the criteria this paper suggests should signal high-caution areas, this is one of the domains where lawmakers have been most active post-Crisis.\footnote{See supra Part II.C.} This juxtaposition, combined with the lack of any effort by lawmakers to assess whether the benefits that flow from the recent changes that increase demand for safe assets justify the drawbacks outlined here, demonstrates why this paper’s contribution is so timely. At the same time, it also suggests there may be broader challenges standing in the way of improving regulation in light of an intervention’s propensity to drive innovation.\footnote{See infra Part IV.}

The evidence regarding the pricing of stocks in the S&P 500 and the increasing use of other indexes in for open-end mutual funds and exchange-traded funds (ETFs) may be another area that merits attention. Significantly, however, the lack of a discernable price impact does not mean there isn’t one. Financial innovation, like innovation generally, can increase the supply of close substitutes for a desired product, causing prices to fall and yields to rise. As a result, although depressed yields on a particular category of assets indicates a domain in which the system can likely cover the cost of innovation, the lack of a statistically significant discontinuity does not rebut the possibility of sufficient demand to drive demand-driven innovation if innovation is already underway that minimizes the price impact. For these reasons, innovation itself may be a flag of the requisite price impact. Although this reasoning may seem circular, it nonetheless serves the key function of this filter—identifying the domains in which policymakers ought to undertake the extra effort required to consider whether their actions could trigger innovation. By looking historically at financial innovation and seeking to identify situations where an innovation seems to have arisen, at least in part, in response to a legal change that affected investor preferences, policymakers can enhance their understanding of the domains where future interventions are most likely to trigger innovation in the future. Money claims and safe assets, again, illustrate how this might work, but so too does the opening account of the rise of high-yield debt and the ways regulatory and market-based forces interacted to create demand for rated, investment-grade debt during the earlier parts of the twentieth century.

\footnote{IMF Report, supra note \_____, at \_____.}
A second lesson that flows from recognizing the requirement of a price impact is that the consequences of a legal intervention must be considered over the course of a credit cycle. The post-Crisis reforms, like many reform efforts, were put into place shortly after a massive financial crisis while the country was just emerging from the deepest recession in nearly a century. The Crisis caused market participants and policymakers alike to fundamentally re-assess the risks associated with particular types of assets and during the Crisis, market participants contributed to its depth by fleeing toward the safest assets and away from assets that were riskier or about which less was known. These patterns are common; a crisis is often defined as an event during which market participants demand cash or government debt and flee from assets that, up until that point, had been treated as if they were safe. As a result, even without any regulatory reform, the Crisis would have triggered significant changes in how financial institutions manage risks, the pricing of risk, and the range of assets that market participants would be willing to treat as safe. Similarly, if history is any indication, there will again be a period of normalcy that eventually leads to another period of froth; and, over the course of this cycle, the size of the financial system will grow, the demand for safe assets will exceed the supply, and new and old innovations will be deployed to increase the effective supply of safe and other sought after asset classes.

IV. Bigger Picture

Despite the simplicity of this paper’s claims, they provide a much-needed grounding for understanding when prudential regulations and other legal interventions are likely to spur financial innovation. The direct implications are largely addressed in the discussion of the two claims. Part II brings to the fore the importance of developing an appropriate baseline when seeking to assess the impact of a regulatory intervention. An intervention may appear to create massive demand for particular types of assets, but if it largely replicates the types of private constraints that would arise in the absence of regulation, its net effect may be modest. By contrast, government actions that do not explicitly require institutions to hold particular types of assets may nonetheless have powerful effects. For example, state actions that affect firm (or sovereign) incentives to self insure against bad outcomes or the need for liquidity at an unspecified time in the future needs can significantly increase the demand for money substitutes and other safe assets.

266 [https://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf (comparing the Great Recession to the ten previous recessions in the United States and showing it to be the worst along a number of dimensions)]; See generally, [Roberta Romano, Quack Governance];
267 See, e.g., [citations from Information Gaps – section reviewing empirical work on the shadow banking runs];
268 E.g., Walter Bagehot, Lombard Street: A Description of the Money Market (William Clowes and Sons eds., 14th ed. 1924) (1873) (stating that a financial panic is “a sudden demand for cash”); Gorton, Misunderstanding Financial Crises at 6 (“Whatever the form of the bank money, financial crises are en masse demands by holders of bank debt for cash—panics.”).
269 See, e.g., Gorton, History of Safe Assets
270 Gorton, Misunderstanding Financial Crises; Perry Mehrling; Adair Turner, Between Debt and the Devil: Money, Credit, and Fixing Global Finance 6 (2015) (“Self-reinforcing credit and asset price cycles of boom and bust…. are inherent to any highly leveraged bank system” and “can also be generated by the complex chains of nonbank origination, trading, and distribution….”).
Part III examined the mechanisms through which excess demand can prompt financial innovation and when those mechanisms are likely to spring to life. Although there can be meaningful benefits that arise from innovations that connect pools of constrained capital with an increasing array of productive undertakings, there are also real costs. Of greatest importance in current environment are the ways that investor-driven financial innovations can contribute to fragility. Against this backdrop, Part III developed the paper’s second claim regarding the conditions required for innovation—the need for the increased demand to have a price impact. This analysis revealed how this requirement can help policymakers to discern whether the category of assets that a particular intervention impacts is a domain where innovation is likely and it demonstrates the need to take a long-term perspective in evaluating the potential impact. Having already addressed the key policy implications, the aim of this Part is to consider two bigger picture implications of this paper’s findings. It begins by reaffirming the importance of an issue that has already received significant attention before proposing a radically new way to study financial system stability.

