

Staff Papers

Understanding the Risks Inherent in Shadow Banking: A Primer and Practical Lessons Learned

*by David Luttrell
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Understanding the Risks Inherent in Shadow Banking: A Primer and Practical Lessons Learned

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Abstract

Examinations of the 2007–09 financial crisis often use the term “shadow banking.” This paper explains the form and functioning of the shadow banking system, how it relates to systemic risk and the recent financial crisis, and what particular aspects should be highlighted to benefit policymakers as they implement new regulations designed to enhance financial market resiliency. The paper is divided into two parts: The first serves as a primer on shadow banking; the second provides a narrative of how the system froze during the financial crisis and pertinent lessons learned for the current reform effort.

JEL codes: G01, G18, G21, G28

Keywords: Shadow banking, systemic risk, “too big to fail,” moral hazard, regulatory reform

I: A Primer on the Shadow Banking System

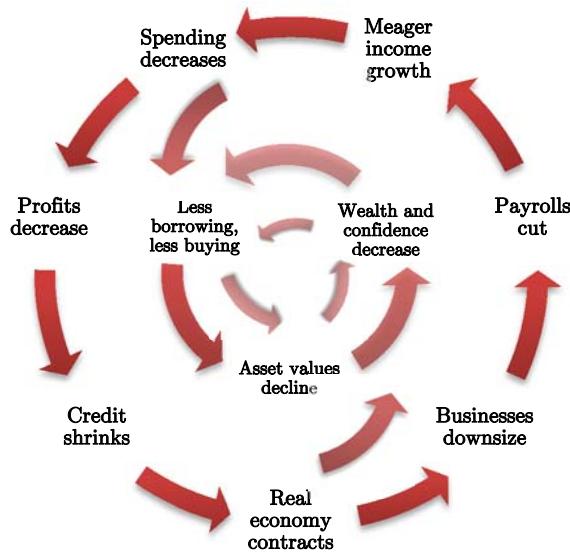
Through the 2007–09 financial crisis, the term “shadow banking” appeared in headlines and descriptions of the contagion in money and capital markets. This paper provides a narrative of the role and inherent risks of the shadow banking system, describing its basic functioning and development, rise to prominence, and precipitous decline.

1. SYSTEMIC RISK

Under the Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank), the Financial Stability Oversight Council (FSOC) was created and tasked with monitoring the systemic risk present in financial markets and designating systemically important financial institutions (SIFIs), firms whose failure poses a risk to the national economy. Dodd–Frank, enacted in 2010, also requires that the Federal Reserve System’s supervision and regulation adopt a macroprudential approach—risks to the overall functioning of financial markets must be considered beyond those normally encountered at individual firms.

Arguably, the Fed's most prominent Dodd-Frank responsibility is monitoring systemic risk—a threat carrying the potential to incite widespread panic and contagion in financial markets, resulting in significant negative spillover to the real economy and credit markets. Systemic events often result in a sharp contraction of credit, which slows economic activity and, in turn, further curtails credit. This generally occurs along with declining asset values, which produce negative wealth effects. These forces tend to reduce individual propensity to consume, putting further downward pressure on economic activity. Many economists refer to these linked and self-perpetuating events as an “adverse feedback loop”; we call it the “negative vortex” (*Figure 1*). In the absence of specific policy measures ensuring proper financial system operation, this negative self-feeding cycle can trap the economy in a suboptimal state in which resource utilization persists below historic levels, unemployment remains elevated, and economic growth is below trend.

Figure 1: Negative Vortex



An Unusually Uncertain Time

Although many of the negative forces seen in Figure 1 have abated, some lingering effects remain. Fed Chairman Ben Bernanke (2011) emphasized, “While a great deal has been accomplished since [Dodd–Frank] was passed ... much work remains to better understand sources of systemic risk, to develop improved monitoring tools, and to evaluate and implement policy instruments to reduce macroprudential risks. These are difficult challenges, but if we are to avoid a repeat of the crisis and its economic consequences, these challenges must be met.” Economic expansion and the outlook for the U.S. have remained *unusually uncertain* following the financial crisis, despite stimulative monetary and fiscal policies (Bernanke 2010).

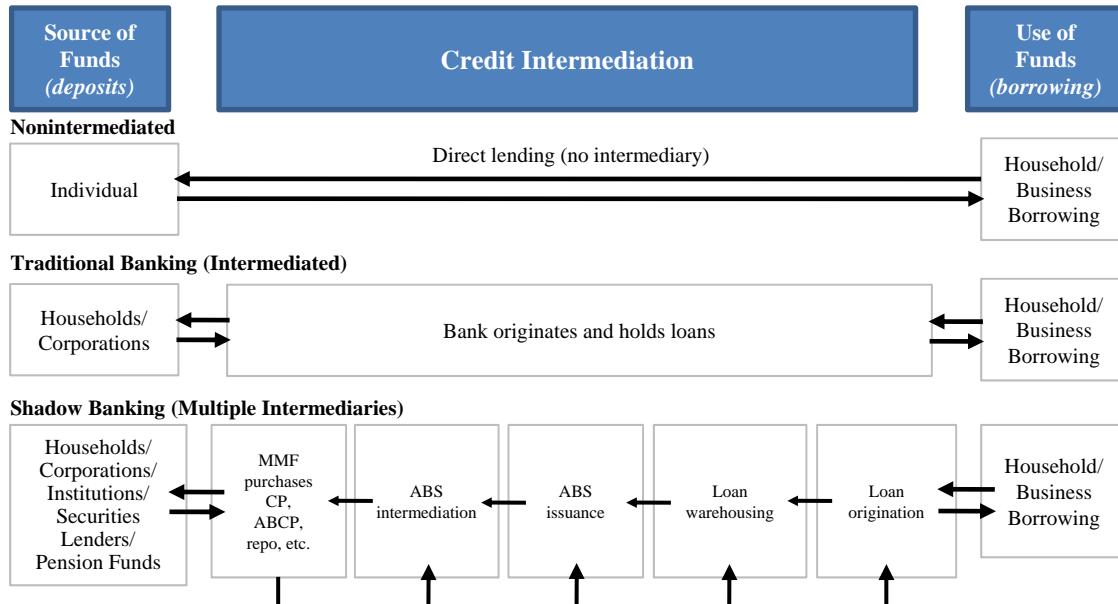
Our nation has yet to fully address and overcome the dysfunction caused by the debt-infused boom that preceded the bust. This study of shadow banking—market-based credit intermediation entities and activities outside the regular banking system—attempts to retrace where we have been in the hope of finding where we need to go.

2. FINANCIAL INTERMEDIATION

To understand the shadow banking system and gain perspective on its complexity, it is necessary to comprehend the traditional banking system and the service it provides. Figure 2 depicts the most common types of credit intermediation: a) nonintermediated, direct lending, b) intermediated lending through traditional banking, and c) intermediated lending via shadow banking.

In nonintermediated lending, the borrower and lender interact directly—as in direct financing between a corporation and debt investor. Intermediated lending is the service banks provide—taking deposits from customers (the ultimate lenders) and making loans to consumers and businesses (the ultimate borrowers). As will be discussed, shadow banking is an intermediated, market-based form of lending involving entities and activities outside the traditional commercial banking system.

Figure 2: Channels of Financial Intermediation



NOTE: MMF is money market mutual fund, CP is commercial paper, ABCP is asset-backed CP, repo is repurchase agreement, and ABS is asset-backed securities. See Glossary for definitions.

3. THE TRADITIONAL BANKING SYSTEM

Before the 1970s, banks were the primary means of credit extension between lenders and borrowers. In traditional banking, the lenders are primarily households with savings and businesses with excess cash to deposit; the borrowers are households and businesses requiring loans for homes, goods, and capital investment. Banks, as financial intermediaries, are agents that undertake three critical activities: maturity, liquidity, and credit transformation.

Maturity Transformation. Banks use short-term deposits to fund longer-term loans. Traditional deposits are a bank's liabilities, collected in the form of savings and checking accounts and redistributed as loans to consumers and businesses.¹ Because short-term deposits are a bank's liabilities and long-term loans are its assets, there is an inherent risk in maturity transformation. Because the maturity of the loans is longer than that of the liabilities, a bank assumes interest rate risk. When interest rates increase, the value of a bank's assets declines more than the value of its liabilities, assuming all else holds equal. Interest rate risk was once a significant concern, but interest rate hedges now commonly reduce its effects.

Liquidity Transformation. Closely related to maturity transformation, liquidity transformation refers to the fact that a bank's assets are less liquid than its liabilities. Depositors' money (the liabilities that fund

¹In addition to deposits, a bank's liability structure typically includes short-term notes, certificates of deposit, and interbank loans. However, deposits make up the majority of typical commercial bank liabilities, 76 percent on average as of fourth quarter 2011, according to Federal Reserve H.8 data. While this is significantly lower than the 95 percent share typical in the early 1970s, deposits have risen from about 70 percent in early 2008.

the assets) is available “on demand” at any time, while the loans (a bank’s assets) have a longer, often fixed life. Most banks worldwide are required to hold only a fraction of bank deposits as cash on hand, available for withdrawal. This allows the banking system to “create money” after meeting the reserve requirements mandated by central banks. If all depositors simultaneously withdraw their funds, a bank is forced to sell assets to meet depositor demand. Such mass exits at fire-sale prices can cause bank insolvency as the value of assets declines below the value of liabilities.

Credit Transformation. While any individual loan carries risk specific to that transaction, a bank diffuses its overall risk exposure by lending to a large number of borrowers. Despite this diversification, the riskiness of a bank’s assets usually exceeds that of its liabilities. The credit quality of the debt issued by an intermediary is enhanced by the priority of claims. Senior deposits are of better credit quality than the underlying loan portfolio because the intermediary’s junior equity is available to absorb any losses. Taking on this credit risk is typically how banks earn a return above the cost of their liabilities, a concept known as net interest margin. Assuming banks hedge interest rate risk, they can earn the difference between their cost of funds (the weighted average rate paid on liabilities) and the weighted average rate at which they lend.

Walter Wriston (1986), renowned banking leader and former chief executive officer of Citicorp (later, Citigroup) from 1967 to 1984, described commercial banks as “depository institutions that will take your money for safekeeping, pay you a rent called interest for the use of your money, and then lend it to a third party—if possible, at a rate sufficiently higher than the rent to cover their costs of operation and, if managed properly, make a profit to finance their future growth.”

Traditional Banking Backstops

Any financial institution that takes on maturity transformation faces the possibility of a run—large numbers of depositors simultaneously demanding their funds, typically at a time of panic. Bank runs were commonplace in the nineteenth and early twentieth centuries, with thousands of banks failing in the 1920s and early 1930s alone. A primary factor contributing to the prevalence of bank runs was a lack of deposit insurance.

Deposit Insurance. At the first sign (or rumor) of trouble, depositors had every incentive to withdraw money from a potentially distressed bank. Because deposits were returned at par (one hundred cents on the dollar) until the bank became insolvent (or halted withdrawals), it paid to be the first person in line to retrieve money. In effect, there was a value transfer from late withdrawers to early withdrawers, incentivizing a rapid response to any concerns. Due to these incentives, the mere specter of insolvency could become a self-fulfilling prophecy. Thus, depositors’ panic and coordinated action increased the likelihood of systemic failure even though no single bank was large enough to collapse the system on its own. In addition to curtailing lending, panics also reverberated to the real economy by means of disrupted trade and damaging psychological effects. As people saw bank runs emerge, they hoarded currency. Many businesses would not accept checks—or would discount them severely—because they did not trust that the bank backing the check would honor its obligation.

To alter this paradigm, individual incentive to run had to change; depositors needed to feel their money was safe in times of panic. To engender confidence in the security of deposits, the Banking Act of 1933 established the Federal Deposit Insurance Corp. (FDIC), backed by the full faith and credit of the United States government. The FDIC collects fees from member banks and insures deposit accounts (currently up to \$250,000) to protect depositors in the event of bank insolvency. The FDIC began providing insurance on January 1, 1934, and since then, no depositor has lost money on insured funds because of a bank failure. Further, bank runs causing thousands of failures drastically declined in scope and number.² Credible deposit insurance halted the spiral of withdrawals that led to bank runs, attenuating the impetus to panic. Deposit insurance also gave depositors confidence that in the event their bank failed due to poorly underwritten loans or excessive amounts of leverage (or both), they would not suffer losses. Still, bank failure and the subsequent temporary assumption of operations by the FDIC can delay access to funds for a short period, and deposits in excess of the FDIC-insured maximums can be lost. Deposit insurance has significantly reduced, but not completely eliminated, the risk that bank customers will withdraw funds in a panic.

Central Bank: Lender of Last Resort. While deposit insurance mostly mitigated the credit risk of bank depositors, it did not address liquidity needs that can arise from bank loans that have longer maturity

²See www.fdic.gov/about/learn/symbol/index.html.

and less liquidity relative to liabilities. To ensure ample liquidity during times of stress, banks have access to the Federal Reserve discount window. Credit at the discount window is available to generally sound depository institutions on a very short-term basis, typically overnight, at a rate above the Federal Open Market Committee (FOMC) target rate for federal funds (the overnight rate banks charge each other). These occasional short-term advances of credit are a backup rather than a regular source of funding, as evidenced by their above-market pricing. The discount window as a liquidity backstop contributes to the Fed's role as the "banker's bank" and the central bank's function as "lender of last resort."³

In financial parlance, deposit insurance is referred to as a "credit put," enabling depositors to "sell" their deposits at par. This put option is *de facto* exercised any time the FDIC puts an insolvent bank into receivership and ensures deposit accounts are made whole. The Fed's discount window is often referred to as a "liquidity put," which banks can exercise by "selling" (pledging as collateral) assets in exchange for short-term funding. Together, discount window lending and deposit insurance are safety nets that make traditional banking special, helping prevent bank runs and mostly negating the need for bank customers to police banks' asset risk to determine the security of their demand and savings deposits.⁴ These backstops are an important package deal: Deposit insurance as a credit put works because it is supported by the central bank's commitment to validate the liabilities—the lender of last resort's liquidity put can put a floor under the value of assets.

4. SHADOW BANKING DECONSTRUCTED

Throughout much of the twentieth century, traditional banks served as the primary intermediary between the source of loanable funds and borrowers. Starting in the mid-1970s, however, financial innovation and technological advances opened up new avenues of credit. The various other avenues of credit flow have been called the shadow banking system—so named because they intermediate credit with less transparency and regulation than in traditional banking. Shadow banks are at the center of our global market-based financial intermediation system, conducting maturity, liquidity, and credit transformation without explicit public sector credit guarantees or liquidity access. It is worth noting that many forms of nonbank financial intermediation have existed for decades and predate the federal safety net provided by the Fed and the FDIC. Further, many of the largest shadow banks are established institutions that are deeply intertwined with the traditional banking system. The largest securities dealers, investment banks, finance companies, and asset managers that dominate capital markets are actors in the wholesale funding and securitization (the issuance of bonds backed by a pool of loans) that are core to shadow banking (*see Appendix A*).

Firms engaged in shadow banking resemble traditional banks in many ways. Like traditional banks, shadow banks perform maturity transformation, turning short-term "deposits" into long-term assets. While the traditional banking system is based on deposit-gathering institutions (the banks), the shadow banking system is market based, with intermediation occurring through a chain of transactions. Shadow banks gather funds from those with money to invest, typically by issuing commercial paper (CP), repurchase agreements (repos), or similar debt or structured credit instruments. These debt instruments are purchased by money market mutual funds (MMFs), bond funds, and other entities, with capital ultimately flowing to potential borrowers. Whereas traditional depository institutions and "narrow banking activities," defined in Kay (2010), are relatively comprehensively regulated, shadow banks engage in a broad range of banklike activities (often using uninsured short-term funding) that are lightly scrutinized and only sometimes backed by private sector sources of liquidity (often from traditional banks).

Differences Between Traditional and Shadow Banking

Shadow bank structures vary widely, from specific funding vehicles to large, nonbank financial institutions such as insurance companies and investment banks. Shadow banks encompass finance companies, asset-backed commercial paper (ABCP) conduits, hedge funds, MMFs, and securities lenders. Where shadow banking becomes most confusing and misunderstood is through the narrow lens of *institutions* instead of

³The Fed's discount window offers three secured lending programs to depository institutions: primary credit, secondary credit, and seasonal credit. Primary credit is a very short-term (usually overnight) loan to depository institutions in generally sound financial condition. Depository institutions not eligible for primary credit may apply for secondary credit to meet short-term liquidity needs. Seasonal credit is extended to relatively small depository institutions that have recurring intrayear fluctuations in funding needs.

⁴The banking industry pays for FDIC deposit insurance through assessed premiums determined by the FDIC using various risk categories. As with most banking expenses, this cost is ultimately borne by depositors and clients of FDIC-insured banks. In addition, the Federal Reserve is independent within the U.S. government, "owned" by its member banks and not explicitly backed by the full faith and credit of the U.S. However, the Federal Reserve derives its authority from and is subject to oversight by Congress, and in the spirit of its public mission as the U.S. central bank, remits annual earnings to the Treasury.

the system's wide berth of securitization and wholesale funding *activities*. In some instances, shadow banks straddle the line between traditional and shadow banking—such as a regulated bank sponsoring a special purpose vehicle (SPV). SPVs are entities created to hold specific assets in order to move them off the sponsoring entity's balance sheet (*see Appendix B*).

Indeed, it is helpful to discuss shadow banking in terms of market-based intermediation activities that lack explicit official (federal government) credit enhancement rather than the institutions that might or might not be party to official liquidity and credit guarantees. Many of these shadow banking activities involve a vast network of debt instruments that may be held at some point by traditional depository institutions within the public safety net. This interconnectedness makes it very difficult to draw clear lines between traditional and shadow credit intermediation. **However, the distinguishing characteristic remains the absence of explicit public sector backstops, leaving shadow intermediation activities susceptible to runs.**

Because they operate outside the realm of banking regulation and explicit public sector enhancement, shadow banks lack access to the Fed's discount lending window and to FDIC deposit insurance. Prior to the onset of the financial crisis, shadow banking credit and liquidity enhancements provided by the private sector were thought to be sufficient and essentially equivalent to traditional banking backstops. However, the public sector does not directly support shadow banking activities. Nevertheless, shadow banking activities and liabilities can be indirectly publicly enhanced because institutions supporting shadow bank liabilities are often supported by public safety nets. For instance, a traditional bank may implicitly or explicitly support its own SPV with a line of credit (liquidity put). This traditional bank has direct access to the Fed's discount window and FDIC's deposit insurance, and this relationship indirectly supports the SPV connection.

In addition, shadow banking can be supported by third-party liquidity and credit guarantees such as lines of credit, private credit insurance from monoline insurers (MBIA, Ambac, etc.), or increased backing for debt with larger amounts of par-value securities (overcollateralizing). There are also shadow bank entities that are simply unenhanced. These entities have no credit or liquidity backstops in times of stress. Examples are securities lending programs of nonbank entities and some types of asset managers, including MMFs.⁵

While indirect and private sector safety nets provided shadow banking activities adequate protection in normal times, they failed amid the extreme market stress at the height of the crisis as market participants lost faith in the entities providing the guarantees. Shadow bank assets were a complicated web of (essentially) nontraditional loans funded by short-term borrowing in wholesale markets. This allowed increased leverage and profit-making opportunities but ended disastrously when wholesale funding dried up. Once the solvency of private sector put-providers was questioned—regardless of their functional capital adequacy—the run on shadow banking would not stabilize until a series of stopgap official credit guarantees and liquidity facilities supplanted failed private sector backstops.

The Spectacular Growth of Shadow Banking

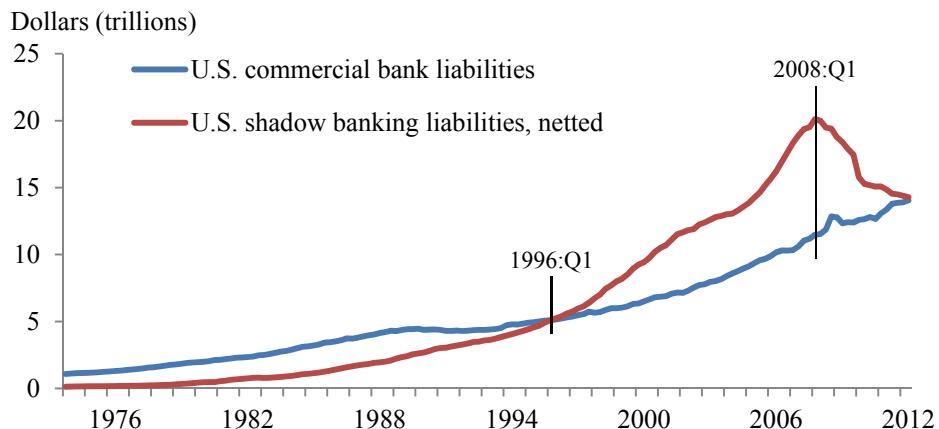
The inherent fragility of shadow banking becomes evident when viewed in light of the magnitude of securitization and money market wholesale funding activities. At its peak, in early 2008, the U.S. shadow banking system had about \$20 trillion in liabilities, compared with commercial banks' \$11 trillion (*Figure 3*). Using the sum of liabilities related to securitization activity and short-term, noninsured money market transactions as a proxy, shadow banking first surpassed the traditional banking system in early 1996 and grew rapidly until the financial crisis. Although an imperfect measure of the shadow banking system, and more correctly interpreted as a total of securities related to shadow banking activities rather than an estimate of the net supply of shadow banking credit, the capacity of shadow banking instruments is demonstrably larger than that of the commercial banking industry.⁶ Further, it is notable that commercial bank liabilities continued to grow while large portions of the shadow banking system eroded during and following the crisis. The role of commercial banks in the shadow banking system will be fleshed out later in this paper.

