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**Working Paper**

## Shadow banking: A review of the literature

Staff Report, No. 580

**Provided in Cooperation with:**  
Federal Reserve Bank of New York

*Suggested Citation:* Adrian, Tobias; Ashcraft, Adm B. (2012) : Shadow banking: A review of the literature, Staff Report, No. 580, Federal Reserve Bank of New York, New York, NY

This Version is available at:

<https://hdl.handle.net/10419/93632>

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Federal Reserve Bank of New York  
Staff Reports

# Shadow Banking: A Review of the Literature

Tobias Adrian  
Adam B. Ashcraft

Staff Report No. 580  
October 2012



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## **Shadow Banking: A Review of the Literature**

Tobias Adrian and Adam B. Ashcraft

*Federal Reserve Bank of New York Staff Reports*, no. 580

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JEL classification: E44, G00, G01, G28

### **Abstract**

We provide an overview of the rapidly evolving literature on shadow credit intermediation. The shadow banking system consists of a web of specialized financial institutions that conduct credit, maturity, and liquidity transformation without direct, explicit access to public backstops. The lack of such access to sources of government liquidity and credit backstops makes shadow banks inherently fragile. Much of shadow banking activities is intertwined with the operations of core regulated institutions such as bank holding companies and insurance companies, thus creating a source of systemic risk for the financial system at large. We review fundamental reasons for the existence of shadow banking, explain the functioning of shadow banking institutions and activities, discuss why shadow banks need to be regulated, and review the impact of recent reform efforts on shadow banking credit intermediation.

Key words: shadow banking, financial intermediation

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## 1) What Is Shadow Credit Intermediation?

The shadow banking system is a web of specialized financial institutions that channel funding from savers to investors through a range of securitization and secured funding techniques. Although shadow banks—the institutions that constitute the shadow banking system—conduct credit and maturity transformation similar to that of traditional banks, they do so without the direct and explicit public sources of liquidity and tail risk insurance available through the Federal Reserve’s discount window and the Federal Deposit Insurance Corporation. Shadow banks are therefore inherently fragile, not unlike the commercial banking system prior to the creation of the public safety net. This definition closely follows that of Pozsar, Adrian, Ashcraft, and Boesky (2010).

### A) Definition

In the traditional banking system, intermediation between savers and borrowers occurs in a single institution. Through the process of funding loans with deposits, banks engage in credit, maturity, and liquidity transformation. Credit transformation refers to the enhancement of the credit quality of debt issued by the intermediary through the use of priority of claims. For example, the credit quality of senior deposits is better than the credit quality of the underlying loan portfolio due to the presence of junior equity. Maturity transformation refers to the use of short-term deposits to fund long-term loans, which creates liquidity for the saver but exposes the intermediary to rollover and duration risks. Liquidity transformation refers to the use of liquid instruments to fund illiquid assets. For example, a pool of illiquid whole loans might trade at a lower price than a liquid-rated security secured by the same loan pool, as certification by a credible rating agency would reduce information asymmetries between borrowers and savers.

Savers entrust their funds to banks in the form of deposits, which banks use to fund loans to borrowers. Savers furthermore own the equity and long-term debt issuance of the banks. Deposits are guaranteed by the FDIC, and a liquidity backstop is provided by the Federal Reserve’s discount window. Relative to direct lending (that is, savers lending directly to borrowers), credit intermediation provides savers with information and risk economies of scale by reducing the costs involved in screening and monitoring borrowers and by facilitating investments in a more diverse loan portfolio.

Shadow banking activity is removed from official public-sector enhancements, but typically receives indirect or implicit enhancements. Official enhancements to credit intermediation can be classified into four levels of strength:

1. A liability with direct official enhancement must reside on a financial institution’s balance sheet, whereas off-balance-sheet liabilities of financial institutions are indirectly enhanced by the public sector.
2. Activities with direct and implicit official enhancement include debt issued or guaranteed by the government-sponsored enterprises (GSEs), which benefit from an implicit credit put to the taxpayer.

The implicit nature of support implies that the intermediary receives the benefit of credit and put options to the public sector, but typically would not pay their full marginal social cost. It is not surprising that, with such a subsidy, these intermediaries would grow very large.

3. Activities with indirect official enhancement generally include the off-balance-sheet activities of depository institutions, such as unfunded credit card loan commitments and lines of credit to conduits. The focus here is on the accounting and capital arbitrage activities by financial institutions. Capital requirements have typically been tied to accounting rules, so transactions to remove assets from the balance sheet have historically reduced regulatory capital. While recent accounting reform has reduced the scope for this form of arbitrage going forward, it was an important part of the narrative of the recent credit cycle.
4. Finally, activities with indirect and implicit official enhancements include asset management activities such as bank-affiliated hedge funds and money market mutual funds (MMMFs), as well as the securities lending activities of custodian banks.

Credit intermediation activities that take place without official credit enhancements are said to be unenhanced. For example, the securities lending activities of insurance companies, pension funds, and certain asset managers do not benefit from access to official liquidity. We define shadow credit intermediation to include all credit intermediation activities that are implicitly enhanced, indirectly enhanced, or unenhanced by official guarantees established on an ex ante basis.

## B) Measurement

To illustrate how shadow banking has evolved over the past few decades, Figure 1 presents the liabilities of each type of financial business, derived from U.S. Flow of Funds data. In particular, it shows the shares of traditional intermediaries, which include depository institutions, pension funds, and life insurance companies, in the overall funding of credit held by financial businesses. While these traditional forms of financial intermediation accounted for almost 100 percent of funding for credit intermediation in the mid-1940s, their share fell to as low as 40 percent in 2007 and then, with the collapse of the shadow banking system, rebounded to 47 percent. The figure documents that a significant part of the long-run decline in the role of liabilities of traditional intermediaries is driven by the rise of the shadow banking system, as defined above. In particular, the share of liabilities corresponding to MMMFs, repo, open market paper, GSEs, and corporate/securitization peaked at 34 percent through the last decade, but declined to only 26 percent at the end of 2011.

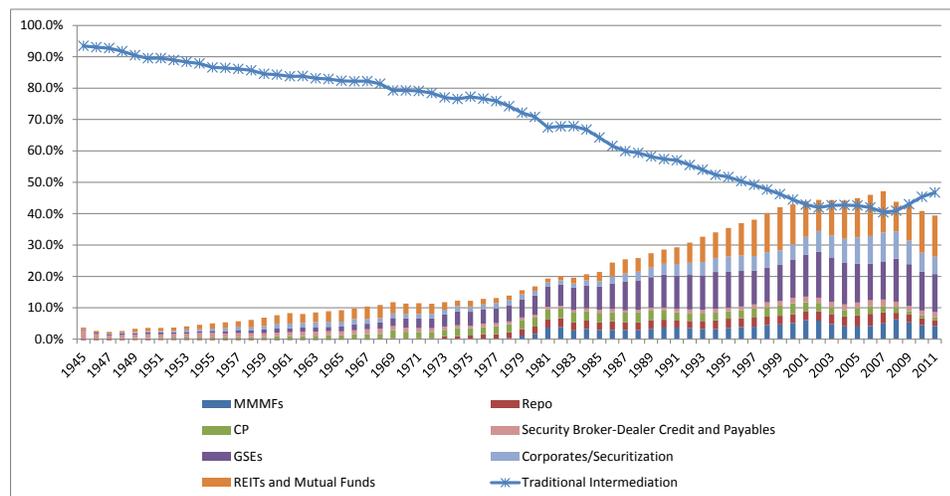
Illustrating the importance of maturity transformation in the financial system generally, and of shadow credit intermediation in particular, Figure 2 breaks out the liabilities of the financial business into one of four major categories: 1) traditional maturity transformation, including bank deposits and interbank liabilities; 2) traditional credit transformation including term debt issued by banks and bank holding companies as well as reserves of pensions and life insurance companies, in addition to depository loans not elsewhere classified; 3) shadow maturity transformation, including MMMFs, repo,

