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A Regulatory Design for Monetary Stability

Morgan Ricks

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This Article proposes a unified regulatory approach to the issuance of "money-claims"—a generic term that refers to fixed-principal, very short-term IOUs, excluding trade credit. The instability of this market is arguably the central problem for financial regulatory policy. Yet our existing regulatory system lacks a coherent approach to this market. The Article proposes a public-private partnership ("PPP") regime, under which only licensed entities would be permitted to issue money-claims (subject to de minimis exceptions). Licensed money-claim issuers would be required to abide by portfolio restrictions and capital requirements. In addition, the government would explicitly insure licensed issuers' outstanding money-claims in return for a fee. The Article compares this PPP regime to the prevailing alternatives. In particular, it considers the likely efficacy of (1) risk-constraint regulation; (2) conditional liquidity support (lender of last resort) facilities; and (3) the new Orderly Liquidation Authority, a centerpiece of the recently enacted Dodd-Frank Act. The Article identifies significant problems with each of these approaches. It concludes that, although the PPP system raises significant implementation challenges of its own, it compares favorably to the available alternatives.

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A Regulatory Design for Monetary Stability

Morgan Ricks [*]

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INTRODUCTION

This Article argues that our financial regulatory apparatus is ill designed to address what is, arguably, the central problem for financial regulatory policy. That problem is the instability of the market for *money-claims*—a generic term used herein to denote fixed-principal, very short-term borrowings (or "IOUs"), excluding trade credit.[1] The money-claim market is vast, and it is dominated by financial issuers. Building on prior work,[2] this Article contends that the money-claim market is associated with a basic market failure. It further suggests that our current regulatory approach, even as modified by recent and pending reforms, is unlikely to be conducive to stable conditions in this market.

The Article offers an alternative regulatory framework to address this market failure. Specifically, it proposes that the issuance of money-claims be confined to a public-private partnership ("PPP") system. Unlike our existing financial stability architecture, the proposed regulatory design embodies a coherent economic logic. Furthermore, the proposed regime would be more readily administrable than our current system, in part because it would rely on more modest regulatory capacities.

The elements of the proposal can be described succinctly. Under the PPP regime, the government would:

1. Establish licensing requirements for the issuance of money-claims. Logically, this would mean disallowing unlicensed entities from issuing these instruments, subject to de minimis exceptions.
2. Require licensed entities to abide by portfolio restrictions and capital requirements. In effect, adherence to these risk constraints would be the "eligibility criteria" for the regime.
3. Establish an explicit government commitment to stand behind the money-claims issued by licensed entities—making them default-free.
4. Require licensed entities to pay ongoing, risk-based fees to the government in exchange for this public commitment.

Those who are familiar with the modern regulation of depository institutions will observe that these are *precisely* the core regulatory techniques that have been used for the depository sector

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1.   The components of this market are described in Part I.A below.

2.   Morgan Ricks, *Regulating Money Creation After the Crisis*, 1 HARV. BUS. L. REV. 75, 82 (2011).

since the establishment of the Federal Deposit Insurance Corporation ("FDIC") in 1933. Specifically: (1) the federal government and state governments issue special charters for the issuance of deposit instruments, and unlicensed entities are legally prohibited from issuing these instruments;[3] (2) licensed depositories are constrained to a narrow range of permissible activities and investments and are subject to capital requirements; (3) the federal government explicitly stands behind (most) deposit instruments[4] through the deposit insurance system; and (4) depositories pay ongoing, risk-based fees to the government in return for this explicit commitment. In short, U.S. depository banks operate under a public-private partnership regime.

Conceptually, then, the PPP proposal is modest, even conservative. It aims to modernize an approach that has been used in the United States for many decades, arguably with reasonable success (albeit with some notable lapses). Importantly, the proposal is not that deposit insurance be "extended" willy-nilly to any entity that wishes to issue money-claims. Rather, eligibility would be strictly limited to those entities that agreed to comply with the regime's portfolio and capital standards.[5] In particular, licensed entities would be confined to diversified portfolios of relatively high-quality credit assets. Entities not abiding by these standards would be ineligible for licenses and would therefore be prohibited from issuing money-claims in significant amounts. The aggregate size of the PPP system would be determined by the monetary authority in accordance with its monetary policy objectives. There would be no separate depository regime; deposits are just a variety of money-claim.[6] Thus the PPP regime would establish a

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3. This prohibition is a feature of state law. *See, e.g.,* N.Y. BANKING LAW § 131 (McKinney 2010) ("No corporation, domestic or foreign, other than a national bank or a federal reserve bank, unless expressly authorized by the laws of this state, shall employ any part of its property, or be in any way interested in any fund which shall be employed for the purpose of receiving deposits . . . .").

4. The federal government insures up to $250,000 per depositor, per insured bank, for each account ownership category. *See* 12 U.S.C. § 1821(a)(1)(E).

5. The precise contours of these risk constraints would be determined through a calibration methodology described in Part IV.B. In brief, portfolio restrictions would be a function of both the desired supply of money-claims (a question for monetary policy) and the available categories of credit assets.

6. Whether money-claims would come to be referred to as "deposits" under the PPP regime is a question of semantics. Deposit insurance aside, a three-month "time deposit" (certificate of deposit) is of course functionally indistinguishable from any other three-month unsecured promissory note. It just happens to be issued by a licensed depository. Likewise, a demand deposit is an unsecured promissory note of instantaneous maturity (in finance terms, it contains a continuously exercisable par put option). Such demand notes are particularly well suited to serve as a medium of exchange. Whether they are called "demand deposits" or "demand money-claims" is beside the point. Licensed firms under the PPP regime would have the

unified regulatory approach to money-claim issuance. It would abandon banking law's formalistic and anachronistic focus on deposit instruments. Other money-claims serve a function substantially similar to that of deposit instruments, and they raise the same basic policy problem.

The PPP proposal is predicated on the notion that the instability of money-claim financing is *the* central challenge for financial policy and regulation. Credit booms and busts should be expected to happen from time to time, but it is through the money-claim market that a credit adjustment can turn into a destabilizing crisis.[7] Panics by money-claimants are not just epiphenomena; they do not represent simply symptoms or manifestations of some other underlying issue. Rather, they have independent effects on the capital markets and the real economy. That is to say, they do real economic damage. And they are the overwhelming focus of emergency policy. During the recent financial crisis, very nearly the *entire* emergency policy response was directed at stabilizing the money-claim market.[8] Indeed, there is no financial "emergency" to speak of until a panic erupts in this market.

If this market is unstable, then why not just outlaw money-claim issuance altogether? The reason is that money-claim issuance generates immense economic value. Depository banks and other money-claim issuers channel economic agents' pooled cash reserves into the capital markets. Unlike other financial intermediaries, they do so without compromising the "moneyness" of those cash reserves.[9] This activity is typically (if inelegantly) referred to as "maturity transformation"—one of the core functions of modern financial systems. The PPP approach is designed to make this activity safe. It aims to simultaneously (1) realize the enormous economic value that arises from having private specialists invest the proceeds of money-claim issuance; (2) bring about stable monetary and financial conditions by publicly underwriting the money supply; and (3) counteract through risk constraints the incentives for resource misallocation that arise from pursuing the first two goals.

The PPP approach would make all money-claims sovereign and default free. In the event of insolvency, licensed issuers would be

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exclusive legal privilege of issuing money-claims, including demandable ones that serve as a transactions medium.

  7.   *See infra* Part I.B (discussing the role of money-claim instability in the recent economic crisis).

  8.   *See infra* Table 1.1.

  9.   For a description of the money-like properties of money-claims, see Ricks, *supra* note 2, at 89–97.

subject to a special resolution regime under which money-claims would be honored in full and on time, while other providers of financing would see their claims impaired or extinguished. This resolution regime would be modeled on the FDIC's existing resolution regime for depository banks, under which insured deposit instruments are seamlessly honored. The proposal does not contemplate coverage caps, such as the current $250,000 limit on deposit insurance coverage. All money-claims, whether or not styled as "deposits," would be sovereign obligations. In effect, the PPP regime would recognize money creation as a public good. The system would be no larger than necessary to fulfill its monetary purpose.

With money-claim issuance confined to the PPP regime, financial panics should be expected to disappear, as money-claim defaults would be ruled out by definition. Under these conditions, entities without licenses might be left relatively free from stability-oriented risk constraints.[10] Unlicensed entities would, however, be prohibited from issuing money-claims—again, just as entities not licensed as depository banks are now prohibited from issuing deposit instruments. In practical terms, unlicensed entities would be required to "term out" their funding, that is, finance themselves in the debt and equity capital markets, not the money-claim market. Funded in this way, these entities would be amenable to ordinary bankruptcy procedures.[11] These unlicensed entities (which would comprise most of the financial sector) could credibly be denied access to public support facilities. Importantly, many business models that currently rely heavily on money-claim funding, such as broker-dealers and certain types of hedge funds, would not come close to meeting the PPP regime's portfolio criteria. Such entities would therefore be precluded from issuing money-claims; they would be required to term out.

The advantages of the PPP approach would be severalfold. By establishing money creation as a sovereign obligation, the regime (like deposit insurance) would remove money-claimants' incentives to engage in destabilizing panics. It would depart from our current regime of implicit public support, which results in public subsidies for certain segments of the financial industry and distorts market resource allocation. It would take ad hoc financial rescues off the

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10. Of course, regulatory-risk constraints might sometimes be warranted on grounds apart from promoting financial stability. For instance, they might have consumer-protection benefits under certain circumstances (e.g., for issuers of retail-mutual-fund shares or retail-insurance policies). The PPP regime would in no way be inconsistent with such measures. The present Article focuses only on stability-oriented regulation.

11. The successful 2009 prepackaged bankruptcy of CIT Group—a very large finance company with only a small amount of short-term funding—is the best example.

table: money-claim issuers would be resolved under an administrative resolution regime, while nonissuers (including dealer firms) would be made safe for bankruptcy. And it would obviate the perceived need for costly, prophylactic regulatory interventions in the capital and derivatives markets.

A key virtue of this regime is its relative simplicity. It represents a surgical approach to a specific market failure, rather than the scattershot approach of recent policy. In the aftermath of the Dodd-Frank Act, regulators are now tasked with evaluating all manner of financial firms, industries, and activities in order to gauge their supposed "systemic risk"—a nebulous concept that has yet to be defined, much less operationalized, in anything approaching a satisfactory way. Even if this concept could be given determinate content, its estimation would be far beyond our calculative powers. By contrast, the PPP regime would ask regulators to do what bank regulators have traditionally done: assess credit portfolio risks, not "systemic" risks.

This is not to suggest that the PPP regime would make financial regulation easy or error free. But it would be a mistake to hold the PPP proposal to too high a standard. If there is indeed a market failure in this area, then we are already in a world of second best. Both theory and history offer reasons to doubt the efficiency of a laissez-faire approach to maturity transformation. And alternative regulatory interventions—such as broad risk constraints on the capital and derivative markets, either alone or in combination with open-ended public support facilities for the financial sector—represent poorly conceived approaches to the basic problem and entail substantial social costs of their own. The PPP regime aims to situate regulatory judgments within a tractable, theoretically grounded institutional framework, while recognizing that implementation will inevitably be far from perfect.

I.   THE POLICY PROBLEM

This Part presents the policy problem. Part I.A provides an overview of the giant market for money-claims. The overview makes use of a time series data set that was assembled from a wide array of sources and which the author believes to be unique. Part I.B then reviews evidence, drawn from the recent financial crisis, that panics in the money-claim market have independent effects on the capital markets and the real economy—a proposition that, perhaps surprisingly, is sometimes disputed.

Part I.C then argues that the instability of this market should be understood as a market failure. Transaction costs and enforcement obstacles prevent money-claimants from entering into a value-maximizing bargain to avoid damaging runs on money-claim issuers. The inability to reach such a bargain leaves money-claimants with an equilibrium selection problem that determines the dynamics of run-behavior. This structural characteristic of the money-claim market will be shown to raise important questions about the value of "market discipline" by money-claimants. It will also generate important implications for regulatory design.

A. The Contemporary Monetary Landscape

Much is gained by our coming to regard demand deposits as virtual equivalents of cash; but the main point is likely to be lost if we fail to recognize that savings-deposits, treasury certificates, and even commercial paper are almost as close to demand deposits as are demand deposits to legal-tender currency.

—Henry C. Simons, University of Chicago, 1934[12]

[P]ure money . . . is nothing else but the most perfect type of security. Bills of short maturity form the next grade, being not quite perfect money, but still very close substitutes for it. . . . The rate of interest on these securities is a measure of their imperfection—of their imperfect 'moneyness'.

—John Hicks (winner of 1972 Nobel Prize in economics), 1939[13]

1. The U.S. Money-Claim Market

It is useful to begin with a brief overview of the market for U.S. dollar-denominated money-claims. The following figure depicts the evolution of this market over the past two decades:

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12.   RONNIE J. PHILLIPS, THE CHICAGO PLAN & NEW DEAL BANKING REFORM 90 (1995) (quoting Letter from Henry C. Simons to Irving Fisher (1934)).

13.   JOHN HICKS, VALUE AND CAPITAL: AN INQUIRY INTO SOME FUNDAMENTAL PRINCIPLES OF ECONOMIC THEORY 163–68 (2d ed. 1946) (originally published in 1939).

Figure 1.1: Gross Money-Claims Outstanding[14]
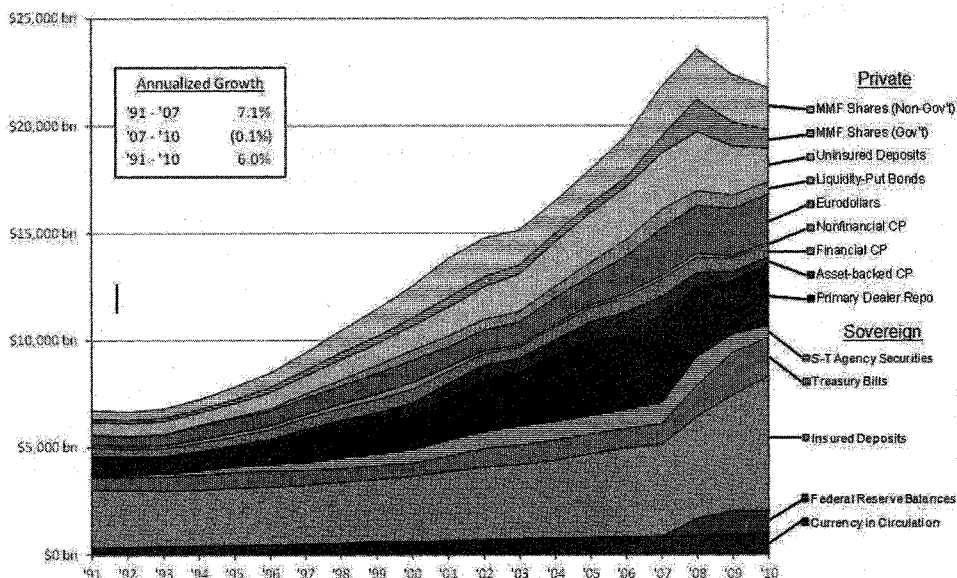
In this figure, the top nine series in the graph represent "private" money-claims, in the sense that the issuer (promisor) is a private firm, not a public institution. The bottom five series represent "sovereign" money-claims, meaning that the government is either issuer or guarantor of the instrument.

Each of the instruments shown in the figure above is a fixed-principal, short-term IOU. Their precise technical features vary in certain respects. Some, like repurchase agreements ("Primary Dealer Repo") and portions of the asset-backed commercial paper market, are collateralized instruments; the others generally are not. Insured and uninsured deposits are issued only by licensed depository banks; the rest are issued by nondepository institutions. Money market mutual fund ("MMMF") "shares" function like fixed-principal IOUs and typically are redeemable more or less on demand; unlike the other instruments, their issuers are regulated under the federal investment company laws. Eurodollar deposits are simply *U.S. dollar-denominated*, short-term IOUs issued by financial institutions that are domiciled outside the United States.[15] These formal distinctions

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14. The sources of Figure 1.1 are detailed in Appendix A. In certain instances—particularly Eurodollar deposits—extrapolation was required due to the absence of reliable data. Extrapolation methodologies are described in the Appendix. This Figure uses a one-year maturity cutoff, following market convention for the "money market." However, these instruments are heavily concentrated at the short end of the range. A large majority mature inside of one month, and probably a majority mature within one *week*.

15. The "Euro" prefix is misleading, as the issuer need not be European.

are matters of detail and are not important for present purposes. All of these instruments are fixed-principal, short-term IOUs, and they share basic functional attributes.

The figure above gives rise to a few immediate observations. First, the market for U.S. dollar-denominated money-claims is huge, exceeding $20 trillion on a gross basis.[16] (By way of comparison, total outstanding U.S. mortgage debt is around $14 trillion.[17]) Second, this market has grown rapidly over the past two decades. The 7.1% annualized growth rate of this market from 1991 to 2007 significantly exceeded the 5.4% annualized growth rate of nominal GDP over the same period.[18] Third, while insured deposits were the single largest individual component of this market throughout the entire period, their share of the total diminished steadily during the years preceding the crisis. Finally, while the market for short-term IOUs is commonly supposed to consist largely of commercial paper issued by nonfinancial firms to finance their working capital, it is immediately apparent that this view is mistaken. The figure shows that nonfinancial commercial paper is only a trivial component of the overall market for money-claims. This market is dominated by sovereign and financial issuers, not commercial or industrial ones.

It is useful to look separately at the private and sovereign components of the money-claim universe. Private money-claims are shown in the following figure:

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16.   It should be emphasized that these are *gross* numbers: every distinct money-claim contract is counted. That is to say, these figures do not subtract those money-claims that are held by issuers of money-claims. For example, the figure includes the "shares" of MMFs, even though these institutions' assets consist mostly of other instruments that appear in the figure. A net figure would exclude MMF shares as double counting. It is worth pointing out, however, that MMFs are not simply pass-through vehicles. They are engaged in maturity transformation. They issue demandable IOUs, whereas the weighted-average maturity of their assets may be as high as sixty days. So their shares are in fact distinct money-claims.

17.   SEC. INDUS. & FIN. MKTS. ASS'N, MORTGAGE-BACKED SECURITIES (MBS) FACT SHEET 1 (2011), *available at* http://www.sifma.org/issues/item.aspx?id=8589934849.

18.   GDP data can be downloaded from the Federal Reserve Economic Data (FRED) database at http://research.stlouisfed.org/.