The shadow banking system grew alongside the traditional banking system during the modern age of finance as interest rate and credit derivatives were introduced to transfer various components of credit market risk to those willing to bear that risk (*see Appendix C*). The advent of splitting off and selling interest rate risk and credit risk separately offered cheaper credit to more borrowers. Additionally, financial

⁵ For detail on different types of liquidity and credit enhancements shadow banks use and how they are classified, see Pozsar, Adrian, Ashcraft, and Boesky (2012).

⁶ Many securitized assets are held on the balance sheets of depository institutions or held off their balance sheets but supported through backup liquidity and credit derivatives. Thus, Figure 3 delineates liabilities of U.S. commercial bank and shadow bank *activities*. Further, this measure of shadow banking liabilities underestimates the size of shadow banking because it ignores the repledging (rehypothecation) of assets by broker-dealers (*see Appendix E*).

Figure 3: Shadow Banking Exceeds Commercial Banking Activity



NOTE: U.S. shadow banking liabilities equal the sum of the following liability items from the flow of funds accounts: CP, repos, borrowed securities, agency- and GSE-backed securities, mortgage pools, ABS, and MMFs, minus commercial banks' federal funds (excess reserves), repos, and CP. See Glossary for definitions.

SOURCE: Federal Reserve flow of funds; defined by Pozsar, Adrian, Ashcraft, and Boesky (2012).

market innovation moved credit risk off traditional banks' balance sheets and separated the credit system that raised funds in nondeposit instruments from the traditional banking system where loans originated. This is where the term "originate to distribute" finds its meaning: Many banks shifted from making loans and keeping them on their books to selling loan portfolios, portfolios that may or may not have had the same underwriting standards as if banks kept them on their books. Traditional banks used the shadow banking system to move liquidity risk and credit risk off commercial bank balance sheets, transferring it outside the regulation and regulatory support (safety nets) of traditional banking. However, the risks were not eliminated from the financial system.

The Depositors—Money Market Funds, Cash Funds, Institutional Investors, and Securities Lenders. In the mid-1970s, an institutions-based credit intermediation system in the U.S. began giving way to a markets-based one. This shift coincided with an increasing number of investment options enabling individuals to accumulate savings outside of traditional bank accounts.

One of the first steps coincided with the emergence of the MMF (see *Appendix D*). MMFs can vary in the assets they hold, but most individual investors are familiar with those operating under Rule 2a-7 of the Investment Company Act of 1940. These funds are restricted in the type of debt they can buy, the maturity of the debt, and the amount of exposure to a specific issuer. The restrictions seek to protect investors from taking on risks of which they are unaware. A stable \$1 net asset value (NAV) distinguishes these funds from other bond mutual funds. MMFs can maintain a stable NAV because they mark their assets (typically CP, certificates of deposit issued by banks, and Treasury securities) at book value, or the value repaid upon maturity, as long as the issuing firm is not in default.⁷

While MMFs are a significant source of funding for shadow banking activities, they are not the sole source. Other means of wholesale funding are subject to fewer restrictions than MMFs under Rule 2a-7 and often invest in a wider variety of assets to increase yield, taking on more maturity and credit risk in the process.⁸ In addition to MMF-type funding, shadow intermediation also relies on securities lenders, institutional investors, and corporate treasurers for financing, tapping unsecured debt markets such as interbank borrowing and CP as well as secured funding instruments such as repos and ABCP. MMFs, securities lenders, short-term bond funds, cash funds, overnight sweep agreements, cash plus funds, and other such money market sources of liquidity are known as "wholesale funding," provided by shadow banking "depositors."

The prominence of wholesale funding (as opposed to small-denomination retail funding) is critically important when analyzing the shadow banking system's resilience. These instruments have an implicit put

⁷The underlying "true" NAV of a money market mutual fund must be greater than or equal to \$0.995 as well. This is different from other bond mutual funds, which are required to mark their assets to market price and reflect those prices in their NAV.

⁸Rule 2a-7 imposes restrictions on prime MMFs that affect the duration and asset quality of the securities they are able to hold. It also includes provisions specifying required portfolio liquidity and disclosures.

option embedded in them—holders can demand their funds on short notice by refusing to roll over their investment at maturity. This is called “rollover risk.” With most of these investments being of overnight to one-week maturity, rollover risk is ever present, even in good times.

The Borrowers—Issuers of CP, Repo, and Discount Notes to Fund Securitization-Based Instruments. The ultimate borrowers in shadow and traditional banking systems are the same: households, businesses, and governmental entities. However, the liability structure supporting this lending differs significantly.

The previously mentioned funding sources—money market entities such as MMFs and short-term bond funds—hold assets representing the shadow banking system’s liabilities. Such assets are typically CP, ABCP, medium-term notes, and repos—which in turn are the liabilities on shadow banking entities’ balance sheets supporting mortgage, auto, credit card, and other types of loans. Although the structure can vary widely, all these securities fund various links in the shadow banking system’s chain. For example, financial holding companies (FHCs) often issue ABCP and repos. These firms temporarily warehouse asset-backed securities (ABS) before they are combined into larger pools, known as collateralized debt obligations (CDOs).

The common factor among all these financing instruments is their short-term maturity. Because these liabilities finance longer-duration assets, the paper must renew continually. If this is possible, the liability becomes perpetual in effective maturity, similar to traditional bank deposits. However, any unwillingness on the part of the paper purchaser (“depositor”) can cause a serious liquidity crunch for the issuer. Ratings agencies realized this, so liquidity and credit enhancements were a prerequisite to receive top credit grades. However, as noted, when these enhancements were present, they were provided by private sources and were only indirectly backstopped by official guarantees when sponsoring entities had access to public safety nets.

5. THE SHADOW INTERMEDIATION PROCESS

Mervyn King (2009), governor of the Bank of England and chairman of its Monetary Policy Committee, described the nature of financial risk, noting that “banks are dangerous institutions. They borrow short and lend long. They create liabilities that promise to be liquid and hold few liquid assets themselves. That though is hugely valuable for the rest of the economy. Household savings can be channeled to finance illiquid investment projects while providing access to liquidity for those savers who may need it.”

Credit intermediation serves an extremely valuable economic function—well-capitalized banks making credit available to households and businesses is a key lubricant that greases the engine of economic growth. Financial markets, however, are prone to panics and runs, and banking crises are all-too-regular occurrences in market economies. As shadow banking has grown, the financial system has accumulated risks. The expansion of market-based credit intermediation reliant on asset sales and securitization has prompted rapid balance sheet growth, a marked rise in leverage, and a proliferation of complex and difficult-to-value financial products.

Banking has changed from its traditional model, focused on direct origination and holding a significant portion of loans made. The shadow banking system deconstructs the familiar credit intermediation process of deposit-funded, hold-to-maturity lending by traditional banks into a more complex, wholesale-funded, securitization-based intermediation chain. Shadow banking functionally is similar to traditional banking—maturity, liquidity, and credit transformation—but the financial flows occur in multiple steps rather than within one institution’s balance sheet. A range of entities using various market funding instruments intermediate credit along a distinct, sequential chain.⁹

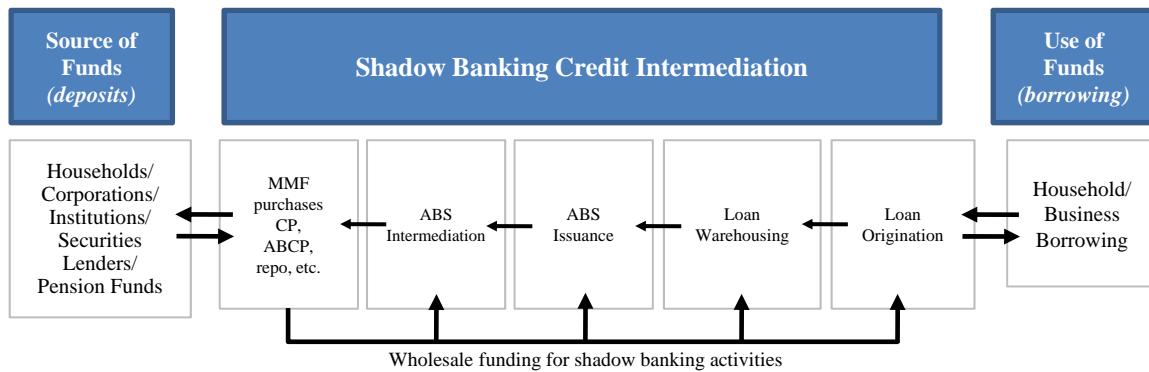
Risky, long-term loans (such as subprime mortgages) are transformed into seemingly risk-free, short-term, moneylike instruments with stable NAVs, issued by MMFs with daily liquidity. In an example, a finance company originates loans and transfers them to a “warehouse.” A bankruptcy-remote vehicle (like a bank-sponsored SPV) warehouses pools of these loans until they are transferred to a broker-dealer to be combined with other loans and structured into ABS in a process known as tranching (*see Appendix A*). The initial loan originator would typically rely on CP or medium-term notes. The warehouse might rely on ABCP, with the store of loans serving as the collateral for that funding. The broker-dealer structures and then warehouses ABS through its trading book and may fund this process through repos or repo conduits. An MMF could purchase the CP or other short-term debt issued by either entity (either the loan originator or ABS warehouse). This chain can continue through further warehousing and blending of ABS using a bankruptcy-remote SPV to create a CDO. This process could be extended several more times, along the way employing various other forms of financing such as repos or ABS with CDOs as collateral. Securitization allows loan originators to sell pools of debt (such as mortgages, credit card receivables, or auto loans) to other

⁹For a useful, in-depth description and taxonomy of shadow bank activities and funding flows, see the shadow banking maps and schematics presented in Pozsar, Adrian, Ashcraft, and Boesky (2012).

institutions, thus transferring credit risk. The tranching of these pools into separate slices achieves credit and liquidity transformation through the diversification and distribution of the new segments of consolidated debt.

The shadow banking intermediation chain always starts with loan origination and ends with wholesale funding (*from right to left in Figure 4*), with each shadow bank usually appearing only once in the process. The original loan passes through the shadow banking chain, with each intermediation step supported by various funding techniques, and emerges as wholesale funding provided by money market intermediaries (such as MMF) and direct money market investors (such as securities lenders). To put it simply, shadow banking credit intermediation is analogous to traditional bank lending—cash comes in, loan goes out, more cash comes in as loan is repaid, and more loans go out. Shadow banking intermediates credit through securitization supported by wholesale funding—this market funding supports income-generating securitized assets that produce more capacity for “depositors” to fund the intermediation process all over again.

Figure 4: Credit Intermediation via the Shadow Banking System



NOTE: See Glossary for definitions.

At each step in the process of shadow intermediation, the true quality of the underlying collateral is further obscured. As more links are added to the chain, more loans are included. The end buyer holds a very small slice of a very large number of loans. In theory, this diversifies risk because any single loan going bad will have little effect on the total pool's value. However, this also complicates the evaluation of the quality of individual pieces, leaving investors to rely on aggregate data to assess the riskiness of assets. In the recent crisis, these data were often manipulated and unreliable (due to the prevalence of low- and no-documentation loans). Even when data are reliable, the process remains difficult to analyze, requiring expensive software, loan- and borrower-specific data, and a thorough understanding of collateral-specific factors. This complexity leads to a decline in underwriting standards because the loan originator has little stake in the long-term performance of a loan that is quickly sold to be wholesaled, warehoused, and repackaged in a pool.

Maturity and liquidity transformation also occur in the shadow banking process. Because shadow banking primarily relies on short-term funding, the underlying collateral can be virtually anything, but it typically consists of mortgage, consumer, and business loans. The maturity of these loans can range from short term, in the instance of credit card receivables, to longer term for mortgages. During the crisis, a large proportion of such structures funded mortgages.¹⁰

¹⁰The main shadow bank entities involved in the mortgage securitization process are the government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac. These GSEs were actually the heralds of the originate-to-distribute securitized credit intermediation model. GSE issuance of short- and longer-term agency debt securities, bought by money and capital market investors, served as a model for wholesale funding markets. The GSEs' combined books of business (total mortgages held or securitized) have accounted for one-third to one-half of total residential mortgage debt outstanding since 1993, according to Federal Housing Finance Agency market data. Total mortgage debt outstanding eclipsed \$11 trillion at its peak in 2006. Clearly, mortgage lending is an integral market with U.S. and global financial stability implications. Further, the mortgage credit intermediation chain is dominated by entities that enjoy an implicit government guarantee. These characteristics suggest that Fannie and Freddie essentially serve as off-balance-sheet shadow banks of the federal government. Although this paper describes mortgage financing and mortgage-backed securities (MBS) briefly in Appendix A, in-depth discussion of these themes is beyond the scope of this paper.

6. THE ROLE OF RATINGS AGENCIES AND REGULATORS

Despite good intentions, ratings agencies and regulators were significant contributors to the imbalances that culminated in financial crisis.

Ratings firms initially sought to help investors determine the riskiness of fixed-income securities. The ratings business grew rapidly in the 1970s following some high-profile corporate bankruptcies—the most notable being Penn Central. Shortly thereafter, the Securities and Exchange Commission (SEC) cemented the ratings agencies' oligopoly. The SEC found it appropriate to sensitize capital requirements to risk, altering broker-dealer capital requirements by making bond ratings the proxy for risk. To implement this rule, the SEC had to specify whose ratings mattered. The SEC determined that a newly created category dubbed the Nationally Recognized Statistical Rating Organizations would be the only source for valid ratings and that the Big Three ratings agencies—Standard & Poor's (S&P), Moody's, and Fitch—would be grandfathered in as the ratings agencies of record (L. White 2012).

As regulations evolved, regulators increasingly focused on ratings, including those assigned to the bank, insurance, pension fund, and mutual fund industries. As a result, many institutions could not hold below-investment-grade debt. The Big Three ratings agencies' oligopoly prevailed—without their ratings, companies could not sell debt. Additionally, an inherent conflict of interest arose; issuers paid the companies for ratings. Perhaps even more problematic was that many investors depended on those evaluations when purchasing debt in lieu of a more thorough due-diligence review. Investors ran into further difficulties because the evaluations frequently lagged material market developments—for example, massive downgrades of complex mortgage securities in 2007 occurred after the market had already moved significantly lower. Moreover, the lag is not limited to complex, structured credit. The more recent example of tumbling credit ratings on European sovereign debt occurred long after repayment problems arose.

The ratings agencies were complicit in the growing complacency of investors leading up to the credit crisis. Large structured-product deals involving complex securities were very profitable for ratings agencies. Further, issuers had the ability to choose among potential raters, leading to “ratings shopping.”¹¹ The ratings agencies’ shift from an investor-pay to an issuer-pay business model degraded the value of the evaluations provided because the agencies faced little risk from inaccurate ratings. Meanwhile potential gains substantially increased with the growing number of issuers and instruments.¹²

During the frenetic environment at the height of the credit boom, ratings for complex securities often relied on inaccurate models and assumptions, leading to unreasonable analyses of the underlying securities (Ashcraft, Goldsmith-Pinkham, and Vickery 2010). These ratings-agency models for complex securities, such as MBS, relied on historical housing and mortgage data designed to determine default probability and loss expectancy in the event of default. Among the models’ critical assumptions: The performance of each individual mortgage was random and uncorrelated. Not only was this assumption untrue, but it relied on a second incorrect hypothesis: Mortgages and borrower behavior would be the same as in the past.

Because the ratings agencies did not examine the underlying mortgages, they failed to see a shift in borrower behavior and mortgage terms. The emergence of speculative home purchases with 100 percent financing, and the emergence of low- and no-documentation loans meant that the environment was very different from the past, when homebuyers made significant down payments and lived in the houses they purchased.

Moreover, defaults encouraged still more defaults; when one loan went bad, there was a higher probability that others would as well. Financial contagion had crossover effects from seemingly diverse assets that became highly correlated as investors shed securities en masse to generate liquidity. Ultimately, the ratings agencies made the same mistake many financial market participants made. They were guilty of driving while looking in the rearview mirror, and they severely underestimated the correlation effect of major systemic events.

Complacent with Complexity

The ratings agencies’ failings affected the shadow banking industry in two major ways. Because many of these securitized products were rated AAA, assuming risk mitigation through diversification, they were perceived as the safest of the safe. Thus, these investment-grade products garnered significantly more

¹¹ Skreta and Veldkamp (2009) identified the contribution of “ratings shopping”—an asset issuer’s ability to observe multiple ratings and disclose only the most favorable—to overly optimistic ratings on complex securities, even if the raters attempted to produce an unbiased estimate of the asset’s true quality. The conflict of interest reflects the issuer’s ability to select the rater and the complexity of these securities, which can beget divergent views of creditworthiness.

¹² Partnoy (2009) notes that the regulatory dependence on credit ratings began in 1973 with an SEC proposal to amend broker-dealer capital charge (haircut) requirements. This dependence became problematic as the informational value of ratings deteriorated in the decades building to the crisis.

demand than would have otherwise been the case.¹³ This sent broker-dealers into overdrive, producing more of these securities and fueling a flood of credit. Robust credit supply, in turn, led to declining underwriting standards to meet broker-dealer demand. The AAA ratings also allowed shadow banks to “lever up” because repo counterparties required smaller discounts for higher-quality, investment-grade collateral. Changes in the level of discounts are important because many participants use very-short-term repo financing and renew repeatedly. Before the crisis, market participants commonly borrowed 90 percent of the value of AAA-rated MBS (Krishnamurthy 2010). This would be a relatively high leverage ratio for even genuinely high-quality, AAA assets. But the AAA assets and liabilities that collateralized and funded the shadow banking system were found to be less than the highest quality, weakened by poorly underwritten loans and aggressively structured securities.

Lax regulatory oversight compounded the issue as securitized instruments spread globally. Banks and shadow banks became increasingly intertwined. Regulations incentivized purchases of highly rated ABS by requiring banks to retain a smaller amount of capital in support of these assets.¹⁴ Prior to 1971, banking regulators had sole responsibility for enforcing securities laws as they applied to banks. However, the SEC gained new authority over bank holding companies (BHCs) as the BHC movement grew during the 1970s. BHCs own bank subsidiaries, and large BHCs often house several financial services companies and shadow banks under the same corporate umbrella. BHCs are supervised by the Federal Reserve, SEC, and bank subsidiary supervisors like the Comptroller of the Currency and FDIC. Although a large BHC incurs additional layers of regulatory reporting and oversight, the company has greater range and flexibility with funding and legal authorization than does its bank subsidiaries. Many of today’s shadow banking activities were, in fact, born out of the transformation of the largest BHCs from a lower-return-on-equity, originate-and-hold utility banking model funded by deposits to a more highly leveraged, originate-to-distribute credit intermediation model of fee-based income, structured financial products, and wholesale funding.

By increasing leverage, banks could boost short-term profits, directing more capital toward the securitized asset class than they otherwise might have. It was also beneficial for banks to set up SPVs (*see Appendix B*) to shift these assets off balance sheets and further free capital to either make more loans or purchase other assets. Regulators outsourced part of their oversight responsibility by taking third-party ratings on blind faith, using them to determine capital levels. Similar to the complacency of ratings agencies during the height of the boom, regulators were complicit in the buildup of excessive risk taking and growing complexity of intermediation activities. In addition, it is obvious in hindsight that many of the BHCs most active in securitization and wholesale funding were woefully undercapitalized. The financial system was vulnerable—a run on the shadow banking activities that had built leverage during the credit boom led to a megabust.

¹³To put AAA-rated credit into perspective: *Only four* corporations retained AAA corporate bond ratings following the 2007–09 crisis, down from 15 corporations in 2000 and nearly 60 in the early 1980s. **This illustrates that AAA ratings are rare in the corporate bond world and that new, complex securitized products should only be ascribed AAA ratings with assiduous prudence.**

¹⁴This effect is playing out again. European banks accumulated significant amounts of sovereign debt that carries zero capital charge under regulations but is far from having zero credit risk.