open market paper, and security broker-dealer credit and payables; and 4) shadow credit transformation, including GSEs, term debt issued by nonbanks, mutual fund shares, REIT mortgage debt, and loans categorized as “other.” The figure suggests several striking patterns. First, the amount of maturity transformation in the financial system has been declining over the past sixty years. While almost 75 percent of intermediated credit was funded by short-term bank liabilities in the mid-1940s, that number has fallen as low as 15 percent in recent years before rebounding to 21 percent in 2011.

Second, the reduced importance of bank maturity transformation is being offset partly by shadow maturity transformation. The consequence is that the fraction of the aggregate money supply issued by shadow intermediaries has increased significantly, peaking at 45 percent in the early 2000s before declining to 28 percent in 2011, a level not seen since 1993. While the figure illustrates that the amount of credit funded through shadow intermediation even at the peak is modest (approximately 10 percent), the growing importance of shadow money in the aggregate supply of money was an important factor in amplifying the shocks to the economy more broadly.

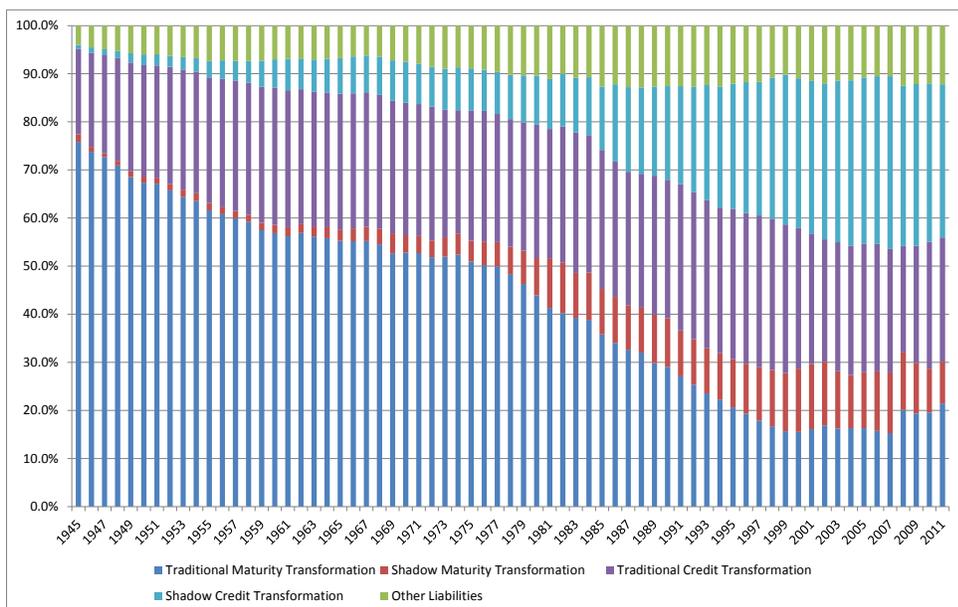
Third, while maturity transformation by shadow intermediaries has increased over the period, the larger story is clearly the increased role of term debt markets in funding credit. In particular, the amount of shadow credit transformation increased from zero in 1945 to as much as 36 percent of total financial sector liabilities in 2007 before declining to 31 percent in 2011. The increase in market funding for credit is driven not only by the GSEs and securitization, but also by the increased importance of mutual funds and REITs. Shadow credit transformation increased from only 5 percent of total credit transformation in 1945 to a peak amount of 60 percent in 2008 before declining to 55 percent in 2011.

**Figure 1: Liabilities of Financial Business**



**Source: Federal Reserve Flow of Funds, Tables L107 and L212.** Traditional Intermediation refers to net interbank liabilities (line 28) plus checkable (line 29) and savings (line 30) deposits of depository institutions plus reserves of life insurance companies (line 43) and pensions (line 44) plus corporate debt. The latter is calculated by subtracting from total corporate debt (line 36) the amount issued by holding companies (line 10) and banks (line 5) from L212. Shadow banking components are from L107: MMMFs (line 31), repo (line 32), commercial paper (Line34), GSEs (line 35), and security broker-dealer credit (line 41) and payables (line 42). Shadow credit transformation includes corporate debt (less amounts in traditional credit transformation).

**Figure 2: Maturity and Credit Transformation**



**Source: Federal Reserve Flow of Funds, Tables L107 and L212.** Traditional maturity transformation includes net interbank liabilities (line 28) plus checkable (line 29) and savings (line 30) deposits of depository institutions. Traditional credit transformation includes reserves of life insurance companies (line 43) and pensions (line 44) plus corporate debt issued by banks and holding companies plus loans from depository institutions NEC (line 37). The latter is calculated by subtracting from total corporate debt (line 36) the amount issued by holding companies (line 10) and banks (line 5) from L212. Shadow maturity transformation includes from L107 MMMFs (line 31), repo (line 32), commercial paper (line 34), and security broker-dealer credit (line 41) and payables (line 42). Shadow credit transformation includes GSEs (line 35), REITs (line 39), mutual fund shares (line 40), and other loans (line 38).

## C) Examples

The types of activities, institutions, and vehicles that are part of the shadow banking system are constantly evolving. The examples provided in this subsection are by no means exhaustive, but they do represent parts of the shadow banking system that have been particularly important at some point in time and some that still are.

### ABCP Conduits

Asset-backed commercial paper (ABCP) is commercial paper collateralized by a specific pool of financial assets. ABCP is usually issued by bankruptcy-remote special-purpose vehicles (SPVs), such as ABCP conduits or special investment vehicles (SIVs). Both ABCP conduits and SIVs obtain credit ratings on the issued paper. ABCP ratings are largely based on the credit profile of banks providing credit and liquidity support by commercial banks, while SIV ratings are based on the credit quality of the assets as well as the overall funding strategy of the SIV. Single-seller ABCP conduits are backstops to the working capital needs of large nonbank finance companies and receive such support from a single commercial bank, while multi-seller conduits fund the working capital needs of smaller nonbanks and receive the support of multiple institutions. Similarly, SIVs can either be affiliated with a single banking institution, or obtain support from multiple institutions.