Figure 1.2: Gross Money-Claims Outstanding – <u>Private</u>
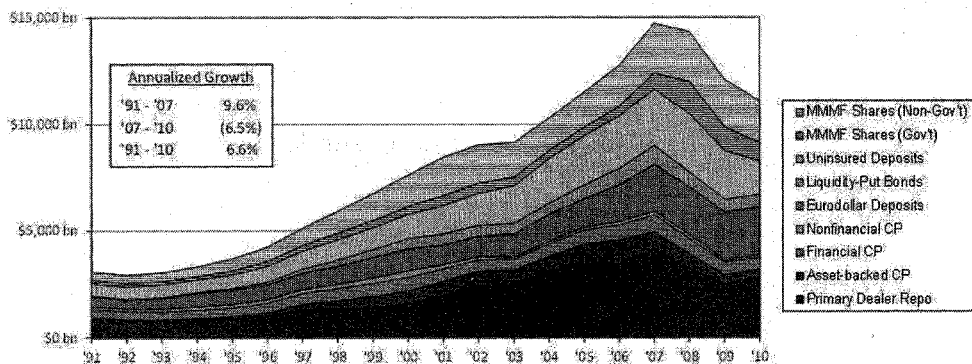
Sovereign money-claims—that is, money-claims that are either issued or guaranteed by the federal government—are shown here:

Figure 1.3: Gross Money-Claims Outstanding – <u>Sovereign</u>
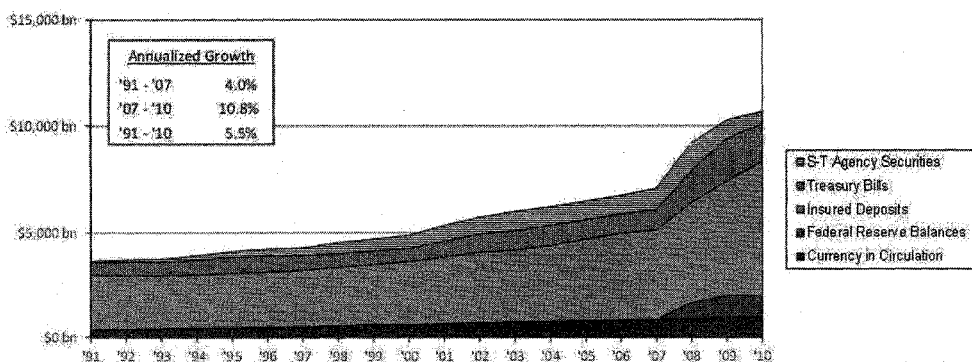
As shown above, over the period from 1991 to 2007, private money-claims grew at an annualized rate of 9.6%, far outstripping the 4.0% growth rate of sovereign money-claims over the same period. This trend reversed itself in 2008 with the government's intervention during the financial crisis. The quantity of sovereign money-claims increased dramatically from 2007 to 2010. Interestingly, most of this crisis-related growth came not from the Federal Reserve's balance sheet expansion—indeed, the pictures above reveal the relatively modest size of the Federal Reserve's balance sheet in relation to the overall market for money-claims—but rather from emergency increases in deposit insurance coverage.[19] Still, as shown in Figure

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19.   This increased coverage was attributable to two policy measures: first, the increase in the deposit insurance cap from $100,000 to $250,000 under the Emergency Economic Stabilization Act of 2008, 12 U.S.C. § 5241 (2011); and second, the FDIC's emergency

1.1, the postcrisis growth in sovereign money-claims was insufficient to offset the massive contraction in private money-claims over the same period.

During the years preceding the crisis, private money-claims came to represent a steadily increasing share of the total. The following Figure illustrates this trend and its sudden reversal with the onset of the crisis:

Figure 1.4: Gross Money-Claims Outstanding – Private / Total
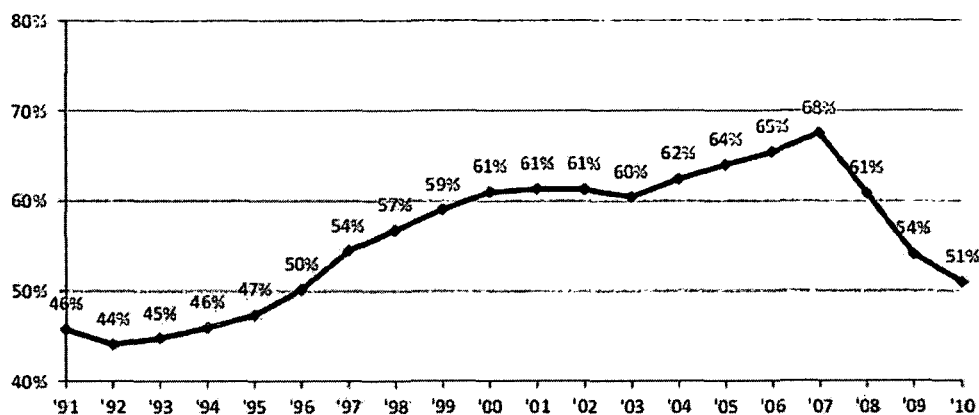
As shown above, by 2007 private money-claims had come to represent 68% of the total, up from 46% at the start of the period. A cursory examination of this Figure reveals that the periods during which the share of private money-claims increased most rapidly roughly coincide with recent financial booms (1996 through 2000, and 2004 through 2007). This shift can be understood as an increasing privatization of the money supply.

2. Characteristics of Money-Claims

The proposition that the instruments shown in the Figures above have "money-like" attributes was addressed in detail in *Regulating Money Creation*.[20] That argument will not be repeated here. For present purposes, it will be sufficient to postulate that economic agents find it useful to allocate a portion of their wealth to liquid instruments whose value *relative* to currency is extremely

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Transaction Account Guarantee program, which temporarily removed the deposit insurance cap for noninterest-bearing demand deposit obligations, 12 C.F.R § 370.4 (2012).

   20.   *See* Ricks, *supra* note 2, at 89–97.

stable.[21] In order to possess this property, a financial instrument must exhibit very low credit risk *and* very low interest rate risk. Money-claims are unique in possessing both of these attributes.

In this regard, it is important to emphasize that the term "money-claim" is not synonymous with the term "safe asset" as used in the current literature.[22] The latter term has come to denote credit instruments that have, or are perceived to have, negligible *credit* risk. Thus a long-term Treasury security, or a long-term AAA-rated obligation issued by a securitization trust, would constitute a safe asset under current usage. Importantly, however, such long-term instruments can and do fluctuate significantly in price due to changes in market rates of interest.[23] This characteristic is incompatible with the requisite price-stability feature described above. Accordingly, the term "money-claim" as used herein excludes all long-term instruments.

Currently, there exists no legal or regulatory category corresponding to the term "money-claim" as used herein. Instead, our existing regime singles out the issuers of *deposit* instruments for special treatment. The PPP proposal would collapse this legal distinction, treating all money-claims as a single functional category. This proposal should not be taken to imply that there are no important distinctions between deposit instruments and other money-claims. On the contrary, two such differences merit special mention. First, demand deposit instruments serve as the predominant medium of exchange in modern economies. Generally speaking, other money-claim categories do not serve this function. Second, deposit instruments are a ubiquitous retail product; a significant proportion of their ownership base consists of relatively unsophisticated consumers. By contrast, most other money-claims are purely institutional

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21.   For a discussion that reaches similar conclusions on this score, see Robert E. Lucas, Jr. & Nancy L. Stokey, *Liquidity Crises: Understanding Sources and Limiting Consequences: A Theoretical Framework* 1 (Fed. Reserve Bank of Minneapolis, Economic Policy Paper 11-3, 2011), *available at* http://www.minneapolisfed.org/pubs/eppapers/11-3/eppaper11-3_liquidity.pdf.

22.   For a recent discussion of the importance of this distinction, see Zoltan Poszar, *Institutional Cash Pools and the Triffin Dilemma of the U.S. Banking System* 3 (Int'l Monetary Fund, Working Paper 11/190, 2011), *available at* http://www.imf.org/external/pubs/cat/longres.cfm?sk=25155.0.

23.   For illustration: if ten-year market interest rates increase from 5% to 6%, a risk-free bond with a duration of ten years will lose about 9% of its market value. Interest-rate movements of this magnitude are not an unusual occurrence. From year-end 1990 to year-end 2010, there were fourteen distinct, nonoverlapping periods over which ten-year Treasury yields increased by one full percentage point.

products. In these two important respects, deposit instruments are indeed special.[24]

In practice, however, the functional similarities between deposit instruments and other money-claims are widely acknowledged. *Regulating Money Creation* described a variety of legal, accounting, and economic contexts in which nondeposit money-claims are treated as functional substitutes for deposit instruments.[25] To provide just one example: they are designated as "cash equivalents" under generally accepted accounting principles so long as they mature within three months, and their purchases and sales are not required to be recorded in the statement of cash flows. In recognition of this functional similarity, the issuers of nondeposit money-claims have come to be known in recent years, collectively, as the "shadow banking system." Like depository banks, shadow banking firms are engaged in the business of maturity transformation, but the money-claims they issue are not formally styled as deposits.

A natural question is whether it is possible to devise a regulatory definition of "money-claim" that is not susceptible to avoidance by market participants. While this regulatory arbitrage problem should not be minimized, it also should not be overstated. Ask the major public accounting firms for a list of instruments that they have blessed as "cash equivalents," and you will capture most of these instruments. Better still, periodically ask nonfinancial firms in the S&P 500 for a list of the financial instruments that they own, excluding strategic equity positions and commodity and interest rate hedges. The remainder will be mostly cash-parking instruments. As with most regulatory regimes, there will, of course, be gray areas.[26] But lawmakers, regulators, and judges are already called upon to define and interpret such terms as "security," "investment company," "deposit," "capital," "swap," and myriad other terms that arise under the financial and securities laws. There are gray areas and arbitrage opportunities in each of these cases, and definitions must be adjusted periodically to reflect evolving market conditions. Simply put, this is a problem that arises under practically every regulatory regime. It is

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24. Money market mutual fund shares also have a substantial retail ownership; the regulatory regime for their issuers is briefly discussed in the Conclusion.

25. Ricks, *supra* note 2, at 89–97.

26. There will also be an element of arbitrariness in the maturity cutoff. The author would suggest twelve months, but nine months or eighteen months might be defensible as well. As a matter of market convention, the term "money market" is used for high-quality IOUs with original maturities of twelve months or less. *Regulating Money Creation* reviewed empirical evidence for the "moneyness" of short-term securities of different maturities. Ricks, *supra* note 2, at 94–95.

not unique to the PPP regime, and there is no reason to think that it would be especially problematic in this area.[27]

Finally, it is noteworthy that, during the recent financial crisis, policymakers largely disregarded the regulatory distinction between deposit instruments and other types of money-claims. As shown in the following Table, almost every category of private money-claims was targeted with emergency stabilization programs in 2008 (compare with Figure 1.2 above):

Table 1.1: The Policy Response to the Financial Crisis

Private Money-Claim Category		*Emergency Policy Measures*
Money market mutual fund "shares"	▶	MMMF Guarantee (Treasury) Money Market Investor Funding Facility (Fed)
Uninsured Deposits	▶	Transaction Account Guarantee (FDIC) Term Auction Facility (Fed) Deposit Insurance Limit Increase (EESA[28])
Liquidity-Put Bonds	▶	N/A
Eurodollar Deposits	▶	Central Bank Liquidity Swaps (Fed)
Financial Commercial Paper Nonfinancial Commercial Paper	▶	Temporary Liquidity Guarantee Program (FDIC) Commercial Paper Funding Facility (Fed)
Asset-Backed Commercial Paper	▶	ABCP MMMF Liquidity Facility (Fed)
Primary Dealer Repo	▶	Primary Dealer Credit Facility (Fed) Term Securities Lending Facility (Fed)

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27. On the contrary, it seems likely that this problem would be *less* pronounced for the term "money-claim" than for the other examples listed above. It is in the nature of money-claims to be simple, short-term IOUs. The introduction of contingencies (as in the derivatives markets) or longer duration (as in the capital markets) would be inconsistent with the essential stable-price attribute of money-claims. Curiously, the regulatory-arbitrage objection is sometimes raised as though it were an insuperable obstacle to the effective implementation of the PPP system. Yet it would be strange to assert that an adequate regulatory definition of "money-claim" cannot be devised—but an adequate regulatory definition of, say, "capital" can be. Likewise, if "money-claim" is not capable of being defined satisfactorily, then neither is the concept of "stable funding" that serves as a cornerstone of the Basel Committee's new liquidity standards. *See* BANK FOR INT'L SETTLEMENTS, BASEL COMM. ON BANKING SUPERVISION, BASEL III: INTERNATIONAL FRAMEWORK FOR LIQUIDITY RISK MEASUREMENT, STANDARDS AND MONITORING 26 (2010), *available at* http://www.bis.org/publ/bcbs188.pdf (defining "stable funding" to include "liabilities with effective maturities of one year or greater"). The idea that stable funding can be defined but short-term funding cannot is self-refuting: stable funding is defined as funding that is not short-term! The point is that the regulatory-arbitrage argument cannot be applied selectively.

28. Emergency Economic Stabilization Act of 2008, Pub. L. No. 110-343, § 136, 122 Stat. 3765 (codified in scattered sections of 12 U.S.C. and 26 U.S.C.).

        In addition, the major emergency policy measures that are not reflected in this table—such as capital infusions under the Troubled Asset Relief Program ("TARP"), as well as the FDIC's massive debt guarantee program for longer-term debt—were primarily directed toward stabilizing diversified financial firms that rely heavily on money-claim financing. It is no exaggeration to say that practically the *entire* emergency policy response to the recent crisis was aimed at stabilizing the market for private money-claims.

        The stated purpose of these interventions was not to protect these markets for their own sake, but rather to protect the real economy. These emergency measures were therefore predicated on the assumption that an unhindered panic in the money-claim market would do serious economic damage. The basis for this assumption is discussed next.

B. The Impact of Panics: Some Evidence from the Crisis

Some people just deny that there are real effects of monetary instability, but I think that's just a mistake. I don't think that argument can be sustained.

            —Robert Lucas (winner of the 1995 Nobel Prize in economics), 2003[29]

I guess I don't see a mechanism for money. . . . Once the Fed stopped trying to stabilize the economy, the economy got a lot more stable. . . . I think the financial crisis has been greatly overstated as a problem. It's had virtually no consequences for the real economy. . . . With benign neglect the economy would have come roaring back quite quickly.

            —Edward Prescott (winner of the 2004 Nobel Prize in economics), 2009[30]

        Liquidity events (money-claim panics) are characteristically triggered by *capital-market events* (such as major impairments of longer-term credit assets). This causal sequence often leads to the inference—implicit in much of the recent policy debate regarding financial regulatory reform—that adverse capital-market events, rather than liquidity events, should be viewed as the fundamental policy problem.

        This inference merits scrutiny. Consider a simple analogy. A powerful storm triggers a landslide that destroys a village.[31] Should

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    29. Robert E. Lucas Jr., *My Keynesian Education*, *in* THE IS-LM MODEL: ITS RISE, FALL, AND STRANGE PERSISTENCE 12 , 23 (Michael de Vroey & Kevin D. Hoover eds., 2004).

    30. *On the Economy*, BLOOMBERG (Mar. 30, 2009), *available at* http://media.bloomberg.com /bb/avfile/Economics/On_Economy/vv9VRoc8DQl8.mp3.

    31. This analogy is inspired by a passage in Milton Friedman and Anna Schwartz's *A Monetary History of the United States*. In their discussion of "a liquidity crisis in a unit fractional reserve banking system," they write: "Because no great strength would be required to hold back the rock that starts a landslide, it does not follow that the landslide will not be of major

storms or landslides be the object of future preventive policy? The initial trigger in this case was the storm. But unless an effective and affordable technology exists for storm prevention—one that does not generate unacceptable side effects—this is not a promising area for policy intervention. On the other hand, perhaps engineers can reliably stabilize hillsides in a reasonably cost-effective manner.

The seemingly obvious point is that the optimal locus of policy intervention cannot be determined by simply tracing a causal sequence backward in time in search of an ultimate cause. This Article views the direction of recent regulatory reform initiatives as the rough equivalent of misguided "storm-prevention" efforts. It suggests that these efforts are likely to prove both costly and ineffectual. The proposal is that we undertake a targeted intervention to stabilize hillsides instead—a feasible engineering task that has been performed fairly successfully in the past, with deposit insurance. Undeniably, this approach has significant costs of its own. But hillside stabilization is nevertheless likely to be the welfare-maximizing intervention: it is superior to storm prevention, as well as to the laissez-faire alternative.

This analogy clarifies the importance of isolating the *independent* effects of money-claim instability. (If landslides do no damage, there is no point in stabilizing hillsides.) In this regard, it is worthwhile to review evidence from the recent crisis that money-claim instability played an independent causal role in 2007 and 2008 in relation to the credit crunch (i.e., the drastic reduction in the issuance of new consumer and business credit) and the ensuing economic downturn.

It is instructive to start from the beginning, with the credit boom in the years leading up to the crisis and the subsequent bust that began in 2007:

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proportions." MILTON FRIEDMAN & ANNA J. SCHWARTZ, A MONETARY HISTORY OF THE UNITED STATES, 1867–1960, at 419 (1963).

Figure 1.5: The Credit Boom and Bust

A) U.S. Real Estate Prices[32]

B) U.S. Corporate Leveraged Buyout (LBO) Valuations[33]
   (multiples of cash flow (EBITDA))[34]

C) Real Estate Lending–Serious Delinquency Rates[35]

D) Price of "AAA" Residential Subprime Structured Credit[36]
   (Jan. 2007 = 100)
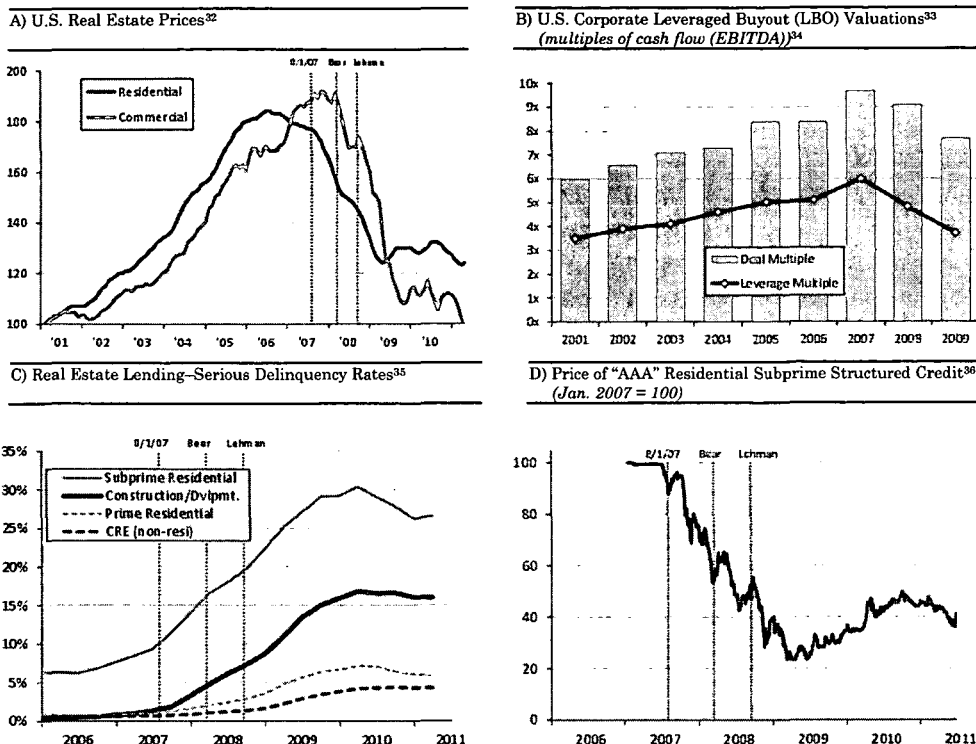
32. Residential series is S&P/Case-Shiller composite 20-city home price index (not seasonally adjusted), available for download at http://www.standardandpoors.com/indices/main /en/us; commercial series is Moody's/REAL CPPI index (national index, all property types), available for download at http://web.mit.edu/cre/research/credl/rca.html.

33. Both series are from Standard & Poor's, Leveraged Commentary & Data (subscription required).

34. The multiples are based on the valuation and debt levels at closing for U.S. corporate leveraged buyouts. EBITDA is a proxy for cash flow, and stands for "earnings before interest, taxes, depreciation and amortization." The "Deal Multiple" calculation is: (Total Enterprise Value / EBITDA); the "Leverage Multiple" calculation is: (Total Post-Closing Debt / EBITDA).

35. Subprime residential and prime residential series are from Bloomberg Professional (subscription required). Subprime residential is the sum of "90 days past due" (DLQTSP90 Index) and "foreclosures" (DLQTSPFC Index). Prime residential is the sum of "90 days past due" (DQS1US Index) and "foreclosures" (DQFQUS Index).

Construction and Development and Commercial Real Estate (Non-Residential) series are from the FDIC's Quarterly Loan Portfolio Performance Indicators, All FDIC-Insured Institutions, available for download at www2.fdic.gov/qbp/timeseries/LoanPerformance.xls. The relevant series are "Construction and Development Loans—Noncurrent Rate" and "Real Estate Loans Secured by Nonfarm Nonresidential Properties—Noncurrent Rate."

36. Markit ABX.HE Index (series ABX.AAA 2007-1), provided by J.P. Morgan ABS Weekly Spreads Datasheet (on file with author).