II: The Run on Shadow Banking

Having discussed the operation and development of the shadow banking system and the roles of traditional banks and BHCs, shadow banking entities, capital markets, rating agencies, and regulators, we now examine in greater detail the run on shadow banking that occurred during the crisis, highlighting key considerations for regulators and policymakers.

When Congress established the FDIC in 1933, deposit insurance was created to complement the safety net that Federal Reserve financial system liquidity provides, effectively ending bank runs. However, as the global financial network became bigger, more complex, and more interconnected, the sufficiency of this backstop exclusively for regulated banks was tested when a liquidity crisis hit wholesale funding markets.

Demand for Liquidity

Paul McCulley coined the phrase “shadow banking system” in 2007. McCulley referred to shadow banks as leveraged financial intermediaries whose liabilities were broadly perceived to resemble conventional bank deposits in quality and liquidity.¹⁵ Leading up to the crisis, shadow banking enjoyed more leverage, less regulation, and fewer constraints on the types of assets held, producing higher returns on equity than the conventional banking model. The net interest margin associated with maturity, liquidity, and credit (quality) transformation was earned on a much smaller capital base, removed from the direct confines of comprehensive regulation. This continued as long as market participants believed shadow bank liabilities were roughly the same as traditional bank deposits. Also, since many of the shadow banks were layered within the traditional banking system, the distinction between the two interconnected credit intermediation channels was muddled by complexity and counterparty familiarity. The BHC model houses depository institutions with the securities dealers and asset managers integrally involved along the chain of shadow banking intermediation. Commercial banks and shadow banks can live happily together under the same corporate roof but play by different rules (regulations). Leading up to the crisis, the liabilities of these established shadow bank market players were assumed by most to be as integral to “banking” as the core deposits of traditional banks, despite their lack of official sector backstops.

Such thinking was part of the global credit intermediation system until asset prices stopped rising and collateral values no longer supported a myriad of suddenly illiquid and ultimately toxic shadow bank-funded assets. The prominence of wholesale funding (as opposed to small-denomination retail funding) is critically important when analyzing the shadow banking system’s resilience. Forced asset sales can occur when large numbers of depositors in a shadow bank seek their funds simultaneously during a period of financial distress. Once such fire sales begin, the value of assets declines and the cost of funding for all shadow banks—healthy and unhealthy alike—rises rapidly, furthering the need for liquidity.

Liquidity for everyone is an illusion absent banks’ special access to deposit insurance and to a lender of last resort in times of severe financial difficulties or “unusual and exigent circumstances.”¹⁶ Although an individual may consider his or her specific positions liquid, the same cannot be true for all market participants collectively.¹⁷ In order for some participants to deleverage, or liquidate their positions, offsetting parties must be willing to assume those positions on an order of magnitude matching the demand for liquidity. McCulley (2008) calls this facet of liquidity the “paradox of deleveraging”—collective deleveraging can create deflation in the assets from which leverage is being removed. The private sector as a whole cannot delever unless the Fed or some other public sector entity is willing to lever up its balance sheet to put a floor under otherwise declining asset values and net worth.

A stark example of such a demand for at-par liquidity occurred in September 2008 when Lehman Brothers failed. As Lehman’s financial status became increasingly precarious before its collapse, market participants became wary of extending credit to the firm. Lehman struggled to fund its levered illiquid assets and could not exit its positions at prices necessary to shore up its capital base. Ultimately, the firm could not continue financing its operations, declaring bankruptcy on September 15, 2008. Although the

¹⁵See McCulley (2007, 2008). Paul McCulley is a former managing director at Pacific Investment Management Co. (PIMCO) and is now chairman of the Global Interdependence Center’s Global Society of Fellows.

¹⁶Prior to Dodd-Frank, the Fed’s emergency lending authority pursuant to Section 13(3) of the Federal Reserve Act of 1913 authorized lending in “unusual and exigent circumstances” to a wide range of borrowers using good collateral, subject to the approval of at least five Fed governors. In response to the financial crisis, the Board of Governors exercised its Section 13(3) authority between March and November 2008, creating six lending facilities to support overall market liquidity (*see note 65*). Dodd-Frank refocuses the Board’s Section 13(3) authority on programs or facilities with broad-based eligibility.

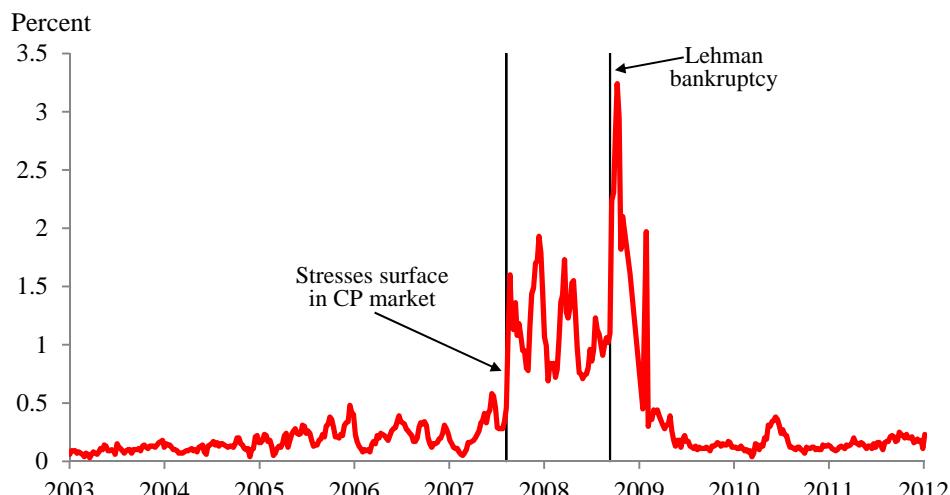
¹⁷John Maynard Keynes (1936) said of systemwide liquidity: “For the fact that each individual investor flatters himself that his commitment is ‘liquid’ (though this cannot be true for all investors collectively) calms his nerves and makes him much more willing to run a risk.”

onset of systemic turmoil began in the ABCP and CP wholesale funding markets as early as summer 2007, Lehman's failure is widely held as the systemic event that catalyzed liquidity-driven asset sales and broken counterparty trust.

Following Lehman's bankruptcy, panic rippled through the financial system. Financial market participants either faced dire liquidity and solvency issues or were unsure of their counterparties' credit exposure and solvency. Firms seeking to protect their balance sheets and preserve capital rapidly curtailed their use of credit and consequently sold assets. Widespread and simultaneous asset sales depressed prices, prompting further sales to reduce risk exposure, which produced yet lower prices. With counterparty trust broken and asset prices spiraling downward, the situation was not unlike someone yelling fire in a crowded room. Not everyone can exit at once, creating a traffic jam and potentially leading to behavior contrary to the best interests of everyone present. As asset prices kept tumbling, lending dramatically slowed because of uncertainty surrounding collateral values.

The NAV of the Reserve Primary Fund, a money market fund that had significant holdings of defaulted Lehman CP, declined below \$1, the usual share price of such funds.¹⁸ In industry parlance, the Reserve Primary Fund "broke the buck." At the time, many other money funds sustained losses because of their holdings of Lehman debt; some opted to liquidate following significant investor redemptions.¹⁹ Unlike commercial banks, MMFs and other wholesale funding sources of the shadow banking system operate without regulatory capital requirements or official sector backstops. They are, therefore, especially vulnerable to rapid contractions of liquidity. At the time, many institutional cash balances were invested in MMFs and other types of short-term bond funds in an attempt to earn additional yield beyond what conventional banks or Treasury securities paid. Unnerved by the Lehman collapse, the subsequent breaking of the buck at the Reserve Primary Fund, and other financial market disruptions, investors effectively staged a run on part of the shadow banking system, leading to a sharp increase in the short-term cost of funds for companies (*Figure 5*). With wholesale funding instruments no longer viewed and priced similarly to bank's retail deposits, the flight from funding markets squeezed financial institutions that had borrowed short and invested long—resulting in restricted credit flow to even the most worthy borrowers. The inherent fragility of these sources of capital exposed the erroneous belief that wholesale funding instruments were similar to traditional bank deposits because they were short term and rolled continuously.

Figure 5: Commercial Paper Spread Exhibits Run on Shadow Banking



NOTE: Three-month AA (highly rated) financial CP rate minus three-month Treasury bill yield.
SOURCE: Federal Reserve Board.

¹⁸In fall 2008, the Reserve Primary Fund held \$785 million in Lehman CP and medium-term notes that were written down after Lehman failed. Due to these losses, the Reserve Primary Fund was forced to let NAV fall below \$1. Shareholders in the Reserve Primary Fund eventually recovered about 99 cents of each dollar invested. While investors lost access to a portion of their funds for over a year, about 92 percent of initial funds were recovered within a year.

¹⁹Typically, there are very small fluctuations in the asset values underlying the NAV at money funds. In the event of losses, the sponsoring company usually makes investors whole through capital injections because continued functioning of the fund (avoiding officially breaking the buck) is more valuable than the cost of covering the loss. In addition to shareholder losses, a systemic liquidity crisis can result from an unchecked run on MMFs and short-term funding markets. Debate among regulators and within the SEC itself continues concerning additional reforms needed to buttress the MMF market. See Schapiro (2012a and 2012b) and Appendix D for a more in-depth look at MMFs.

Lehman's failure prompted other market dysfunction. The investment firm played a significant brokerage role for hedge funds and other market participants, and in doing so, frequently used client assets—that it held as custodian—to fulfill its own credit needs, a process commonly referred to as “rehypothecation” (*see Appendix E*).²⁰ When Lehman declared bankruptcy, many of the assets held for counterparties at Lehman’s foreign subsidiaries were frozen. This further dislocation in the securities lending market significantly reduced the collateral available for securities lending and prompted a corresponding reduction in liquidity. In the aftermath of Lehman, the shadow banking system was the primary channel through which financial market distress flowed to the real economy—and it rapidly propagated panic to all corners of the financial markets. The episode underscored the issue of shadow banking’s existence outside the structure of safety nets and their conjoined twin, regulatory oversight. With market confidence utterly shaken, any backstop other than that of the official U.S. public sector would have been insufficient to stem the systemic run.

In fall 2008, financial market players were becoming acutely aware that there was something special about being a traditional bank—the explicit government-backed safety nets. The shadow banking system had essentially separated the credit system (underwriting and distribution of credit) from the payment system (the transfer of funds that makes credit extension possible). The credit system was under dire stress without the safety nets of the payment system. This split proved unsustainable during the crisis—a partial reintegration of shadow and federally backed conventional banking systems occurred. Additionally, two prominent shadow banks converted to BHCs to gain access to government-backed safety nets.²¹ Other shadow intermediaries gained access to funding through special Federal Reserve and Treasury programs.²² The government safety net was unfurled to an unprecedented degree to stem the panic in credit markets (*see Appendix F*).

7. A MINSKY MOMENT

Hyman Minsky’s “financial instability hypothesis” presaged how these events rapidly unfolded and the way the entire securitization structure of the 1990s and 2000s faltered. Minsky (1992) summarized his “interpretation of the substance of Keynes’s General Theory” as a “framework for distinguishing between stabilizing and destabilizing capitalist debt structures”:

Three distinct income-debt relations for economic units, which are labeled as hedge, speculative, and Ponzi finance, can be identified. Hedge financing units are those which can fulfill all of their contractual payment obligations by their cash flows: The greater the weight of equity financing in the liability structure, the greater the likelihood that the unit is a hedge financing unit. Speculative finance units are units that can meet their payment commitments on “income account” on their liabilities, even as they cannot repay the principal out of income cash flows. Such units need to “roll over” their liabilities (issue new debt to meet commitments on maturing debt). ... For Ponzi units, the cash flows from operations are not sufficient to fulfill either the repayment of principal or the interest due on outstanding debts by their cash flows from operations. Such units can sell assets or borrow. Borrowing to pay interest or selling assets to pay interest (and even dividends) on common stock lowers the equity of a unit, even as it increases liabilities and the prior commitment of future incomes.

The first theorem of the financial instability hypothesis is that the economy has financing regimes under which it is stable and financing regimes under which it is unstable. If hedge financing dominates, the economy may well be an equilibrium-seeking and -containing (stable) system. In contrast, the greater the weight of speculative and Ponzi finance, the greater the likelihood the economy is a deviation-amplifying (unstable) system. The second theorem of the financial instability hypothesis predicts that periods of prolonged prosperity are ultimately destabilizing because of asset-price and credit excesses that stability

²⁰ Rehypothecation, also referred to as repledging, occurs when client assets held by a prime broker are used as collateral to obtain funding. This collateral can then be repledged by the receiving party in yet another transaction (*see Appendix E*).

²¹ Both Goldman Sachs and Morgan Stanley received permission from the Board of Governors in October 2008 to become financial holding companies (FHC). In this paper, we predominantly use “BHCs” to reference the biggest banking corporations, which largely share the same legal and regulatory framework as FHCs. The Gramm-Leach-Bliley Act amended the Bank Holding Company Act in 1999, allowing a BHC to declare itself an FHC and thereby engage in securities underwriting and dealing, insurance, and merchant banking activities that were an extension of the authority of BHCs to engage in nonbanking activities.

²² Initially, the Fed’s Section 13(3) authority was used to establish lending facilities for securities dealers around the time of a government-assisted acquisition of investment bank Bear Stearns in March 2008. Then, when runs on MMFs caused these money funds to stop buying CP, the Fed supported the CP market. In late 2008, other wholesale funding markets received support from the Fed and Treasury’s stopgap liquidity and credit programs to support the shadow banking system in the absence of reliable private sector credit guarantees.

begets. Stability essentially causes market participants to become complacent and fail to appropriately weigh the probability of an asset-price decline.

The financial crisis of 2007–09 was a downward spiral of collateral, liquidity, and solvency, which Minsky's hypothesis essentially describes. Stability in the preceding period became destabilizing as market participants extrapolated stability to infinity (or, at least, far into the future), installing ever-more-risky debt structures. The longer people make money by assuming risks of which they are unaware, the more imprudent their risk-taking becomes. Unfortunately, the risk cycle is self-perpetuating. During the upswing, risk premiums fall and collateral values increase, encouraging borrowing.²³

Minsky's hypothesis helps explain the endemic boom–bust cycles of capitalism, which played a role in the bubbles in property prices, mortgage finance, and shadow banking that culminated in the 2007–09 credit crunch. McCulley (2009) dubbed the bubbles' eventual bursting as a "Minsky Moment." He suggests the reverse Minsky journey must retrace the bubble, moving backward through the three-part progression: asset prices falling, risk premiums rising, and leverage declining (making economic growth difficult). Minsky (1992) speaks to the inherently procyclical nature of market forces: "From time to time, capitalist economies exhibit inflations and debt deflations which seem to have the potential to spin out of control. In such processes, the economic system's reactions to a movement of the economy amplify the movement—*inflation feeds upon inflation and debt-deflation feeds upon debt-deflation*."

The rapid growth of the shadow banking system reverses course during a downturn through a repricing of speculative and Ponzi financing risk, which is deflationary for risky asset prices and results in debt deflation. When all market participants attempt to deleverage, it can create a negative, self-feeding vortex in which collective deleveraging produces more asset deflation, which paradoxically increases leverage as net worth falls. The shadow banking system was at the heart of the credit crisis, which deepened when financial firms made a run on other financial firms by drastically deleveraging through increased capital charges (haircuts) and not renewing short-term funding (such as repos).²⁴ Credit markets dried up quickly, severely reducing the availability of liquidity and shattering confidence in the solvency of much of the banking system. This was a systemwide crisis in which the prices of securitized assets and financial companies of varied focus declined when all sources of nondeposit funding became suspect.

In this crisis, however, the reverse Minsky journey was accompanied by an additional compounding factor: complexity. Due to the interconnectedness of financial institution balance sheets through an opaque web of counterparty exposure and difficult-to-value securities, market participants lost the confidence and ability to appropriately manage risk. Liquidity was in short supply, stressing solvency, which further pressured liquidity. The resulting rapid reduction of credit and skittish demeanor toward counterparties amounted to the equivalent of a classic bank run in the electronic age: Short-term funding markets froze.

Containing the Panic

As the shadow banking system seized up, liquidity issues doubled back on the deposit-taking banking system, generating significant strains on intermediaries' capitalization. This produced further contraction in lending, which further weakened the economy—companies lacking sufficient capital curtailed investment and shed employees. Without extraordinary intervention by the Federal Reserve and Congress, this lack of liquidity that pressured solvency posed a significant threat of plunging the U.S. into a depression.

Walter Bagehot (1873) described the central bank's role as lender of last resort—an institution with the power to increase aggregate liquidity in the financial system—as responding to panics by lending freely against sound collateral. Chairman Bernanke described the Federal Reserve's response to the emergence of financial market runs and self-feeding negative market forces in an April 2012 speech:

From the beginning of the crisis, the Fed, like other major central banks, provided large amounts of short-term liquidity to financial institutions ... on a broad range of collateral. Reflecting the contemporary institutional environment, [the Fed] also provided backstop liquidity support for components of the shadow banking system, including money market mutual funds, the commercial paper market, and the asset-backed securities markets. To be sure, the provision of liquidity alone can by no means solve the problems of credit risk and credit losses, but it can reduce liquidity premiums, help restore the confidence of investors, and thus promote stability. It can also reduce panic-driven credit problems in cases in which such problems result from price declines during liquidity-driven fire sales of assets. ...

²³In Nakamoto and Wighton (2007), former Citigroup CEO Charles Prince quips: "When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing."

²⁴For instance, when a repo (or other short-term funding technique) haircut expands from 10 to 20 percent, the capital required to hold the asset doubles, decreasing leverage.

The Federal Reserve's responses to the failure or near failure of a number of systemically critical firms reflected the best of bad options [emphasis added], given the absence of a legal framework for winding down such firms in an orderly way in the midst of a crisis—a framework that we now have. However, those actions were, again, consistent with the Bagehot approach of lending against collateral to illiquid but solvent firms. ...

To say that the crisis was purely a liquidity-based panic would be to overstate the case. Certainly, an important part of the resolution of the crisis involved assuring markets and counterparties of the solvency of key financial institutions, and that assurance was provided in significant part by the injection of capital, including public capital, and the issuance of guarantees.

Bernanke ended his remarks with a proclamation that “the promotion of financial stability must be on an equal footing with the management of monetary policy as the most critical policy priorities.” The landscape for policymaking has changed, and new drivers and actors are influencing the regulatory framework, setting the rules to which financial market participants are expected to adhere.

8. CAN WE PREVENT THE NEXT FINANCIAL CRISIS?

Dodd-Frank doesn’t directly address the shadow banking system but instead designates the FSOC, under the lead of the Treasury secretary, and the Federal Reserve to oversee SIFIs. These can be broadly defined as entities that cannot exit the market (that is, fail) without creating significant financial and economic disruption. In an effort to identify these major players in today’s interwoven financial intermediation landscape, the International Financial Stability Board (FSB) publishes a list of global systemically important financial institutions (G-SIFIs). This list of G-SIFIs, more specifically labeled global systemically important banks (G-SIBs), was updated in November 2012 (*Table 1*).²⁵ G-SIFIs face a different set of integrated policy measures (higher capital requirements, supervisory expectations for risk management functions, data aggregation capabilities, risk governance, and internal controls) as regulators seek implementation of a policy framework addressing systemic and moral hazard risks associated with “too big to fail” (TBTF) institutions.²⁶

Table 1: TBTF 2012 List of G-SIBs

Bank of America	Group Banque Populaire CdE	Royal Bank of Scotland
Bank of China	Group Crédit Agricole	Santander
Bank of New York Mellon	HSBC	Société Générale
Barclays	ING Bank	Standard Chartered
BBVA	J.P. Morgan Chase	State Street
BNP Paribas	Mitsubishi UFJ FG	Sumitomo Mitsui FG
Citigroup	Mizuho FG	UBS
Credit Suisse	Morgan Stanley	Unicredit Group
Deutsche Bank	Nordea	Wells Fargo
Goldman Sachs		

NOTE: List based on the methodology set out in Basel Committee on Banking Supervision (2011).

SOURCE: FSB (2012a).

For U.S. BHCs, Dodd-Frank presumes they are systemically important if holdings exceed \$50 billion in consolidated assets. The FSOC guidance pursuant to Section 113 of the Dodd-Frank Act designates a nonbank financial company as systemically important if its material financial distress could pose a threat

²⁵ Compared with the group of G-SIBs published in 2011, the 2012 list adds two banks (BBVA and Standard Chartered) and removes three banks: Dexia, which is undergoing an orderly resolution process; and Commerzbank and Lloyds, as a result of a decline in their global systemic importance. The SIFI framework is expected to be extended beyond banks to insurers and other nonbank financial institutions over the course of 2013 (Financial Stability Board 2012a). Although the specific nomenclature for these firms may vary—for example, domestic systemically important banks (D-SIBs) and global systemically important insurers (G-SIIs)—the broadest designation is referenced as G-SIFI.