The bankruptcy remoteness of all of these entities implies that the collateral backing the ABCP is exempt from the potential bankruptcy of the institution that provides the backup lines of credit and liquidity. The maturity of ABCP is between one and 180 days, exposing the ABCP to rollover risk, a source of fragility for ABCP issuers that will be discussed later. There were a few examples of ABCP issuers that did not receive unconditional enhancements from commercial banks. One is the Canadian ABCP market, where investors were forced to hold defaulted paper. In addition, extendible ABCP effectively transfers the rollover risk to investors, thus requiring a higher rate of return.

Structured investment vehicles (SIVs) are specialized financial institutions that conduct shadow maturity transformation. On the asset side of SIVs are securitized assets such as ABS, MBS, CDOs, CLOs, CMOs, or financial sector debt. These assets are funded through issuance of ABCP, medium-term notes (MTN), or long-term notes (LTN). In order to achieve a credit rating on their liabilities, SIVs obtain backup lines of credit from commercial banks. SIVs were first created in 1988, effectively moving the financing of ABS from the balance sheet of Citigroup to an off-balance-sheet SIV. While some SIVs are closely associated with particular financial institutions, others operate independently of any particular institution. Since the financial crisis of 2007-09, SIVs have stopped operating. SIVs resemble commercial banks in many ways, but both assets and liabilities are tradable, and liquidity and credit backstops are provided by private institutions.

ABCP has provided funding flexibility to borrowers and investment flexibility to investors since the 1980s, when ABCP was used as a way for commercial banks to fund customer trade receivables in a capital-efficient manner and at competitive rates. ABCP became a common source of warehousing for ABS collateral in the late 1990s. The permissible off-balance-sheet structure facilitated balance-sheet size management, with the associated benefits of reduced regulatory capital requirements and leverage. ABCP funding has also been a source of fee-based revenue. For corporate users, ABCP benefits include some funding anonymity, increased commercial paper (CP) funding sources, and reduced costs relative to strict bank funding. Over time, ABCP conduits expanded from the financing of short-term receivables used as collateral to a broad range of loans, including auto loans, credit cards, student loans, and commercial mortgage loans. At the same time, as the market developed, it came to embed much more maturity mismatch through funding longer-term assets, warehoused mortgage collateral, etc. Securities arbitrage vehicles are one particular example of a shadow banking institution that performed substantial amounts of maturity transformation. These vehicles used ABCP to fund various types of securities, including collateralized debt obligations (CDOs), asset-backed securities (ABS), and corporate debt.

ABCP experienced a run that began in the summer of 2007, when the sponsor of a single-seller mortgage conduit, American Home, declared bankruptcy, and three mortgage programs extended the maturity of their paper. On August 7, BNP Paribas halted redemptions at two affiliated money market mutual funds when it was unable to value ABCP holdings. Covitz, Liang, and Suarez (2012) use data from the Depository Trust Clearing Corporation (DTCC) to document an investor run on more than 100 programs, one-third of the overall market. While runs were more likely on programs with greater perceived subprime mortgage exposure, weaker liquidity support, and lower credit ratings, there is also evidence of investor runs that were unrelated to specific program characteristics.

## ABS issuers

Asset-backed securities (ABS) are collateralized claims on pools of loans, mortgages, or receivables. The cash flow and income from ABS are structured into tranches, which receive credit ratings. For example, the super senior AAA tranche might represent 80 percent of the total value of the ABS, the mezzanine BBB tranche might represent 15 percent of the total value, and the remainder may be allocated to an equity tranche. Such pooling and tranching of the ABS are referred to as securitization as the ABS' value is securitized by its collateral.

Securitization activity is at the heart of shadow banking, as it allows credit originators to sell pools of credit to other institutions, thereby transferring the credit risk. Securitized products such as ABS are sold to banks, shadow banks, and real money investors. The underlying assets of ABS consist of receivables from credit cards, auto loans, mortgages, and aircraft leases, among others. Even royalty payments and movie revenues have been securitized. Securitization techniques such as ABS represent a major form of financial innovation in recent decades and are tightly linked with both the credit cycle and the development of the shadow banking system.

Legally, the ABS is structured as a bankruptcy-remote SPV. ABS typically perform no maturity transformation, but do achieve credit and liquidity transformation. Credit transformation is achieved through diversification. For example, the ABS collateral might consist of subprime mortgage loans, while much of the ABS' liabilities consist of AAA assets. Liquidity transformation occurs because any individual mortgage or loan of the ABS collateral might be illiquid due to adverse selection problems, yet a pool of such assets might be liquid. However, the liquidity of the ABS depends crucially on the business cycle, as ABS become more illiquid during downturns, particularly during financial crises.

One special form of ABS is the collateralized debt obligation (CDO), which is secured by a smaller number of loans or by bonds. For other forms of ABS, collateral consists of a large number of individual loans, mortgages, or receivables. For CDOs, however, the collateral can be corporate bonds, structured credit products such as ABS, or pools of agency mortgage-backed securities (MBS). When the collateral of a CDO is ABS, it is sometimes called an ABS CDO. When collateral is MBS, the CDO is called a collateralized mortgage obligation (CMO). There are also collateralized loan obligations (CLOs), which are CDOs with syndicated loans as collateral. The underlying loans of CLOs are often leveraged loans, used to restructure the funding of corporations to allow for more leverage.

Historically, the first CMO was issued by Salomon Brothers and First Boston in 1983 for Freddie Mac, and the first CDO was issued by Drexel Burnham Lambert for Imperial Savings Association in 1987. The credit quality of ABS CDOs is often enhanced through CDOs on the underlying mezzanine tranches of the ABS that are re-securitized. This enhancement reduces the credit risk of the CDO's collateral and allows the issuance of AAA tranches from an underlying pool of mezzanine tranches, which can in turn be funded in shorter-term markets. CDO issuance peaked in 2007 and then totally collapsed in the aftermath of the 2007-09 financial crisis.

## Tri-party Repo

A repurchase agreement (repo) is the sale of securities together with an agreement that the seller will buy back the securities at a later date. Most repo contracts are short term—between one and 90 days—although there are repos with much longer maturities. Repos are over-collateralized, and the difference between the value of the collateral and the sale price is called the repo haircut. In addition, the repurchase price is greater than the sale price, the difference constituting the repo rate, which is, in economic terms, an interest rate on a collateralized loan. In a repo transaction, the party buying the collateral acts as a lender.

The distinguishing feature of a tri-party repo is that a clearing bank acts as an intermediary between the two parties to the repo. The clearing bank is responsible for the administration of the transaction, including collateral allocation, marking to market, and substitution of collateral. The tri-party structure ensures that both the borrower and the lender are protected against the default of the other, as the collateral resides with a third party. The U.S. tri-party repo market represents a major source of funding for security broker-dealers. The market peaked at slightly above \$2.8 trillion in 2008 and is currently slightly below \$1.7 trillion.

Investors in tri-party repo are primarily money market mutual funds and other cash-rich investors such as corporate treasury functions, while the borrowers are large securities dealers with inventories of securities to finance. Clearing banks unwind these trades each afternoon and return the cash to the investors. But because the dealers retain a portfolio of securities that need financing on a 24-hour basis, they must extend credit to the other dealers against these securities for several hours between that afternoon unwind and the settlement of new repos in the early evening. That way, those dealers can repay their investors and avoid defaulting on the obligations.