The precrisis period witnessed a remarkable escalation in the prices of leveraged asset classes. This escalation went hand-in-hand with the increasing availability of credit during those years. The story has become familiar: rising asset prices provided the basis for greater leverage, which in turn fueled asset prices, and so on in what appeared to be a self-reinforcing dynamic. This effect was most prominent in residential real estate. However, as shown in panels A and B above, the phenomenon was far broader in scope. It encompassed other leveraged asset classes, such as commercial real estate and cash-flow rich business enterprises.[37]

While subprime residential lending was not the only asset class to experience the boom and bust, it was the most dramatic. The fraction of subprime loans in "serious delinquency" status would soar to 30% by 2010. (As shown in panel C above, serious delinquencies in construction and development lending—the "subprime" of commercial real estate—followed a similar pattern.) It was the sudden decline in the prices of AAA-rated, subprime-backed securities during the summer of 2007 (panel D above) that signaled the arrival of the first stage of the financial crisis.

The price correction in AAA subprime credit was the initial event of the crisis, but the central focus of concern immediately shifted to the money-claim market:

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37. Incidentally, this data tends to cast doubt on the hypothesis that the credit boom was attributable primarily to affordable housing policies. Such policies may well have been a contributing factor, but the underlying phenomenon seems to have been too broad to be explained by affordable housing policies alone.

Figure 1.6: The Initial Liquidity Events

A) U.S. Asset-Backed Commercial Paper Outstanding[38]
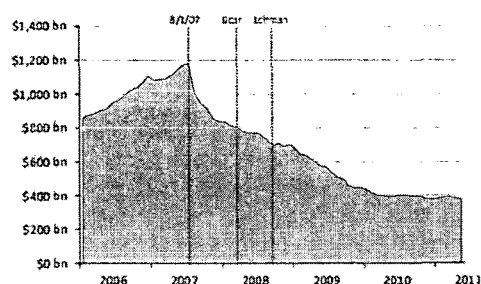
B) Short-Term Funding Spreads[39]
(three-month obligations; spread to risk-free rate)
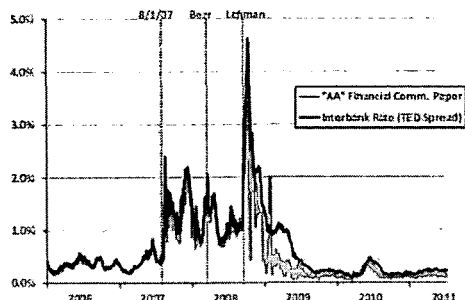
C) Short-Term Repo Outstanding[40]
(broker-dealer "tri-party" repo)
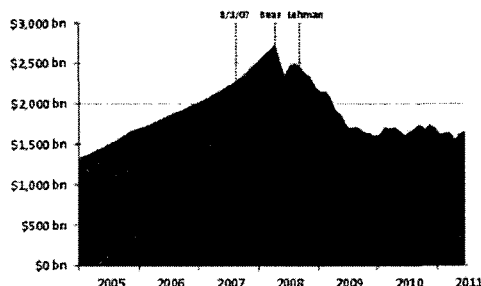
D) Assets of Illustrative U.S. Dealer Firms[41]
(combined assets of Goldman and Morgan Stanley)
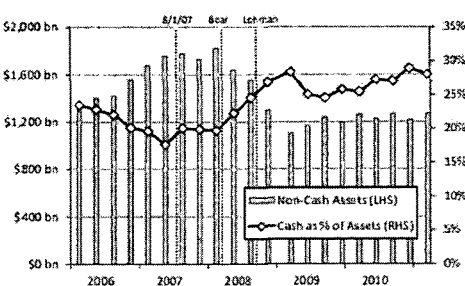
Developments in AAA subprime prompted a market-wide run in August 2007 on asset-backed commercial paper ("ABCP"), a class of short-term IOUs issued by special-purpose entities that invest in longer-term securities, including structured consumer credit. During the second half of 2007, the volume of outstanding ABCP went into free fall (panel A) as many investors declined to roll over their positions. Simultaneously, short-term funding spreads widened dramatically[42] (panel B) as cash parkers sought the safe haven of sovereign money-claims in lieu of ABCP and other private money-claims.[43]

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38. *Statistics*, SEC. INDUSTRY & FIN. MARKETS ASS'N, http://www.sifma.org/research/statistics.aspx/ (last updated Aug. 21, 2012) (excel file titled "US ABCP Outstanding").

39. Bloomberg Professional (subscription required).

40. FIN. STABILITY OVERSIGHT COUNCIL, 2012 ANNUAL REPORT 57 Chart 5.1.17 (2012) (excel data files available at http://www.treasury.gov/initiatives/fsoc/Pages/annual-report.aspx).

41. Data from SNL Financial (subscription required) and company filings. Panel D treats all owned repurchase agreements as "cash assets."

42. Widening spreads indicate higher borrowing costs relative to the risk-free rate.

43. This shift is evident in Figures 1.2 and 1.3 above, which depict the growth in sovereign money-claims and contraction in private money-claims after 2007.

Panel C above shows a similar phenomenon occurring a few months later, in a different segment of the money-claim market. The proximate cause of the Bear Stearns failure was a run on the firm's overnight financing through the giant repurchase agreement ("repo") market. Despite the Federal Reserve-assisted rescue of Bear Stearns in March 2008 and the simultaneous establishment of special lending facilities to support the repo market, the period after Bear's failure saw a rapid reduction in repo volumes.

How might liquidity events such as these be expected to affect the supply of new credit to real borrowers? *Regulating Money Creation* described the distinctive function of maturity transformation as the technology through which economic agents can deploy their cash reserves into the capital markets without compromising the "moneyness" of those cash reserves.[44] The effect of this technology was illustrated as an increase in the supply of financing. A money-claim panic should be expected to cause this process to work in reverse. Under panic conditions, cash parkers withdraw funds from suspect issuers and seek safety in sovereign money-claims (such as Treasury bills) or in money-claims issued by firms with substantial cash balances. As a precautionary response, money-claim issuers naturally reduce their exposures to the capital markets and seek to increase their cash reserves in order to avoid being driven into default by money-claim redemptions. The result is a negative shock to the supply of financing. Such a supply shock should be expected to increase credit costs and decrease the quantity of new credit formation.[45] If accurate, this account provides an intuitive mechanism through which liquidity crises might independently affect the capital markets and real economic performance.

Panel D above appears to illustrate such a phenomenon. It shows the combined balance sheets of the two large, repo-funded dealer firms that survived the crisis as independent companies (and hence for which public data is readily available). In the aftermath of the Bear Stearns run, these two firms dramatically reduced their

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44.   *See* Ricks, *supra* note 2, at 97–103.

45.   For a related but somewhat different account, see Jeremy C. Stein, *Monetary Policy as Financial-Stability Regulation* 1–2 (Nat'l Bureau of Econ. Research, Working Paper No. 16883, 2011), *available at* http://www.nber.org/papers/w16883. Stein emphasizes the role of "fire sale" externalities that result from bank runs. *Id.* at 2. In his model, funds removed from the banking system during a run are not immediately reintermediated. *Id.* at 13. As a result, there is less capital "left over for investment in new projects," and the "hurdle rate for new investment" increases. *Id.* The model is one of a supply shock in the credit markets brought about by run-behavior. *See also* Douglas W. Diamond & Raghuram G. Rajan, *Fear of Fire Sales and the Credit Freeze* 1–4 (Nat'l Bureau of Econ. Research, Working Paper No. 14925, 2009), *available at* http://www.nber.org/papers/w14925.

holdings of noncash assets while parking an increasing fraction of their assets in cash and near-cash. Remarkably, these two firms alone reduced their capital market exposures by more than $600 billion. Anecdotally, other maturity-transformation firms took similar precautionary steps during this timeframe. This shift is consistent with a reversal of the process of maturity transformation, leading to a reduction in the supply of funds in the capital markets. Further evidence for this "credit crunch" phenomenon appears in the following Figure:

Figure 1.7: The Credit Crunch

A) U.S. Securitization Issuance[46]
(excludes agency securitization)

B) New Corporate Lending[47]
(U.S. syndicated loan market)

C) U.S. "A"-Rated Corporate Bond Spreads[48]
(spread to risk-free rate)

D) CDS-Bond Basis–High Grade Corporate[49]
(credit default swap rates less bond spreads)
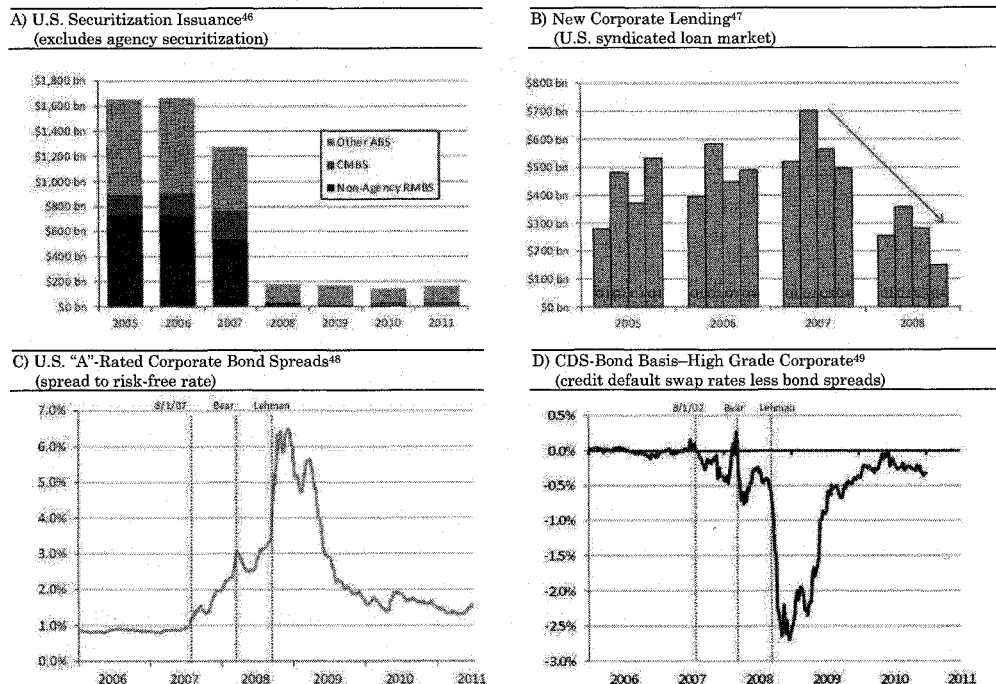
These Figures show dramatic reductions in securitization volumes (panel A) and newly originated loans to big corporations (panel B). Notably, these reductions began well before the crisis reached its apex after the fall of Lehman Brothers in September 2008.

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46.   *See* SEC. INDUSTRY & FIN. MARKETS ASS'N, *supra* note 38 (excel files titled "US Mortgage-Related Issuance and Outstanding" and "U.S. ABS Issuance and Outstanding").

47.   Victoria Ivashina & David Scharfstein, *Bank Lending During the Financial Crisis of 2008*, 97 J. FIN. ECON. 319, 323 (2009).

48.   BofA Merrill Lynch US Corporate A Option-Adjusted Spread, Federal Reserve Economic Data (FRED), *available at* http://research.stlouisfed.org/fred2/ ("BAMLC0A3CA" data series).

49.   The author thanks Mark Mitchell and Todd Pulvino for sharing this data; their analysis of the CDS-bond basis is discussed briefly below. *See infra* note 60 and accompanying text.

Furthermore, these volume reductions coincided with significant increases in the cost of credit. This effect appears in panel C above, which shows the increased spread on bonds issued by "A"-rated companies.[50] A similar phenomenon was evident in virtually every area of the consumer and business credit markets.[51]

To summarize, the data in Figures 1.5, 1.6 and 1.7 show an initial credit event (impairment of existing credit assets, exemplified by AAA subprime securities), followed by a liquidity event (money-claim panic), followed in turn by a credit crunch (collapse in new issuance volumes in the real credit markets). The suggestion here is that this sequence should be interpreted as a causal chain—in particular, that the liquidity event bore primary responsibility for the ensuing credit crunch.

However, there is at least one other plausible interpretation that must be considered. Perhaps all of these phenomena simply reflected a broad repricing of risk in the capital markets. This view might treat the liquidity event as epiphenomenal, a superficial symptom of the fundamental repricing of credit. Under this view, the credit crunch would have happened anyway, even without the liquidity crisis. To extend our metaphor: this view would suggest that the village was damaged by the storm itself, not the landslide.

There are at least two reasons to doubt the validity of this alternate interpretation. The first comes from a recent study by Victoria Ivashina and David Scharfstein of Harvard Business School.[52] Their paper examines U.S. financial firms' syndicated lending to the corporate sector during 2007 and 2008.[53] The authors show that lenders with higher amounts of (uninsured) nondeposit financing reduced their syndicated lending activities in the second half of 2008 to a far greater extent than did those with more stable deposit funding (much of which is FDIC-insured). Specifically, a lender with a deposits-to-assets ratio one standard deviation below the mean reduced its loan originations by 49% during late 2008 versus the prior year, whereas a lender whose ratio was one standard deviation above the mean reduced originations by only 21%. Put simply, financial

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50. The term "spread" as used herein refers to the market yield less the comparable risk-free rate.

51. This broad increase in credit spreads seems to rule out the hypothesis that the decline in issuance volumes was driven mostly by a decline in *demand* for financing. A reduction in demand for financing would tend to drive spreads down, not up. The evidence is consistent with a supply shock.

52. Ivashina & Scharfstein, *supra* note 47, at 319.

53. *Id.* at 319–20. A syndicated loan is a large corporate loan provided by multiple financing sources. The authors focus on this market due to the availability of a robust data set of new originations.

firms that were more reliant on run-prone money-claims cut back on new corporate loan issuance much more severely. The authors conclude that their findings are "consistent with a decline in the supply of funding as a result of the bank run."[54] They further note that "the drop in supply puts upward pressure on interest rate spreads, and leads to a greater fall in lending than one might see in a typical recession."[55]

There is a second, more direct piece of evidence that the liquidity crisis itself reduced the supply of financing. That evidence, the "CDS-bond basis," appears in panel D of Figure 1.7 above. This Figure requires some explanation. The credit default swap ("CDS") market is a derivative market in which investors make side bets on corporate and other credits. Essentially, when two parties enter into a CDS contract with respect to a debtor and that debtor subsequently defaults, one party to the CDS contract (the "protection seller") pays the other party (the "protection buyer") an amount equal to the difference between the principal amount and the market price of the debtor's bonds. The debtor itself is not a party to this contract.

Under normal conditions, the CDS rate associated with an issuer should very closely track the actual spread observed on the issuer's bonds. This is because even a tiny divergence between the CDS rate and the bond spread creates an arbitrage opportunity for investors.[56] Consequently, under efficient market conditions, the *difference* between the CDS rate and the bond spread should stay very close to zero. This difference is called the "CDS-bond basis."[57] And historically this spread has in fact hovered very close to 0.0%. However, beginning in August 2007, bond yields started to widen dramatically *in comparison to* CDS rates. This difference exploded after the failure of Lehman Brothers.[58]

This extraordinary divergence is consistent with a collapse in the supply of financing brought about by severe liquidity pressures. To see why, consider an investor seeking to take a long position with respect to a particular corporate credit. She has two main alternatives: buy the issuer's bonds, or sell protection in the CDS

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54.   *Id.* at 320.

55.   *Id.* at 337.

56.   When the CDS-bond basis is negative, an investor can profit by buying a bond and simultaneously buying CDS protection on the bond. By entering into this trade, the investor will effectively own a risk-free security with a yield that exceeds the risk-free rate.

57.   It is sometimes referred to as the "cash-synthetic basis."

58.   Figure 1.8(D) *infra* shows the CDS-bond basis for high-grade credits only. This effect was actually far more dramatic for lower-grade credits, but for ease of presentation this data is not included.

market. From a present-value perspective, these positions are virtually identical. But the first option must be *funded*: the investor needs to part with cash to obtain the bond. In the second option, the investor parts with little or no cash up front.[59] The CDS contract entitles her to periodic payments, in return for which she agrees to make a large contingent payment in the future *if* the debtor defaults. The derivatives market is therefore called a "synthetic" market, as opposed to a "cash" market.

It is easy to see why this funding distinction might become critical during a liquidity crisis. Concerned about their ability to meet money-claim redemptions, firms engaged in maturity transformation would find themselves in cash-preservation mode. They would therefore charge a significant premium to part with cash. Naturally, this development should reduce aggregate investor demand in the ordinary bond markets, where positions must be funded, relative to the synthetic markets, where they are not. In that case the CDS-bond basis would go negative—which is just what happened.

If this account is accurate, it has important implications for the origination of new credit to real borrowers during a liquidity crisis. The primary market for real credit is, of course, a cash market, not a synthetic one. Borrowers issue into this market in order to rent purchasing power from lenders. According to the account described here, during a liquidity crisis, real borrowers will find that they must pay a substantial premium for access to credit. This implies that costs of financing during a liquidity crisis might be significantly in excess of those justified by fundamentals.[60] This view was widely held among sophisticated market participants during the recent crisis.[61]

There is, then, compelling evidence that the liquidity shock did indeed have an independent impact on the supply of new financing to

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59. Technically, the writer of CDS protection is usually required to part with *some* cash up front, in the form of "initial margin." But this amount is typically only a small fraction of the notional amount of the contract.

60. Under efficient market conditions, this divergence of course would not be expected to happen. That is why the extraordinary CDS-bond basis during the recent crisis requires an explanation. Existing scholarly work has stressed the "slow movement" of capital under crisis conditions. *See* Darrell Duffie, *Presidential Address: Asset Price Dynamics with Slow-Moving Capital*, 65 J. FIN. 1237 (2010); Mark Mitchell & Todd Pulvino, *Arbitrage Crashes and the Speed of Capital*, J. FIN. ECON. (forthcoming) (the CDS-bond basis "highlight[s] the slow movement of capital to extraordinary arbitrage opportunities").

61. In a widely circulated research note, the elite hedge fund D.E. Shaw opined that "we believe that [credit default] swap markets have often priced in a 'truer' level of the market's fundamental view on a particular issuer's credit risk than that implied by prices of cash bonds (although we don't believe that this will necessarily always be the case)." *The Basis Monster That Ate Wall Street*, THE D.E. SHAW GROUP MARKET INSIGHTS (D.E. Shaw, New York, N.Y.), Mar. 2009, at 7.

the real economy. Of course, this is not to say that the liquidity shock was *solely* responsible for the credit crunch. A more likely interpretation is that the forces that caused the initial credit event also independently exerted downward pressure on the supply of new real credit—and that this would have happened even in the absence of a liquidity crisis. In fact, it seems reasonable to suppose that these were mutually reinforcing phenomena. The initial credit event triggered a liquidity event; the liquidity event further drove down asset prices; the supply of new credit to the real economy decreased; economic agents cut back on consumption and real investment; market participants revised their expectations of economic performance downward; these developments raised further doubts about the ability of debtors to service their existing obligations, driving prices of existing credit assets still lower; and so on.[62] The important point here is that the available evidence suggests that the liquidity event was not epiphenomenal. Rather, the dramatic reduction in the supply of long-term financing to real borrowers during the crisis appears to have been attributable, in significant measure, to the unraveling of the money-claim market.

It is useful to conclude this discussion with a brief review of the most severe phase of the financial crisis, as well as the related policy response and the path of macroeconomic performance. Lehman's bankruptcy in September 2008 triggered a broad panic in the market for private money-claims. This panic was evident in the dramatic widening of short-term funding spreads shown above in Figure 1.6. More evidence for the severity of the post-Lehman panic is presented here:

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62.   This cycle shows the limits of the landslide analogy, since landslides do not reinforce storms.