²⁶ Entities referred to as “too big to fail” are assumed to be so large and interconnected within the financial system that regulators and the government in general would step in to prevent their failure. More discussion and greater detail about these financial organizations can be found in Appendix F.

to the financial stability of the United States.²⁷ The hope is that oversight by the FSOC and regulators at the Fed will successfully monitor and prevent the buildup of large negative tail risks—unforeseen and statistically unlikely events that impart significant wealth destruction—in the financial system. Dodd–Frank became law in July 2010 but won’t fully take effect—that is, have a calculable impact on the behavior of banks, shadow banks, and their counterparties—for several years. Dodd–Frank requires a two- to five-year rulemaking process in which more than 200 new regulations need to be proposed, written, and vetted by a variety of regulatory agencies, which consider feedback from the financial industry. More than two years after the legislation passed, only a third of almost 400 rulemaking requirements have been finalized.²⁸ It is estimated that Dodd–Frank has already produced over 8,800 pages of regulations, with many more to come. Until these regulations are implemented and enforced, as well as understood, by the affected parties, considerable uncertainty will remain regarding how, and if, financial institutions and markets will change.

In the meantime, Dodd–Frank—which was intended to end TBTF and create a more resilient financial system—will have limited positive effect. Even when fully implemented, the law’s constructive impact may be muted. As it stands, Dodd–Frank does nothing to roll back the dramatically increased banking concentration predating the 2007–09 financial crisis or the additional consolidation that grew out of the crisis.

Further, Dodd–Frank is complex and cumbersome—a collection of rules and regulations that dynamic, evolving markets for risk-bearing securities and banking practices will likely work to circumvent. Dodd–Frank does little to reduce the systemic importance of the largest financial institutions. Although the law proposes myriad new rules—risk-retention requirements, additional disclosures, limits on bank sponsorship of various affiliates (such as certain ABS and ABCP conduits), and changes to credit rating references—many shadow bank activities will likely evolve to escape much of Dodd–Frank’s intended supervisory oversight. If regulation constrains commercial banks’ risk taking, many questionable assets may simply migrate to less-regulated entities. This ability to stay under the radar will be potentially pernicious if the asset classes in which shadow banking entities invest are highly correlated, even when individual institutions’ balance sheets are relatively small. TBTF is not just about bigness; it also includes “too many to fail” and “too opaque to regulate.”

The Dodd–Frank financial regulation overhaul has a well-intended vision to rein in risk-taking; however, the law’s broad prescriptions and compliance costs may perversely affect many smaller, nonsystemically important firms. Moreover, Dodd–Frank may not be straightforward enough to revamp the most significantly interconnected financial conglomerates.

The Evolution of Financial Intermediation

Any approach addressing systemic risk in the shadow banking system must acknowledge that credit intermediation has become more market-based and, thus, more widespread and interconnected. The technological advancement and financial innovation of the last three decades has empowered credit intermediation to expand beyond traditional institution-based banking to serve the growing sums of capital (from households’ long-term savings, corporate cash coffers, not-for-profit institutional resources and governmental entity funds) seeking short-term, yield-bearing assets. While market-based systems are generally the most efficient allocators of capital, credit is subject to market whim. An accelerating shift toward direct financing by money and capital markets has occurred in recent decades. The progress enabled through sophisticated computers and telecommunications has drastically changed the “banking” business of risk diversification through intermediation.

Gains from specialization encouraged the formation of companies financing specific asset types (examples are equipment-lease financing and receivables-factoring operations). Capital regulations also incentivized banks to shift activities to off-balance-sheet vehicles such as SPVs. For instance, prior to the financial

²⁷The FSOC determined that a nonbank financial company’s material financial distress would likely transmit severe negative effects to other financial firms and markets through several key channels: material impairment from direct counterparty exposure, asset liquidation, and any critical function or service relied upon by market participants. The FSOC has developed an analytic framework for defining systemically important financial institutions by grouping relevant factors, including ten statutory considerations and any additional risk-related factors, into six categories: size, interconnectedness, substitutability, leverage, liquidity risk and maturity mismatch, and existing regulatory scrutiny. For specific thresholds and determinations—such as \$50 billion in total consolidated assets, \$30 billion in gross notional credit default swaps outstanding, and \$3.5 billion of derivative liabilities—see the Federal Register final rule and interpretative guidance on the “regulation of certain nonbank financial companies” at www.federalregister.gov/a/2012-8627.

²⁸The Davis Polk Dodd–Frank Progress Report for September 2012 notes that of 398 total rulemaking requirements: 131 final rules have been issued, 135 have been proposed, and 132 have not yet been proposed. Out of the 237 rulemaking deadlines that have already passed, 145 (61 percent) have been missed and 92 (39 percent) have been met with finalized rules. Regulators have not yet released proposals for 31 of the 145 (21 percent) missed rulemaking deadlines.

crisis, FDIC deposit insurance was limited to \$100,000. Many institutional funds and sophisticated, wealthy investors sought higher returns outside the traditional banking system in instruments that seemed of comparable risk. The system that arose in the shadows became much more complex than traditional banking, with a higher degree of specialization. The discrete steps and multitude of entities along the shadow banking intermediation chain have developed over decades; its weaknesses became evident during the financial crisis.

In a speech at the Federal Reserve Bank of Chicago in 1988, then-Fed Chairman Alan Greenspan noted that “the heart of intermediation is the ability to obtain and use credit and market risk information.” He argued that the expanding franchise of intermediation, the “core element of a bank’s comparative advantage and main contribution to the economic process,” was eroded by the onset of securitization accompanying the information revolution. With the advent of the Internet and proliferation of online banking and investing, a direct investor–borrower linkage was born as those looking to raise debt capital saw a new source of funds in household and business savings that flowed into the marketplace. Banks that wanted to survive and remain profitable evolved. Mortgages, credit cards, student loans, and other forms of debt obligations were pooled and securitized into new products presenting new opportunities for return. To maintain profits, newer, market-based nonbank lending became intertwined with the more traditional, institutions-based banking business—expanding the modern credit intermediation model outward, with financial layering producing an increasingly complicated web of bank and nonbank lending.

Levered financial institutions *with access to safety nets* need to be monitored and their activities restricted to counteract the complacency that prolonged periods of stability create. While economic theory holds that financial markets are continuous and function rationally at all times, in practice that isn’t true. Markets are made up of people, and people are prone to irrational behavior, often herding headlong into risk, or rapidly fleeing it. This human element has the effect of pouring large amounts of liquidity into the economy and suddenly withdrawing it, causing asset prices to gyrate. Such financial market volatility affects the functioning of the economy; households, businesses, and governmental entities need an appropriate, steady, and predictable flow of credit to operate effectively.

Further, human nature influences even the formation and implementation of regulatory policy. Minsky’s lesson (1986) that stability begets instability speaks to how regulators impose checks on the cycles of our capitalist economy: “In a world of businessmen and financial intermediaries who aggressively seek profit, innovators will always outpace regulators; the authorities cannot prevent changes in the structure of portfolios from occurring. What they can do is keep the asset–equity ratio of banks within bounds by setting equity-absorption ratios for various types of assets. If the authorities constrain banks and are aware of the activities of fringe banks and other financial institutions [shadow banks], they are in a better position to attenuate the disruptive expansionary tendencies of our economy.”

In short, **another crisis cannot be entirely prevented**. A few years of good economic times will shorten memories, prompting increased speculative activity and complicity from a number of parties involved. Ingrained human behavior such as complacency, exuberance, and greed change slowly, if at all, over time. The goal of future regulation and supervision should be to foster the temperance of such human tendencies, ensuring the financial system is robust and will continue functioning through inevitable panics while allowing for normal business-cycle fluctuations.

9. DIRE CONSEQUENCES OF MORAL HAZARD

The intent of enhancements (safety nets) is increased financial sector stability. In reality, they may be long-run destabilizers. Enhancements resemble insurance; they pay off in times of distress. However, like insurance, they can lead to increased risk taking because those taking the gamble know they will not bear the full consequence of their behavior, a concept referred to as moral hazard. In addition, improperly funded enhancements—where the pricing does not fully reflect the risk taken—can be destabilizing when an event occurs for which the insurance cannot pay. This is equivalent to an insurance company writing policies but failing to adequately reserve against future claims.

Explicit and direct enhancements such as deposit insurance and access to the Fed’s balance sheet (through discount window lending and the other less-conventional forms of support employed during the crisis) are public goods meant for those under the supervisory and regulatory umbrella of the FDIC and the Fed. A nonbank financial intermediary not operating under meaningful regulatory constraints, notably those specifying the size of capital and liquidity buffers and the type and composition of lending and investments, isn’t supposed to access these public goods. Regulation is the cost of public support of the private institutions that create money, hold demand deposits, and provide a system of credit that flows as the life’s blood of economic expansion. However, the marriage of bankers and regulators has not always been a happy one. Thus, there are incentives to use shadow banking channels to receive the benefits of banking without incurring associated regulatory costs. As credit and liquidity enhancements grow, moral

hazard rises with the increased presence of market-based intermediation.

Banks may capitalize on gains if risky investments pay off, while suffering limited downside if they do not because of the explicit backing of insured deposits and the Fed's availability as lender of last resort. Further, as some of the world's largest BHCs grow still bigger, customers, creditors, and management of such TBTF institutions assume implicit government support in the event of impending failure.²⁹ To mitigate such moral hazard, banks are subject to strict regulations and capital requirements enforced by various agencies, including the FDIC, the Fed, and the Office of the Comptroller of the Currency. However, given the assumption that government authorities will help bear the costs of catastrophic events for the largest, most interconnected financial firms, creditors do not fully price these risks themselves. Although economists and pundits disagree over the scale of this TBTF subsidy, the existence of even a relatively small cost-of-funds advantage poses perverse incentives for risk taking and perpetuates competitive imbalance in the financial intermediation system.³⁰ Dodd-Frank changes regulatory oversight of large banks and shadow banks. The law aims to equip all stakeholders—regulators, employees, and private capital, equity, and debt holders—with transparent tools to monitor management's actions as a safeguard against excessive risk taking. Despite efforts to extend and augment previous regulatory efforts to prevent these dangers, the largest financial companies continue to hold a disproportionate concentration of financial resources, promoting the perception that TBTF remains entrenched.³¹

Further, the largest BHCs face alarming operational-complexity issues because shadow banking activities are intricately woven into the fabric of modern banking. Avraham, Selvaggi, and Vickery (2012) and the FSOC (2012) document that U.S. BHCs have grown disproportionately faster than nominal gross domestic product over the past two decades. Shadow banking activities have accounted for a progressively larger share of total BHC assets over this time, which is not surprising given the shift in revenue generation toward fee income, trading, and other noninterest activities. While traditional commercial banking is usually carried out through a single entity, the largest BHCs have thousands of subsidiaries through which they intermediate credit and drive earnings. The four most complex BHCs each have more than 2,000 separate legal subsidiaries in at least fifty countries. Although some of these subsidiaries are foreign banks, the majority of them are funds, trusts, and financial vehicles that engage in shadow banking activities (which do not have direct and explicit access to public credit and liquidity puts).

In this case, bigger does not necessarily mean better: it may mean *too big* and *too complex to manage*. The benefits of size and scope that accompany BHC bigness come with an enormous cost: The U.S. government safety net is stretched far beyond its intended purpose of protecting the U.S. payments system. Recent regulatory reform efforts partially address these moral hazard concerns by raising capital requirements and developing a robust failure resolution regime for systemically important institutions. However, a high degree of organizational complexity, interconnectedness, and concentration in the financial services industry promotes the perception that the largest financial conglomerates are still too difficult to resolve and remain likely beneficiaries of government support in the event of extreme stress.

Managing Moral Hazard

Freedom to succeed and also to fail is a cornerstone of capitalism—voluntary exchange (or an individual's freedom to choose) characterizes the world's most prosperous economic systems (Friedman and Friedman 1990). When failure is systemic in nature and it becomes apparent that a bad decision (or a series of bad decisions) was made, the decisionmaker(s) should be held accountable. Bailouts promote debilitating moral hazard issues that undermine personal responsibility. Crippling the organic cyclical and competitiveness of a free-market economic system thwarts the “creative destruction” that is essential to capitalism (Schumpeter 1976). Regulation and supervision are meant to safeguard a resilient and competitive financial system as it

²⁹ Rosenblum (2012); also see Appendix F.

³⁰ See Brewer III and Jagtiani (2011) and the literature cited therein from DeYoung, Kane, Kaufman, and Stern. There is a vast literature of papers attempting to quantify the government subsidy imbedded in the credit ratings of TBTF firms. The estimation of these funding cost advantages ranges from 20 basis points (0.2 percent) to more than 1 percent.

³¹ Andrew Haldane (2012) considers supplementary policy options beyond current proposals for systemic surcharges, resolution regimes, and structural reforms that necessitate downsizing the largest banks in order to eliminate unfair funding advantages for firms still considered TBTF. Haldane estimates the size of an implicit TBTF subsidy—found by comparing the “standalone” and “support” ratings assigned to debt issued by large banks—to be a ratings difference of more than three notches, or up to \$700 billion in 2009. Currently, the implicit subsidy (\$300 billion per year) is far larger than before the crisis (a 2002–07 average of \$70 billion per year). To put this in perspective, all U.S. BHCs, in aggregate, reported earnings of \$108 billion for 2011. Haldane infers that the scale of the implied subsidy signals that TBTF is “hard-wired into the structure and pricing of the financial system.” He concludes that existing change initiatives are right in direction but may be insufficient in degree and credibility. The largest banks are still not “the right size,” and TBTF is still alive and well.

weathers such cycles. Bearing in mind the wisdom of Minsky (1986) once again: “An immediate corollary of the endogenous instability of capitalism is that a totally free-market capitalist economy is economically and politically impossible, for in such an economy financial disasters and economic depressions will frequently occur. ... Monetary and banking crises, as well depressions and other systemic malfunctions that were imputed to money going wrong, have been a regular feature of the American economy. ... Regulatory systems tend to break down, especially after a run of good times during which the disasters, which the regulatory system was designed to prevent or contain, do not occur.”

Finding balance among free financial innovation, market discipline that aligns managers’ actions with stakeholders’ interests, and the regulatory refereeing that constructively constrains both exuberance and panic is the key to managing moral hazard.

10. APPROPRIATELY REALIGNING INCENTIVES

Shadow banks need both obvious and hidden constant access to capital; support by private backstops proved insufficiently durable to withstand the panic during the financial crisis. The shadow banking system has its benefits. It serves the same function as traditional banking but in some areas maintains advantages due to superior market knowledge and specialization.

Despite declining shadow banking system holdings following the crisis, these entities are unlikely to disappear soon. Given the continued presence, size, and risks, and the credit flows and economic growth benefits that shadow banking facilitates, the proper dose and measure of reform is crucial. Devising how to address vulnerabilities is no small task because of how the system has intertwined itself with traditional banking, particularly with the large global banks. Realigning incentives will not be easy. Regulators, investors, lenders, creditors, and all other stakeholders should keep some valuable lessons in mind.

First, markets have booms and busts, and market-based systems of credit intermediation will be prone to vicissitudes. Financial innovation can be checked by regulation but will not (and should not) control the progress of profit-seeking ventures. Indeed, an area of scrutiny going forward should undoubtedly involve financial innovation. The rise of shadow banking through widespread use of securitization and derivatives did not turn out to be the panacea of risk mitigation initially claimed. Instead, regulators would be wise to heed the words of economic historian John Kenneth Galbraith (1993), who wrote: “The world of finance hails the invention of the wheel over and over again, often in a slightly more unstable version.” Therefore, the problem is not the reinvention of the wheel; it is the instability of the new product. Extensive derivative exposure and balance sheet linkages between financial companies created an impenetrable web of complexity at the height of the crisis, making it very difficult for market participants to assess risk exposure. This produced a chain of successive collapses, in which the failure of one institution caused the failure of another, which engendered still another.

The second lesson can be seen in the devolution of risk management as institutions began increasingly relying on statistical measures of portfolio safety, such as value at risk, commonly known as VAR. VAR is determined for a portfolio by looking at the historical volatility of its assets and using that measurement to estimate the likelihood of a given dollar value loss—typically the maximum loss 99 percent of the time. Put another way, (purportedly) very rare events—those that fall in the far tails of a statistical distribution—are not considered very risky because the possibility of their occurrence is deemed so remote. This seems somewhat anathema to risk management; rare and unlikely tail events of large magnitude should be of utmost importance.

A valid criticism of VAR is that it covers—and therefore manages the risk of—only *recognized* risk. The occurrence of an unforeseen negative event, therefore, reveals one’s hedging to be insufficient because the universe of known risks is larger than originally thought. Further, the VAR calculation is extremely sensitive to the prior period used to determine an asset’s volatility. If it is a benign time for financial markets and the economy, the analysis can paint a misleading picture and encourage market participants to increase leverage—and, thus, risk—because the asset is assumed to be a safe, low-volatility asset. As billionaire investor Warren Buffet is known to have quipped, “I deplore false precision in math.”³² As soon as we put a metric on risk, people begin to believe it is measured with certainty and that almost all meaningful outcomes are observable. Many can be lulled into complacency, only to be rudely awakened by the next unforeseen crisis.

Firms that are too big and too complex to manage are effectively too big to supervise and regulate—exacerbating the adverse consequences of risk taking and the threat of contagion to counterparties. VAR is a part of this complicity that leads firms to believe they have manageable risk exposure when, in reality, they are seriously underestimating the potential fallout from bad bets. This feeds back into leverage

³²Pulliam and Richardson (2005).

and diversification—in times of crisis, the performance of otherwise seemingly unrelated and diversified investments can quickly converge to near-perfect correlation when prices turn down simultaneously.

A third lesson that should be emphasized regards incentives and the potential unintended consequences of regulations. For instance, before Dodd–Frank, traditional banks’ AAA-rated mortgage securities carried a very low capital charge, and correspondingly, shadow banks could finance 90 percent of the AAA portion of a CDO tranche in the overnight repo markets. Given the large amount of leverage that could be employed with this type of funding technique, it became inherently attractive to those looking for higher returns on a low capital base. Both traditional banks and shadow banking entities, therefore, had strong incentives to hold these assets in order to maximize short-term profits. Regulators should note that incentives such as these could increase the likelihood of simultaneous action in times of systemic stress. Moreover, regulators should be more sensitive to business models or funding techniques that require a positively sloped yield curve to achieve profitability.

Regulations taking effect under Dodd–Frank and Bank for International Settlements (BIS) global banking rules, known as Basel III, have the potential to push some speculative activities further into the shadow banking system—an appropriate consequence because speculative activity does not belong in traditional banking with access to public safety nets. However, shadow banking is difficult to completely segregate from traditional banking—the propensity for volatility among shadow banks negatively affects conventional banks—and, thus, these activities at the margins must be watched closely. This is a monumental task for regulators given the complexity of the financial system, innumerable daily transactions, and the speed with which balance sheets can change. As a result, comprehensive regulation should not be the end goal. Indeed, it may serve to *lessen* diligence as banks become more concerned with compliance than prudent risk taking and as counterparties come to rely on regulators for more than they are capable of overseeing. As financial writer Hartley Withers (1920) said, “Good banking is produced, not by good laws, but by good bankers.”

Encouraging the elusive concept of good banking is paramount. An important first step is credible elimination of the belief that large financial conglomerates will be supported by the public safety net in times of stress (*see Appendix F*). The creation of the Orderly Liquidation Authority under provisions of Dodd–Frank is a necessary measure; however, details of how the resolution regime will function in practice remain unresolved. Although identifying SIFIs and increasing regulatory measures may help dissuade firms from very specific exposures and balance sheet competition, shadow bank managers and creditors still need to recognize their own vulnerability to potential losses, and thus take and price risk accordingly. **Assuming that the government will backstop large financial firms is unacceptable.**

Reinvigorating Market Discipline and Applying Lessons Learned

Keynes was careful to distinguish between risk, for which probabilities or frequencies could be calculated, and uncertainty, in which there is no scientific basis on which to form any probability estimates.³³ Keynes (1937) argued that uncertainty affects behavior in three ways. First, people largely ignore the prospect of future change when it involves something about which little is widely known. Second, individuals assume that the existing state of opinion as expressed in prices and the character of output is based on a correct summation of future prospects; it is accepted unless and until something new and relevant enters the picture. Third, people endeavor to conform to the behavior of the majority or the average.

Keynes said the psychology of a society of individuals endeavoring to copy one another produces “conventional judgment.” According to Keynes, investor difficulty forecasting the future leads to an inability to form pricing that avoids “sudden and violent changes. … The forces of disillusion may suddenly impose a new conventional basis of valuation. … At all times the vague panic fears and equally vague and unreasoned hopes are not really lulled, and lie but a little way below the surface.”