Since the enactment of the Bankruptcy Amendments and Federal Judgeship Act of 1984, repos on Treasury, federal agency securities, bank certificates of deposits, and bankers' acceptances have been exempted from the automatic stay in bankruptcy. The bankruptcy exception ensured the liquidity of the repo market by assuring lenders that they would get speedy access to their collateral in the event of a dealer default. In 2005, the safe harbor provision was expanded to repos written on broader collateral classes, including certain mortgage-backed securities. This broadening of acceptable collateral for the exemption from the automatic stay for repos allowed the repo market to fund credit collateral—and thus directly fund the shadow banking system.

It should be noted that the tri-party repo market is only a subset of other repo and short-term, collateralized borrowing markets. While broker-dealers conduct their funding primarily in the tri-party repo market, their lending occurs mainly in DVP (delivery versus payment) repo or GCF (general collateral finance) repo. In contrast to a tri-party repo, DVP repos are bilateral transactions that are not settled on the books of the clearing banks. Instead, settlement typically occurs when the borrower delivers the securities to the lender. Adrian, Begalle, Copeland, and Martin (2013) discuss various forms of repo and securities lending, and Fleming and Garbade (2003) describe GCF repo, which is conducted among dealers.

Copeland, Martin, and Walker (2011) document the collateral composition in the tri-party market, as well as the repo market conventions, using data from July 2008 to early 2010. They show that, during this period, several hundred billion dollars of collateral in the tri-party repo market consisted of collateral such as equities, private-label ABS, and corporate credit securities without any eligibility for public sources of liquidity or credit backstops. Krishnamurthy, Nagel, and Orlov (2011) complement this finding by looking directly at the collateral of MMMFs. While they find that the majority of the \$3.5 trillion MMMFs' collateral is of high quality, they do document several hundred billion dollars of private-label ABS securities funded by MMMFs. However, the overall amount of private-label ABS funded in the repo market by MMMFs is less than 3 percent of total outstanding.

Adrian and Shin (2009, 2010a) study the role of repo for security broker-dealers and document the growth of the sector since the 1980s. A distinguishing feature of the balance sheet management of security broker-dealers is the procyclicality of their leverage. Balance sheet expansions tend to coincide with expansions in broker-dealer leverage, while balance sheet contractions are achieved via deleveraging. Adrian and Shin show that repos play the crucial role in this leverage cycle of the broker-dealers: The majority of the adjustment in balance sheet size tends to be achieved through adjustments in the size of the repo book. While Adrian and Fleming (2005) point out that the net funding of dealers in the repo market tends to be small, Adrian and Shin (2010a) argue that the overall balance sheet size of financial intermediaries can be viewed as an indicator of market liquidity. When gross balance sheets are reduced through deleveraging, financial market liquidity tends to dry up.

### **Money Market Funds**

Money market mutual funds are open-ended mutual funds that invest in short-term securities such as Treasury bills, commercial paper (including ABCP), and repo. MMMFs were first created in 1971 in response to Regulation Q, which restricted the interest that commercial banks can pay on deposits. Since then, money market funds have represented an alternative to bank deposits from investors' point of view, with yields that are typically more attractive than bank deposits. The money market sector peaked at around \$3.5 trillion in 2008. MMMFs are regulated by the SEC under the Investment Company Act of 1940.

Money market funds seek a stable net asset value (NAV), which is generally \$1.00, meaning that they aim never to lose money. If a fund's NAV drops below \$1.00, it is said to "break the buck." In September 2008, the day following the Lehman Brothers bankruptcy, the Reserve Primary Fund broke the buck and triggered a run on MMMFs. Other fund managers reacted by selling assets and investing at only the shortest of maturities or by reallocating to Treasury bills, thereby exacerbating the funding difficulties for other instruments such as commercial paper and repo.

Wermers (2011) investigates in more detail the role of investment flows into and out of money market mutual funds, focusing particularly on the period of the financial crisis. Wermers shows that institutional investors were more likely to run than retail investors, and institutional investors tended to spread such run behavior across various MMMF families. Institutional MMMF investors can thus be viewed as a transmission channel for contagious runs. Kacperczyk and Schnabl (2011) analyze the impact of the organizational structure of MMMFs on their risk-taking behavior. In particular, they ask

how the risk-taking differs between stand-alone funds and the funds that are owned by larger holding companies, such as bank holding companies. Kacperczyk and Schnabl find significant differences in the risk-taking of stand-alone MMMFs relative to the funds that have implicit guarantees from financial conglomerates. During the financial crisis of 2008, when systemic risk increased and conglomerates became relatively more exposed to systemic risk, stand-alone mutual funds increased their risk-taking behavior relatively more. Conversely, in the run-up to the crisis, when measured systemic risk was low, MMMFs that were part of conglomerates took on relatively more risk.

## 2) Why Does Shadow Credit Intermediation Exist?

The term “shadow banking” was coined by McCulley (2007) and was picked up by policymakers (see, for example, Tucker (2010)). The first articles on shadow banking appeared in 2008 (Pozsar (2008) and Adrian and Shin (2009)). A comprehensive overview of the shadow banking system can be found in Pozsar, Adrian, Ashcraft, and Boesky (2010). An update on regulatory reforms relating to shadow banking can be found in Adrian and Ashcraft (2012). Academic studies of shadow banking include Gorton and Metrick (2011, 2012), Gennaioli, Shleifer, Vishny (2012b), Stein (2010), and Acharya, Schnabl, and Suarez (2010). In addition to the academic literature by financial economists, legal scholars have contributed to the shadow banking literature (e.g., Schwarcz (2012) and Ricks (2010)).

The Financial Stability Board (FSB) has initiated international working groups on shadow banking (see FSB (2011, 2012)). The objective of the FSB is to enhance the regulation and oversight of the shadow banking system. The FSB is leading this work because of the global reach of shadow banking, which acts as an international systemic risk transmitter in times of crisis. In response to the tightened financial regulation, international shadow bank regulatory arbitrage might very well be growing in the future, making an adequate regulatory framework and monitoring system imperative. FSB (2012) presents a classification of shadow banking working groups, with the aim to develop a framework for policy recommendations and monitoring. The classifications are 1) banks’ interactions with shadow banks, 2) money market mutual funds, 3) other shadow banking entities, 4) securitization activity, and 5) securities lending and repos. Finally, industry groups are also studying shadow banking. The Institute of International Finance has put forward a framework for policymaking in relation to shadow banking. In addition, the Securities Industry and Financial Markets Association (SIFMA) has multiple workstreams on the topic of shadow banking.

There are three broad explanations for the existence of shadow banks: A) innovation in the composition of aggregate money supply; B) capital, tax, and accounting arbitrage; and C) other agency problems in financial markets. We discuss each of these explanations. Empirically, they are intertwined, and it is difficult to attribute relative magnitudes to each of them.

## A) Innovation in the Composition of Aggregate Money Supply

Drawing motivation from the narrative of Gorton and Metrick (2011), it is possible to view shadow credit intermediation as financial innovation in the composition of aggregate money supply. Money plays a crucial role in the economy, acting not only as a store of value, but also as a unit of account and means of exchange. The rapid loss of confidence in the value of money has been a root cause of financial panics across countries and over time.