Figure 1.8: The Acute Phase and the Macroeconomic Contraction

A) U.S. Prime Money Market Fund Shares Outstanding[63]

B) Federal Reserve Assets[64]

C) Monetary Policy and Treasury Yields[65]

D) U.S. Real GDP[66]
(annualized quarterly rates; chained 2005 dollars)
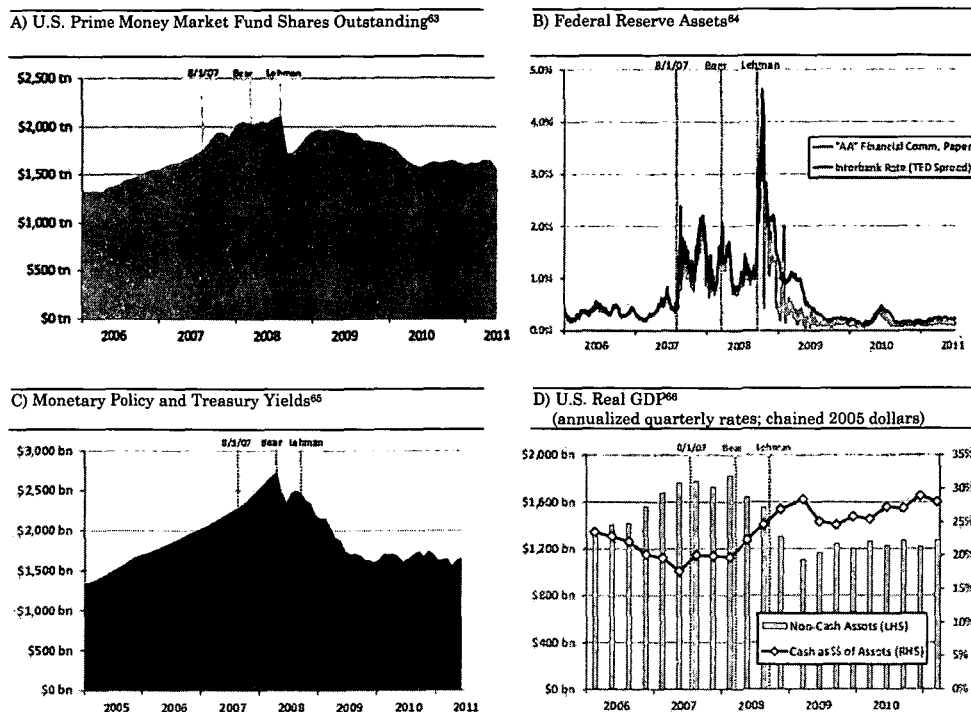
Lehman's default triggered a run on the MMMF sector—one of the core distribution channels for money-claim funding. Practically overnight, investors withdrew nearly half a trillion dollars from prime money market funds (panel A above). The free fall was halted only after a massive policy response by government authorities. This emergency response included an explosion of Federal Reserve liquidity facilities (evident in panel B above). It also included an array of other emergency measures, including a Treasury guarantee of the entire MMMF sector; a new FDIC program to guarantee senior debt issued by depositories and their affiliates; and, in early October, giant equity infusions into the nation's largest financial institutions through the TARP program.

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63. FIN. STABILITY OVERSIGHT COUNCIL, *supra* note 40, at 75 Chart 5.3.5.

64. *Factors Affecting Reserve Balances*, FED. RES., http://www.federalreserve.gov/releases /h41/ (last updated Aug. 23, 2012).

65. *FRED Graph*, FED. RES. BANK OF ST. LOUIS, https://research.stlouisfed.org/fred2/graph/ (last visited July 26, 2012) (graph of "DGS10," "DFEDTAR," and "DFEDTARL" data series).

66. *Id.* (graph of "GDPCA" and "GDPPOT" data series).

These measures ultimately proved sufficient to arrest the money-claim panic. By the following May, short-term funding spreads had returned to precrisis levels. These emergency measures were accompanied by extraordinary monetary policy initiatives by the Fed, which cut the target federal funds rate (lower limit) to 0.0% (panel C) and conducted additional expansionary monetary policy through so-called "quantitative easing" initiatives (evident in the buildup of securities in panel B). However, while risk-free rates remained remarkably low by historical standards—ten-year Treasuries remained range bound from 2% to 4% for an extended period after Lehman Brothers' failure (panel C)—these measures were not enough to avert an abrupt and severe macroeconomic contraction (panel D).

This Part has offered empirical evidence from the recent crisis suggesting that money-claim panics have independent effects on the functioning of the capital markets and real economic performance. This conclusion has critical implications for regulatory design. It suggests a prima facie case for a targeted government intervention to stabilize the money-claim market. The next Part will expand on this case by examining the dynamics of money-claim runs. An analysis of these dynamics will generate important implications for the remainder of the Article, which addresses questions of institutional design.

C. Market Failure and the Equilibrium Selection Problem

I'm not an economist, but these are some fragile [expletive] businesses. No, don't look the bank in the eye, it will fail!

—Jon Stewart, The Daily Show with Jon Stewart, 2010[67]

Are the phenomena described above a market *failure*—or are they just the market at work? If the cost of any feasible policy intervention would exceed the likely benefit, then the assertion that the market has failed is not very meaningful.

In *Regulating Money Creation*, the problem of money-claim instability was analyzed as a basic collective action problem—a signature of market failure.[68] That argument can be summarized as follows, in very brief form. It starts with the observation that money-claimants experience *consequential* losses when money-claim issuers default. The loss of access to cash reserves can lead to operational

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67. *The Daily Show with Jon Stewart: Episode #15006* (Comedy Central television broadcast Jan. 12, 2010), *available at* http://www.thedailyshow.com/watch/tue-january-12-2010/clusterf--k-to-the-poor-house---wall-street-bonuses.

68. *See* Ricks, *supra* note 2, at 109–14.

disruption, reputational damage, or even default. Notably, these consequential losses are distinct from any impairment of the value of the issuer's asset portfolio. Nor do these losses relate to administrative costs of insolvency. Instead, these consequential losses arise from money-claimants' abrupt loss of the "money services" that they had received from owning money-claims (and which were, indeed, the very rationale for owning money-claims in the first place).[69] These losses arise from the default *itself*.

Given this circumstance, money-claimants would seem to have an incentive to reach a bargain to avoid default. The terms of such a hypothetical bargain are easily imagined. Money-claimants might agree up front never to run on an issuer under any circumstances— even if they suspected that portfolio losses had wiped out its equity. In operational terms, they would simply agree never to alter their deposit and withdrawal behavior on account of perceptions about the issuer's solvency. The agreement would specify that, if the issuer were to become balance-sheet insolvent, money-claimants and other financing sources would take pro-rata haircuts (perhaps pennies on the dollar) to recapitalize the firm on a going-concern basis. So long as money-claimants continued to deposit and withdraw as usual, the issuer would be able to maintain an adequate cash reserve and continue its operations during the restructuring procedure. This bargain would of course do nothing to avert the issuer's *portfolio* losses. But it would enable money-claimants to avoid the *consequential* losses that they experience upon default. Presumably such a bargain, which amounts to a prenegotiated going-concern restructuring, would be significantly welfare enhancing.

Regulating Money Creation suggested that, due to transactions costs and impediments to enforcement, reaching such an agreement would not be practically feasible. If any given money-claimant doubted that others would honor the deal, she would have an incentive to skew toward withdrawals in order to limit her exposure. A defection by even a small number of money-claimants would exhaust the issuer's cash reserves, resulting in default and consequential losses for the remaining money-claimants. As a result, the effectiveness of the bargain would depend crucially on the ability to impose meaningful penalties for breach. And establishing breach would be extremely fact-intensive: the fact-finder would need to determine that the money-

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69. For a discussion of the "money services" provided by short-term obligations (including empirical evidence), see Robin Greenwood, Samuel G. Hanson & Jeremy C. Stein, *A Comparative-Advantage Approach to Government Debt Maturity* 35 (Harvard Bus. Sch. - Fin. Unit, Working Paper No. 1680604, 2010), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1680604.

claimant withdrew (or refrained from depositing) more than she would have under normal circumstances. This would be a difficult task. Without a meaningful enforcement threat against potentially tens of thousands of individual money-claimants, the hypothetical bargain would not work.[70]

A collective action problem like the one described here establishes a *prima facie* case for government intervention. However, the question remains whether policy intervention can make matters better. In this regard, it is worth considering whether there might in fact be an *upside* to instability. Specifically, the prospect of runs exerts market discipline on issuers, encouraging them to allocate resources carefully and avoid significant portfolio impairments.[71] Under this view, runs and panics represent healthy responses to issuers' unwise investment decisions. If policy intervention removed the incentive to panic, it would remove this valuable market discipline. The cost of intervention might then exceed the benefit.

Are runs healthy? To address this question, it is important to examine the peculiar dynamics of run-behavior. In an influential article, Douglas Diamond and Philip Dybvig analyzed the dynamics of bank runs through the lens of game theory.[72] Bank depositors in their model are playing what game theorists call a "coordination game."[73] The Diamond-Dybvig model is formal, but the basic intuition is easily grasped. Stated simply, depositors normally benefit from holding deposit instruments, but they have an incentive to withdraw if they believe there to be a high enough probability that other depositors will withdraw in numbers sufficient to cause the bank to default. The outcome therefore has a self-fulfilling aspect: money-claimants will run if they expect other money-claimants to run.

Situating the phenomenon in a game-theoretic context proves illuminating. Coordination games have "multiple equilibria," meaning that money-claimants face more than one set of mutually stable strategies. In the Diamond-Dybvig bank game, there are two

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70. *Regulating Money Creation* also offered reasons to think that private insurance is not likely to be an efficient alternative; that discussion will not be repeated here. Ricks, *supra* note 2.

71. *See* Douglas W. Diamond & Raghuram G. Rajan, *Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking*, 109 J. POL. ECON. 287, 317 (2001).

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

73. In elementary game theory, the basic version of a coordination game is the so-called "Stag Hunt." A good description of this game is available on Wikipedia. *Stag Hunt*, WIKIPEDIA, http://en.wikipedia.org/wiki/Stag_hunt (last visited July 26, 2012). For a more detailed game-theoretic analysis of bank runs, including a comparison with the Stag Hunt game, see Morgan Ricks, *"Moneyness" and Bank Runs*, in INSIDE MONEY (Christine Desan ed., U. Penn. Press, forthcoming 2013).

equilibria: a "stable equilibrium" and a "run equilibrium." Which equilibrium will prevail? This question encapsulates what game theorists call the *equilibrium selection problem.* And an important insight from game theory is that equilibrium selection in a coordination game does not necessarily depend upon any fundamental aspect of the situation. Indeed, it can be completely random. Thus Diamond and Dybvig observe that equilibrium selection in their model might depend upon "some commonly observed random variable in the economy"[74]:

> This could be a bad earnings report, a commonly observed run at some other bank, a negative government forecast, or even sunspots.... The observed variable need not convey anything fundamental about the bank's condition. The problem is that once agents have deposited, anything that causes them to anticipate a run will lead to a run. This implies that banks with pure demand deposit contracts will be very concerned about maintaining confidence because they realize that the good equilibrium is very fragile.[75]

This approach to thinking about equilibrium selection was pioneered by Nobel Prize-winning economist and political scientist Thomas Schelling. In his classic work, *The Strategy of Conflict,* Schelling suggested that the choice among equilibria in a coordination game is determined by a "clue" or "focal point" that leads players to believe that other players will choose a particular strategy. According to Schelling, the prominence of any such focal point is not a question of rationality. Instead, it "may depend on imagination more than on logic."[76] As Schelling describes it:

> [S]ome essential part of the study of [coordination] games is necessarily empirical.... There is, consequently, no way that an analyst can reproduce the whole decision process either introspectively or by an axiomatic method.... One cannot, without empirical evidence, deduce what understandings can be perceived in a nonzero-sum game of maneuver [i.e., a coordination game] any more than one can prove, by purely formal deduction, that a particular joke is bound to be funny.[77]

Because focal points are necessarily contextual and therefore extrinsic to the game, they may have no fundamental significance at all—which is why economists sometimes refer to them as "sunspots." Such focal points affect outcomes simply because they are expected to. According to one contemporary game theorist, when it comes to solving coordination games, "the final court of appeal is the psychology laboratory."[78]

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74.   Diamond & Dybvig, *supra* note 72, at 410.
75.   *Id.*
76.   THOMAS SCHELLING, THE STRATEGY OF CONFLICT 57 (1980) (originally published in 1960).
77.   *Id.* at 162–64.
78.   KEN BINMORE, NATURAL JUSTICE 36 (2005).

It is obvious that, if runs and panics by money-claimants were purely random phenomena, they could have no redeeming value in terms of incentives or otherwise. In the real world, however, money-claim runs do not appear to be entirely random. Casual empiricism suggests that runs virtually never commence except under circumstances in which there have been significant portfolio impairments. Still, it seems equally true that the degree of fundamental deterioration that will trigger a run at any given institution is not knowable in advance with any degree of precision. At some point, initial withdrawals will mount, the institution's cash reserves will decline, others money-claimants will sense danger, and the institution will tip toward a self-perpetuating liquidity crisis. The lesson from game theory is that there is no "rational" point at which this process will start.

Furthermore, if Diamond and Dybvig are correct that a "commonly observed run at some other bank" may be a natural focal point, then a default by any one institution may trigger systemic consequences—widespread, self-reinforcing panic behavior targeting other money-claim issuers. This observation suggests why it may not be useful to describe panics as "irrational." Equilibrium selection in a coordination game is simply not a question of rationality. As Diamond and Dybvig note, "a bank run in our model is caused by a shift in expectations, which could depend on almost anything, consistent with the apparently irrational observed behavior of people running on banks."[79] A June 2008 fixed-income research report from J.P. Morgan makes a similar point:

> As we have seen demonstrated through the past several months of this crisis, actions that short-term investors view as rational behavior *does [sic] not always align with what other investors might view as rational.* As we have pointed out previously, the liquidity focused investors that control most of the money in the short-term markets care mainly about being able to get their money back when they want it. John Maynard Keynes might have explained these investors' behavior in these previous cases as "animal spirits," a spontaneous urge to action rather than a calculated outcome of weighted average of benefits and probabilities. We prefer to think of these previous episodes as rational reactions viewed through the lens of *different priorities.*[80]

This analysis of the dynamics of run-behavior has interesting implications with respect to the social value of "market discipline" by money-claimants. Market discipline is not usually thought to be an end in itself, but rather a means to the end of efficient resource

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79. Diamond & Dybvig, *supra* note 72, at 404.

80. *Short-Term Fixed Income Research Note,* U.S. FIXED INCOME MARKETS WEEKLY (J.P. Morgan Sec. Inc., New York, N.Y.), June 6, 2008 (emphasis added). Notably, this report was issued after the run on Bear Stearns in March 2008 but before the most acute stage of the financial crisis in the fall of that year.

allocation. However, the analysis above suggests that money-claimants' incentives to conduct fundamental investment analysis might be rather limited. Fundamental credit analysis is expensive, but money-claimants can get an *approximate* sense of an issuer's fundamental condition without much effort. They can outsource credit analysis by observing credit ratings; they can examine the market yields on the issuer's long-term debt securities; they can compile cursory credit metrics; and so on. If money-claimants are involved in a coordination game, anything more than an approximate sense of fundamental condition might not be particularly useful. After all, the degree of fundamental deterioration that will trigger a run is not knowable in advance. Accordingly, the marginal benefit of credit analysis might not exceed the marginal cost.

Is this prediction of limited investment analysis in the money-claim market borne out in practice? Consider these observations from the leading money market reference work, *Stigum's Money Market*. "One might expect most institutional [short-term] portfolios to be managed with considerable sophistication," the authors say.[81] But "[m]any short-term portfolios are not managed as well as they could be, and some are not managed at all."[82] They go on: "Some of the ablest [short-term] portfolio managers tend to steer clear of credit analysis."[83] In fact, "a good portfolio manager can, as many do, *refuse to get into* credit analysis . . . ."[84] According to the authors, cash management departments in the nonfinancial corporate sector are particularly inattentive: "In the case of corporations, management will often adopt the attitude: we're in the business of manufacturing widgets, not investing. . . . In small institutions, it is common for the liquidity portfolio to be managed by someone who wears several hats and who, in particular, is not a money market specialist."[85]

If money-claimants perform little or no fundamental credit analysis, how do they make asset allocation decisions? The answer is that they rely largely on readily available indicators, including credit ratings. Indeed, major market participants occasionally acknowledge this point. The J.P. Morgan research report cited above notes that "*[n]early all* of these liquidity-focused [short-term] investors are credit rating sensitive and are more attuned to the opinions of S&P and

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81. MARCIA STIGUM & ANTHONY CRESCENZI, STIGUM'S MONEY MARKET 455 (4th ed. 2007).

82. *Id.* at 455 (emphasis added).

83. *Id.* at 461.

84. *Id.* at 462.

85. *Id.* at 478, 483.

Moody's than they are of the other rating agencies."[86] Credit ratings are not the only focal point, but they play a particularly important role in this market.

Gary Gorton and other economists use the term "informationally insensitive" to describe financial instruments, such as money-claims, on which detailed credit analysis is generally not worthwhile. According to Gorton:

> Broadly speaking, [informationally insensitive] debt does not really correspond to the textbook descriptions of "efficient markets," a notion that is basically about stock markets. . . . [It] is sold based almost exclusively on its rating. . . . Intuitively, informationally-insensitive debt is debt that *no one need devote a lot of resources to investigating. It is exactly designed to avoid that.*[87]

The proposition that money-claimants rely heavily on credit ratings and typically perform only cursory investment research is conventional wisdom in the financial markets. The argument here is that this tendency is largely attributable to inherent structural features of the money-claim market—structural features that are not present in other areas of the financial markets. Stated simply, if money-claimants are involved in a coordination game, then they may find that the marginal benefit of significant investment analysis does not exceed its marginal cost. Their focus will instead be primarily *horizontal* in nature—focused on what other money-claimants are likely to do. There is reason to question whether this unusual variety of market "discipline" is conducive to efficient resource allocation. Perhaps, then, policy intervention that diminished this form of market discipline would not be so costly after all.

Finally, there is one other dimension of this analysis that will prove important in the remainder of this Article. The issue relates to optimal regulatory design. In particular, the next two Parts will show that the prevailing modes of stability-oriented regulatory intervention depend crucially upon the ability of regulators to make reasonably accurate "systemic" judgments about the likely consequences of default by money-claim issuers. Parts II and III will argue that the dynamics of run-behavior described here—the fact that money-claimants are involved in a coordination game, giving rise to an equilibrium selection problem—make such systemic predictions highly problematic. By contrast, Part IV will show that the PPP regime does not suffer from this problem—one of its key virtues. This observation

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86.   *Short-Term Fixed Income Research Note, supra* note 80.

87.   GARY GORTON, SLAPPED IN THE FACE BY THE INVISIBLE HAND: BANKING AND THE PANIC OF 2007, at 9–10 (2009) (emphasis added).

provides a useful transition to the question of regulatory design, which is the subject of the remainder of the Article.

II.   THE SOCIAL COST OF RISK REGULATION

Part I developed a *prima facie* case for government intervention to stabilize the market for money-claims. The rest of the Article will examine alternative modes of intervention. Three alternatives will be considered: (1) risk-constraint regulation, such as portfolio restrictions and capital requirements; (2) conditional support facilities, such as the lender of last resort; and (3) the public-private partnership system. These three approaches will be evaluated in turn.

There is an analytical logic to this sequence, but also a historical one. In the United States, the federal regulation of depository banking has proceeded through three broad phases. The first phase employed a risk-constraint approach. The National Bank Act of 1864 created a new category of federally chartered banks and required them to abide by a detailed and comprehensive array of regulatory risk constraints, including portfolio restrictions and capital requirements.[88] In the second phase, Congress introduced conditional liquidity support. Established in 1913, the Federal Reserve system was endowed with lender-of-last-resort powers, enabling it to support depository banks during a liquidity crisis.[89] Finally, after the banking panics of the early 1930s, deposit insurance legislation was enacted in 1933 and 1934.[90] This legislation ushered in the third and final phase, the public-private partnership regime for depository banking. That regime remains operative today for depository banks, in somewhat modified form.