A. Regulatory Architecture

One of the core mantras to emerge from the Crisis is that maintaining systemic stability requires policymakers to consider how market developments and regulations affect the financial system as a whole. Excessive focus on microprudential aims, that is, promoting the safety and soundness of individual institutions, and insufficient attention to macroprudential aims, that is, ensuring the stability of the financial system as a whole, is widely recognized as one of the major regulatory shortcomings pre-Crisis. This paper provides fresh support for the importance of taking a systemic perspective on financial regulation, but it also reveals just how far we are from achieving that vision.

All of the policies identified here as contributing to constrained capital are designed to further important policy aims. Decisions to limit the provision of government-backed support, whether by reducing the Fed’s ability to provide emergency lending or attaching conditions to IMF loans, are often also motivated by legitimate concerns about the moral hazard that state support can induce. Rules requiring banks, insurance companies and other financial institutions to maintain healthy levels of capital and liquidity are aimed at promoting the health of institutions that serve socially useful functions and might assume excess risk relative to the socially optimal level in the abence


272 Cf., Bernanke, Implementing a Macroprudential Approach to Supervision and Regulation, supra note 271 (describing the ways the Dodd-Frank Act attempts to incorporate new insights about the importance of a macroprudential approach).
of regulatory intervention. Yet the policymakers promulgating the regimes that produce constrained capital are not incentivized to consider the systemic consequences of their actions. They also regularly lack the information and competence required to design policies that take these dynamics into account.

This paper thus provides yet further evidence of the drawbacks inherent the disaggregated financial regulatory regime still in place in the United States. Today, the U.S. financial regulatory regime remains fractured, with myriad regulators, many of whom are competent at addressing the types of financial regulatory challenges they were formed to address, but not particularly competent outside that domain. It correspondingly affirms the importance of some of the structural changes to that architecture that have emerged post-Crisis. The primary structural reform that mitigates both the competence and incentive concerns is the creation of the Financial Stability Oversight Council (FSOC). The FSOC includes the heads of all of the federal agencies active in financial regulation and an insurance expert and is specifically tasked with promoting systemic stability. The structure aims to encourage regulators to be attuned to the systemic ramifications of the policies they promote in their agency-specific capacity and to provide a check on individual agencies should they fail to address systemic threats under their domain. At the international level, the heightened role of the Financial Stability Board is meant to serve similar aims, and is important for similar reasons.

A related post-Crisis insight for which this paper provides fresh support is the importance of mechanisms for identifying sources of fragility that are not within the domain of any single, existing financial regulator. Here too, there has been progress, as reflected in the creation of the Office of Financial Research (OFR). The OFR is charged with supporting the work of the FSOC and has broad authority to gather information from other regulators and market participants. In theory, it is thus well positioned to help assess some of the sources and effects of constrained capital. Nonetheless, it alone does not have the resources to address the full range of issues identified here and there are indications it may be eliminated, rather than empowered and expanded, in the next round of reforms.

The importance of having a body like the OFR if the current regulatory architecture is otherwise unchanged is highlighted by some of the data gaps this paper identifies as important. The analysis here suggests that to assessing the policy ramifications of a wide range of possible legal interventions, policy makers need high-quality information about the nature and amount of constrained capital already present in the financial system and how the intervention might alter those amounts. Pozsar’s work on rise of large pools of private capital held by firms and institutional investors that they

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273 [E.g., Volcker Report]
want to part in money-like claims provides a nice example of the type of research that would be valuable.\textsuperscript{278} His inability to provide more accurate assessments of the size of these cash pools while working at the New York Fed is, unfortunately, also indicative of the paucity of data currently available even to motivated researchers and policymakers.\textsuperscript{279} Given that legal interventions are likely to trigger the spread of investor-driven financial innovations only when the aggregate demand for a particular type of financial instrument approaches the aggregate natural supply, information about other sources of demand and the range of instruments that might satisfy this demand without innovative financing techniques is critical to allowing policymakers to assess the probable ramifications of current requirements or proposed changes. Moreover, given that both demand and supply can vary over the business cycle and in response to other developments, this research should not only seek to gather information as to a particular point in time, but should also entail historical analyses, ongoing monitoring, and possibly even forward-looking projections.