The earliest forms of money, commodity money, were made of precious metals, having inherent value by being comprised of gold or silver. However, commodity money was eventually replaced with fiat money, which has little intrinsic value, but is instead backed only by the issuer's promise to convert the notes into a commodity. In particular, the banking system of the early 1800s was characterized by banks that issued notes backed by the promise of convertibility into gold or silver coin.

Banking charters were tightly restricted by state legislatures. In the Free Banking Era (1837 to 1862), there was free entry into the sector for any banker with adequate initial capital, but banks were required to deposit state or federal government bonds with face value equal to the value of notes issued with a state representative. While one might have thought that the presence of collateral would have made free banking stable, the period was characterized by a series of panics, and almost one-third of all free banks ultimately failed. The root cause of these panics is a subject of debate in the academic literature; reductions in the value of state debt likely played a prominent role. Jaremski (2010) documents that failure rates of free banks is correlated with state bond prices, but does not find the same for charter banks. Rogoff (1985) suggests that the existence of market discounts on state bonds not only reduced confidence by note holders, limiting their liquidity and value, but also created scope for "wildcat banking," where implicit leverage between the face value of bank notes and the market value of state government bonds permitted banks to have extraordinary leverage. The scope for panics created by concern about the value of bank notes was eliminated by the passage of the National Banking Acts in 1863 and 1864. This legislation replaced bank notes with a national currency backed by the deposit of U.S. Treasury bonds, enacted a ceiling on the aggregate circulation of notes, and set required reserves on both notes and deposits in order to encourage banks to hold safer portfolios.

While the National Banking Acts created confidence in currency, financial innovation in the composition of money in the form of bank deposits had already occurred. While bank notes were secured, deposits were secured only by the general assets of the bank. When depositors lost confidence in the solvency of a bank, they would insist that the bank honor its obligation to convert deposits into specie. As banks had a limited supply of specie in reserve, they could not accommodate large runs by depositors, which increased the incentives of depositors to run at the first sign of trouble. State governments made numerous attempts to stabilize deposits through insurance schemes, but most of them failed. As a result, the industry created collectives known as clearinghouses, which carefully monitored the financial condition of their members and stood behind their liabilities in the event of a run by depositors.

The first clearinghouses were established by New York banks in 1853. Gorton (1985) documents that when one member faced a run, the clearinghouses suspended the production of bank-specific financial information and instead published financial information on all members together. In order to prevent the costly liquidation of illiquid assets like loans, the clearinghouses issued loan certificates to members, secured by members' assets. These certificates could be used in the clearing process in place of currency, which freed up currency to accommodate withdrawals by depositors. During the panics of 1893 and 1907, the clearinghouses issued loan certificates directly to the public, permitting depositors to replace their claims on a bank with a claim on the clearinghouse. While the creation of the Federal Reserve in 1913 was intended to bring stability to the banking system by replacing the system clearinghouses, the central bank did not begin to act as a lender of last resort until well after the Great Depression. Consequently, it was the enactment of federal deposit insurance in 1933 that first brought stability to demand deposits.

Over the past thirty years, significant innovations in the composition of the aggregate money supply have made the financial system more vulnerable to a loss of confidence by the holders of money. In particular, money market mutual funds were developed in the 1970s in response to limits on the ability of depository institutions to pay interest on checking accounts, as well as in response to a need for limits on deposit insurance, which left large depositors exposed to bank risk. One of the main investments of money market mutual funds is overnight repurchase agreements, the equivalent of bank notes secured by collateral, most often U.S. Treasury obligations. Seeking stability, financial innovation transformed uninsured deposits into an instrument that looks like an insured deposit in the form of an overnight repurchase obligation.

Sunderam (2012) explores the extent to which shadow banking liabilities constitute substitutes for high-powered money. He shows in a simple model that shadow banking liabilities should constitute substitutes for money in the private sector's asset allocation. Empirically, Sunderam shows that shadow banking liabilities respond to money demand, extrapolating that heightened money demand can explain about half of the growth of ABCP in the mid-2000s. He also confirms that regulatory changes to ABCP played a significant role in the growth of the shadow banking system, a theme that we turn to in the next section.

## **B) Capital, Tax, and Accounting Arbitrage**

We define shadow banking activities as banking intermediation without public liquidity and credit guarantees. The value of public guarantees was rigorously modeled by Merton (1977) using an options pricing approach. Merton and Bodie (1993) propose the functional approach to financial intermediation, which is an analysis of financial intermediaries in relation to the amount of risk-sharing that they achieve via guarantees. Pozsar, Adrian, Ashcraft, Boesky (2010) provide a comprehensive overview of shadow banking institutions and activities that can be viewed as a functional analysis of market-based credit intermediation. Many of their insights are comprised in maps of the shadow banking system that provide a blueprint of the funding flows. Levitin and Wachter (2011) provide a quantitative assessment

of the role of implicit guarantees for the supply of mortgages. There is also a large literature that studies the implicit guarantees of the GSEs (see Passmore, Sherlund, and Burgess (2005), Frame and White (2005), and Acharya, Richardson, Nieuwerburgh, and White (2011)).

Acharya, Schnabl, and Suarez (2011) document that the rapid expansion of ABCP since 2004 resulted from changes in regulatory capital rules. In particular, FASB issued a directive in January 2003 (FIN 46) and updated the directive in December 2003 (FIN 46A) suggesting that sponsoring banks should consolidate assets in ABCP conduits onto their balanced sheets. However, U.S. banking regulators clarified that assets consolidated onto balance sheets from conduits would not need to be included in the measurement of risk-based capital and instead used a 10 percent credit conversion factor for the amount covered by a liquidity guarantee. Acharya, Schnabl, and Suarez document that the majority of guarantees were structured as liquidity-enhancing guarantees aimed at minimizing regulatory capital, instead of credit guarantees, and that the majority of conduits were supported by commercial banks subject to the most stringent capital requirements. Moreover, the authors document that conduits were sponsored by banks with low economic capital as measured by the ratio of the book value of equity to assets. Finally, the authors find that investors in conduits with liquidity guarantees were repaid in full, while investors in conduits with weaker guarantees suffered small losses, suggesting there was no risk transfer despite the capital relief.

The motivation for capital arbitrage is consistent with the mispricing of explicit credit and liquidity put options associated with deposit insurance and access to official liquidity, as well as the presence of a perception that large banks are “too big to fail,” which permits them to engage in excessive leverage maturity transformation. The presence of minimum capital and liquidity standards mitigates these incentives, and the ability of banks to evade binding standards permits them to maximize the value of these put options.

### **C) Other Agency Problems in Financial Markets**

Ashcraft and Schuermann (2008) describe seven important informational frictions that existed in the securitization of subprime mortgage credit prior to the financial crisis, although these frictions can be generalized to all securitization transactions. They include asymmetric information problems between the lender and originator (predatory lending and borrowing), between the lender and investors, between the servicer and investors, between the servicer and borrower, between the beneficiary of invested funds and asset managers, and between the beneficiary of invested funds and credit rating agencies. In addition, asymmetric information between investors and issuers results in risk-insensitive cost of funding. For example, Keys et al. (2010) document that mortgage borrowers with FICO scores just above a threshold of 620 perform significantly worse than borrowers with FICO scores just below 620. As it is more difficult to securitize loans below that threshold, the authors argue that this result is consistent with issuers exploiting asymmetric information, disrupting the otherwise monotone relationship between borrower credit scores and performance.