This Part evaluates the first of these alternatives, that is, regulatory risk constraints. In particular, it considers two key forms of substantive risk constraint that are widely employed in financial regulation: *portfolio restrictions* (sometimes called activity restrictions) and *capital requirements* (or leverage limitations). The primary aim of these tools is to reduce the likelihood that an issuer's assets will fall dangerously close to or below the value of its liabilities,

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88.   *See* National Bank Act of 1864, ch. 106, 13 Stat. 99 (codified as amended in scattered sections of 12 U.S.C.).

89.   *See* Federal Reserve Act, Pub. L. No. 63-43, 38 Stat. 251 (1913) (codified as amended in scattered sections of 12 U.S.C.).

90.   *See* Banking Act of 1933, Pub. L. No. 73-66, 48 Stat. 162 (codified as amended in scattered sections of 12 U.S.C.) (establishing the FDIC as a temporary agency); Banking Act of 1935, Pub. L. No. 74-305, 49 Stat. 684 (establishing the FDIC as a permanent agency) (codified as amended in scattered sections of 12 U.S.C.).

a condition referred to herein as "balance-sheet insolvency," as distinct from cash-flow insolvency.

In keeping with the functional perspective of Part I, the analysis that follows will assume that these regulatory risk constraints are applied to *all* money-claim issuers—that is, all firms engaged in maturity transformation. Logically, this implies that firms declining to abide by these risk constraints would be legally prohibited from issuing money-claims. Such firms would be required to finance themselves in the capital markets.

A. A Simple Diagrammatic Model

To facilitate the analysis below, it will be useful to introduce the simplest of microeconomic models, in the form of a basic diagram. This model will prove surprisingly useful in analyzing different regulatory responses to the problem of money-claim instability.

The diagram is a simple model of the firm—in this case, the money-claim issuer or "maturity-transformation firm." The firm finances itself by issuing a large amount of money-claims and a smaller amount of common equity (a residual, subordinated claim).[91] The common shareholders control the firm, and they seek profit-maximization. The firm earns a profit by investing in the capital markets, for example, loans and securities. For simplicity, the firm is assumed to earn no fee income. All of its earnings come from its "spread" business.

The following figure illustrates the equilibrium production of the firm in the absence of government intervention:

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91.   The introduction of long-term debt into the capital structure would complicate the exposition without materially altering the conclusions.

Figure 2.1: Simple Model of the Maturity-Transformation Firm
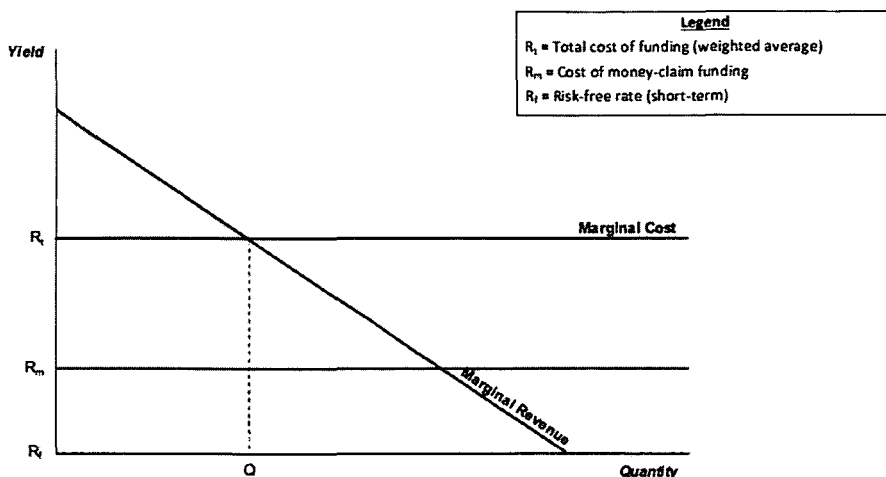
The firm's marginal cost curve represents its total weighted average cost of funds (R_t)—that is, its all-in cost of financing, including the cost of equity. The firm's cost of money-claim funding is also shown (R_m). Naturally, this curve sits below the firm's weighted average cost of funds. However, it sits above the short-term risk-free rate (R_f) since the firm has a positive probability of defaulting on its money-claims. The cost curves are horizontal, reflecting the simplifying assumption that the firm's financing costs do not change as it increases production, all else equal.[92]

The marginal revenue curve represents the yield that the firm earns on its asset portfolio. This curve is downward sloping, a standard assumption. The profit-maximizing firm deploys its financing proceeds first toward higher-value business opportunities (those investments with the highest expected risk-adjusted returns), then progressively toward lower-value opportunities. Importantly, this downward slope implies that the capital markets in which the firm invests are not perfectly competitive. That is, the firm can identify and capitalize on "mispriced" assets within its field of specialization—through superior analysis, a well-developed distribution infrastructure (such as a branch network in the case of a consumer bank), an

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92.   That is, holding constant the firm's ratio of equity to assets (its capital ratio) and its aggregate asset riskiness (volatility). The effects of changes in these two parameters will be explored presently.

identifiable brand that attracts customers seeking financing, or some combination of these sorts of advantages.

The intersection of the marginal cost and marginal revenue curves determines the profit-maximizing quantity of production. The maturity-transformation firm "produces" its investment portfolio. It ceases further production at the point at which the expected marginal revenue derived from additional investment equals the marginal cost of financing—in other words, when it can identify no further investments with positive net present value. The firm's economic profit is depicted by the shaded area, representing the difference between the yield earned by the firm on its investment portfolio and its weighted average cost of funds. These profits represent economic surplus: value-creation (gains from trade) from maturity transformation.[93]

Part I argued that maturity transformation is associated with a market failure. This market failure can be understood as the generation of negative externalities—"run-externalities"—that are external to the model. These run-externalities might have been incorporated into the diagram through a "social cost" curve that sits somewhere above the firm's (private) marginal cost curve. This social cost curve is omitted for two reasons. First, it would clutter the diagram and complicate the exposition. Second, and more importantly, one of the key takeaways from the discussion of equilibrium selection in Part I was that the dynamics of run-behavior make this curve very difficult to locate. To depict the social cost curve in the model would lend it an aura of false precision.

With this basic model in hand, this Article now turns to a consideration of the efficiency characteristics of regulatory risk constraints.

B. *Portfolio Restrictions*

First, the effects of portfolio restrictions are considered. This class of regulation precludes issuers from owning designated types of risky assets and from conducting risky activities. (For example, with some narrow exceptions, depository banks are prohibited under current law from owning equity securities, investing in real estate,

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93.   To be precise, the profits of maturity-transformation firms represent *producer* surplus. Additional economic surplus accrues to both the firm's suppliers of funds (to the extent that any of them would have accepted a lower yield) and to the agents in which the firm invests (to the extent that any of them would have been willing to pay higher yields). These other forms of surplus are not depicted in the diagram, but they can reasonably be assumed to be directly proportional to producer surplus.

and directly engaging in most commercial activities.[94]) This class of regulation also includes concentration limits and diversification requirements.[95] Broadly speaking, these restrictions are intended to reduce the aggregate risk (or volatility) of issuers' asset portfolios.

Portfolio restrictions are conceptually distinct from restrictions on *affiliations*—such as those embodied in the old Glass-Steagall regime and the new Volcker Rule. Affiliation restrictions are designed to limit the types of activities that may be carried on within a corporate group that includes a depository bank, even if the activity in question is not conducted within the depository bank. Because this Article is concerned with the direct substantive regulation of maturity transformation, the question of affiliations falls outside the scope of its analysis.[96]

Portfolio restrictions should be expected to reduce the likelihood of default and, therefore, to reduce the run-externalities associated with maturity transformation. However, they also require the firm to forego its chosen revenue opportunities. The effect of portfolio restrictions can be illustrated in the model as follows:

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94.   *See* 12 U.S.C. § 24 (2006) (corporate powers of national banks); 12 U.S.C. § 29 (power of national banks to hold real property); 12 C.F.R. § 1.3 (2012) (permissible investment securities for national banks); *see also* OFFICE OF THE COMPTROLLER OF THE CURRENCY, ACTIVITIES PERMISSIBLE FOR A NATIONAL BANK, CUMULATIVE, 2011 ANNUAL EDITION (2012), *available at* http://www.occ.gov/publications/publications-by-type/other-publications-reports/bankact.pdf.
These restrictions apply to federally chartered banks, but similar restrictions apply to state chartered banks.

95.   *See* 12 U.S.C. § 84(a).

96.   In the author's view, the importance of affiliations has been vastly overemphasized and has served to distract attention away from the fundamental question of how the activity of maturity transformation should be addressed as a substantive matter. No one would suggest that the damage from the Lehman Brothers failure arose from its ownership of a tiny thrift institution. Yet the Volcker Rule is premised on the notion that systemic safety can be materially enhanced by "structurally" separating depository institutions from certain other activities—as though affiliations among different types of institutions were among the core problems. This anachronistic line of reasoning seems to have a persistent hold. Witness the new "ring-fencing" proposal from the U.K.'s Independent Commission on Banking, which envisions a form of structural separation between retail banking and wholesale banking. *See* INDEPENDENT COMM'N ON BANKING, FINAL REPORT 35–77 (2011), *available at* http://bankingcommission. independent.gov.uk/. To the extent that one accepts the account of market failure described in Part I of this Article, restrictions on affiliations and ring-fencing proposals must be viewed as nonresponsive to the fundamental problem.

Figure 2.2: Portfolio Restrictions
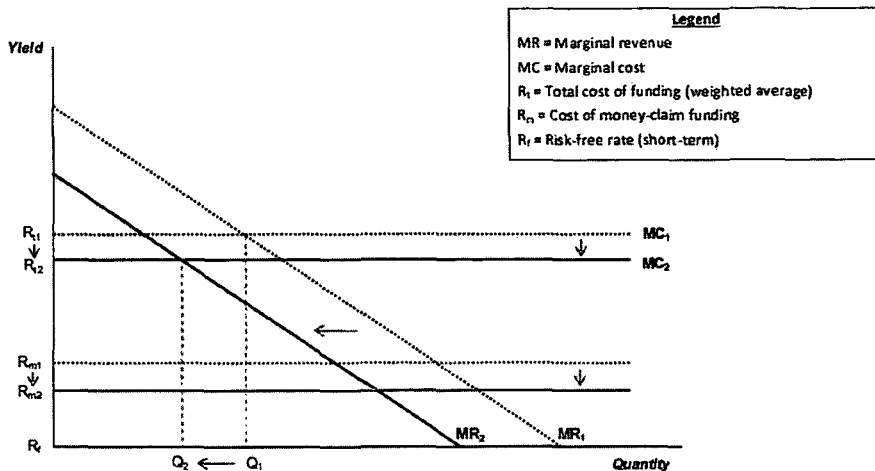
With portfolio restrictions, the *marginal revenue* curve shifts leftward: requiring the firm to forego its chosen revenue opportunities reduces its profits at any given level of production. The *marginal cost* curve shifts downward: insofar as the portfolio restrictions are effective, the firm's likelihood of default decreases, thereby reducing the firm's financing costs. It is evident that the shifts in these two curves have countervailing effects on firm profits. However, with portfolio restrictions, we should expect the firm's profits to be lower than they were in the absence of intervention. Otherwise, a rational firm would self-impose such constraints.

Imposing portfolio restrictions therefore reduces the total economic surplus generated by maturity transformation. Nevertheless, portfolio restrictions might increase overall economic efficiency if this reduction in economic surplus were outweighed by a corresponding reduction in run-externalities. Portfolio restrictions therefore present a tradeoff. An efficient calibration of portfolio restrictions would maximize the difference between (1) the value of such restrictions in terms of reducing run-externalities and (2) the cost of such restrictions in terms of reducing economic surplus from maturity transformation.

How might such an objective function be operationalized? Estimating the value of portfolio restrictions presents extraordinary practical challenges. It requires that regulators possess the capacity to assess, for any given level of portfolio restrictions, both the *likelihood* that issuers will default and the *extent* of run-externalities that would be generated thereby. The dynamics of run-behavior discussed in Part I.C make both of these assessments extremely problematic. Because

money-claimants are engaged in a coordination game, there is no way to determine what degree of fundamental deterioration will trigger a run. More importantly, no reliable method exists to predict what the consequences will be if a run does occur. (Consider the fact that senior government officials believed that the market was prepared for a Lehman Brothers bankruptcy.[97]) Suppose that, as Diamond and Dybvig suggest, a "commonly observed run" at one issuer is a potential focal point for money-claimants of other issuers.[98] Would money-claimants stage runs on other issuers if a given issuer defaulted? As a precautionary measure, would maturity-transformation firms then broadly reduce their exposures to the capital markets, causing a sharp reduction in the supply of financing? How might these developments affect aggregate economic activity? No model exists for answering these kinds of questions. The dynamics of run-behavior are inherently unpredictable, and the complexity of the financial system places these types of questions well beyond our calculative abilities.

These circumstances present a serious policy problem. If portfolio restrictions have a real social cost in terms of reducing economic surplus, as suggested in the diagram above, and if there is no reliable way to estimate the corresponding benefit, then the efficiency-maximizing level of portfolio restrictions is uncertain. Regulators might respond to this uncertainty by erring on the side of caution, imposing very onerous portfolio restrictions on money-claim issuers.[99] But erring in this direction would be costly; highly onerous constraints would have meaningful consequences for credit availability and economic growth. Conversely, erring toward leniency will preserve more economic surplus, but only at the cost of higher run-externalities—and reducing run-externalities was the reason for imposing portfolio restrictions in the first place.

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97.   *See, e.g.*, DAVID WESSEL, IN FED WE TRUST 11 (2009) ("With Lehman clearly struggling for survival, Paulson and Bernanke assured each other—and others on the call—that all the companies and traders that did business with Lehman had been given time to protect themselves from a possible Lehman bankruptcy."); *id.* at 21 ("One Fed official confided later in September that he had acquiesced in the decision to let Lehman go. Why? 'Because I thought people had anticipated it. They [Lehman Brothers] were still very big [but] they had shrunk a lot. It was time to find out what would happen if we didn't stand behind all these guys. It had been a long time coming.' With hindsight, that tough-guy stance looked, at best, naïve.").

98.   *See supra* Part I.C.

99.   In the extreme case, portfolio restrictions would permit money-claim issuers to own nothing but cash—a proposal sometimes referred to as "100% reserve banking." This proposal would prohibit maturity transformation. The economy's pooled cash reserves would sit idle. Run-externalities would be eliminated, but only at the expense of removing a huge amount of resources from the capital markets.

C. Capital Requirements

The foregoing analysis is easily extended to capital requirements. The following Figure illustrates the effect of capital requirements on the economic surplus generated by maturity-transformation firms:

Figure 2.3: Capital Requirements
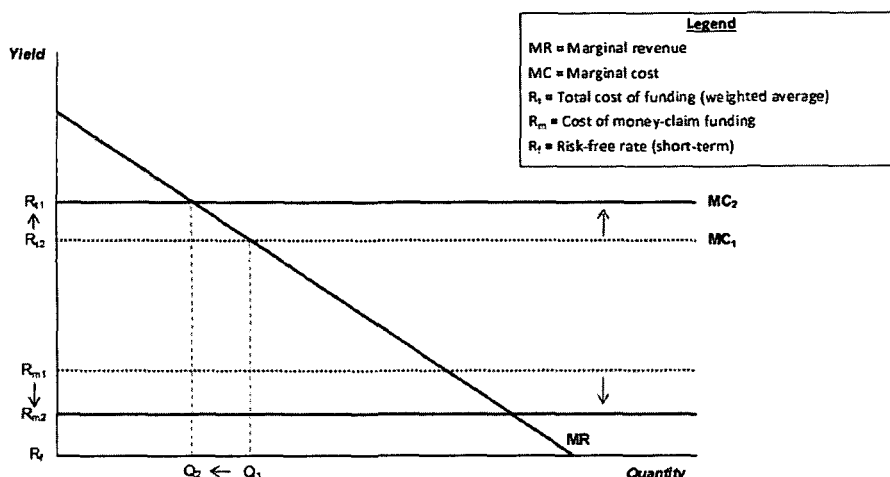
In this Figure, capital requirements shift the marginal cost curve upward: the firm's weighted average cost of financing increases to the extent that it is required to increase the proportion of equity (and therefore reduce the proportion of cheaper money-claims) in its financing structure. The quantity of production decreases, and economic surplus shrinks.

This conclusion is not universally accepted. Indeed, standard corporate finance principles suggest that, in the absence of tax effects and other artificial distortions, the firm's overall cost of financing should be unaffected by its financing structure.[100] This topic was addressed at some length in *Regulating Money Creation*. Without repeating that argument here, it is worth noting that this objection implies that maturity transformation per se does not generate

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100. This is the Modigliani-Miller theorem, a cornerstone of modern finance theory. *See* Franco Modigliani & Merton H. Miller, *The Cost of Capital, Corporation Finance and the Theory of Investment*, 48 AM. ECON. REV. 261 (1958). For an argument that questions whether higher capital requirements generate social costs, see Anat R. Admati et al., *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Expensive* (The Rock Center for Corporate Governance at Stanford University Working Paper Series No. 86, 2011), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1669704.

economic value.[101] Like *Regulating Money Creation,* this Article takes the position that economic agents derive instrumental value from the ability to park cash in liquid financial assets whose value relative to currency is extremely stable. These instruments provide a unique "money service" that is not available in other financial instruments, and they pay exceptionally low yields.

Accordingly, in the model shown here, capital requirements reduce the total economic surplus generated by maturity transformation. Nevertheless, as in the case of portfolio restrictions, capital requirements would increase *overall* economic efficiency if this surplus reduction were outweighed by a corresponding reduction in run-externalities. In this regard, regulators face exactly the same difficulty that was discussed above in the context of portfolio restrictions. Without a reliable way to judge the effect of capital requirements on both the likelihood and the consequences of future run-behavior, regulators face daunting challenges in finding an optimal calibration. Erring in either direction is costly.

The practical significance of these implementation challenges would be difficult to overemphasize. Without the ability to conduct meaningful cost-benefit analyses of portfolio restrictions and capital requirements, regulators are left to proceed on the basis of impressionistic judgments, speculative analysis, and "gut feel." As a result, the prospects for the successful, cost-effective prevention of money-claim panics through *ex ante* risk constraints alone are not promising. It is perhaps for this reason that, for nearly a century, U.S. financial regulation has supplemented regulatory risk constraints with *ex post* liquidity facilities to support money-claim issuers (or, at least, depository banks) in the event of a liquidity crisis. This Article now turns to an examination of this approach.

III.   CONDITIONAL SUPPORT AND SUBSIDIZED FINANCE

> Someday you guys are going to need to tell me how we ended up with a system like this. . . . [W]e're not doing something right if we're stuck with these miserable choices.
>
> —George W. Bush, September 16, 2008[102]

> Like other financial institutions, Goldman Sachs received an investment from the government as a part of its various efforts to fortify our markets and the economy

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101. If this were the case, then the problem of money-claim panics could easily be solved by outlawing money-claim issuance altogether.

102. James B. Stewart, *Eight Days,* NEW YORKER, Sept. 21, 2009, at 72. The President was reportedly speaking to Treasury Secretary Henry Paulson and Federal Reserve Chairman Ben Bernanke.

during a very difficult time. I want to express my gratitude and the gratitude of our entire firm.