A commonly held belief, assumed for an extended period, tends to lead to complacency that breeds booms; the dispelling of the notion produces the bust. Therefore, a conventional wisdom that leads to a speculative mania can quickly collapse as sentiment turns on its head. Case in point: Shadow banking liabilities were believed to be “just as good” as traditional bank deposits, not because they *really were*, but because they *had been* leading up to the crisis.

Conventional judgments and complacency are common to bankers, creditors, borrowers, rating agencies, and regulators alike. U.K. financial journalist Christopher Fildes said the law of the financial cycle is that “disasters happen when the last man who can remember what happened last time has retired.” King (2009) posits that economic cycles’ booms and busts, and periods of financial market euphoria and panic embedded within them, are the costs of a free-market economy. History shows that few generations have been able

³³This distinction between risk and uncertainty is also generally attributable to Frank Knight (1921) at the University of Chicago, who wrote on this topic earlier than Keynes.

to avoid a repetition of such crises. The essential problem is that these seemingly rare and dramatic events over time lose their power to shape the behavior of people and institutions. Among a central bank's most important roles—accepted in the domain of monetary policy with financial stability implications—is retaining a collective memory and resisting temptations of the present.³⁴

The Austrian school of economic thought, notably led by Ludwig von Mises and Friedrich Hayek, presaged that credit booms ultimately produce costly misallocations of resources (“malinvestments”) that culminate in crisis. Combatting the negative vortex of a self-feeding deleveraging and deflationary downturn is an incredibly difficult job for policymakers. Mises opined, “No very deep knowledge of economics is usually needed for grasping the immediate effects of a measure; but the task of economics is to foretell the remoter effects, and so to allow us to avoid such acts as attempt to remedy a present ill by sowing the seeds of a much greater ill for the future.”³⁵ A nation’s central bank must be a student of history, while engaging in policymaking in the present that balances desirable short-run effects with the undesirable potential consequences that may be reaped in the future.

The Fed’s attention to the past is reflected in the words of its former chairman, William McChesney Martin: “The System should always be engaged in a ruthless examination of its past record.”³⁶ With development of financial regulatory reform related to TBTF institutions and systemic risk, the schools of Hayek, Keynes, McCulley, Minsky, Mises, and Schumpeter provide valuable perspective on the high stakes and pitfalls in macroprudential supervision of SIFIs. Dodd–Frank’s preamble states that the act seeks “to promote the financial stability of the United States by improving accountability and transparency in the financial system, to end ‘too big to fail,’ to protect the American taxpayer by ending bailouts.”³⁷ Looking back on the crisis, regulators and market participants each witnessed how SIFIs—both lightly supervised shadow banks and comprehensively regulated TBTF BHCs—nearly caused the collapse of the U.S. financial system. Reform must strike a balance between short-term desired effects and longer-term unintended consequences.

Part I of this paper focused on the shadow banking system and how it evolved from a confluence of events, including the widespread use of CP and ABCP, the rise of MMFs (along with other investors in wholesale funding markets), and the advent and subsequent abuse of securitization. Technological progress also played a role, enabling efficient tracking and processing of the payment streams these structures generated. While securitization can decrease asset-specific risk through diversification, its misuse leading up to the crisis spread risk more widely while concealing its magnitude. Securitization in and of itself simply transfers risk and does not improve the underlying quality of the assets.

Part II described how the financial crisis revealed the susceptibility of shadow banking activities to a freeze in wholesale funding markets. The perceived risk-free collateral supporting the system’s liabilities turned out to be riskier than assumed (priced) and insufficiently backed by private credit risk enhancements. The downward spiral of financial deleveraging and collective need for liquidity prompted the expansion of public sector guarantees to stem the panic. The intent of the reform effort under way is to avoid such dire episodes in the near future.

While working to ensure the current reform effort has a chance to end bailouts, eliminate TBTF, and promote financial stability, we should remember the lessons learned from Minsky about boom times: **The transition from hedge to speculative to Ponzi financing is a slippery slope of greed, perhaps accompanied by a generous dose of willful blindness—a human tendency to see what we want to see, or are conditioned to see or overlook.** In addition to stronger regulatory standards for bank capital and liquidity, the broader financial system encompassing banks, shadow banks, and capital markets requires greater market discipline and changes to institutional incentives to lift the veil of obfuscation and opacity that leads to mispriced risk. **Currently, the drivers of systemic risk remain largely intact, and shadow banking appears poised to grow considerably, and dangerously, if it does not acquire the necessary market discipline to shape risk-taking activities.**

³⁴ Fildes’ quote, Keynes’ delineation between risk and uncertainty, and lessons learned are described in King (2009).

³⁵ See Mises (1981). Also, for a perspective of the potential costs and dangers of a prolonged period of easy monetary policy, see W. White (2012).

³⁶ FOMC transcript, November 26, 1968, p. 1,456.

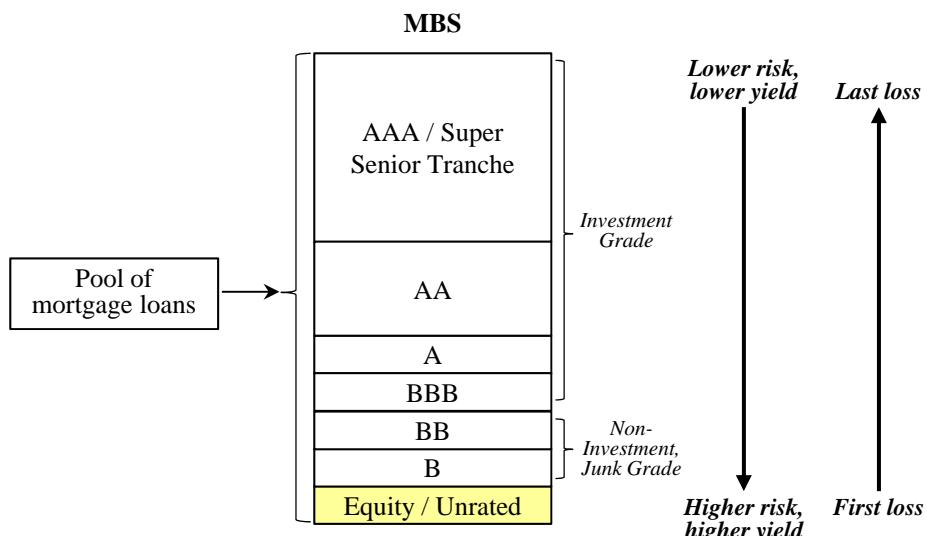
³⁷ The Dodd–Frank Act can be found at: www.sec.gov/about/laws/wallstreetreform-cpa.pdf.

APPENDIX A: Securitization

Securitization, which plays a significant role in shadow banking, involves pooling various debt obligations, such as mortgages, credit card receivables, or auto loans into a single security and selling pieces of the consolidated debt as bonds or other types of securities. Each bond has exposure to the risk profile of the entire group rather than any single obligation. Investors receive principal and interest on the debt as it is repaid. The process of pooling and packaging various debt obligations to create ABS is called securitization because the value of the asset is *securitized* by its collateral.

One appeal of securitization is that it allows diversification. Because exposure is to a broad pool of obligations, a single loan default has a small impact. Another appeal is the risk distribution that it enables when the mortgage pool is divided into pieces called tranches. A tranche (French for “slice”) refers to payment streams from the underlying group of assets. The tranches are ranked hierarchically, with the lower ones of greater risk (the lowest often referred to as equity) and subordinated in priority of claim to the higher tranches. An easy way to visualize the loss distribution among tranches is to picture a beachfront condominium. If a hurricane hits and water levels rise ten feet, the lowest floors flood, but the penthouse on the tenth floor is likely safe. However, if water levels rise sufficiently high, the penthouse is flooded along with all the lower floors. In this case, flooding is equivalent to losses. As would be expected, the lower the floor, the higher the yield to compensate for the additional risk and the lower the rating due to the smaller buffer from losses. This payment structure, known as a waterfall, is illustrated for securities backed by mortgages in Figure A-1.

Figure A-1: Mortgage-Backed Securities Structure



Basic securitization involves the following steps:

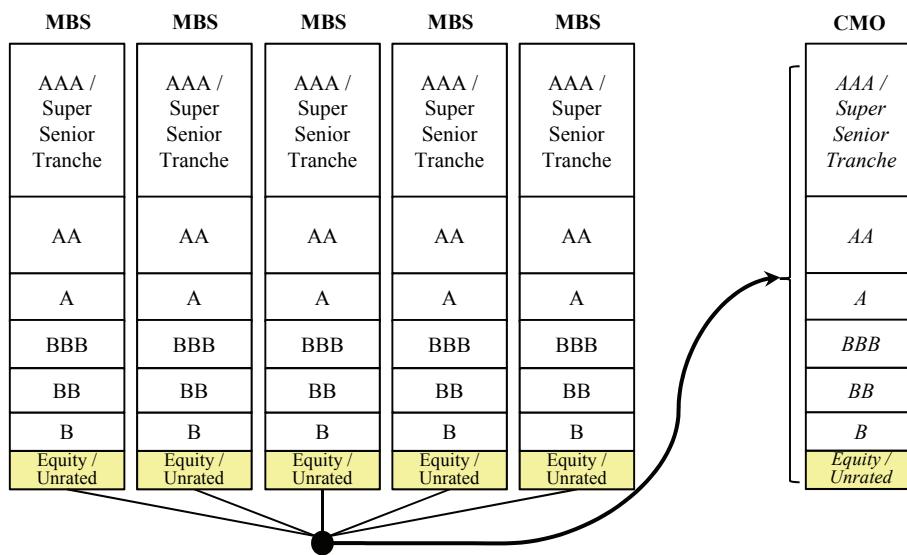
1. A sponsor or originator of receivables sets up a bankruptcy-remote SPV, pools the receivables, and sells them to the SPV.
2. The cash flows from these assets are tranced into ABS, the most senior of which are rated and issued in the market.
3. The proceeds from ABS issuance are used to purchase the receivables from the sponsor (known as a “true sale”) so that they are transferred completely from sponsor to SPV.
4. The pool revolves over a period during which the principal on the underlying receivables accumulates to enough to purchase new receivables.
5. Over a final amortization period, all cash flows from the receivables are used to pay down tranche principal amounts.

This process can be repeated to create more structured credit products. For example, CDOs are secured by loans or bonds, often other ABS. A CDO secured by MBS is referenced as a collateralized mortgage obligation (CMO). Figure A-2 depicts the process by which MBS pieces with lower credit quality (including some noninvestment-grade tranches) are “recycled” to create a CMO, a significant portion of which garners an investment-grade rating. Securitization and resecuritization of ABS tranches support the issuance of new

structured credit products that are funded in short-term debt markets (such as repos and CP). Through this feat, ABS issuers participate in the shadow banking system, converting assets of diverse credit quality into new investment-grade securities. The creation of CMOs powers more demand for MBS, which in turn generates more mortgage lending to supply mortgage pools. Further, the process seen in Figures A-1 and A-2 can take place for any collateralized claims on pools of loans, mortgages, or receivables. The cash-flow-producing asset can be pooled, structured into tranches, and rated, and the credit risk can be transferred from one party to another.

The shadow bank underwriters who packaged and sold structured credit products, the ratings agencies that gave their seal of approval, and the guarantors who wrote protection against default all collected fees for their part in the securitization process through the mid-2000s. This period saw trillions of dollars of securitized products created: A lending boom was born.³⁸

Figure A-2: MBS Tranches Bundled into a CMO



In theory, the segregation of risk made possible through securitization distributes risk to those most willing to accept it, resulting in more efficient risk pricing. Securitization allows loan originators to sell pools of debt to other institutions, thus transferring credit risk. Further, tranching the pools of receivables into diversified segments achieves credit and liquidity transformation through diversification and distribution. In practice, the process became one of considerable complexity. The boom years of financial innovation (and bad loan underwriting) availed an abundance of cheap, but mispriced, credit leading up to the crisis. The risk of this abundant, but vulnerable, credit was often assumed by those who did not fully understand it.

³⁸ Federal Reserve flow of funds data shows that market lending from “ABS issuers”—defined as SPV entities producing securitized assets—grew at an average annual pace of almost 20 percent, or more than \$2.7 trillion from 2002 through mid-2007. During this period, ABS issuance reached a peak level of more than \$4.5 trillion in third quarter 2007. Since then, total securitized assets held off balance sheet in SPVs have declined by about \$2.7 trillion—returning to 2002 levels.

APPENDIX B: Special Purpose Vehicles

An SPV is a legal entity typically used to hold securitized assets.³⁹ These off-balance-sheet trusts issue short-term securities collateralized by loans or other receivables from a separate, but related, entity while investing in assets of longer maturity. SPVs are solely paper entities; they do not have a physical manifestation, an office, or employees. SPVs exist in large part to reduce bankruptcy costs using an off-balance-sheet vehicle that restricts control rights to a specific group of assets and financing decisions. An SPV's bankruptcy-remote aspect means that if the administrator (the sponsoring entity) enters bankruptcy, creditors of the administrating entity have no claim on the assets of the SPV. Likewise, holders of notes issued by the SPV have only a specified claim on the cash flows generated by the underlying assets, not a general claim on the assets of the administrating entity.

SPVs also often have some type of liquidity and credit enhancement. The liquidity enhancement seeks to mitigate the funding risk arising from short-term resources supporting longer-duration assets. Credit enhancement can come in the form of overcollateralization or external enhancement. Overcollateralization occurs when the face value of the assets held exceeds the face value of securities the SPV issues. To enhance the quality of a securitized tranche, an SPV may use cash collateral accounts or reserve accounts to support the assets. An SPV can pay a fee to a third party to provide external credit enhancement (like a guarantee by a monoline insurance company). A large commercial or investment bank sponsor usually enhances its SPVs directly with lines of credit.

Throughout the credit boom, traditional banks, aware of the advantages of more borrowing per dollar of equity, supported shadow banking activities outside commercial banking regulators' direct purview by shifting assets off balance sheet through the use of SPVs and by warehousing securitized assets on broker-dealers' trading books. ABCP conduits were bankruptcy-remote SPVs that commonly financed the purchase of receivables by issuing CP. When the collateral values backing SPVs deteriorated significantly during the crisis, banks were forced to bring these vehicles back on balance sheet despite their bankruptcy-remote design. Sponsors voluntarily supported failing SPVs, not because they were contractually obligated, but because many sponsors recognized their implicit support had already been factored into the price of securities issued from these SPVs. For example, a bank subsidiary of a BHC has access to public backstops, but the capital-efficient, fee-rich, leveraged shadow banking activities conducted by the BHC's broker-dealers and asset management units do not. A bankruptcy-remote SPV is designed to be self-contained with regard to control rights over its assets. However, many BHC sponsors reacted to systemic paralysis in wholesale funding markets by bringing their off-balance-sheet, capital-depleted SPVs back on balance sheet to avoid SPV defaults.

Supporting the troubled SPVs reduced the capital of the regulated banking entity, thereby increasing the bank's leverage ratios. Because credit losses were experienced by many financial intermediaries reliant on short-term funding markets, the very moment capital was needed most, it was in short supply—and therefore very expensive. What was meant as an off-balance-sheet, bankruptcy-remote leverage creator only exacerbated the perverse effects of the negative vortex (*see Figure 1 in the text*) when the leverage worked in reverse to hurt banks' capital efficiency, contributing losses to the mounting write-downs on what turned out to be risky debt securities.

The financial crisis revealed several important lessons regarding off-balance-sheet financing vehicles and the relationship between SPV and sponsor.⁴⁰ From the perspective of risk managers, failure to take into account implicit support of SPVs leads to underestimated potential financial pressures on the sponsor. From the perspective of the sponsor's security holders, implicit promises of support should have been factored into the sponsor's cost of funding but were unknown or misunderstood. Thus, the lack of disclosure of off-balance-sheet arrangements undermined market discipline. Additionally, failure to fully understand the relationship between SPV and sponsor provided a misleading picture of a sponsor's financial health, promoting false impressions about the interrelationships that channel systemic risk. Although SPVs can be an efficient means of wholesale funding, the pervasive unwinding of these vehicles and the securitization techniques they employed were significant transmission mechanisms of financial contagion at the onset of the crisis.

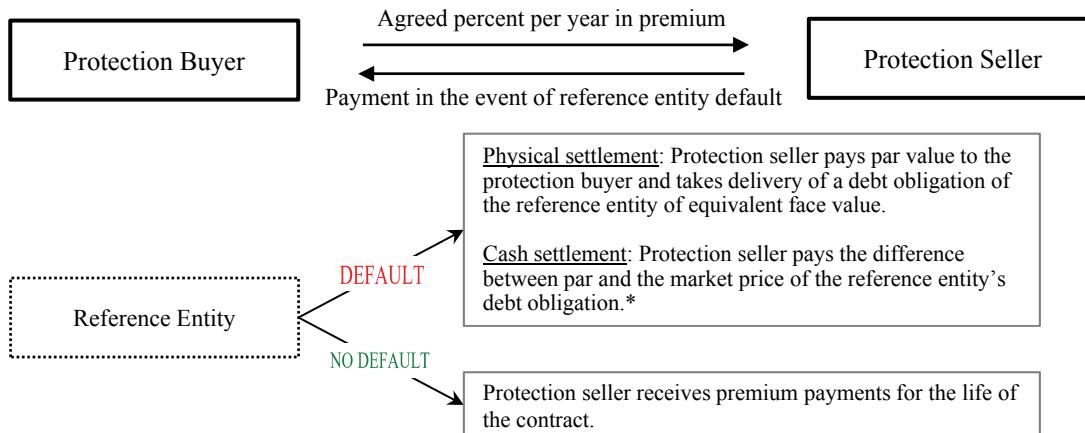
³⁹ SPVs may also be referenced as special purpose entities.

⁴⁰ See Gorton and Souleles (2006) for an explanation of the role and potential hazards of SPVs, identified years before the crisis at a National Bureau of Economic Research conference in October 2004.

APPENDIX C: Credit Default Swaps and Interest Rate Swaps

Credit Default Swaps. A derivative is an agreement transferring risk from one party to another; its value is dependent on an underlying price, rate, index, or financial instrument. A credit derivative is an agreement designed explicitly to shift credit risk between parties; its value is derived from the credit performance of one or more corporations, sovereign entities, or other debt issuers. A popular form of credit derivative is the credit default swap (CDS), a contractual agreement to transfer the default risk of one or more reference entities from one party to the other. The most common and simplest form of CDS involves one reference entity, often a bond.

Figure A-3: Credit Default Swap Structure



*The International Swaps and Derivatives Association will typically hold an auction to determine a fixed cash settlement price to facilitate the settlement of a large number of contracts.

A CDS buyer makes a series of payments, or spreads, to the seller in exchange for a payoff if an underlying credit instrument experiences a material credit event or default. The purchaser of CDS protection gives up the opportunity to profit from the reference entity's credit risk and is relieved of exposure to reference entity default. A CDS seller takes on the credit risk, selling protection against default for a fixed periodic fee. Fixed-income and derivatives traders refer to CDS protection as “short” and sold CDS protection as “long” the reference entity. If the reference entity defaults or declares bankruptcy, or another specified credit event occurs, the protection buyer receives the value of the contract, although the buyer remains exposed to the counterparty risk—the risk that the counterparty is unable to uphold the contract—of the CDS seller.⁴¹

The reference entity is not a party to the contract, and the buyer or seller need not obtain the reference entity's consent to enter into a CDS. Therefore, a CDS is like insurance insofar as the buyer collects when an underlying security defaults or breaches terms specified by the contract. However, a CDS differs from insurance because the buyer need not have an “insurable interest” in the underlying security. Because CDSs were not regulated as insurance contracts, companies selling them were not required to maintain sufficient capital reserves to ensure their ability to pay potential claims.

An example of how a CDS was widely used throughout the early and mid-2000s involves synthetic securitizations—transactions under which a CDS transfers the credit risk of loans or bonds (often a CDO) in lieu of an actual cash sale of the assets. The CDS seller assumes a long position on the referenced CDO, taking on its credit risk. The CDS buyer (the party acquiring default protection) is short the CDO and is thus responsible for making the corresponding interest payments while standing to profit if a material credit event occurs.

CDSs typically have one of two purposes: The CDS is either a hedge or a trade. Although it is not always clear which use is intended, a hedge often involves acquiring CDS protection to provide capital relief and insurance against credit losses or counterparty exposure. Financial intermediaries were natural buyers of credit protection for such purposes, while highly rated broker-dealers, insurance companies, and finance companies were the usual protection sellers prior to the financial crisis.