Although securitization has a relatively short history, it is a troubled one. The first known securitization transactions in the United States occurred in the 1920s, when commercial real estate (CRE) bond houses sold loans to finance CRE to retail investors through a vehicle known as CRE bonds. Wiggers and Ashcraft (2012) document the performance of these bonds, which defaulted in large numbers following the onset of the Great Depression. Although the sharp deterioration in economic conditions played an important part in explaining their poor performance, so did aggressive underwriting and sales of the bonds in small denominations to unsophisticated retail investors.

During the 1990s no fewer than five different sectors of ABS ran into trouble, including but not limited to home equity, home improvement lending, manufactured housing, equipment leasing, and franchise loans. In each of these cases, there was generally meaningful risk retention by a sponsor using securitization as a source of funding. However, one common theme appears to have been the aggressive pursuit of gain-on-sale-related earnings from securitization in advance of an initial public offering, and this was often achieved through competition on underwriting standards. In contrast, the challenges of securitization in the 2000s were concentrated in multisector CDOs in 2002 as well as RMBS and CMBS in 2005-07. These credit cycles were more likely to involve firms using securitization for arbitrage and were used as a source of fee income with minimal intended risk retention, although many of them were left holding warehouses of loans as the financial crisis unfolded.

Over-reliance on credit ratings can create problems when the rating agencies face their own agency problems. For example, Mathis, McAndrews, Rochet (2009) analyze a dynamic model of ratings where reputation is endogenous and the market environment may vary over time. The authors' model predicts that a rating agency is likely to issue less accurate ratings in boom times than it would during recessionary periods. Moreover, the authors demonstrate that competition among rating agencies yields similar qualitative results. Xia and Strobl (2012) document that the conflict of interest caused by the issuer-pays rating model leads to inflated corporate credit ratings. In particular, the authors compare the ratings issued by an issuer-paid rating agency with an investor-paid agency and demonstrate that the difference between the two is more pronounced when issuer-paid agency's conflict of interest is particularly severe. For example, the issuer-paid agency has more favorable ratings for firms with more short-term debt, a newly appointed CEO or CFO, and a lower percentage of past bond issues rated by the agency. However, the authors find no evidence that these variables are related to corporate bond yield spreads, which suggests that investors may be unaware of incentive problems at the issuer-paid agency. Cohen (2010) documents significant relationships between variables that should not affect a CRA's view of the credit risk of conduit/fusion CMBS transactions issued during 2001-07, but that would affect issuers' and CRAs' incentives in an environment where rating shopping was present.

### 3) How Does Shadow Credit Intermediation Work?

Pozsar, Adrian, Ashcraft, and Boesky (2010) make a distinction between the “internal,” “external,” “independent,” and “government sponsored” shadow banking system. The internal system consists of shadow banking activities conducted under the auspices of bank holding companies. The external system comprises shadow banking activities that are conducted by major nonbank financial institutions such as nonbank-affiliated broker-dealers or insurance companies. Independent shadow banking institutions are specialized shadow banking vehicles that are independent of any major financial institutions. Finally, the government-sponsored shadow banking system consists of institutions that provide credit intermediation services with implicit government guarantees. Before discussing the various shadow banking institutions in detail, we review the “seven steps” of shadow credit intermediation.

#### A) The Seven Steps of Shadow Credit Intermediation

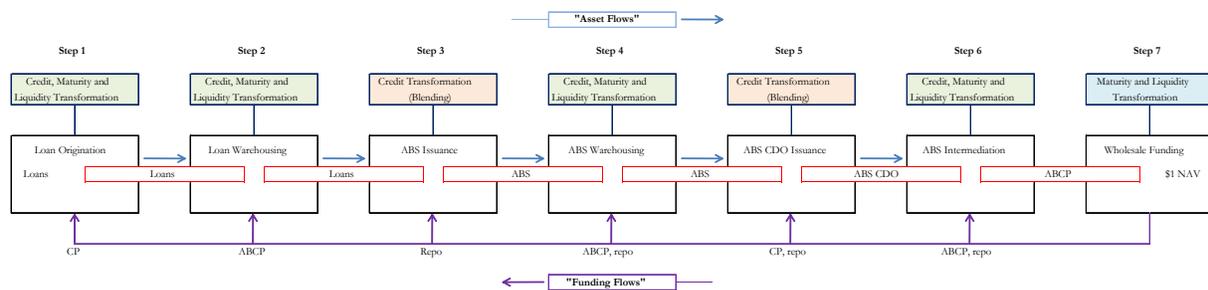
The shadow banking system is organized around securitization and wholesale funding. Loans, leases, and mortgages are securitized and thus become tradable instruments. Funding is also in the form of tradable instruments, such as commercial paper and repo. Savers hold money market balances, instead of deposits with banks.

The shadow banking system decomposes the credit intermediation into a chain of wholesale-funded, securitization-based lending. Through the shadow intermediation process, the shadow banking system transforms risky, long-term loans (subprime mortgages, for example) into seemingly credit-risk-free, short-term, money-like instruments. Shadow credit intermediation is performed through chains of nonbank financial intermediaries in a multistep process that can be interpreted as a “vertical slicing” of the traditional bank’s credit intermediation process into seven steps. Pozsar, Adrian, Ashcraft, and Boesky (2010) explain the seven steps of shadow bank credit intermediation:

1. Loan origination (auto loans and leases, nonconforming mortgages, etc.) is performed by finance companies.
2. Loan warehousing is conducted by single- and multi-seller conduits and is funded through asset-backed commercial paper (ABCP).
3. The pooling and structuring of loans into term asset-backed securities (ABS) is conducted by broker-dealers’ ABS syndicate desks.
4. ABS warehousing is facilitated through trading books and is funded through repos, total return swaps, or hybrid and repo conduits.
5. The pooling and structuring of ABS into CDOs is also conducted by broker-dealers’ ABS.

6. ABS intermediation is performed by limited-purpose finance companies (LPFCs), structured investment vehicles (SIVs), securities arbitrage conduits, and credit hedge funds, which are funded in a variety of ways including, for example, repo, ABCP, MTNs, bonds, and capital notes.
7. The funding of all the above activities and entities is conducted in wholesale funding markets by funding providers such as regulated and unregulated money market intermediaries (for example, 2(a)-7 MMMFs and enhanced cash funds, respectively) and direct money market investors (such as securities lenders). In addition to these cash investors, which fund shadow banks through short-term repo, CP, and ABCP instruments, fixed-income mutual funds, pension funds, and insurance companies also fund shadow banks by investing in their longer-term MTNs and bonds.