B. Embracing risk in research and policy design

1. A different starting point

There is a large and ever growing body of research on the sources of financial fragility and how best to promote financial stability. Much of the research that has been done on systemic stability focuses on identifying sources of fragility or weakness. This is valuable research and has produced powerful insights regarding mechanisms through which crises spread and hamper economic growth. Not surprisingly, however, research focused on identifying weak spots in a financial system tends to lead to policy recommendations aimed at shoring up those weaknesses. The heightened capital and liquidity requirements being imposed on banks are the byproduct of new understandings regarding bank fragility and the adverse spillovers that emanate from the failure of systemically important banking institutions. The recent efforts to impose liquidity requirements on mutual funds are similarly motivated by new insights regarding the fragility of these structures.\textsuperscript{280} The analysis here does not undermine the value of such research and reforms but it does suggest that they may have unintended, adverse side effects. By increasing the amount of constrained capital in the system, these reforms may well spur investor-driven financial innovations not all that different in kind than those that proliferated prior to the Crisis and contributed to the overall fragility of the financial system once the housing bubble burst.

More generally, this paper provides support for a different approach to studying financial stability. Credit creation and liquidity transformation are socially valuable activities that play an important role contributing to economic growth. Yet, they also entail risk. Some of these risks, like credit and liquidity risk, are inevitable. Others, like the fragility that arises from interconnectedness and complexity, are not. Rather, it is the design of the institutions that extend credit and engage in maturity transformation that determines whether and to what extent the magnitude of these ancillary risks. This paper

\textsuperscript{278} Pozsar, supra note __. See also supra Part II.A.1.
\textsuperscript{279} Id.
shows how legal interventions can cause the design of the financial system to morph in ways that increase ancillary risks. These effects are not intentional. Although this can be traced in part to a regulatory system that incentivizes regulators to focus on the health of the institutions they oversee rather than the health of the overall financial system, the origins of these policies can also be traced to research focused on identifying points of fragility. An alternative approach to studying financial stability might start with the recognition that extending credit and producing money-like assets and then ask who is best suited to bear those risks. In other words, in addition to identifying points of weakness and mechanisms through which adverse shocks trigger market dysfunction, research could focus on identifying nodes in the system that could withstand losses and structures that would dampen the ripple effects that can emanate from shocks. In contrast to the typical policy recommendations, which aim to reduce the risks certain institutions assume, this could lead to recommendations to encourage institutions that are well suited to bear certain risks to assume those risks.

The question of how best to construct a financial system that can absorb losses without triggering panics is closely related to another issue embedded in the analysis here—what is the optimal degree of self insurance against various needs and when, if ever, should the state play a role providing insurance when the market does not or cannot? As reflected in the analysis regarding the types of legal interventions that produce constrained capital, access to external insurance, whether publicly or privately provided, and the costs of that insurance can be critical factors influencing demand for safe assets. Thus, in conjunction with identifying who should be first in line to bear particular risks, this line of research should also explore when and how risks should be reallocated. There is already some very valuable research in this vein, but the questions that remain dwarf the insights thus far provided. This research is unlikely to yield simple answers. Issues of institutional competence, capacity, and other considerations may pull in different directions when trying to determine the optimal role for the state, financial firms and nonfinancial actors to each play in an interdependent financial system. At the same time, the analysis here highlights the importance of confronting these difficult tradeoffs head on and understanding what is at stake in making different decisions. One of the core lessons of this paper is that averting our gaze to and focusing only on minimizing the risks to which particular institutions are exposed cannot eliminate the risks inherent in credit creation and liquidity transformation, but it can increase other risks and thus the social costs of those activities.

2. Allowing localized fragility

A core lesson this paper holds for policymakers combines a recognition of the importance of risk with the discussion above regarding regulatory architecture. As already recognized in theory—(1) systemic stability requires a systemic perspective and (2) a healthy financial system capable of supporting robust growth is going to pose some

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systemic risk. Efforts to eliminate systemic risk or, as is more often the case today, NIMBY (not in my backyard)ism wherein regulators seek to promote the health of institutions they oversee without considering the systemic ramifications of those efforts, will inevitably lead to suboptimal policy outcomes. More research is needed, but this paper alone marks an important step forward in highlighting the type of analyses that regulators should undertake. The analysis here suggests that the current regulatory regime makes too great of an effort to eliminate fragility in each domain while paying too little head to the systemic ramifications of those efforts.

By recognizing the relationship between constrained capital and investor-driven financial innovation, and understanding the systemic risk that can emanate from the spread of those innovations, regulators will be better positioned to ensure that the benefits of a regulatory intervention exceed the associated costs. Given the current regulatory architecture, implementing this revised approach will require leadership by entities with a more macroprudential perspective. In concrete terms, this means that the FSOC will should encourage other federal regulators to take these dynamics into account and the OFR should take a lead role in coordinating the collection and production of the information regulators need to make more informed decisions.

Conclusion

Investor-driven financial innovation is far from a new phenomenon. Nonetheless, discontinuities in investor demand continue to be assumed away in much of the legal and finance literature and ignored by policymakers who rely on that literature. This paper highlights the costs of those simplifying assumptions. It brings to light the first-order importance of investor preferences in shaping today’s financial markets and the way investor-driven financial innovations can increase the fragility of those markets. More importantly, in providing a framework for understanding the relationship among constrained capital, investor-driven financial innovations, and the law, this paper lays the groundwork for identifying the interventions most likely to have unintended, systemic consequences.