Interest Rate Swaps. Interest rate swaps are similar to credit default swaps because their value similarly depends on a reference variable—in this case, interest rates. In a simple interest rate swap, one party

⁴¹The International Swaps and Derivatives Association (www.isda.org) defines “credit event” as bankruptcy, failure to pay, restructuring, obligation acceleration, obligation default, and repudiation/moratorium.

agrees to pay a fixed rate and the other a floating rate (such as the unsecured funding rate in the London wholesale money market, known as the London Interbank Offered Rate, or Libor) plus a premium. The party paying the fixed rate will then receive a payment based on the floating rate, and the party paying the floating rate will receive a fixed payment for the term of the swap. To determine the amount of each payment (conducted in the same currency), the rates are multiplied by a notional principal amount; however, this notional principal is solely used for computational purposes and is not exchanged. Market convention dictates the fixed rate payer be referred to as the “payer,” though it also receives the floating-rate payment, while the fixed-rate receiver is called the “receiver,” though it also pays the fixed rate.

Most often, two parties do not directly enter into an interest rate swap with one another but instead go to a bank, which acts as the intermediary between counterparties. The bank (or shadow bank, such as a securities firm) stands ready to enter either side of the swap transaction without waiting to find the opposite counterparty. Plain-vanilla interest rate swaps are the most common and easiest to understand. Market participants often use these customizable derivatives to hedge perceived interest rate risk. The following diagrams illustrate the structure of a plain-vanilla swap in which Party A exchanges a floating-rate liability for a fixed rate, and Party B exchanges a fixed-rate liability for a floating rate. In practice, payments are often netted, so funds will flow only from the paying party to (or from) the bank.

Figure A-4 illustrates a fixed-rate-payer interest rate swap. Party A has a floating-rate obligation and wants to eliminate the risk that interest rates rise, increasing the cost of servicing said obligation. Party A goes to Big Bank, which agrees to enter into a swap—Party A pays a fixed rate to Big Bank and, in return, receives payments based on a floating-rate reference, in this case Libor. Figure A-5 illustrates the reverse situation. Party B has a debt obligation that requires a fixed payment but prefers to borrow at a floating rate. In this case, it will enter into a swap with Big Bank, receiving a fixed payment in return for paying a floating rate, Libor, to Big Bank.

Figure A-4: Fixed-Rate Payer

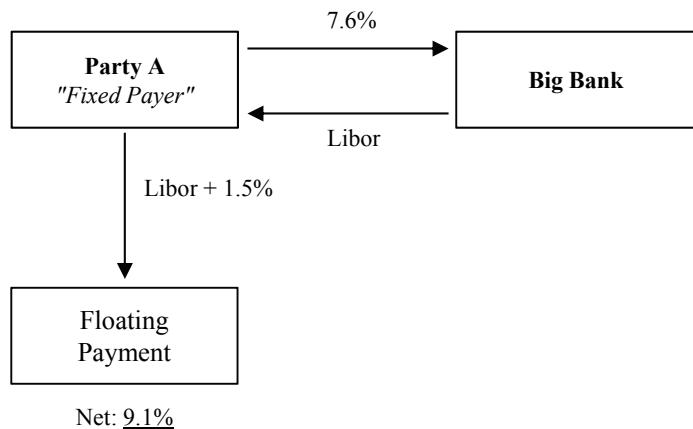
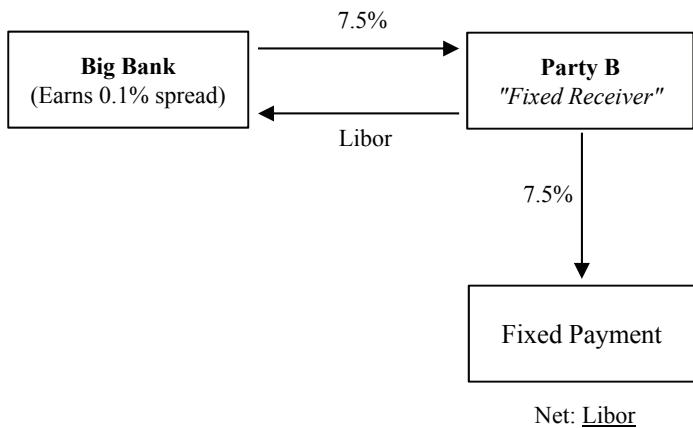


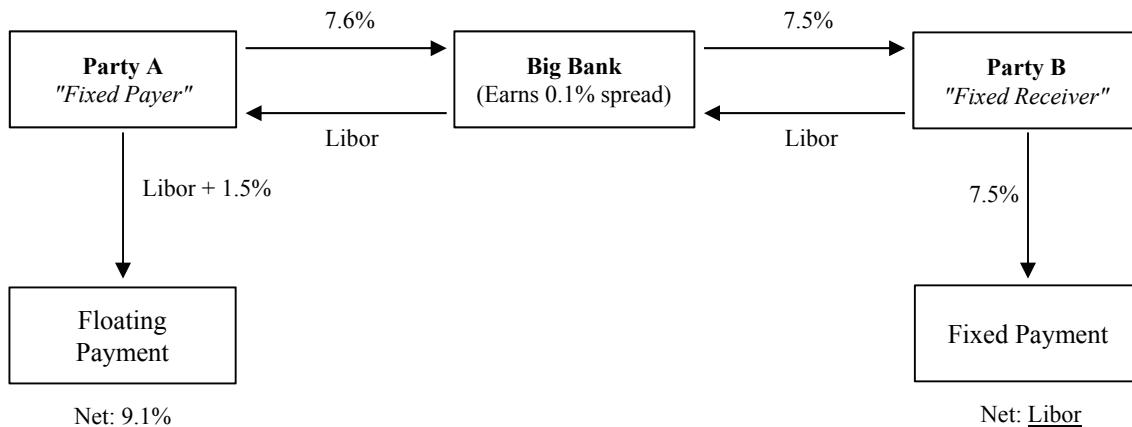
Figure A-5: Fixed-Rate Receiver



For simplicity, we assume the duration of the transactions is the same. The result is seen in Figure A-6. Party A and Party B are unknown to each other. Instead, they deal solely with the bank. In practice, the

two parties may not directly offset each other; in that case, the bank would likely hedge the assumed risk. As compensation for acting as an intermediary, the bank earns a “spread,” charging the parties slightly more than it costs to offset the interest rate risk. This spread also compensates the bank for the credit risk it assumes. In the event Party A or Party B goes bankrupt, Big Bank would terminate that leg of the swap. However, the remaining portion of the swap may have economic value to Big Bank, depending on the forward curve—anticipated interest rates over the next ten years or so.

Figure A-6: Interest Rate Swap



Large financial institutions are the most active credit derivative market-makers, and in the case of swaps, offer both fixed- and floating-rate cash flows to their clients. The counterparties in a typical swap transaction are a corporation, a bank, or an investor on one side (the bank client) and a commercial bank or securities lender on the other side. The bank/securities firm acts as the broker for both sides of the swap transaction. After the bank executes a swap, it can arrange offsetting transactions in the interdealer broker market and may arrange to sell the swap to several different counterparties, diversifying risk.

Size of the Over-the-Counter Derivatives Market. These explanations of two common credit derivative instruments provide a glimpse into the complexity of the interconnected web of derivative transactions meant to disperse risk to willing counterparties throughout the interdealer market. CDSs and interest rate swaps are over-the-counter (OTC) instruments, so they can be of varying duration and are customizable to meet specific counterparty needs. The OTC derivative market trades through a dealer network (and not an organized securities exchange). The flexibility that these derivatives offer in terms of risk transfer has contributed to the dramatic growth of CDSs and interest rate swaps outstanding over the past decade. According to the BIS, the notional value of outstanding CDSs totaled \$28.6 trillion at year-end 2011, up from \$6.4 trillion in December 2004 (earliest recorded data). That pales in comparison to the \$402.6 trillion in outstanding interest rate swaps, up from \$51.4 trillion in June 2001. The reported value of all OTC derivatives contracts at year-end 2011 was \$648 trillion.

This market is so large on a notional outstanding basis due to offsetting trades that are often used to terminate or replace former contracts.⁴² Therefore, the total size of the OTC derivatives market can be measured different ways depending on how contracts are netted. For example, measuring the cost of replacing all existing contracts, the OTC derivatives market’s “gross market value” was \$27 trillion at year-end 2011. Taking into account all legally enforceable bilateral netting agreements, the market’s total value can be reduced further to an approximately \$4 trillion “gross credit exposure.”⁴³ In summary, even after several years of decline from 2008 highs, total OTC derivatives market contracts outstanding were more than forty times the \$15 trillion annual U.S. gross domestic product as of year-end 2011. Accounting for comprehensive netting of total exposures, the figure still amounts to more than a fourth of U.S. total output. Though there are different ways to evaluate the overall size of this dealer web of derivatives, one thing is clear: These financial transactions make up a very large system of interconnected credit exposures.

⁴²For example, CDSs bind both counterparties until the agreed-upon maturity. The CDS can be terminated by mutual agreement; either side of the contract can be replaced by a third party; or a dealer can unwind its position by entering into an offsetting transaction, which may or may not be with the same counterparty as the original deal. Thus, duplicates result from essentially the same transaction and create a chain of linked exposures among market participants.

⁴³OTC Derivatives Markets Statistics released by the BIS semiannually monitor comprehensive and internationally consistent information on the size and structure of derivatives markets in the G-10 countries and Switzerland: www.bis.org/statistics/derstats.htm.

CDSs and AIG. At no time in recent history was this interconnectedness more evident than in fall 2008. Although many banks and broker-dealers sold credit protection on securitized products like synthetic CDOs to gain exposure to the reference entity's credit risk, one entity tends to stand out from the rest as notoriously tied to CDSs: American International Group. The general public most readily identifies AIG as a key player in the CDS credit derivatives market—a role that contributed very visibly to the collapse in financial markets. AIG failed on the heels of the financial upheaval at Lehman Brothers, Merrill Lynch, Fannie Mae, and Freddie Mac. Although all of these “failures” looked different, only Lehman failed in the outright bankruptcy sense.⁴⁴ The events surrounding Lehman’s September 2008 failure were the tipping point of the crisis.

Table A-1 shows a list of the twenty largest CDS counterparties in 2005. Although some of the firms’ names, ownership, or legal structures changed, the only firms not included in the FSB’s initial, November 2011 G-SIB list were Lehman (which was dissolved) and AIG (which is not a BHC). These twenty firms were linked via bad subprime mortgage credits and their intertwined OTC derivatives market exposures. Many of the TBTF firms were “too complex to manage”—and a “too many to fail” situation caught the financial world unaware.

Table A-1: Largest Credit Default Swap Counterparties as of Year-End 2005

1. Morgan Stanley
2. Deutsche Bank
3. Goldman Sachs
4. J.P. Morgan Chase
5. UBS
6. Lehman Brothers (*filed for Chapter 11 bankruptcy, September 2008*)*
7. Barclays
8. Citigroup
9. Credit Suisse
10. BNP Paribas
11. Merrill Lynch (*acquired by Bank of America, January 2009*)
12. Bear Stearns (*acquired by J.P. Morgan Chase, September 2008*)
13. Bank of America
14. Dresdner (*merged with Commerzbank, May 2009*)
15. ABN Amro (*parent of LaSalle, acquired by Bank of America, October 2007*)
16. HSBC
17. Société Générale
18. Calyon (*now Group Crédit Agricole; change occurred February 2010*)
19. Royal Bank of Scotland
20. AIG*

*Not a large BHC or 2011 G-SIB.

NOTE: Listed on a count basis (number of times institution cited).

SOURCE: Fitch Ratings (2006), p.7.

AIG, the world’s largest insurance company and a major participant in the global trade of derivatives and other financial instruments, was the twentieth largest CDS counterparty in 2005. AIG encountered severe liquidity problems several years later as a result of losses related to its credit derivatives portfolio, largely built up during the 2005 boom in CDS and CDO protection sold. AIG Financial Products, the firm’s noninsurance, shadow banking arm, maintained the dominant share of the insurance industry’s global net exposure to credit derivatives throughout the mid-2000s. AIG Financial was the CDS market’s largest one-way net seller of protection for higher-rated senior tranches of CDOs—a strategy primarily viewed as a fixed-income-asset investment class (and not an insurance hedge). In a tightened spread environment, these investments were tempting for many firms reaching for yield. Selling CDSs required minimal capital allocation because there were small haircuts demanding little collateral during a time when capital efficiency was king. However, AIG Financial built a large portfolio of protection sold, while most banks and shadow banks participating in the CDS market were largely weighted toward the purchase of credit protection,

⁴⁴For a discussion of *degrees of failure*, see Rosenblum (2012), Box 1, p. 10.

with net credit derivatives exposure taken on to hedge a position that resulted from a customer-originated request. As was the case with many of the failed firms of the financial crisis, accumulated layers of leverage and credit exposure were at the epicenter of AIG's eventual demise.

AIG's third quarter 2008 aggregate gross notional amount of credit derivatives sold was \$493 billion, or \$372 billion on a net basis. According to BIS statistics, the notional amount of CDS outstanding was \$42 trillion at year-end 2008. The Depository Trust and Clearing Corporation, which tracks weekly transactions, reported a net notional exposure of \$1.5 trillion at that time. Therefore, on a gross notional basis, AIG's derivative footprint was not considered hugely significant, but on a *gross credit exposure* basis, AIG was an extremely concentrated counterparty risk.

AIG Financial sold credit derivative "insurance" without buying much offsetting protection.⁴⁵ However, unlike in its core insurance business—which can balance premiums coming in against payments going out on relatively steady, actuarially predictable terms—there can be a high degree of serial correlation among bond defaults. Holders of the CDSs written by AIG to cover MBS and CDOs ended up calling on AIG for big payouts. The inability of AIG to cover hundreds of billions of dollars' worth of CDS contracts resulted in credit-rating downgrades and a severe counterparty scare. Banks all over the world had bought CDS protection from the firm. If AIG's good standing as a sound counterparty was at risk, that CDS protection had to be replaced with coverage at higher market rates as risks in the system rose. IndyMac Bank and Lehman had already experienced debilitating losses that led to their collapse; Fannie Mae and Freddie Mac were placed in government conservatorship. There was a loss of confidence in global financial markets. Wholesale funding markets were severely disrupted, further spreading the financial panic and counterparty uncertainty. Without clarity, financial intermediaries stopped lending to each other, and the financial markets froze up.

On September 15, 2008, downgrades by the three major credit-rating agencies triggered CDS-related collateral calls that AIG could not meet. Not only was AIG Financial's significant net negative exposure a systemic risk for its largely singular direction and significant scale, but many of its exposures were not initially collateralized and margin was thin or nonexistent. Commitments were backed by parent AIG's AAA credit rating as the guarantor. AIG had already reported staggering losses in fourth quarter 2007 and first quarter 2008, owing to write-downs related to the subprime-mortgage market bust. Further, AIG faced a flight from its U.S. securities lending program around the time of the credit-rating cuts. The severe stress on AIG Financial produced a run on AIG's securities lending—borrowers returned securities and demanded their cash collateral, which AIG had largely invested in highly rated MBS and CDOs that were becoming increasingly difficult to sell. AIG's liquidity position rapidly deteriorated, resulting in severe credit problems and a need to raise capital in a strained liquidity environment.⁴⁶ Upon failure of a consortium of private banks to agree on a private sector solution, the Fed and Treasury established a secured revolving credit facility of up to \$85 billion to protect U.S. citizens from the potentially devastating consequences of AIG's disorderly failure.⁴⁷

As Table A-1 shows, AIG wasn't even the largest CDS counterparty in 2005 (the only year the firm cracked the top twenty). The CDS market is concentrated around a few large counterparties. Three U.S. BHCs, J.P. Morgan Chase, Goldman Sachs, and Morgan Stanley, have been among the largest four credit derivative counterparties every year since 2002, when Fitch started collecting market feedback on OTC data for the credit derivatives market. Fitch (2009) revealed that the top five counterparties provided 88 percent of the total notional CDS outstanding in 2008, representing more than \$6 trillion notional at each institution—upwards of \$3 trillion bought and \$3 trillion sold each year, with a relatively small net notional exposure of several hundred billion dollars. However, CDSs (like all other OTC derivatives) are a financial system zero-sum game. There is a clear winner and loser for each transaction, although both parties can suffer losses if counterparty risks materialize. Thus, if the credit environment deteriorates (spreads widen)

⁴⁵ Structured credit positions in CDSs were not recognized by regulators' risk-based capital formula as an offset risk to an existing cash position. Therefore, from a regulatory capital standpoint, insurers had little incentive to buy credit protection.

⁴⁶ AIG's second quarter 10-Q regulatory filing as of August 6, 2008, disclosed that \$17 billion of collateral had been posted for its outstanding CDS contracts. Given the credit-rating downgrades of September 15, 2008, the credit-rating triggers included in many of its CDS contracts required AIG to post additional collateral. AIG estimated that it would require at least an additional \$20 billion to fund further calls for collateral and derivative-termination payments. The firm had insufficient liquidity to meet these additional capital demands.

⁴⁷ In 2008, AIG had more than 76 million customers in approximately 140 countries, with more than 30 million customers in the U.S. alone. The scope of activities that would be impacted by an AIG bankruptcy filing was staggering. AIG and its subsidiaries were providers of life, health, property, and casualty insurance and retirement services and were active market participants in credit derivatives, U.S. municipal bonds, and CP issuance. For information regarding the government actions related to AIG during the crisis, refer to the New York Fed repository: www.newyorkfed.org/aboutthefed/aig/index.html.

and any of the large counterparties buying protection (such as Lehman) default, the seller (such as AIG Financial) would still be required to pay the protection buyer the amount required to take on the original trade at a lower spread. As was seen in fall 2008, the interconnected nature of the OTC derivatives market can result in a chain of large trade replacement costs in the event of a dealer failure.

The credit events of 2007–09 revealed the counterparty risk embedded in the gargantuan OTC derivatives market. **The systemic nature of the linked exposure chain among OTC derivatives market participants validates the ongoing debate about and progress toward establishing central clearing of standardized contracts.⁴⁸**

⁴⁸Section 813 of Dodd–Frank mandates central clearing of certain swaps. In July 2011, the Board of Governors, Securities and Exchange Commission, and Commodity Futures Trading Commission released a joint report on improving clearing oversight. Also, for details concerning a progress report on implementation of OTC derivatives market reforms (including standardized contracts and central counterparty clearing), see Financial Stability Board (2012b).

APPENDIX D: History of the Money Market Mutual Fund

The first U.S. MMF introduced in 1971 barely registered in terms of asset size.⁴⁹ However, MMFs grew quickly due to regulatory advantages over traditional demand deposit accounts and through the use of emerging technology. As short-term interest rates rose above those allowed on savings accounts, deposits flowed out of banks and into higher-yielding short-maturity debt (such as Treasury bills). Thus, MMFs began as a way for depositors seeking higher short-term rates to more efficiently invest in short-term debt instruments through the pooling of funds with a centralized asset manager. These money funds quickly gained in popularity because they maintained a stable \$1 NAV and typically credited interest at a higher rate than bank savings accounts. Further, MMFs were investment funds that could attain scale by offering their services nationwide. Some of the largest MMFs introduced a feature similar to check-writing to mimic the conveniences of a bank deposit account. These innovations increased assets under MMF management and blurred the distinction between traditional bank deposits and money funds.

MMFs' development in the 1970s can also be attributed to the banking regulatory environment at the time, specifically Regulation Q and limits on interstate banking. Reg Q, which appeared as part of the Glass–Steagall Act in 1933, prohibited banks from paying interest on demand deposits and gave the Federal Reserve the ability to set limits on the interest banks could pay on savings deposits. For the first thirty years, the ceiling rate on deposits typically exceeded interest rates banks paid and was above short-term market rates. Policy regarding Reg Q changed in 1966 in response to concerns about allocation of credit, specifically an increase in the volume of business loans relative to mortgage loans. Seeking to correct this perceived anomaly, Reg Q ceiling rates on some types of accounts trailed Treasury bill rates.

The McFadden Act of 1927 prohibited existing banks from branching across state lines, creating another regulatory hurdle for banks and helping open the door for MMFs. The interstate banking rules of the Bank Holding Company Act of 1956 restricted BHCs from purchasing other BHCs based in a different state. Although interstate banking rules were repealed with the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994, MMFs were by then well-established among retail and institutional clients.

To better enable banks to compete with the burgeoning MMF industry, Congress passed the Depository Institutions Deregulation and Monetary Control Act in 1980. It phased out Reg Q's interest rate limits, which fully disappeared by 1986. Congress also passed the Garn–St. Germain Depository Institutions Act of 1982, which opened the door for banks to offer money market deposit accounts (MMDA). These MMDAs had no limit on interest rates, and while MMDAs were intended to compete directly with MMFs, by statute, customers were limited to only a few transactions monthly. MMDAs were popular at first, but interest rates offered on MMDAs fell over time while MMF assets continued growing.