**Figure 3: The Shadow Credit Intermediation Process**



Source: Pozsar, Adrian, Ashcraft, and Boesky (2010)

Not all intermediation chains involve all seven steps, and some might involve even more steps. For example, an intermediation chain might stop at the second step if a pool of prime auto loans is sold by a captive finance company to a bank-sponsored multi-seller conduit for term warehousing purposes. In another example, ABS CDOs could be further repackaged into a CDO<sup>2</sup>, which would elongate the intermediation chain to include eight steps. Typically, the poorer an underlying loan pool's quality at the beginning of the chain (for example, a pool of subprime mortgages), the longer the credit intermediation chain that would be required to "polish" the quality of the underlying loans to the standards of money market mutual funds and similar funds. As a rule of thumb, the intermediation of low-quality long-term loans (nonconforming mortgages) involved all seven or more steps, whereas the intermediation of high-quality short- to medium-term loans (credit card and auto loans) involved usually three steps (and rarely more). The intermediation chain always starts with origination and ends with wholesale funding, and each shadow bank appears only once in the process.

## B) Commercial Banks and Shadow Banking

Per definition, credit intermediation activity on the balance sheets of commercial banks does not constitute shadow banking, as it has access to official liquidity and credit guarantees by the Federal Reserve and the FDIC. However, commercial banks can be involved in shadow banking activities in several ways. For example, they can provide credit and liquidity lines to shadow bank entities such as

conduits, ABS issuers, or SIVs. Commercial banks in turn are owned by bank holding companies (BHCs). Mandel, Morgan, and Wei (2012) provide a detailed analysis of commercial banks' sponsorships of shadow banking activities.

Many shadow banking activities are conducted under the auspices of BHCs. For example, a BHC might own a wealth management unit with a money market mutual fund, which we would consider a shadow bank internal to the BHC. Another example is tri-party repo funding by the broker-dealer subsidiaries of BHCs. A third example is the use of ABCP conduits, which are off balance sheet to the BHC, but are sponsored by the commercial bank subsidiary of the BHC via credit and liquidity lines.

One gauge of the extent of shadow banking activity by BHCs is their organizational complexity. While traditional banking is done in a single entity, BHCs tend to have hundreds or thousands of subsidiaries, most of which do not have direct, explicit access to public credit and liquidity puts. For example, Avraham, Selvaggi, and Vickery (2012) document that each of the five largest BHCs in the U.S. had over 1,500 subsidiaries in 2012, with the largest one owning more than 3,000. While some of these subsidiaries are foreign banks, most of them are nonbank subsidiaries in the United States. The majority of the subsidiaries are funds, trusts, and financial vehicles that are typically engaging in shadow banking activities. In fact, Copeland (2012) shows that these shadow banking activities of bank holding companies have been increasing over time and represent a quantitatively important share of the holding companies' total earnings.

Cetorelli and Peristiani (2012) investigate the role of BHCs in asset securitizations. They assess quantitatively the degree to which commercial banks are involved in ABS, CMBS, and CDO issuance, and in servicing and underwriting securitizations. For nonagency ABS, the BHC market share is between 35 and 75 percent for underwriting, issuance, and servicing and close to 100 percent for trust services. In contrast, for private-label mortgages, the market share of BHCs has increased dramatically over the past twenty years to over 60 percent for underwriting, servicing, and issuance. This suggests that the presence of BHCs in shadow banking activities relating directly to securitizations is substantial.

Bord and Santos (2012) study the role of banks in the originate-to-distribute model of credit intermediation. They base their study on data from the Shared National Credit Program (SNC). The data are collected by the national supervisory banking agencies (Federal Reserve, the FDIC, or the OCC), which track credit held by federally supervised institutions. Unlike any form of publicly available data, the SNC allows Bord and Santos to track the ownership of loans by various institutions over time. The authors document that more than 75 percent of syndicated credit lines are bought by syndicate participant banks and that they stay with those banks after three years. The share of term loans owned by syndicate banks has fallen from around 75 percent in the mid-1990s to around 30 percent in the mid-2010s. For term loans, shadow banking organizations have thus emerged as more and more important investors over the past twenty years. Buyers of term loans that are particularly important are investment managers and collateralized loan obligations (CLOs). Bord and Santos conclude that the share of term loans sold to the shadow banking system amounted to less than 10 percent in 1993 and rose to over 30 percent by 2007. While loan originations are conducted almost exclusively by commercial banks, the ultimate owners of term loans are thus split among banks and shadow banks.

Besides the subsidiaries associated with BHC involvement in securitization activities, the largest nonbank BHC subsidiaries consist of finance companies, broker-dealers, and wealth management units including mutual, hedge, and money market mutual funds. In many respects, the financial crisis of 2007-09 has led to a financial system where the BHCs own a larger share of nonbank subsidiaries that conduct shadow banking activities. For example, the five largest independent broker-dealers prior to the crisis all were absorbed by, or transformed into, BHCs. Similarly, some of the largest independent issuers, originators, and servicers of private-label mortgages were absorbed by BHCs. So while the two decades in the run-up to the financial crisis saw the emergence of a shadow banking system that was partially independent from BHCs, the financial crisis led, perhaps paradoxically, to a migration of independent shadow banking activity into BHCs. Cetorelli (2012) shows that, as of 2011, BHCs controlled about 38 percent of the assets of the largest insurance companies, 41 percent of total money market mutual fund assets, and 93 percent of the assets of the largest brokers and dealers. Moreover, very little securities lending and related cash collateral reinvestments take place without the services provided by the main custodian banks.

The trend toward consolidation of shadow banking in BHCs since the crisis is, however, counteracted by a powerful force: the enhanced prudential standards of BHCs. Tighter capital and liquidity requirements will arguably lead to an increased incentive for some forms of credit intermediation to migrate out of BHCs and into the shadow banking system. This trend has been observed in proprietary trading, which has largely migrated from the BHCs to independently run hedge funds in anticipation of the Volcker Rule (see Duffie (2012) for an academic assessment of the rule). Furthermore, the CLO market continues to thrive and is at least partially independent from BHCs. A broader movement of securitization-related activity from BHCs to shadow banking institutions can be expected over time.

### **C) External and Independent Shadow Banking**

External shadow banking entities are regulated institutions that are independent of any entities with direct, explicit government backstops and that conduct shadow banking activities. Examples of such institutions are stand-alone broker-dealers; independent wealth management firms that run money market funds; credit hedge funds; and finance companies that are affiliated with industrial companies such as the auto loan subsidiaries of car manufacturers. Independent shadow banks are institutions independent of the government safety net; they are set up to engage exclusively in certain shadow banking activities. In contrast to the institutions of the external shadow banking system, independent shadow banks do not have non-shadow banking activities as their primary business, but rather specialize only in shadow banking. Examples of independently run shadow banks are nonbank affiliated SIVs, stand-alone money market mutual funds, independent CDOs and CLOs, and the majority of ABS and private-label RMBS and CMBS.