—Lloyd Blankfein (CEO of Goldman Sachs), 2010[103]

Evaluating *ex ante* risk constraints in isolation may be largely academic. Arguably, the government cannot credibly commit never to provide *ex post* support in the event of a panic. To quote economists Robert Merton and Zvi Bodie:

> No matter how firm the government's commitment to relying on private markets, there is a problem of time inconsistency that limits their effectiveness.... [U]nder certain circumstances, it is socially optimal for the government to renege on its threat to allow banks to fail.... The government, therefore, is caught in a paradox of power. For market discipline to work, the government must bind itself convincingly not to bail out banks that get into trouble. But the government is too powerful not to intervene. Everyone knows that since government makes the rules, it can change them, too. Indeed, only an incompetent government would not intervene to stop a panic. But if the government will bail out depositors *ex post*, then there is implicit insurance, even if there is no explicit insurance *ex ante*.[104]

This Part considers the efficiency implications of *ex post* support facilities, which may be used alone or in combination with *ex ante* risk constraints. For purposes of the discussion that follows, *ex post* support can be understood as liquidity support from the central bank, that is, lender-of-last-resort authority.[105]

A. *Conditionality and Funding Subsidy*

It is obvious that *unconditional* liquidity support—a government commitment to always lend to certain firms if needed to prevent them from defaulting—would be equivalent to a government guarantee from the perspective of those firms' creditors. For illustrative purposes, it is useful to begin by considering this extreme, unconditional version of *ex post* support:

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103. *Wall Street and the Financial Crisis: The Role of Investment Banks, Hearing Before the Permanent S. Subcomm. on Investigations of the Comm. on Homeland Sec. & Governmental Affairs*, 111th Cong. 130–31 (2010).

104. Robert C. Merton & Zvi Bodie, *Deposit Insurance Reform: A Functional Approach*, 38 CARNEGIE-ROCHESTER CONF. SERIES ON PUB. POL'Y 6 n.16 (1993).

105. As detailed above, during the recent crisis *ex post* support also took the form of equity capital infusions and guarantee facilities for broad segments of the financial sector. These alternative modes of intervention originated from the Treasury Department and the FDIC, not the Federal Reserve. For present purposes, these distinctions are not significant. These alternative modes of intervention are conceptually similar to the lender of last resort, and the analysis that follows will not treat them separately.

Figure 2.4: Unconditional *Ex Post* Support
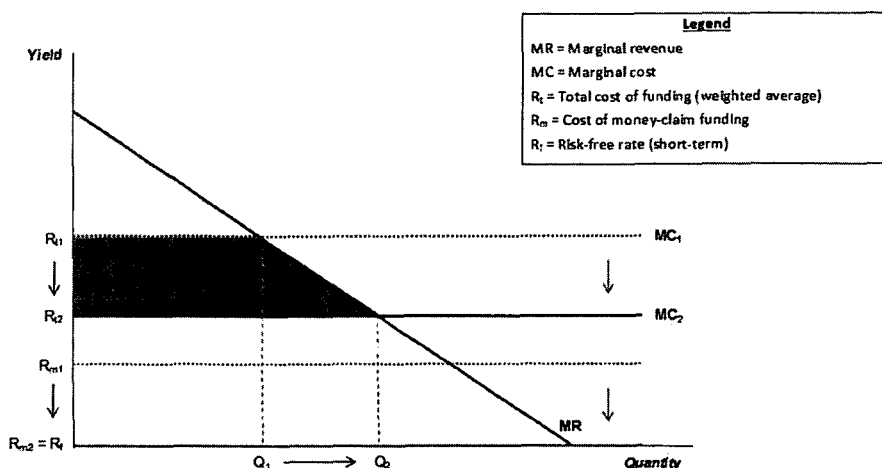
With unconditional support, the firm's cost of money-claim funding declines to its theoretical minimum, the risk-free rate (the x-axis). The firm's marginal cost curve shifts downward substantially. The quantity of production increases correspondingly.

Unconditional *ex post* support self-evidently eliminates run-externalities, as money-claim defaults are ruled out by definition. In effect, money-claims are guaranteed. Economic surplus (light gray area) remains unaffected. However, unconditional *ex post* support also creates a funding subsidy to the firm (dark gray area). The firm's lower cost of financing enhances its profitability on existing investments and enables it to profit from lower-value, and previously uneconomic, investment opportunities. The funding subsidy is extracted by the firm from the government. It represents an inefficient resource allocation.

The diagram above can be understood as a depiction of the "too big to fail" phenomenon—the notion that some institutions will not be allowed to default under any circumstances. Whether this regime of unconditional *ex post* support is superior to a laissez-faire regime depends on whether the costs of such support (in terms of funding subsidies) are outweighed by its economic benefits (in terms of reducing run-externalities). Understandably, though, this unconditional approach has few advocates, as it results in extreme subsidies to the financial sector.

One way to reduce the funding subsidy associated with *ex post* support would be to make that support conditional. Under this

version, the central bank declines to furnish *ex post* support to halt a run under certain circumstances. (The specification of these conditions will be a central question.) The effects of this conditional approach can be illustrated as follows:

Figure 2.5: Conditional *Ex Post* Support
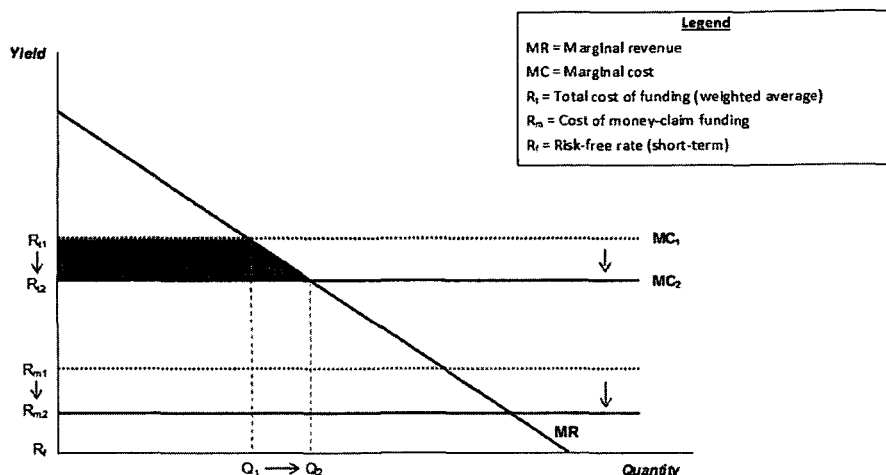
The prospect of *ex post* support effects a downward shift in the firm's money-claim funding curve: by virtue of the reduced probability of default, money-claimants are willing to accept lower yields. However, the cost of money-claim funding does not decline to the risk-free rate, because the firm still has a positive probability of default. The firm's marginal cost curve shifts downward, and the equilibrium quantity of production increases. These results are intuitive.

Like unconditional support, conditional support leaves the original economic surplus intact (light gray area). It also creates a funding subsidy (dark gray area), albeit a smaller one than under the unconditional approach. The size of this subsidy depends on the likelihood that, under a run-scenario, the government will intervene to support the firm.[106] However, the conditional approach does not completely eliminate run-externalities. Defaults by money-claim issuers will be allowed to happen under some circumstances. Whether the conditional approach is superior to the unconditional approach depends on whether the benefit of lower subsidies outweighs the higher (that is, nonzero) run-externalities.

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106. It is assumed that there is no informational asymmetry between the government and the market in this regard. That is, the central bank cannot be expected to successfully "bluff" the money-claim market regarding the likelihood of intervention—at least not forever.

In this regard, the nature of the conditions is critical. It is generally agreed that the central bank's exercise of its lending powers should be rule-based. Specifically, it is commonly argued that the central bank should lend only against prespecified forms of high-quality collateral and only at prespecified haircuts.[107] If the liquidity afforded under these rules is insufficient to meet the cash requirements of a given firm in distress, the firm should be allowed to default.

It is not obvious why such a policy—referred to herein as the "collateral policy"—should be expected to be efficiency-maximizing. There is little basis to suppose that defaults by firms that are unable to meet the central bank's collateral requirements during a liquidity crisis will not generate very serious run-externalities. (Consider again the example of Lehman Brothers.[108]) Nor is there any reason in theory to expect that the central bank's commitment to a strict collateral policy, even if credible, would induce maturity-transformation firms to fully "back" their money-claim funding with assets that the central bank has indicated are acceptable collateral. In fact, the history of fractional-reserve banking appears to offer conclusive empirical evidence to the contrary.[109] To be sure, a strict collateral policy will

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107. The term "haircut" refers to the difference between the value of the collateral and the face amount of the loan secured by that collateral.

108. Federal Reserve officials have stated that Lehman Brothers had insufficient high-quality collateral to create a legal basis to lend to the firm in sufficient size to prevent default—to use Bernanke's formulation, the Federal Reserve would have been "lending into a run." There is no reason to doubt the veracity of these statements. But they highlight the point made here, which is that collateral and solvency conditions to the exercise of lender-of-last-resort authority represent an impediment to the government's ability to minimize run-externalities—unless we accept the doubtful proposition that defaults by firms that do not meet such conditions will for some reason never produce serious negative consequences. One might have supposed that "lending into a run" was the *point* of lender-of-last-resort powers.

109. To the extent that maturity-transformation firms must forego their preferred investment opportunities in order to own more eligible collateral, they incur an opportunity cost. Firms must weigh this cost against the expected value of liquidity support. It is not obvious that the expected benefit would exceed the cost. When the Federal Reserve system was established in 1913, it was widely assumed that state banks would choose to join the system in order to have access to lender-of-last-resort support. However, as of 1922, only 15% of eligible state banks had joined the system—and the trend was toward withdrawal from the system. *See* Charles S. Tippetts, *State Bank Withdrawals from the Federal Reserve System*, 13 AM. ECON. REV. 401, 402 n.6 (1923) (noting that of the 11,326 eligible state banks, only 1,648 banks were members of the Federal Reserve system). Membership in the system required state banks to abide by modestly higher cash reserve requirements than were required under most state laws. According to one contemporaneous account:

> Probably the reason most frequently [given] for giving up membership has been the loss of interest on the reserve balance which must be kept with the federal reserve bank. . . . Many [banks] regard the loss as payment for insurance, and cheap insurance at that. But many member banks . . . claim that the protection given is charged at too high a rate.

limit subsidies and reduce the likelihood that the central bank will incur losses. But it will do so only at the expense of allowing greater run-externalities, the mitigation of which was the reason for establishing *ex post* support facilities in the first place. On the other hand, the more liberal the collateral policy, the more the system will resemble the unconditional support scenario described above, with large subsidies.

An alternative to the collateral policy would be to condition liquidity support on the balance-sheet solvency of the institution as a whole. While this "solvency policy" bears a superficial resemblance to the collateral policy, it has far different implications. First, to the extent that one places value on the incentive effects of market discipline by money-claimants, the solvency policy nullifies that value. The issuer does not default so long as the central bank views it to be fundamentally solvent; the central bank's discipline is substituted for money-claimants' discipline. Second, this solvency policy necessitates a more expansive set of institutional capacities from the central bank than the collateral policy described above. In order to assess fundamental solvency, the central bank must be capable of evaluating whatever asset portfolio the distressed money-claim issuer happens to own. The collateral policy, by contrast, contemplates lending only against familiar, prespecified classes of (presumably) relatively low-risk assets.

There is, however, one important characteristic that the collateral policy and the solvency policy have in common. By design, these rule-based regimes take no account of the expected run-externalities that might result from declining to lend in any particular case. Such externalities do not figure into the analysis of collateral adequacy or firm solvency. On reflection, this omission is odd, since the reduction of run-externalities was the rationale for establishing *ex post* support facilities in the first place.

This latter point raises a third alternative: the abandonment of a rule-based regime in favor of an ad hoc, case-by-case analysis of costs and benefits. This kind of multifactor analysis might take expected run-externalities into account. As such, it would suffer from deficiencies of its own. The first deficiency relates to the fundamental calibration problem discussed above in the context of *ex ante* risk constraints. The dynamics of run-behavior are such that no remotely reliable method exists to predict the consequences of default by a maturity-transformation firm. In the absence of such a method, regulators are left to rely on an inherently error-prone, gut-feel

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Id. at 404–05.

approach. Erring on the side of action generates inefficient subsidies. Erring toward inaction leaves intact the run-externalities that the *ex post* support regime was intended to reduce.

There is a second problem with this discretionary, ad hoc policy. As shown in the diagrams above, the quantity of production by a money-claim issuer is an increasing function of the likelihood of *ex post* support. (The more likely the support, the lower the marginal cost curve.) However, under the discretionary policy, the reverse should also be true: the likelihood of support should be an increasing function of the firm's production. This is because, all else equal, defaults by larger money-claim issuers should generate larger negative externalities than defaults by smaller ones. This circumstance leads to a perverse result. The initial introduction of possible *ex post* support shifts the marginal cost curve downward and increases the firm's portfolio size. This increased size, in turn, increases the likelihood of *ex post* support, causing a further downward shift in the marginal cost curve. This downward shift results in further portfolio growth, and so on. The result is a vicious circle:

Figure 2.6: Incentives to Grow
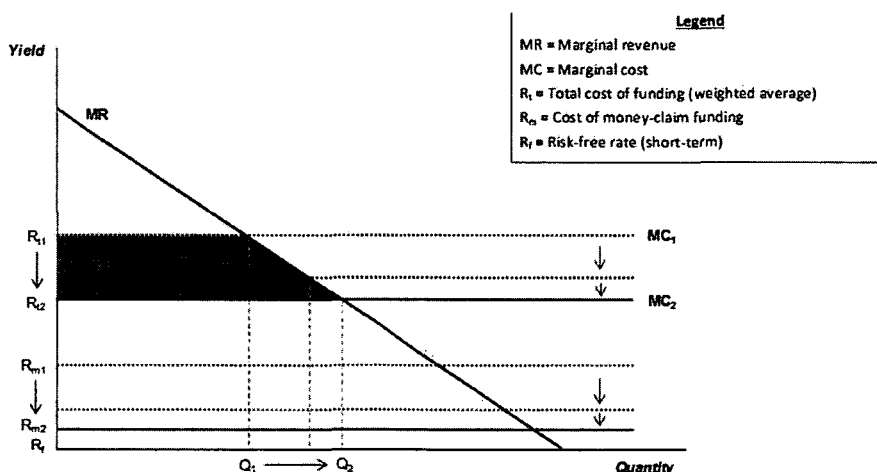
This adverse-feedback loop means that discretionary support creates incentives for money-claim issuers to grow. This regime of discretionary support (verging toward unconditional support) was the de facto policy of major industrialized nations, including the United States, in the years preceding the recent crisis. Public subsidies and dramatic financial-sector growth were a natural result.

The foregoing discussion has identified significant obstacles to the efficient design of *ex post* support policies. The unconditional

policy, the collateral policy, the solvency policy, and the discretionary policy each appear to have significant drawbacks. Apart from unconditional support, all of them leave open the possibility of run-externalities. Moreover, all of them are associated with public subsidies. This is a necessary consequence of a standing public credit commitment, even a purportedly "conditional" one, that is provided free of charge.[110]

B. *Moral Hazard Subsidy*

The term "moral hazard" is frequently used in a loose sense to characterize the subsidy described above. Strictly speaking, however, the government subsidy analyzed above is distinct from the effects of moral hazard. The subsidy discussed above might be termed a *funding subsidy*: a reduction in the cost of money-claim funding due to the potential for *ex post* support. Moral hazard refers to something else—namely, the incentive of a party that does not bear the full downside of its decisions to take greater risks. Moral hazard arises when portfolios are dynamic.

Basic options theory elucidates this concept. The value of an option is an increasing function of the volatility of the underlying asset. A party that does not fully internalize the costs of its actions (the put-owner) extracts value from the party bearing the downside (the put-writer) by increasing risk (volatility). Funding subsidies, by contrast, do not rely on this incentive effect.

The following figure depicts the effects of moral hazard arising from a conditional *ex post* support regime:

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110. Among the ironies of the lender of last resort is that the very firms that receive this subsidy are engaged in the business of charging substantial fees for undrawn credit commitments. None of these firms would write a credit commitment, even a conditional one, without charging for it!

Figure 2.7: Moral Hazard
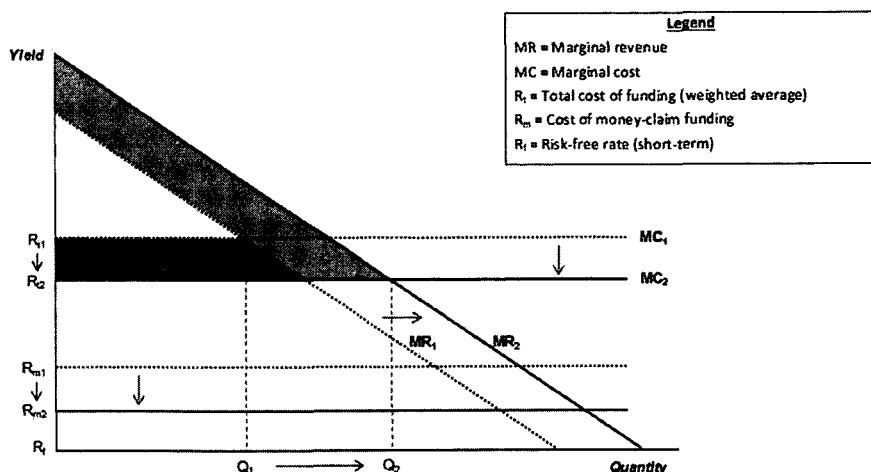
Moral hazard results in a rightward shift in the marginal revenue curve: the possibility of *ex post* support presents the firm with additional investment opportunities in riskier assets. This Figure depicts both *funding subsidy* (dark gray area) and *moral hazard subsidy* (medium gray area). It is evident that moral hazard subsidy flows directly to the firm: it represents a value transfer to the firm from the government—an inefficient resource allocation.[111]

This figure shows that *ex post* support has the combined effect of shifting the marginal cost curve downward and the marginal revenue curve rightward. Interestingly, *ex ante* risk constraints were previously shown to have exactly the opposite effect. Portfolio restrictions shift the marginal revenue curve leftward, and capital requirements shift the marginal cost curve upward. Such constraints might therefore be expected to have utility in counteracting the subsidies that are inherent in an *ex post* support regime. Notably, using *ex ante* risk constraints in this narrow manner—solely to counteract the effects of funding and moral hazard subsidies—does *not* require speculative assessments of run-externalities. Instead, calibration is based on a firm-specific analysis designed to return firm

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111. Moral hazard also shifts the (subsidized) marginal cost curve back upward somewhat, since riskier firms are more likely to default. The upward shift has the effect of mitigating the funding subsidy. However, any such reduction must be more than offset by the new moral hazard subsidy—otherwise the firm would not derive value from increasing risk.

risk to its unaffected level. This topic will appear again when the PPP regime is discussed in Part IV.

C. Capital Subsidy

Finally, there is one other subtle yet distinct form of subsidy that maturity-transformation firms enjoy as a result of the availability of *ex post* support facilities. Recall that a maturity-transformation firm's weighted average cost of financing is a function of two components: (1) its cost of money-claim funding, and (2) its cost of capital financing. As discussed above, the prospect of *ex post* liquidity support reduces these firms' money-claim funding costs. However, less obviously, it also reduces their costs of capital financing. This effect is referred to as *capital subsidy* in this Article.

Capital subsidy is an artifact of legal design. When money-claim issuers receive liquidity support from the government, they are protected from default and insolvency proceedings. However, without insolvency proceedings, there is no legal mechanism to impair or extinguish these firms' capital instruments, including subordinated and other long-term debt. As a result, capital instruments— particularly long-term debt—are prevented from serving a loss-absorbing function.[112] Thus the legal linkage between payment default and capital impairment generates an additional form of subsidy, one that is conceptually distinct from both funding subsidy and moral hazard subsidy. In the context of the diagrams sketched above, capital subsidy exerts additional downward pressure on the marginal cost curve.

Upon reflection, the legal linkage between payment default and capital impairment is not logically necessary. One can imagine various institutional mechanisms to permit capital impairment even while money-claims are honored in accordance with their terms. In fact, the FDIC's resolution regime for depository banks does exactly that: insured deposit instruments are honored seamlessly in resolution, while other creditor and shareholder claims are impaired or extinguished. One can even imagine institutional mechanisms to decouple payment default and capital impairment on a going-concern basis, without the need for administrative resolution.[113]

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112. AIG is the paradigmatic example from the recent crisis.

113. Recent "contingent capital" proposals aim to do exactly this: they convert long-term debt claims into residual equity claims on a going-concern basis under specified circumstances, with no payment default.