By 1985, MMFs had reached almost 6 percent of combined commercial and shadow bank liabilities and continued to grow at an annual pace of more than 12 percent through 2008 to reach about 12 percent of total bank liabilities. At their peak in fourth quarter 2008, MMFs accounted for almost \$3.8 trillion in assets. This amount has declined to \$2.5 trillion in second quarter 2012 (Figure A-7).

Figure A-7: Money Market Fund Assets Rose Significantly in Years Before the Crisis



⁴⁹ Bruce Bent and Henry Brown created the first U.S. MMF, the Reserve Fund. In first quarter 1974, MMFs made up only 0.03 percent of total banking (commercial and shadow) assets.

Breaking the Buck. As Figure A-7 displays, the MMF industry has grown steadily over the past four decades, but not without the occasional hiccup. Since 1971, the industry has experienced only two instances in which a fund's NAV fell below \$1 per share. The first time, in 1994, the Community Bankers U.S. Government Fund “broke the buck” because of derivatives losses and paid investors 96 cents per share. The second instance, and one of notoriety in the recent crisis, was the Reserve Primary Fund in 2008 due to its accumulated holdings of CP from bankrupt Lehman Brothers. Reserve Primary Fund investors ultimately recouped about 99 cents on the dollar but lost access to a portion of their funds for more than a year.

More commonly, sponsors support their funds by buying impaired credits from the MMF to maintain the \$1 NAV. Typically, there are very small fluctuations in the asset values underlying the NAV at money funds. In the event of small losses, the sponsoring company usually makes investors whole through capital injections because continued functioning of the fund is more valuable than the cost of covering the loss. Many funds did this in 1994, the same year the first MMF broke the buck, as well as in 2008, amid the credit crunch.

Based on an SEC staff review, various sponsors have voluntarily supported MMFs in this way (to avoid officially breaking the buck) on more than 300 occasions since the funds were first offered in the 1970s. The most prevalent of these episodes was following Lehman’s failure. The run on the Reserve Primary Fund spread to include massive redemptions from other MMFs.⁵⁰ Further, since MMFs are substantial participants in the short-term funding markets—in 2008 they held about 40 percent of outstanding CP—the money funds’ retreat from short-term funding markets contributed to the freeze in debt markets. Sponsors supported more than one hundred MMFs during September 2008 alone.⁵¹

Shareholder losses and a systemic loss of liquidity access are tangible impacts of an unchecked run on MMFs and short-term funding markets. In this regard, sponsor support is a much needed private-sector safety net in lieu of public guarantees. Shareholder balances are unaffected because the sponsor bears the losses, just as the FDIC would in the event of a bank failure. However, as occurred during the fall of 2008, the sponsors may face their own solvency issues depending on the severity of the losses and liquidity impairment due to market panic.

MMFs appear safe on the basis of losses per dollar invested. Most assets held by MMFs are short-term, high-quality, and high-liquidity debt easily convertible to cash in normal times. However, these funds can also be destabilizing because of the speed with which capital can flow in and out. In the months following Lehman’s failure, times were abnormal. During such periods, MMFs pose a two-sided risk—MMF holdings are very short term, and MMF shareholders (depositors) can withdraw funds on demand. These risks make it easy for MMFs to abruptly stop acquiring assets and, in the process, impair credit-market liquidity simply by declining to roll over CP. Additionally, MMF shareholders can quickly redeem shares, forcing a fire sale of assets that further impair credit-market liquidity. This occurred in late 2008 as managers’ risk aversion increased and they shifted some MMFs from CP into Treasuries while simultaneously demanding shorter CP maturities. When the Reserve Primary Fund broke the buck, investors withdrew significant sums.⁵² To stem fund outflow and corresponding credit reduction, the Treasury offered to guarantee money fund shares at par in return for a sponsor-paid fee. Separately, the Fed instituted a program to assist the ABCP market.⁵³ Together, these initiatives successfully staunched the outflow of funds.

Proposed Reform. During the financial crisis, MMF industry stability was critical because of the large amount of credit it allocated. In 2008, prior to Lehman’s failure, MMFs held about 37 percent of all CP outstanding, amounting to around \$650 billion. At the end third quarter 2008, after the Lehman collapse, MMF holdings of CP slipped to 32 percent. As seen in Figure A-8, other investors stepped forward in third quarter 2008, notably commercial banks, which accounted for approximately two-thirds of the absorption (likely benefiting greatly from the Fed’s implementation of the Asset-Backed Commercial Paper Money

⁵⁰The Reserve Primary Fund is the same landmark MMF created by Bruce Bent and Henry Brown in 1971. See the following archive of press releases from September 2008 for more information regarding fund losses, securities liquidation, and suspension: www.primary-yieldplus-inliquidation.com/archive.html.

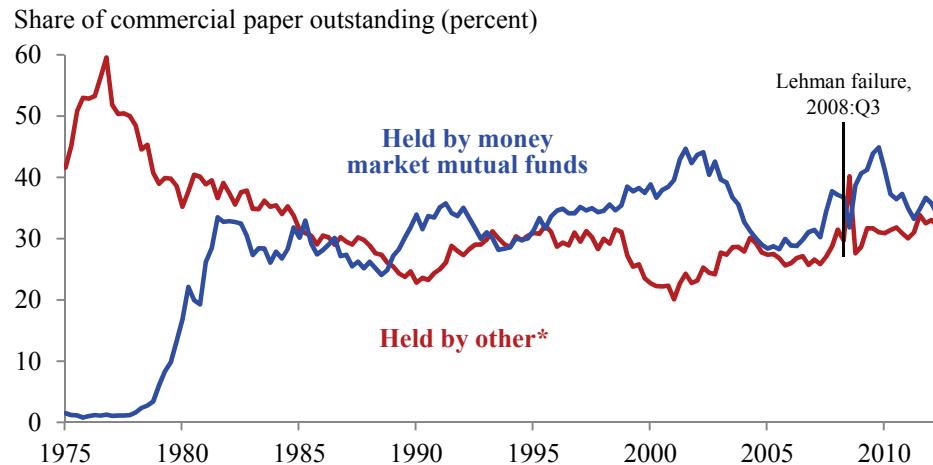
⁵¹Some money market funds with well-known sponsors such as Putnam and BNY Mellon proceeded to liquidate due to significant redemptions. Further, more than 100 funds required support from their sponsors to avoid breaking the \$1 NAV.

⁵²In one week, over \$300 billion was withdrawn from prime money funds, or approximately 15 percent of prime fund investments. In contrast, government-only funds—those that invest in Treasury and agency securities—saw inflows. The result was a moderate decline in total money market funds and a significant redistribution in the allocation among money fund types.

⁵³The Treasury’s special “deposit insurance” program, announced on September 19, 2008, stood for one year. The following week (September 22, 2008), the Fed instituted the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility to provide financing to depository institutions and bank holding companies to fund their purchases of ABCP from MMFs under certain conditions. The facility closed on February 1, 2010.

Market Mutual Fund Liquidity Facility). In 2012, MMFs have maintained market share while total holdings of commercial paper have steadily dwindled to less than \$350 billion.

Figure A-8: Money Market Funds Dump Commercial Paper Following Lehman Failure



*“Other” includes: broker-dealers, pension funds (private and public), life insurance companies, commercial banks, credit unions, GSEs, and foreign owners.

SOURCE: Federal Reserve flow of funds.

After Lehman, steps were taken to strengthen the MMF structure. Amended SEC regulations governing MMFs imposed additional credit-quality constraints, reduced portfolio maturity, and enhanced liquidity standards. MMFs are now required to stress test their ability to maintain a stable NAV, and funds in the process of breaking the buck are allowed to suspend redemptions to aid orderly portfolio liquidation.⁵⁴

Although important first steps in strengthening MMFs, they alone will not prevent future runs. On the contrary, the reduction in portfolio maturity may further curtail funding during crises as MMFs decline to replace maturing CP with new funding. Multiple policy options focused on reducing the systemic risk posed by MMFs have been discussed. They include 1) floating NAVs, 2) private emergency liquidity facilities, 3) mandatory redemptions in kind, 4) insurance for MMFs, and 5) a two-tier structure for MMFs with enhanced protection for those with stable NAVs.⁵⁵

The various proposals have their benefits and drawbacks. A floating NAV—mark-to-market valuation employed by other mutual funds—presents the simplest approach and at the same time makes apparent that MMFs are not equivalent to cash or an FDIC-insured account.⁵⁶ As of late 2012, it remained unclear which proposals would ultimately prevail, or if a hybrid form would take shape.⁵⁷ What is important is that the risks inherent in MMFs are recognized and addressed so future runs can be avoided and that retail and institutional investors alike are aware the government support of MMFs seen during the crisis is unlikely in the future.

⁵⁴ Debate among regulators and within the SEC itself continues concerning additional reforms needed to buttress the MMF market. Much discussion has followed Investment Company Institute (2009), as pointed out in Schapiro (2012a, 2012b).

⁵⁵ See President’s Working Group on Financial Markets (2010). Follow-up comments about the President’s Working Group report at the behest of the SEC can be found at www.sec.gov/comments/4-619/4619-82.pdf.

⁵⁶ Indeed, the market may already be moving in this direction as many bond exchange-traded funds (ETFs) focused on short-term credit have debuted. An ETF is similar to a mutual fund in that it tracks an index, a commodity, or a basket of assets but is traded on a stock exchange. A key feature of ETFs is that they have a fluctuating price (though that price may be at a small premium or discount to the underlying NAV).

⁵⁷ Meetings have taken place between MMF managers and regulators from the SEC and Treasury to discuss collaborative solutions following industry opposition to structural reforms proposed by SEC Chairman Mary Schapiro (2012a). A plan offered by the world’s largest money manager, BlackRock, in September 2012 proposed that money funds charge investors “stand-by liquidity fees” if they withdraw money when a fund’s liquidity fails to meet existing minimums (or when a fund’s mark-to-market share value dips below a certain level).

APPENDIX E: Rehypothecation

“Hypothecation” in capital markets occurs through the use of margin accounts—investors borrowing funds from a broker to acquire assets, most commonly stocks. Assets purchased by an investor on margin are hypothetically held by the brokerage as collateral. If the securities’ value drops, the broker can satisfy credit repayment with a margin call (compelling the investor to deposit more money to cover the original loan amount) or through sale of the securities. While the investor has legal ownership of the securities—since they were bought with the investor’s money and partially borrowed funds from the broker—both the original deposit and the securities become collateral. “Rehypothecation,” also referred to as “repledging,” occurs when a broker-dealer reuses the collateral posted by a client to back the broker’s own trades and borrowing. The process may be repeated several times, with the same collateral repledged simultaneously in a number of transactions. This is known as “churn” and effectively increases financial institution leverage in an opaque way.

A mortgage agreement—a home loan using a down payment and the property as collateral—is a common example of hypothecation. The lender has a lien on the house—if the borrower defaults on the mortgage, the lender has a legal right as the mortgage creditor to take ownership of the collateral. Now imagine that, due to no fault of the borrower, the house is seized because it was repledged as collateral for the lender in a new transaction. This illustration of rehypothecation demonstrates how the repledging process can go astray.

You can see the thorny issue that would arise if tangible collateral assets like houses could be rehypothecated. However, there are contractual rights that limit the appropriation of various assets—such as residential property—by third parties. Banks and nonbank financial intermediaries don’t rehypothecate tangible assets such as houses, but broker-dealers and asset managers around the world repledge collateral on margin securities accounts (such as those used for trading credit derivatives) many times over, many times each day.

Among the greatest benefits of rehypothecation is capital efficiency in funding intermediation. Because collateral is repledged, less capital is needed to fund new debt or yield-seeking activities. Rehypothecation reduces the cost of pledging collateral, leveraging a greater amount of funding on a relatively smaller capital base. However, there are significant risks when leverage and financial layering become too complex and opaque to discern whether a reasonable capital cushion exists to cover potential asset price declines.

Under Federal Reserve Regulation T and SEC Rule 15c3-3, a broker-dealer has the right to rehypothecate customers’ margin securities when securities are pledged to the broker-dealer to support a margin debit. Under Rule 15c3-3, the broker-dealer may rehypothecate an amount up to 140 percent of a client’s debit balance.⁵⁸ This rule, adopted in 1972, is meant to restrict the use of customer cash or margin securities to activities directly related to financing customer securities purchases. The broker-dealer is not allowed to use customer property as a source of working capital for its operations. However, in the U.K., there is no statutory limit on the amount of rehypothecation. Brokers in the U.K. can rehypothecate their customers’ assets along with their own proprietary assets as collateral for reuse in the global financial system.

Cases of Rehypothecation Gone Awry. Lehman Brothers International Europe (LBIE), Lehman’s U.K. subsidiary, was not subject to restrictions on the amount of custodial collateral it could rehypothecate. When Lehman Brothers filed for bankruptcy, LBIE client assets were frozen (additionally, some U.S. client assets were transferred to LBIE and rehypothecated legally because of clauses in Lehman’s securities lending agreements). In some cases, client interest in the assets was eliminated and the clients became unsecured creditors. Disparate regulations between countries can lead to regulatory arbitrage and unexpected outcomes. Rehypothecated assets in the U.S. were resolved with relative ease compared with proceedings in the U.K., but the global liquidity drain emanating from issues in the U.K. severely impacted global credit markets. From year-end 2007 through year-end 2010, collateral available to be rehypothecated by large U.S. and European banks declined \$4.2 trillion, from approximately \$10 trillion to \$5.8 trillion (Pozsar and Singh 2011).

The October 2011 bankruptcy of primary dealer and brokerage MF Global (also using a U.K. subsidiary) refocused attention on the dangers of rehypothecation in the shadow banking system. MF Global’s demise is often attributed to its use of off-balance-sheet repurchase agreements called “repo-to-maturity.” The repo-to-maturity transactions involved borrowing billions of dollars backed by European sovereign debt due to expire at the same time. Because the loan collateral and the loan itself were set to mature simultaneously, MF Global was allowed to treat the transaction as a “sale” under generally accepted accounting principles.

⁵⁸ Assume a customer has \$1,000 in pledged securities and a debit balance of \$400 with a broker, resulting in a net equity position of \$600. The broker-dealer can rehypothecate up to \$560 of this customer’s assets ($140\text{ percent} \times \400).

This allowed the firm to move billions of dollars of transactions off its balance sheet—a majority of the collateral was debt issued by Italy, Spain, Belgium, Portugal, and Ireland. Although rehypothecation is legal, using client funds to *service debt* is not. Repledged securities are meant to be used in transactions that generate future revenue, and the rehypothecating firm is expected to cover and eventually return all capital to clients' accounts when needed or appropriate, per agreed-upon securities lending agreements. The overextension of leverage and exposure to bad bets in European sovereign debt led to financial stress at MF Global in the summer and fall of 2011. Margin calls followed ratings cuts, and hurried asset liquidation to post more collateral further contributed to the liquidity shortage-turned-solvency issue. MF Global subsequently commingled customer funds with firm capital to meet margin calls.

In the wake of MF Global's bankruptcy on October 31, 2011, \$1.6 billion of customer funds that should have been kept separate from MF Global's proprietary trading portfolio were estimated to have been "lost." When MF Global failed, competing claims on the firm's assets clamped down on all available (customer, creditor, and company) funds. Multiple bankruptcy trustees, in the name of multiple claimants, are pursuing the same purse of funds. Although a messy process, recovery is up to eighty cents on every dollar of customer funds, and it has been suggested that U.S. customers will eventually be made whole.⁵⁹ No criminal charges have been brought in the year following the bankruptcy filing.

Rehypothecate Responsibly. After Lehman's bankruptcy, brokers required higher haircuts, which affect the amount of collateral held to support a loan. In the wake of the crisis, the future of rehypothecation depends on the balancing of the benefits of capital efficiency and funding liquidity needs against the costs of introducing marketwide counterparty risks that amplify market strains with funding leverage.

The Dodd–Frank Act changes rehypothecation and clearing practices to combat the costs of systemic counterparty risk that amplify market stress and the uncertainty of recovering collateral in the case of default. Dodd–Frank limits rehypothecation by requiring that most swap contracts clear through a derivatives clearing organization, such as a central counterparty, and that the collateral pledged is held in a segregated account with no possibility of rehypothecation.

Market participants may widely assign blame when excessive leverage and credit derivative exposure topple firms such as Lehman and MF Global. There are, however, many contributing factors and parties. The arguments from this paper reinforce that certain risks are inherent in credit intermediation. Financial innovation has enabled credit intermediaries to spread risk through the financial system, slicing risk exposure into segments and distributing the pieces to those supposedly willing to bear the risk. Globally connected financial markets provide an incredible opportunity to decrease the cost of funding and increase capital efficiency, serving the consumption and investment needs of businesses and households worldwide. **However, no matter how risk is distributed and transferred outside regulation and safety nets, it cannot be eliminated from the financial system.**

⁵⁹ Although James Giddens is the court-appointed bankruptcy trustee for the Securities Investor Protection Act liquidation of MF Global, the trustee for unsecured (noncustomer) creditors, Louis J. Freeh (2012), stated that he believes all customer losses and even some unsecured creditors' losses will be recovered.

APPENDIX F: ‘Fringe Banks’ and ‘Too Big to Fail’

Hyman Minsky, a student of Joseph Schumpeter and an economist who astutely modeled the credit system, joined John Stuart Mill, Alfred Marshall, Knut Wicksell, and Irving Fisher in demonstrating the importance of the financial system in business-cycle booms and busts. What Minsky described as “fringe banks and other financial institutions” we refer to as the “shadow banks” that finance longer-dated and less-liquid activities with shorter-dated, liquid funds. In the current era, commercial banks’ support of both narrow banking and fringe financing is a development that helped create giant institutions, whose role is important to the functioning of our money and capital markets. These financial intermediaries are considered too big to fail when their distress or disorderly failure would significantly disrupt the wider financial system and economic activity. Given their size, interconnectedness, and complexity, these institutions are the focal point of regulatory reform.

Attempting to avoid this disorder during the recent financial crisis, authorities forestalled the outright failure of several TBTF institutions through public solvency support. This adversely affected private incentives and public finances. Regulators are seeking to implement a policy framework to address systemic and moral hazard risks associated with TBTF (*see Table 1*). To identify the major players in today’s interwoven global financial-intermediation landscape, the FSB created a list of G-SIBs in 2011 and began in November to update it annually.⁶⁰

As identified by the FSB, several policy measures now being implemented include: effective resolution regimes to wind down failing firms in an orderly manner without exposing taxpayers to the risk of loss; increased capital requirements to boost loss absorption capacity; and more intensive and effective supervision, including stronger international standards.

Moreover, it is interesting to note the FDIC-insured consolidated asset sizes of the largest U.S. BHCs (*Table A-2*). The liabilities and capital supporting these assets include both the wholesale funding of shadow banks and the government-backstopped core deposits of traditional banks. These megabanks house subsidiaries that conduct a range of credit intermediation activities, from plain-vanilla-type loan origination to ABS intermediation. Eight of these top ten U.S. BHCs are listed as G-SIBs.⁶¹ Goldman Sachs and Morgan Stanley shed their identities as stand-alone investment banks during the height of the crisis, acquiring BHC charters. This metamorphosis of parent company legal structure serves as a palpable example of the fuzzy distinction between opaque shadow intermediation and the traditionally regulated and publicly supported sphere of deposit-taking commercial banks.

Table A-2: Consolidated Assets of Largest U.S. Bank Holding Companies as of December 31, 2011

	Consolidated assets (billions of dollars)
J.P. Morgan Chase	2,266
Bank of America	2,137
Citigroup	1,874
Wells Fargo	1,314
Goldman Sachs	924
MetLife	800
Morgan Stanley	750
Taunus (subsidiary of Deutsche Bank)	355
U.S. Bancorp	340
HSBC North America	331

SOURCE: Federal Financial Institutions Examination Council.

⁶⁰FSB (2012a); these 28 financial firms will be required to hold an additional 1 to 2.5 percent in capital beginning in 2016, with expected full implementation of the capital surcharge by January 2019. Further, six FSB Workstreams under the FSB Shadow Banking Task Force, created at the November 2011 G-20 Cannes Summit, are developing policy recommendations to strengthen regulation of the shadow banking system by the end of 2012 (FSB 2011a).

⁶¹MetLife and U.S. Bancorp are not included in the G-SIB list. Taunus is a U.S. subsidiary of Deutsche Bank and, as of February 1, 2012, was reclassified as a “domestic entity” instead of a “financial holding company,” purportedly to avoid new rules mandated by Dodd-Frank that will determine capital and liquidity requirements and related stress tests and other exams U.S. BHCs will face. See “Deutsche Avoids Dodd-Frank Rule,” *Wall Street Journal*, March 22, 2012.