It should be clear, however, that the institutional decoupling of payment default and capital impairment, in and of itself, only addresses *capital* subsidy. So long as the government commits resources to avoid money-claim defaults, funding subsidies remain: money-claimants are indifferent as to whether the firm may enter "resolution," so long as their claims will be honored in full and on time. Likewise, moral hazard subsidies remain intact, as firms can still extract value from the prospect of *ex post* support by increasing risk *ex ante*. Finally, even with resolution tools, the government still faces the difficult problem of determining the circumstances under which money-claims will be honored within resolution, if at all. Will authorities follow the unconditional policy, the collateral policy, the solvency policy, the discretionary policy—or some other policy? As described above, each of these policies is associated with inefficiencies.[114]

Part I concluded that using *ex ante* risk constraints in isolation poses challenges for the optimal regulation of maturity transformation. It is now evident that *ex post* support is also problematic from an efficiency perspective—even if combined with *ex ante* risk constraints and even if supplied in the context of resolution proceedings.

D. *The Elusive Logic of the Lender of Last Resort*

It's as if the major banks have tapped a hole in the social till and they are drinking from it with a straw.

—Tyler Cowen (libertarian economist and blogger), 2011[115]

The foregoing discussion has sought to shed light on the distinct forms of subsidy that are entailed by the lender of last resort. These subsidies need to be disentangled before meaningful policy analysis can take place. Unfortunately, discussions in policy circles of the lender of last resort often gloss over these institutional defects.

Discussions of the lender of last resort often follow a predictable pattern. Proponents typically begin with a defense of the strict collateral policy.[116] They argue that the central bank should establish a policy of lending only against collateral that is practically

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114. These concerns have direct relevance to the new Orderly Liquidation Authority, a centerpiece of the Dodd-Frank Act. This topic will be addressed in Part V.

115. Tyler Cowen, *The Inequality That Matters*, AM. INTEREST, Jan. 2011, at 36.

116. The collateral policy is sometimes referred to as the "Bagehot rule," after Walter Bagehot, the legendary nineteenth-century English banker, essayist, and theorist. Bagehot articulated this policy in his masterwork. WALTER BAGEHOT, LOMBARD STREET: A DESCRIPTION OF THE MONEY MARKET (1873).

free from credit risk—say, Treasury and agency securities—and nothing else. This view implies that financial firms that lack sufficient risk-free collateral to support a central bank loan big enough to meet their obligations in a panic should simply be allowed to default. This position raises a basic question: If the reason for having a lender of last resort in the first place is to reduce run-externalities, to what extent should this strict collateral policy be expected to achieve that objective?

It often turns out that advocates of the strict collateral policy believe that, if this policy were credibly established, firms that issue money-claims would choose to fully back their money-claims with eligible collateral. As shown above, this "if you build it they will come" assumption is not easily defended, either theoretically or historically. Relatedly, it sometimes becomes apparent that adherents to this view just do not think run-externalities are very troubling. This position implies a measure of skepticism that there is any market failure to be addressed in the first place. In that case, one wonders why we should have a lender of last resort at all. At any rate, an *ex post* support policy that strictly limits itself to very narrow categories of collateral is unlikely to have much of an impact in preventing run-externalities.

Frequently, the discussion then takes a subtle turn. It becomes apparent that the commitment to the collateral policy is softer than it first appeared. The proponent's argument goes something like this: we should try to prevent panics by imposing *ex ante* risk constraints, but it is important to have a lender of last resort to rescue *solvent* financial firms in case a panic does happen. Thus the collateral policy morphs into the solvency policy—a fundamentally different position. This shift raises its own set of problems. It frequently becomes evident that the proponent does not believe that the solvency policy generates subsidies for the industry. When it is pointed out to the proponent that the policy reduces the probability of default and therefore necessarily reduces firms' funding costs, it becomes obvious that the proponent is resting on the assumption that the money-claim market in its laissez-faire state is *too* punitive—healthy financial firms default when they "should" stay open. This view logically implies that, to the extent that the solvency policy reduces funding costs, this reduction is appropriate. The solvency policy allows issuers to realize their true, fundamental funding costs, as opposed to the artificially high ones that prevail in a state of laissez-faire.

Even if this were accurate—and it is not an easy position to defend[117]—the solvency policy eviscerates market discipline by money-claimants. Under the solvency policy, the central bank, not the market, makes the ultimate decisions about which money-claim issuers should be permitted to fail. The institutional capacity required of the central bank to make valuation and solvency judgments is often glossed over in this context. Finally, there is the question of whether the default of an *insolvent* issuer might still result in catastrophic run-externalities. There is no doubt that the solvency policy enhances issuers' incentives to stay solvent (by the central bank's standards), but it does not follow that insolvencies will not happen. Would it be wise policy for the central bank to allow Bank of America, Citigroup, or J.P. Morgan to default if central bankers deemed them balance-sheet insolvent during a liquidity crisis? If the point of *ex post* support is to mitigate run-externalities, what reason is there to be confident that the solvency policy—which, by definition, does not take run-externalities into account—is the optimal approach?

At this point the discussion sometimes takes yet another turn. It turns out that the commitment to a solvency policy is also rather soft. The proponent suggests that *of course* the central bank must take run-externalities into account when deciding whether to extend liquidity support. The central bank, it is said, must make a context-specific judgment. Thus the solvency policy morphs into the ad hoc, discretionary policy. The problems with the discretionary policy must then be rehearsed: large subsidies for the largest firms; incentives for firms to grow larger in order to capture this subsidy; and the absence of any reliable means of estimating run-externalities, which makes satisfactory implementation of the discretionary policy extremely problematic.

It is instructive to conclude this discussion of *ex post* support by considering a potential variant that was not discussed above. First, imagine that the central bank adopts the collateral policy. That is, the central bank will lend only against prespecified categories of relatively low-risk collateral and only at prespecified haircuts. Second, imagine that money-claim issuers are required to abide by portfolio restrictions, and that that these portfolio restrictions are made *identical* with the collateral that the central bank will accept. In other words, money-claim issuers are permitted to own only those assets that have been deemed to be acceptable collateral. Third, and finally, imagine that money-claim issuers are required to abide by risk-based

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117. Is it not just as likely that money-claimants will fail to run on a balance sheet–insolvent issuer as it is that they will run on a balance sheet–solvent one?

capital requirements,[118] and that the amount of capital that must be held against each asset is *identical* with the central bank's prespecified collateral haircut for that asset.

Under these conditions, every money-claim issuer that was in compliance with the applicable portfolio restrictions and capital requirements would *by definition* meet all of the central bank's conditions for liquidity support in an amount up to the issuer's maximum permissible quantity of money-claim financing. In effect, the money-claims issued by compliant firms would be guaranteed by the central bank. Here the outlines of the PPP regime begin to take shape. The Article now turns to a consideration of this alternative.

IV. THE PUBLIC-PRIVATE PARTNERSHIP ALTERNATIVE

The creation of money is in many respects an example of a public good.

—Kenneth Arrow (winner of the 1972 Nobel Prize in economics), 1969[119]

The market will not work effectively with monetary anarchy. . . . Let us not waste this set of crises by exclusive recourse to jerry-built efforts to patch up the failed monetary anarchy we have witnessed.

—James M. Buchanan (winner of the 1986 Nobel Prize in economics), 2010[120]

Ex ante risk constraints and conditional *ex post* support, used either alone or in combination, are defective tools when it comes to the regulation of money-claim issuance. These techniques are arguably superior to the laissez-faire approach, but they entail significant social costs of their own. Specifically, they necessarily entail surplus reduction, inefficient subsidies, and/or the persistence of (unmeasurable) run-externalities. This Part turns to an evaluation of the third alternative: the public-private partnership system.

A. *Institutional Design*

In important respects, the PPP proposal resembles the existing regulatory regime for depository banks. The PPP proposal consists of the following basic elements, as outlined in the introduction:

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118. "Risk-based" capital requirements require issuers to hold relatively more capital against relatively riskier assets. Capital standards in many developed countries, including the United States, have been risk-based since the 1988 Basel Accord.

119. Kenneth J. Arrow, *The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Non-market Allocations*, in ANALYSIS AND EVALUATION OF PUBLIC EXPENDITURES: THE PPP SYSTEM 48 (Joint Econ. Comm. of Congress ed., 1969).

120. James M. Buchanan, *The Constitutionalization of Money*, 30 CATO J. 251, 251, 258 (2010).

1. Establish licensing requirements for the issuance of money-claims, and forbid the issuance of money-claims by unlicensed parties.
2. Require licensed entities to abide by *ex ante* risk constraints, including portfolio restrictions and capital requirements.
3. Establish an explicit government commitment to stand behind the money-claims issued by licensed entities—making them default-free.
4. Require licensed entities to pay ongoing, risk-based fees to the government in exchange for this public commitment.

The PPP system can be understood as a modernization of depository regulation along functional lines. Instead of licensing entities to issue deposit instruments, the PPP regime would license entities to issue money-claims ("deposits" being just one variety of money-claim). Instead of providing deposit insurance, the regime would establish money-claim insurance (though without coverage caps). Any issuer of money-claims, whether or not its money-claims were formally styled as "deposits," would be required to submit to the terms of this regime. Any firm that chose *not* to finance itself with money-claims would reside outside the system.

The PPP regime self-evidently reduces run-externalities to zero, as money-claim defaults are ruled out by definition. The government commits upfront to honor all money-claims; these instruments become sovereign obligations. In return for this explicit commitment, the government charges ongoing fees. The fees are risk based, meaning that the government charges higher fees to riskier issuers, as with the current deposit insurance system.[121]

It is useful to begin the analysis by supposing that the government can price this fee perfectly (an assumption that will be relaxed momentarily). The effect is as follows:

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121. The FDIC has employed risk-based deposit insurance fees since 1992, as required by the Federal Deposit Insurance Corporation Improvement Act (FDICIA) of 1991, 12 U.S.C. §§ 1811–1835A (2006).

Figure 3.1: Effect of Optimal Insurance Fee
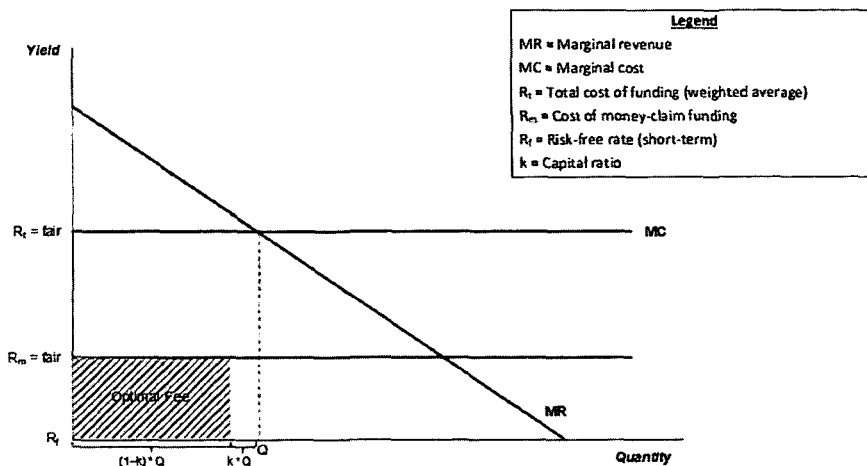
Although money-claimants supply funds at the risk-free rate, the optimal risk-based fee restores the marginal cost curve to its actuarially fair position. From the *firm's* perspective, the all-in cost of financing is unsubsidized. The quantity of production remains at its unsubsidized level.

A perfectly calibrated insurance fee thus achieves an optimal result. It permits full realization of economic surplus (light gray area in Figure 3.1) with no subsidies and no run-externalities. Actuarially fair fees exactly offset the government's losses over the long term. Losses are therefore mutualized among industry participants, with no costs to taxpayers. Notably, the introduction of risk-based fees presents the *theoretical* possibility of a perfectly efficient outcome—a feature not shared by *ex ante* risk constraints, *ex post* support, or their combination.

Realistically, implementation of the fee would not be perfect. Even with a mispriced fee, run-externalities would still be zero. However, imperfect fee pricing would generate inefficiencies[122]:

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122. Figure 3.2 shows the effects of an *under*priced fee. An *over*priced fee also generates inefficiencies, as it reduces economic surplus from maturity transformation. For ease of exposition, this scenario is not discussed.

Figure 3.2: Subsidies from Underpriced Fee
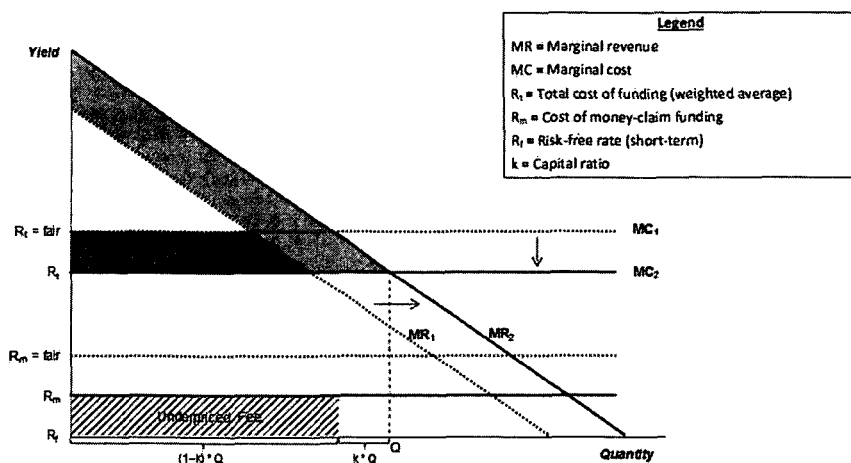
The Figure illustrates the distortive effects of imperfect fee pricing. There are two distinct problems. First, if the fee is underpriced, issuers enjoy a funding subsidy (dark gray area). Second, unless the monetary authority can update the fee continuously, issuers enjoy a moral hazard subsidy (medium gray area). The moral hazard subsidy arises from the fact that issuers' portfolios are dynamic: they can extract additional value from the government by increasing portfolio risk after the fee is set for a given period.

These two problems furnish a rationale for *ex ante* risk constraints under the PPP regime. Consider the first problem: imperfect valuation. It is reasonable to expect that the magnitude of the government's pricing errors will be lower to the extent that the fair value of the fee is closer to zero. To see why, suppose that the government systematically underprices the fee. Suppose also that the short-term risk-free rate is 2.0%. Observe that the fee has a lower bound of zero; the government will not charge a negative fee. If the actuarially fair cost of money-claim funding for a given firm is 4.0%, then the maximum absolute underpricing error is 2.0% (i.e., 4.0% less 2.0%). By contrast, if the actuarially fair cost of money-claim funding is 7.0%, then the maximum absolute underpricing error is 5.0% (i.e., 7.0% less 2.0%). A fee with a lower fair value leaves less room for underpricing.

Ex ante risk constraints—portfolio restrictions and capital requirements—reduce the fair value of the fee, all else equal. This fact is most easily expressed in terms of options theory. Under the PPP

regime, the government writes a put option on the firm's assets, struck at the face amount of its outstanding money-claims.[123] The fair premium for such an option is an increasing function of the volatility of the firm's asset portfolio. The fair premium also increases as the option comes closer to being in-the-money (i.e., as capital declines). Conversely, lower portfolio volatility and higher capital equate to a lower fair fee. Consequently, these two *ex ante* risk constraints should reduce costly fee-pricing errors.

Now turn to the second problem: the incentive to increase risk after the fee has been established for a given period. This incentive will manifest itself in two ways. First, issuers will seek to expand into riskier asset classes. Second, issuers will seek to increase the fraction of their balance sheets that they fund with cheap money-claims (as opposed to capital). In this context, the policy rationale for *ex ante* risk constraints—portfolio restrictions and capital requirements—is obvious.

On reflection, the utility of *ex ante* risk constraints as a component of a government insurance regime should not be surprising. Private insurance firms use these very techniques. Specifically, they: (1) charge premiums tailored to the degree of risk underwritten; (2) impose deductibles to align incentives and absorb "first loss"; and (3) impose covenants to constrain risk taking. These techniques are precise analogues to the PPP regime's risk-based fees, capital requirements, and portfolio constraints, respectively. In other words, the PPP system embodies the standard private-sector techniques for optimizing insurance contracts.

B. Implementation and Calibration

A central theme of Parts II and III was the problem of implementation. Both *ex ante* risk constraints and *ex post* support were shown to entail social costs (surplus reduction and subsidies, respectively). These costs come with a corresponding benefit: the reduction of run-externalities. However, the equilibrium selection problem—the fact that money-claimants are involved in a coordination game—makes estimating run-externalities very problematic. In the absence of a reasonably reliable way to estimate these negative externalities, regulators lack a legitimate basis for calibration.

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123. This insight is due to Robert Merton's pioneering work. Robert C. Merton, *An Analytic Derivation of the Cost of Deposit Insurance and Loan Guarantees: An Application of Modern Option Pricing Theory*, 1 J. BANKING & FIN. 3 (1977).

The PPP regime presents implementation challenges as well. The regime's three distinct tools—portfolio restrictions, capital requirements, and ongoing fees—each require calibration. How might regulators (collectively, the "monetary authority") go about calibrating these three tools?

Portfolio Restrictions. The monetary authority first faces the question of portfolio restrictions. Here, it faces a tradeoff. On the one hand, the riskier the assets on issuers' balance sheets, the greater the expected resource-misallocation costs of the regime. This consideration tends to favor the safest assets available, such as risk-free government securities. On the other hand, if the value of maturity transformation is to be realized, the set of permissible investments must be large enough to allow the proceeds of money-claim issuance to be deployed effectively. The optimal supply of money-claims[124] might far exceed the available supply of risk-free government obligations. This consideration favors a wider category of permissible investments, encompassing relatively riskier assets.

This analysis suggests that the PPP system's portfolio restrictions should be a function of both the desired supply of money-claims and the available categories of credit assets. The monetary authority starts by making the safest assets eligible. It then admits assets of increasing risk—that is, various types of consumer and business credit (loans and securities)—until an adequate supply of investment opportunities exists. Naturally, equity securities and other deeply subordinated instruments would be excluded.[125] In addition, regulators would seek to limit issuers to the safer end of the credit spectrum by establishing underwriting standards designed to minimize exposures to distressed or speculative credits. They would also impose diversification requirements to limit concentration risks. These techniques are part of the standard toolkit of depository regulation as it exists today.

The optimization of these portfolio restrictions poses nontrivial calibration challenges. But these challenges are not unique to the PPP system. *Any* plausible regime for the regulation of maturity transformation includes at its core a set of portfolio restrictions. Once the laissez-faire system is abandoned, the task of implementing portfolio restrictions appears to be unavoidable. Notably, under the PPP regime, the calibration of portfolio restrictions does *not* require

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124. Determining the optimal supply of money-claims is a question for monetary policy. This topic is beyond the scope of this Article.

125. Licensed issuers would also be prohibited from conducting commercial activities directly, which is just another type of equity exposure.

an inherently speculative assessment of run-externalities, which are ruled out by definition.

Capital Requirements. Second, capital requirements must be established. As seen above, capital requirements serve to reduce resource-misallocation costs by reducing likely pricing errors and counteracting the effects of moral hazard. However, there is a tradeoff here as well. The rationale for establishing the PPP regime in the first place—instead of just requiring money-claim issuers to hold 100% cash—is to mobilize otherwise idle cash reserves for deployment into the capital markets. Imposing capital requirements on money-claim issuers draws investment capital into a system whose very purpose is to generate investment capital for the real economy.[126] Accordingly, under the PPP regime, the monetary authority seeks to calibrate capital requirements so as to maximize the difference between (1) the benefit of capital requirements in terms of minimizing resource misallocation, and (2) their cost in terms of reducing the net investment capital generated by the maturity-transformation industry. The analysis above suggests that capital requirements should be *risk-based,* meaning that relatively more capital should be required to be held against relatively riskier portfolios (as is the case under modern depository regulation).

As with portfolio restrictions, optimizing capital requirements under this regime poses significant challenges. But, again, capital requirements are a feature of *any* plausible regime for the regulation of maturity transformation. The need to design and calibrate capital requirements, like the need to design and calibrate portfolio restrictions, cannot be avoided once the laissez-faire approach is abandoned. Importantly, under the PPP regime, the calibration of this tool does *not* require an inherently speculative assessment of run-externalities.

Ongoing Insurance Fees. Finally, risk-based fees must be calibrated. As described above, the monetary authority seeks to charge each issuer a fair premium for a put option written on the issuer's asset portfolio, struck at the face value of the issuer's outstanding money-claims. The value of this option is a function of the issuer's

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126. For illustration, suppose that the monetary authority seeks to generate $10 trillion of money-claims through the PPP system. (This figure is probably accurate to an order of magnitude.) A capital requirement of 8.0% would equate to an aggregate private sector equity investment in the PPP system of $870 billion [.08 * $10tn/(1 − .08)]. An increase in capital requirements to 9.0% would require a private sector equity investment of $989 billion—an increase of $119 billion. If this increased capital absorption were not offset by a corresponding benefit, the increase in capital requirements would generate a net social cost. (For simplicity, these calculations assume that all assets are risk-weighted at 100% under the capital regime.)

portfolio volatility and its level of capital (i.e., the difference between the value of the firm's assets and the face value of its money-claim liabilities). To estimate portfolio volatility, the monetary authority might take into account such factors as: the historical financial performance of the firm; the historical loss experience of the asset categories on the firm's balance sheet; secondary-market benchmarks for those asset categories; the pricing of the firm's capital instruments, if actively traded; publicly available credit ratings; assessments by brokerage research analysts; the quality of management; the adequacy of risk-management practices; and so on. These are the types of factors that depository banking regulators rely upon today in both prudential regulation and in setting deposit insurance fees. Once portfolio volatility has been estimated, the government can avail itself of widely used pricing models to value the put option. Because issuers' asset portfolios are dynamic, each firm's fee would be reset on a periodic basis.

Setting these fees presents a significant valuation challenge, and errors are costly. As described above, incorporating portfolio restrictions and capital requirements into the PPP regime should serve to reduce mispricing errors. These risk constraints should also reduce the degree to which issuers can extract value by increasing portfolio risk between periodic fee recalibration. Nevertheless, pricing will presumably be less than perfect.

C. Cost-Benefit Analysis

The following table provides a synoptic comparison of the three approaches to the regulation of maturity transformation considered in this Article, alongside the laissez-faire alternative:

	Laissez-Faire	*Ex Ante* Risk Constraints (in isolation)	Conditional *Ex Post* Support[127] (w/ *ex ante* risk constraints)	Public-Private Partnership
Economic Benefits				
Reduces Expected Run-Externalities	No benefit	Partial	Partial	Complete

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127. Conditional *ex post* support is shown in the "discretionary" variant, in which the monetary authority takes expected run-externalities into account in deciding whether to provide liquidity support in any given instance.

Economic Costs				
Reduces Economic Surplus	None	Yes	None (so long as risk constraints are not too high)	None (so long as fees and risk constraints are not too high)
Funding Subsidy	None	None	Yes	None (so long as fees and risk constraints are not too low)
Incentives to Grow	None	None	Yes	None (so long as fees and risk constraints are not too low)
Moral Hazard Subsidy	None	None	None (so long as risk constraints are not too low)	None (so long as fees and risk constraints are not too low)
Capital Subsidy	None	None	None (so long as combined with resolution authority)	None (so long as combined with resolution authority)
Implementation Challenges				
Requires Calibration of Portfolio Constraints and Capital Requirements	No	Yes	Yes	Yes
Requires Estimates of "Systemic" Consequences (Run-Externalities)	No	Yes	Yes	No
Requires Fee Pricing	No	No	No	Yes

It is useful to conclude with a comparative cost-benefit analysis of these alternative approaches:

Benefits. The rationale for government intervention in maturity transformation is to mitigate the run-externalities that are generated by the prospect of money-claim defaults. As shown in the first row of

the table, only the PPP system offers a complete solution to this problem. By design, the other regulatory approaches leave open the possibility of run-externalities. Considering this criterion in isolation, the PPP regime is superior.

> *Costs*. The PPP regime necessarily inhibits the operation of market discipline by money-claimants. Runs and panics are, after all, the very *manifestations* of market discipline by money-claimants. What is the social cost of this aspect of the PPP regime?

> It is useful to consider this question from the perspective of pricing. Under the PPP regime, the monetary authority occupies the senior-most position in the financing structure of money-claim issuers. It seeks to charge an actuarially fair price for its commitment, in the form of an ongoing risk-based fee. If the monetary authority's pricing of its senior claim were identical to the laissez-faire market price, the two regimes would result in exactly the same resource allocation, and the PPP regime would generate no costs. However, to the extent that the monetary authority's pricing of this senior claim is inferior to (less fundamentally accurate than) the market's, the PPP system generates inefficiencies. The pertinent question is whether the PPP regime's *relative* mispricing of this senior claim generates costs that outweigh the regime's stability-enhancing benefits.

> In this regard, it is important to return to one of the key implications of Part I.C In a state of laissez-faire, money-claimants are engaged in a coordination game that gives rise to an equilibrium selection problem. As a result, outcomes depend upon focal points that may or may not have fundamental significance. Because prices are determined by expected outcomes, it follows that money-claim *prices* in a state of laissez-faire may be affected by factors that lack fundamental significance. Indeed, it was argued above that money-claimants have relatively muted incentives to perform fundamental investment analysis. This discussion suggests that laissez-faire resource allocation in this market may be less than ideal to begin with.

> Laissez-faire distortions are important, because the policy question is one of *relative* accuracy. The architecture of the PPP regime is designed to reduce the expected magnitude of fee-pricing errors. Importantly, the PPP system does not abandon market forces entirely. Issuers are controlled by private shareholders who own residual claims. The terms of the partnership are such that shareholders lose their entire investment before the government loses any. Thus the PPP system seeks to harness the incentives of long-term capital providers to allocate resources efficiently. In view of these

design features, as well as laissez-faire distortions, the *relative* costs of the PPP regime might not be as great as they would appear at first.

Finally, it merits emphasis that *ex post* support facilities, such as the lender of last resort, inhibit market discipline as well. Nevertheless, it is not uncommon for those who disapprove of the PPP regime on "market discipline" grounds to nevertheless support *ex post* support facilities. These positions are not easily reconciled. Under an *ex post* support regime, the monetary authority substitutes its own valuation for that of the market, at least under some circumstances. The more expansive these circumstances, the less market discipline can be said to have any operative significance. Conversely, the less expansive these circumstances, the greater the degree of run-externalities that remain.

Implementation Challenges. Once the laissez-faire approach is abandoned, the calibration of regulatory techniques is unavoidable. The discussion above stressed the difficulty of estimating the run-externalities associated with any given level of *ex ante* risk constraints, or with any given *ex post* support policy. Any regulatory regime under which money-claim defaults remain possible will encounter this basic problem. In policy discussions, this difficulty is often dismissed as a mere technical detail of implementation, to be worked out later. Yet there is little reason to be confident that analytical techniques can be devised that will make this problem more tractable. As Schelling noted, equilibrium selection "may depend on imagination more than on logic."[128]

One of the key virtues of the PPP regime is that portfolio restrictions and capital requirements are rationalized within a unified framework, with no need to rely on inherently speculative estimates of run-externalities. This is not to suggest that calibration under the PPP regime is a simple matter. However, all else equal, we should prefer regulatory approaches that rely upon more manageable judgments.

D. *International Considerations*

The discussion so far has neglected cross-border considerations. The PPP system would be rendered ineffective if foreign-domiciled entities were able to issue large quantities of dollar-denominated money-claims outside the perimeter of the regime. This phenomenon, of course, exists today. Foreign banks issue Eurodollar obligations— typically to U.S.-based cash parkers—and invest the proceeds back

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128. SCHELLING, *supra* note 76, at 57.

into the U.S. credit markets. This is classic fractional-reserve banking. It involves the issuance of monetary instruments denominated in dollars. However, it takes place outside the reach of U.S. monetary authorities. During the recent crisis, the panic in the Eurodollar market prompted a massive policy response from the Federal Reserve, peaking at a staggering $580 billion in U.S. dollar funding to *foreign* institutions via liquidity swaps with foreign central banks.[129]

For the PPP regime to work, this form of avoidance would need to be addressed. To this end, a new international accord would be needed—perhaps a "Basel money-claim accord" to complement the existing Basel capital accord. The terms of this accord would be fairly straightforward. States would agree to prevent domestic entities from issuing money-claims denominated in nondomestic currencies. Essentially, the Eurocurrency markets[130] would cease to exist in their current form. To be clear, the accord would not prevent, say, a German bank from owning a *U.S.-domiciled* issuer of dollar money-claims (which would be subject to the U.S. PPP regime). The German bank could therefore offer dollar money-claims to its own clients. In effect, the international accord would acknowledge money creation as a sovereign prerogative.

V.   CONCLUSION

A.   *Observations on the Existing Regulatory Structure*

What approach to maturity transformation does our current regulatory system take: laissez-faire, *ex ante* risk constraints, *ex post* support, or public-private partnership? The answer is all of them—or none of them. The functional activity of maturity transformation per se has no regulatory status. Money-claims are not a cognizable regulatory category; their issuance has no operative legal significance.

Issuers of deposit instruments are a special case. Insured depository institutions operate under a regime that approaches a public-private partnership.[131] They are subject to portfolio constraints and capital requirements; the government stands behind the insured

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129. The original crisis-related liquidity swaps expired in February 2010, but they were revived in May 2010 in response to renewed strains in the Eurodollar markets.

130. This term refers to deposit liabilities that are denominated in nondomestic currencies, irrespective of where the issuer is domiciled.

131. Until quite recently, this resemblance was rather crude. Under the PPP system sketched above, it is essential that both capital requirements and ongoing fees be *risk based*. While deposit insurance has been with us for eighty years, these two critical tools have been risk-based for only the past twenty or so.

deposits they issue; they pay ongoing fees in return for this support; and nondepositories are legally prohibited from issuing deposit instruments. As a historical matter, this approach appears to have been stability enhancing. Since the inception of this system, no insured depositor runs have taken place.

Issuers of money market mutual fund shares, too, fall under a special regime. However, theirs is not a public-private partnership but rather a risk-constraint regime. Money market mutual funds are limited to a narrow range of permissible investments, and they must abide by strict diversification requirements.[132] While these institutions did receive *ex post* support during the recent crisis, subsequent legislation has called into question whether such support would be available in the future.[133]

What about other types of money-claims—how are their issuers regulated? It depends. Consider the market for short-term repurchase agreements. Many repo issuers are owned directly or indirectly by bank holding companies (because they are affiliated with depository institutions), in which case their issuers fall under the Federal Reserve's regulatory and supervisory aegis.[134] As a result, such issuers are subject to consolidated capital requirements and certain restrictions on affiliations. But not all repo-funded dealers are owned by bank holding companies. For that matter, many hedge funds issue repo as well, and they fall outside of any meaningful regulatory regime. Looking beyond repo to other money-claims—such as financial commercial paper, asset-backed commercial paper, and Eurodollar obligations—it is apparent that our regulatory system does not adopt a consistent approach to maturity transformation.[135]

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132. *See* Investment Company Act of 1940 Rule, 17 C.F.R. § 270.2a-7 (2012) (detailing permissible investments and diversification requirements).

133. The Treasury Department's guarantee of the MMMF industry represented a staggering $3 trillion national public commitment. Congress has since removed the legal basis for this guarantee. *See* Emergency Economic Stabilization Act of 2008 § 131(b), 12 U.S.C. § 5236(b) (2011) ("The Secretary is prohibited from using the Emergency Stabilization Fund for the establishment of any future guaranty programs for the United States money market mutual fund industry.").

134. All bank holding companies have been subject to regulation and supervision on a consolidated basis by the Federal Reserve since the enactment of the Bank Holding Company Act of 1956, Pub. L. No. 84-511, 70 Stat. 133 (codified as amended at 12 U.S.C. §§ 1841–52 (2006)).

135. It is possible that some money-claim issuers that are not otherwise subject to robust regulation will be brought under the Federal Reserve's regulatory umbrella pursuant to the new "systemic designation" authority under Section 113 of the Dodd-Frank Act. (Indeed, "the degree of reliance on short-term funding" is one of ten open-ended factors that the Financial Stability Oversight Council is required to consider in making these determinations.) But the operative word here is *possible*.

Likewise, lender-of-last-resort support from the Federal Reserve is generally available only for depository banks.[136] While nondepositories may receive such support under "unusual and exigent circumstances," the Dodd-Frank Act has imposed significant limitations on this exception.[137] Carving back on *ex post* support should be expected to reduce subsidies. But there is little reason to believe that, in the absence of *ex post* support, catastrophic panics will not happen. Panics were the reason for the establishment of *ex post* support in the first place.

It is often argued that the new Orderly Liquidation Authority ("OLA"), one of the centerpieces of the Dodd-Frank Act, has provided the critical tool to thread the needle—to allow financial firms to fail in an "orderly" way, while impairing creditors, protecting taxpayers from losses, and preventing damaging run-externalities. This topic was covered at length in *Regulating Money Creation*.[138] For present purposes, it can simply be noted that OLA was not designed to prevent money-claim defaults, nor does it provide a reliable means to do so. Indeed, the FDIC has indicated that money-claimants under OLA will experience default "in virtually all cases."[139] This new authority therefore cannot be expected to avoid the equilibrium selection problem or materially mitigate run-externalities. True, OLA was modeled closely on the FDIC's existing resolution regime for depository banks, and depository failures have been rendered relatively benign since the advent of that system. But it seems likely that the key to orderly depository failures is not depository "resolution" per se, but rather deposit *insurance*. OLA does not replicate this cornerstone of depository regulation. By contrast, the PPP proposal does.

In short, unless a money-claim issuer happens to be a depository bank, it is not explicitly eligible for *ex post* support, and it may or may not be subject to *ex ante* risk constraints. If the functional activity of maturity transformation (money-claim issuance) is indeed associated with a market failure, then our existing regulatory structure, even as recently modified, does not embody a coherent

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136. Federal Reserve Act § 13(3), 12 U.S.C. § 343 (2006) (subsequently amended by §1101(a) of the Dodd-Frank Act, Dodd-Frank Wall Street Reform and Consumer Protection Act §1101(a), Pub. L. No. 111-203, 124 Stat. 1376 (2010) (codified at 12 U.S.C. § 343 (2011))).

137. Dodd-Frank Wall Street Reform and Consumer Protection Act §1101(a), 12 U.S.C. § 343. These changes were reviewed in detail in *Regulating Money Creation*.

138. *See* Ricks, *supra* note 2, at 122–29.

139. Orderly Liquidation Authority Provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act, 76 Fed. Reg. 4207, 4211 (Jan. 25, 2011) (codified at 12 C.F.R. pt. 380 (2012)).

approach to this problem. Furthermore, if this market failure is *the* central problem for financial regulatory policy—as this Article has suggested—then recent reforms would appear to have been broadly misdirected.

B. Some Implications

[W]hat we call necessary institutions are often no more than institutions to which we have grown accustomed . . . .

—Alexis de Tocqueville, 1850[140]

Conceptually, the PPP approach is conservative. It represents a logical evolution of a set of tools that has been used in the United States for decades, with reasonable success. No new regulatory capacities, techniques, or institutions would be required. As a matter of regulatory organization, the regime could be administered by a single monetary authority. Alternatively, it could be administered through a fragmented system—like our existing system, under which monetary policy, prudential oversight, and deposit insurance/resolution responsibilities are allocated to different agencies. These are matters of detail.

In terms of the industrial organization of finance, however, adopting the PPP approach would have far-reaching consequences. Large portions of the financial industry that currently rely heavily (directly or indirectly) on money-claim funding would be required to term out their financing structures. The effects on the profitability and size of these firms would be very substantial. Relatedly, the PPP regime should be expected to result in higher bid-ask spreads in the capital markets, reducing overall capital mobility to some degree. Moreover, the money market mutual fund business model would be rendered uneconomic.[141] These effects are undesirable when considered in isolation. However, the removal of a subsidy is necessarily costly to its beneficiaries.

More important are the costs of imperfect implementation. Like the available regulatory alternatives, the PPP regime requires the monetary authority to make difficult appraisals of value. Any deficiencies in its appraisals would generate social costs. However, this is true of any government intervention to address a market

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140. ALEXIS DE TOCQUEVILLE, THE RECOLLECTIONS OF ALEXIS DE TOCQUEVILLE 101 (Alexander Teixeira de Mattos trans., The Macmillan Co. 1896).

141. MMMF portfolios consist entirely of money-claims, which would all be federally insured under the PPP regime, reducing their yield. In addition, MMMFs would be required to pay ongoing fees and abide by capital requirements, since their "shares" are themselves money-claims. It is very unlikely that this business model would generate sufficient returns to be viable.

failure—from national defense, to antitrust enforcement, to environmental protection, to the provision of infrastructure, and so on. The costs of publicly underwriting the money supply through the PPP system must be weighed against the benefits of monetary stability, which appear to be substantial.

APPENDIX A: SOURCES FOR MONEY-CLAIM FIGURES

Measure	Source	Notes
Currency in Circulation	Federal Reserve Bank of St. Louis – Economic Research Division ("FRED")	Year-end data.
Federal Reserve Balances	FRED	Year-end data.
Treasury Bills	2011 Economic Report of the President – Table B-87	Year-end data.
Insured Deposits	Federal Deposit Insurance Corporation ("FDIC") – 2011Q1 Quarterly Banking Profile	Estimated Insured Deposits reported by the FDIC; Q4 data.
Short-Term Agency Securities	Bloomberg (Government Sponsored Enterprise ("GSE") short-term borrowing); 2010 Annual Reports for Fannie Mae and Freddie Mac; Federal Home Loan Bank ("FHLB") Office of Finance Annual Reports (discount notes)	FHLB discount notes extrapolated prior to 1998 (as a constant proportion of GSE short term borrowings). Year-end data except for Freddie Mac 2010, whose short-term debt measure is an average balance.
Primary Dealer Repo	Treasury Department Financial Stability Oversight Council ("FSOC") 2011 Annual Report Chart 5.2.43; Federal Reserve	Extrapolated prior to 1995 (as a constant proportion of financial commercial paper); Q4 data.
Asset-Backed CP	Federal Reserve Data Download Program; FRED	Pre-2001 data reflects Federal Reserve's old method; 1991 figure not available, so set equal to 1992; December data. 2001-2010 data reflects Fed's new method; year-end data.
Financial CP	Federal Reserve Data Download Program; FRED	Pre-2001 data reflects the Fed's old method; December data. 2001-2010 data reflects the Fed's new method; year-end data.
Nonfinancial CP	Federal Reserve Data Download Program; FRED	Pre-2001 data reflects the Fed's old method; December data. 2001-2010 data reflects the Fed's new method; year-end data.

Measure	Source	Notes
Eurodollar Deposits	FDIC 2011Q1 Quarterly Banking Report; McGuire & von Peter, *The US Dollar Shortage in Global Banking, BIS Quarterly Review* 54 (March 2009)	Sum of (1) the FDIC's reported foreign office deposits and (2) McGuire and von Peter's $2.2 trillion Eurodollar deposit estimate for 2007 extrapolated before and after 2007 (as a constant proportion of the FDIC's reported foreign office deposits). Q4 data.
Government Money Market Mutual Funds	Investment Company Institute 2011 Investment Company Factbook	Year-end data.
Nongovernment Money Market Mutual Funds	Investment Company Institute 2011 Investment Company Factbook	Includes both the nongovernment and tax-exempt categories reported in the ICI Factbook; year-end data.
Liquidity-Put Bonds	FSOC 2011 Annual Report Chart 5.2.42; Federal Reserve	2005-2010 estimates are the sum of the average amounts outstanding of Tender Option Bonds, Auction Rate Securities, and Variable Rate Demand Bonds; extrapolated prior to 2005 (as a constant proportion of ABCP); year-end data.
Uninsured Deposits	FDIC 2011 Quarterly Banking Report	Calculated by subtracting Estimated Insured Deposits from Domestic Office Deposits; Q4 data.