From Credit Losses to Counterparty Contagion to Crisis. When Adam Smith's invisible hand grows lazy from prolonged stability, markets are not efficiently pricing risk.⁶² The excesses of exuberant risky loan origination, esoteric off-balance-sheet entities like SPVs, and other complex instruments and entities involved in securitization embody the Minsky progression of financial market risk taking. Their apparent stability gives rise to ever-riskier debt arrangements, which lead to asset price bubbles. When asset price declines eventually come, the net worth of significantly overvalued, highly levered securities quickly evaporates. Cash flow shortfalls then force asset sales to cover debts, further collapsing asset values.

Although Lehman's bankruptcy is widely viewed as the tipping point of the financial crisis, the onset of systemic turmoil began much earlier. A succession of events leading to dysfunctional capital and money markets began as early as summer 2007. A run on the ABCP market erupted in August 2007; the \$350 billion contraction in this market in the last five months of 2007 engendered concerns about the credit quality of many of the securitized instruments funding the shadow banking system.⁶³ The asset-quality deterioration of many single-seller ABCP conduits and SPVs engaged in securitization disrupted the wholesale funding provided by MMF investors and other shadow banking depositors. The large BHCs that held the majority of these ABCP conduits (off balance sheet) were then forced to find other sources of funding, such as unsecured interbank lending. Other disruptions occurred in repo markets in the subsequent months, and investment bank Bear Stearns collapsed due to a funding liquidity shortage, and many of its assets were acquired at pennies on the dollar in J.P. Morgan Chase's government-assisted purchase in March 2008. Mortgage lender IndyMac Bank closed in July, and the *de facto* quasi-nationalization of Fannie Mae and Freddie Mac followed in early September.⁶⁴

In the fateful weeks following Lehman weekend (September 13–14, 2008), the nation witnessed a systemic run in slow motion. Bank of America acquired broker-dealer Merrill Lynch, AIG suffered downgrades and received government support, the MMF Reserve Primary Fund broke the buck, Washington Mutual was closed by regulators, Goldman Sachs and Morgan Stanley were approved as BHCs, and stopgap public guarantees expanded the government safety net through a series of loan and liquidity facilities established to stem the panic.⁶⁵ Providing liquidity was one thing, but instilling confidence in the financial system required repairing systemic risks that had accumulated in the shadow banking system. The government safety net was unfurled to reduce panic-driven solvency problems resulting from price declines from liquidity-driven asset fire sales. As Fed Chairman Bernanke (2012) said, these were "the best of bad options." Bernanke's account of the unprecedented actions taken during the crisis was consistent with descriptions of the Bagehot approach of lending against collateral to illiquid but solvent firms:

The acquisition of Bear Stearns by J.P. Morgan Chase was facilitated by a Federal Reserve loan against a designated set of assets, and the provision of liquidity to AIG was collateralized by the assets of the largest insurance company in the United States. In both cases, the Federal Reserve determined that the loans were adequately secured, and in both cases, the Federal Reserve has either been repaid with interest or holds assets whose assessed values comfortably cover remaining loans.

⁶² For more on discussion of the self-equilibrating economy in action, see Adam Smith (1776). For a view of the episodic and systemic nature of shadow banking during the crisis, see Gary Gorton (2009).

⁶³ Covitz, Liang, and Suarez (2009) conducted a comprehensive empirical analysis of runs in the ABCP market using issue-level data for all ABCP programs in the U.S. market. A "run" was identified if a program did not issue new paper despite having a substantial share of its outstanding debt scheduled to mature. Covitz, Liang, and Suarez found evidence of extensive runs: More than one hundred programs (one-third of all ABCP programs) were in a run within weeks of the onset of the turmoil in August 2007. They also found that while runs were linked to credit and liquidity exposures of individual programs, they were also related importantly to nonprogram-specific variables, indicating that runs were relatively indiscriminate during this period of stress. Simply put, panic in the ABCP market in 2007 exposed the inherent systemic vulnerability of the shadow banking system that would become fully evident in fall 2008.

⁶⁴ In September 2008, the FHFA announced the decision to place Fannie Mae and Freddie Mac in conservatorship. The Treasury also committed to provide up to \$200 billion in credit lines to support the two GSEs.

⁶⁵ In response to the financial crisis, the Federal Reserve exercised its emergency lending authority pursuant to Section 13(3) of the Federal Reserve Act, which grants authority to lend to a wide range of borrowers using good collateral in "unusual and exigent circumstances." Between March and November 2008, the Fed created the following six lending facilities to support overall market liquidity: Term Securities Lending Facility, Primary Dealer Credit Facility, Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, Commercial Paper Funding Facility, Money Market Investor Funding Facility, and Term Asset-Backed Securities Loan Facility. For more details concerning AIG and the Reserve Primary Fund, see Appendix C and Appendix D, respectively.

It is important to remember that bad loan underwriting contributed to the overabundance of cheap credit through 2007. There is a distinctly human element to the systemic build-up and subsequent systemic run on the shadow banking system. The benefits of investment banking activities (helping companies issue debt and equity) are integral to global credit intermediation. However, financial conglomerates have grown to gargantuan size and complexity, while claiming that diversification of revenues through broker-dealer and asset-management shadow banking activities makes overall credit intermediation more stable and, ultimately, better for customers.

The authors of this paper argue that the run on shadow banking proves otherwise. These activities exhibit a high degree of complementary credit intermediation that leverages the effects of banking booms and busts. The perceived credit quality of shadow bank liabilities is enhanced by private credit and liquidity backstops of a parent company—in essence, high-quality credit ratings are borrowed from parent companies instead of more fully assessed based on the risk exposure embedded in the products themselves. **Shadow banking activities should not benefit from explicit or even implicit access to the Fed's discount window or to FDIC deposit insurance.**

The perception that the shadow banking arms of huge BHCs enjoy government support needs to be replaced by a market-determined, private-sector-guaranteed paradigm that appropriately prices risk and reward per the merits of prudent management. **Market discipline, debilitated by the crisis and recent expansion of the federal safety net (both implicit and explicit), needs to be reinvigorated. The taxpayer should never again bail out the shadow banks.**

GLOSSARY

Asset-backed commercial paper (ABCP)—A short-term debt instrument (maturities ranging from overnight to 270 days) issued by corporations and financial institutions to meet short-term financing needs. The instrument is backed by a specified pool of assets from which the payments primarily stem.

Asset-backed securities (ABS)—Tradable securities backed by a specified pool of underlying cash-flow-producing assets (such as loans, leases, or receivables) that are not sold individually. The holders of ABS are entitled to payments that are distributed by the underlying assets.

Bank holding company (BHC)—A corporation that controls one or more banks. BHCs are supervised by the Federal Reserve, even if the bank owned by the holding company is under the primary supervision of a different federal agency (the Comptroller of the Currency or the Federal Deposit Insurance Corp.).

A **financial holding company (FHC)** is a BHC that has met capital, managerial, and other requirements to take advantage of expanded affiliations (among banks, securities firms, insurance companies, etc.) allowed under the Gramm–Leach–Bliley Act.

Bank for International Settlements (BIS)—An international organization headquartered in Basel, Switzerland, that fosters global monetary and financial cooperation and serves as a bank for central banks.

Broker-dealer—Any individual or firm in the business of buying and selling securities for itself (as a dealer) and others (as a broker). Broker-dealers must register with the Securities and Exchange Commission.

Collateral—Assets that are pledged by a borrower to a lender against debts owed.

Collateralized debt obligation (CDO)—A financial instrument that entitles the purchaser to cash flows from a portfolio of fixed income (debt) assets, which may include bonds, loans, mortgage-backed securities, or other CDOs. A CDO is a type of ABS.

Commercial paper (CP)—A short-term debt instrument issued by corporations and financial institutions to meet financing needs. These unsecured promissory notes do not need to be registered with the Securities and Exchange Commission as long as they mature before 270 days. Therefore, CP is considered a cost-effective source of financing current assets (inventories) or various financial transactions.

Counterparties—The persons or institutions entering into a financial contract on opposite sides of the transaction. One of the risks involved in any transaction is counterparty risk, which is the risk that the counterparty will be unable to fulfill the duties of the contract.

Credit default swap (CDS)—An agreement that transfers the credit exposure of an underlying fixed-income product between parties. A CDS contract provides protection against default by borrowers. Similar to an insurance contract, the CDS buyer makes periodic payments to the CDS seller, and in return, the buyer receives a payoff from the seller if the borrower defaults. See Appendix C for more details.

Credit intermediation—The role of the middleman between counterparties in a financial transaction in which funds are transferred. Commonly, when a financial services company accepts deposits and lends to borrowers (financing).

Credit transformation—The enhancement of the credit quality of intermediated debt through the use of claims prioritization or guarantees. The credit intermediary (accepting deposits, making loans, and reserving against losses with junior equity present) elevates the quality of senior claims (such as deposits) above that of the underlying loan portfolio.

Demand deposits (deposits)—Funds that the depositor has a right to withdraw at any time without prior notice to the depository institution. Demand deposits are commonly offered in the form of checking and savings accounts.

Deposit insurance—**Federal Deposit Insurance Corp.** coverage backed by the full faith and credit of the U.S. government for all deposit accounts—including checking and savings accounts, money market deposit accounts, and certificates of deposit—up to \$250,000 per depositor, per insured bank, for each account ownership category in the event a depository institution fails. (This paper uses the term **credit put** as a euphemism describing the ability of the FDIC to support the value of deposits.)

Depository institution—A financial institution that makes loans and obtains its funds mainly by accepting deposits from the public; includes commercial banks, thrifts, savings banks, and credit unions.

Derivative—A financial instrument for which the payoff depends on the characteristics and value of an underlying reference entity. A **credit derivative** is a negotiable bilateral contract through which market participants can manage their exposure to credit risk. A **CDS** is an example of an **over-the-counter credit derivative** that trades through a dealer network (and not an organized securities exchange).

Discount window—A generic term used to reference the Federal Reserve lending facility that allows eligible institutions (those subject to reserve requirements) to borrow money on a short-term, collateralized basis from the Federal Reserve at an above-market rate to meet temporary liquidity shortages.

Dodd–Frank—The Dodd–Frank Wall Street Reform and Consumer Protection Act, signed into law on July 21, 2010, increases government oversight of financial intermediaries and expands regulation of complex financial instruments, proprietary trading activities, and consumer banking practices. The law's preamble states in part that the act seeks “to promote the financial stability of the United States by improving accountability and transparency in the financial system, to end ‘too big to fail,’ to protect the American taxpayer by ending bailouts.”

Federal Deposit Insurance Corp. (FDIC)—An independent federal agency created by Congress to maintain stability and public confidence in the nation’s financial system by insuring deposits, examining and supervising financial institutions for safety and soundness, protecting consumers, and managing receiverships. The FDIC directly examines and supervises about 4,900 banks—more than half of the institutions in the banking system. The FDIC is the primary federal regulator of state-chartered banks that do not join the Federal Reserve System.

Federal Housing Finance Agency (FHFA)—An independent federal agency that regulates government-sponsored enterprises such as Fannie Mae and Freddie Mac.

Federal Open Market Committee (FOMC)—The Federal Reserve body that sets U.S. monetary policy.

Federal Reserve (Fed)—The central bank of the United States created by Congress to provide the nation with a safer, more flexible, and more stable monetary and financial system. The Fed conducts the nation’s monetary policy, supervises and regulates nationally chartered and certain state-chartered banking institutions, maintains the stability of the financial system, and provides financial services to depository institutions, the U.S. government, and foreign official institutions.

Financial Stability Board (FSB)—An international body that coordinates the work of national financial authorities and international standard-setting bodies in the interest of global financial stability.

Financial Stability Oversight Council (FSOC)—An interagency government board formed under Title I of the Dodd–Frank Act to monitor the stability of the nation’s financial system. It is authorized to formally designate which large financial companies are systemically important financial institutions (**SIFIs**).

Government-sponsored enterprise (GSE)—A privately held financial services corporation with public purposes created by the U.S. Congress to reduce the cost of credit in certain sectors of the economy. Fannie Mae and Freddie Mac are examples of GSEs that intermediate credit for homeowners.

Haircut—The discount applied to an asset’s **market value** for the purpose of calculating capital requirement, margin, and collateral levels. This capital charge varies depending on the type, maturity date, quality, and marketability of the asset. When securities are used as collateral for a lending transaction, the haircut is the percentage cushion the lender requires in case the market value of the asset falls.

Investment-grade rating—One of the four highest rating categories given by a nationally registered statistical rating organization. An investment-grade rating of BBB or higher represents the ratings-agency’s assessment of the security’s likelihood to pay interest and repay principal. AAA is the highest rating designation for credit quality, indicating the obligor has extremely strong capacity to meet its financial commitments.

Liquidity—An asset is said to be liquid if it is easily convertible to cash with relatively little loss of value in the conversion process. An institution is said to have liquidity if it can easily meet its cash needs because it has sufficient funds on hand or can raise or borrow capital. A market is considered to be liquid if the instruments it trades can easily be bought or sold in quantity with little impact on market prices.

Liquidity backstop—An alternative source of financing in the event market participants are unable to access financial markets. The ability and willingness of the Federal Reserve to put a floor under the price of otherwise illiquid assets during times of duress is also referenced as a **liquidity put**. Although the Fed’s lender-of-last resort function serves as an official sector liquidity put, any guarantee supporting the market value or marketability of an asset is considered a credit or liquidity put, respectively.

Liquidity transformation—The activity of issuing liquid liabilities to fund illiquid assets. An asset is considered illiquid when it cannot be easily converted into cash without a loss in nominal value. An example is a pool of illiquid mortgages trading at a lower price than a more liquid asset (rated by a credit ratings agency) secured by the same pool of mortgages.

Market discipline—Market-based forces that restrain a firm’s stakeholders (stockholders, creditors, and management) from excessive risk-taking due to the belief that they are exposed to the firm’s losses. Market discipline requires transparent and timely disclosure of the firm’s activities, a clarity (or lack of excessive complexity) in these disclosures, and the perception that losses imposed on stakeholders are possible, and even *likely*, and will not be absorbed by government **safety nets**. This skin-in-the-game market mechanism minimizes **moral hazard** and works in concert with regulatory systems to increase financial market resiliency.

Market value—The price at which buyers and sellers can agree to sell a security in an arm’s-length transaction. This price may fluctuate from the security’s **par value**, or face value at which it was issued.

Maturity transformation—The activity of issuing short-term liabilities (such as deposits) and transforming them into longer-term assets (such as loans). The credit intermediary assumes rollover and duration risks that the shorter-term liabilities could be called before the longer-term assets produce sufficient cash flow to cover them.

Money markets—Financial markets for short-term debt instruments, such as commercial paper, repurchase agreements, and Treasury bills. Money market instruments are generally considered very safe investments that return a relatively low interest rate in exchange for temporary cash storage over a short period. The money markets constitute the funding network of dealers and investors over which short-term debt securities are purchased and sold, in contrast to the **capital markets**, in which corporate equity and longer-term debt securities are issued and traded.

Money market mutual fund (MMF)—A fund that invests solely in money market instruments and other relatively low-risk, low-yield securities. Unlike a money market deposit account at a bank, money market mutual funds are not federally insured. The Securities and Exchange Commission regulates money market mutual funds under the Investment Company Act of 1940. See Appendix D for a detailed history of MMF.

Moral hazard—The concept that increased risk taking occurs when risk takers do not bear the full repercussions of their behavior. The partial cost absorption of insurance and safety nets can lead to more reckless behavior than would otherwise occur without loss-sharing.

Mortgage-backed securities (MBS)—Tradable securities that represent claims on the cash flows from underlying mortgage loans. An MBS investor owns an interest in a pool of mortgages, which serve as the source of cash flow for the security. These securities are a type of ABS.

Net asset value (NAV)—The per-share dollar value of a portfolio of assets. In the context of mutual funds and money market mutual funds, the NAV is computed once a day based on the closing market prices of the securities in the fund’s portfolio.

Notional amount—The total dollar value of a derivative that never changes hands in a transaction but is the basis from which payouts are determined. See Appendix C for an application of the term.

Put—A financial contract that gives the owner the right, but not the obligation, to sell a certain quantity of an underlying asset at a fixed price before a specific date. Put protection guards against a decline in an asset’s value—an investor purchasing a put option profits from a decline in the price of the underlying asset. In financial parlance, deposit insurance is referred to as a **credit put**, enabling depositors to “sell” their deposits at par instead of suffering losses. The Fed’s discount window is often referred to as a **liquidity put**, which banks can exercise by “selling” (pledging as collateral) assets in exchange for short-term funding. These official forms of put protection represent the **safety nets** protecting traditional depository institutions.

Rehypothecation—The practice by prime brokers of reusing client assets as collateral to obtain funding in another transaction. See Appendix E for more information.

Repurchase agreement (repo)—A financial transaction in which the holder of a security obtains funds by selling that security to another financial market participant under an agreement to repurchase the security at a specified price at a predetermined future date. A repo is practically similar to a collateralized loan. A repo can take various forms: For example, a security seller in need of funds can accept general collateral for cash or, desiring certain investments, can trade a specific set of securities. In a triparty repo, an agent facilitates the transaction by providing operational services such as custody of securities and valuation, allocation, and settlement of collateral. Triparty repo opens secured money market lending to a wide range of cash-rich market participants, including many shadow banks.

Rollover risk—The risk associated with refinancing debt that is about to mature.

Run—A situation that occurs when a financial institution’s customers withdraw their short-term funds or deposits simultaneously due to concerns about the entity’s solvency. The more people withdraw their funds, the closer the financial institution becomes to actually being insolvent. Due to the risks involved in maturity, credit, and liquidity transformation, financial intermediaries are vulnerable to runs without reliable credit and liquidity backstops to stem the concern that depositors will be made whole.

Safety net—Publicly supplied credit or guarantees that can put a floor under the value of assets. For U.S. depository institutions, FDIC deposit insurance and the Federal Reserve’s lender-of-last-resort liquidity function protect the payments system. These credit and liquidity backstops shift risks from the bank and its creditors to the general public as a cost for a more resilient payments system, less prone to runs. Although public safety nets are designed to minimize systemic risk, they also present a moral-hazard issue.

Securities and Exchange Commission (SEC)—A government organization created by Congress to regulate U.S. securities markets and protect investors. The SEC is composed of five commissioners appointed by the president and approved by the Senate. The statutes administered by the SEC are designed to promote full public disclosure and to protect the investing public against fraudulent and manipulative practices in the U.S. securities markets.

Securitization—The process of pooling various types of debt (for example, mortgages, auto loans, or credit card debt) and packaging (also called **tranching**) that debt into asset-backed securities that are sold to investors. See Appendix A for more detail.

Shadow banking—Market-based credit intermediation involving entities and activities outside the traditional banking system. Shadow banking entities and activities provide credit by themselves or through a “chain” that finances longer-dated and less-liquid activities with shorter-dated, liquid funds (maturity and liquidity transformation). Rather than a liabilities base composed of FDIC-insured deposits, shadow banks typically rely on short-term market funding and are subject to less-comprehensive regulation than the regular banking system. Examples include investment banks, finance companies, hedge funds, money market mutual funds, real estate investment trusts, commercial paper issuers, and insurance companies that engage in credit intermediation.

Special purpose vehicle (SPV)—A bankruptcy-remote entity created for the acquisition and financing of specific assets. SPVs are used in the securitization process of creating asset-backed securities. See Appendix B for more detail.

Systemic risk—Risk that affects an entire financial market system or market segment. Systemic risk undermines the effectiveness of financial regulation. Such risk may be present in any market in which confidence can be quickly lost to the impairment of market functionality. A shadow banking credit-intermediation chain poses several systemic-risk factors through its characteristics of maturity and liquidity transformation, credit risk transfer or guarantee, and leverage.

Systemically important financial institution (SIFI)—A financial firm of such size, complexity, and interconnectedness that its distress or disorderly failure would cause significant disruption to the wider financial system and economic activity. Current regulatory reform efforts intend to foster more intensive and effective supervision of all SIFIs—through such means as stronger supervisory mandates, resources, and powers—and higher supervisory expectations for risk-management functions, data aggregation capabilities, risk governance, and internal controls. A **G-SIFI** is a **global systemically important financial institution** of such size, market importance, and global interconnectedness that its distress or failure would cause significant dislocation in the global financial system and adverse economic consequences across a range of countries. These firms face additional capital requirements to provide loss-absorption capacity commensurate with their impact on the financial system in the event of default. *Bank* entities are referenced more specifically as **global systemically important banks (G-SIBs)**. See Table 1 for a list of G-SIBs.

Too big to fail (TBTF)—A euphemism for a financial institution so large, interconnected, and/or complex that its demise could substantially damage the financial system and economy if it were allowed to fail. See **SIFI** and Appendix F.

Wholesale funding—Large, short-term borrowings from sources other than demand deposits that are used by financial intermediaries to finance operations and activities.

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