The fifth and sixth steps of the credit intermediation chain rely heavily on private credit risk repositories to perform originate-to-distribute securitizations. Private risk repositories specialize in

providing credit transformation services in the shadow banking system and include mortgage insurers, monoline insurers, certain subsidiaries of large, diversified insurance companies, credit hedge funds, and credit derivative product companies. These entities, as investors in the junior equity and mezzanine tranches of loan pools, all provide risk capital to the shadow banking system, thereby supporting credit extension to the real economy. Different credit risk repositories correspond to specific stages of the shadow credit intermediation process. As such, mortgage insurers specialize in insuring or wrapping whole mortgage loans; monoline insurers specialize in wrapping ABS tranches (or the loans backing a specific ABS's tranches); and large, diversified insurance companies, credit hedge funds, and credit derivative product companies specialize in taking on the risks of ABS CDO tranches through CDS. There are also overlaps, with some monolines wrapping both ABS and ABS CDOs, for example. Effectively, the various forms of credit put options provided by private risk repositories absorb tail risk from loan pools, turning the enhanced securities into securities that are free from credit risk (at least from investors' perceptions prior to the crisis). This in turn means that any liability that issued against these assets is perceived to be free of credit risk as well, just as if it is FDIC-insured.

The perceived credit-risk-free nature of traditional banks' and shadow banks' liabilities stems from two very different sources. In the case of traditional banks' insured liabilities (deposits), the credit quality is driven by the counterparty—the U.S. taxpayer. As a result, insured depositors invest less effort into examining a bank's creditworthiness before depositing money than they would if they were uninsured. In the case of shadow banks' liabilities (repo or ABCP, for example), perceived credit quality is driven by the "credit-risk free" nature of collateral that backs shadow bank liabilities, as it is often enhanced by private credit risk repositories. The credit puts provided by private credit risk repositories are alternatives to the credit transformation performed by 1) the credit-risk-based calibration of advance rates and attachment points on loan pools backing top-rated ABCP and ABS tranches, respectively; 2) the credit-risk-based calibration of haircuts on collateral backing repo transactions; 3) the capital notes supporting LPFCs' and SIVs' portfolios of assets; and 4) the pooling and repackaging of non-AAA-rated term ABS into ABS CDOs. The credit puts of private credit risk repositories are also similar in function to the wraps provided by Fannie Mae and Freddie Mac on conforming mortgage pools. Just as these government-sponsored, public credit risk repositories "borrowed" the AAA-rating of the federal government and extended it to pools of mortgage loans (turning them into credit-risk-free rate products), the private credit risk repositories were effectively "borrowing" the AAA rating of their parent.

## **D) Government-Sponsored Shadow Banking**

In many ways, the modern shadow banking system originated in the government sector. Securitization was first conducted by government-sponsored enterprises (GSE), which are comprised of the FHLB system (1932), Fannie Mae (1938), and Freddie Mac (1970). The GSEs have dramatically impacted the way in which banks are funded and the way in which they conduct credit transformation: The FHLBs were the first providers of term warehousing of loans, and Fannie Mae and Freddie Mac pioneered the originate-to-distribute model of securitized credit intermediation.

Like banks, the GSEs fund their loan and securities portfolios with a maturity mismatch. Unlike banks, however, the GSEs are funded not through deposits, but through capital markets, where they issue short- and long-term agency debt securities. These agency debt securities are bought by money market investors and real money investors such as fixed-income mutual funds. The funding functions performed by the GSEs on behalf of banks and the way in which GSEs are funded are the models for wholesale funding markets. The GSEs use several securitization techniques. They use term loan warehousing services provided by the FHLBs. They also use credit risk transfer and transformation through credit insurance provided by Fannie Mae and Freddie Mac. Securitization functions are provided by Fannie Mae and Freddie Mac. Maturity transformation is conducted on the GSEs' balance sheets through retained portfolios. These securitization techniques first used by the GSEs were adopted and imitated by banks and nonbanks to generate the nongovernmental shadow banking system. The adaptation of these techniques gave rise to the securitization-based, originate-to-distribute credit intermediation process.

#### **4) Why Does Shadow Credit Intermediation Need to Be Regulated?**

During the financial crisis of 2007-09, the shadow banking system collapsed. ABCP conduits experienced a series of runs. Of the five major investment banks, one failed, two were acquired by banks, and two were transformed into bank holding companies. Securitization activity totally stopped, and many shadow banking institutions such as SIVs and CDOs all but disappeared. The collapse of shadow banking institutions and shadow banking activities occurred both on the asset and liability sides. On the asset side, the main issues were the underwriting standards. On the liability side, the main issues were related to the fragility of wholesale funding. As a result of these fragilities, the government sector set up a variety of backstops for the shadow banking system. These backstops consisted of both liquidity facilities and solvency guarantees. They were created because of the potential for shadow bank distress to spill over to other institutions and damage the real economy.

##### **A) Asset Quality**

Because they are tailored to take advantage of mispriced tail risk, shadow banking institutions accumulate assets that are particularly sensitive to tail events. At a deep level, the question becomes, how can the mispricing of tail risk exist in a world with fully rational actors? Shouldn't financial market participants be able to calculate tail risk probabilities, implicit guarantees, and various tail risk enhancements? And shouldn't these calculations lead to the proper assessment of tail risk? The literature has provided two distinct, complementary answers. The first relies on the behavioral explanation of "neglected risk." The second relies on information opacity in a rational world. We will discuss each of these explanations in turn.

Evidence from psychology and behavioral finance argues that market participants are fundamentally biased against the rational assessment of tail risk. Gennaioli, Shleifer, and Vishny (2012a) develop a theory of individual decision making based on the behavioral evidence, positing that actors neglect risk. In a later paper, Gennaioli, Shleifer, and Vishny (2012b) apply this theory to the economics of the shadow banking system. They model a world where investors systematically ignore the worst state of the world, generating overinvestment and overpricing during the boom and excessive collapse of real activity and the financial sector during the bust.

Their theory is possibly the most parsimonious narrative of the boom and bust of the shadow banking system. In fact, much empirical evidence is consistent with such a theory. Credit rating agencies modeled only small or no declines in aggregate housing prices, and investors in securitized products often did not understand the amount of risk exposure that was embedded in the products. Meanwhile, the prices of tail risk far into the future, far out of the money options relating to mortgage credit, were surprisingly cheap. An early paper warning of the financial system's exposure to such tail risk was presented by Rajan (2005), who pointed to precisely this phenomenon by asking whether financial innovation had made the world riskier.

Neglected risks are one way to interpret the widely perceived risk-free nature of highly rated structured credit products, such as the AAA tranches of ABS. Coval, Jurek, and Stafford (2009) point out that these AAA tranches behave like catastrophe bonds that load on a systemic risk state. In such a systemic risk state, assets become much more correlated than in normal times. The underestimation of correlation enabled financial institutions to hold insufficient amounts of liquidity and capital against the puts that underpinned the stability of the shadow banking system, which made these puts unduly cheap to sell. As investors tend to overestimate the value of private credit and liquidity enhancement purchased through these puts, the result is an excess supply of cheap credit. Adrian, Moench, and Shin (2009) document the close correspondence between the pricing of risk and the fluctuations of shadow bank and broker-dealer balance sheets. Times of low-risk premia tend to be associated with expanding balance sheets—in fact, intermediary balance-sheet developments predict the pricing of risk across many asset classes. Neglected risk can manifest itself through over-reliance on credit ratings by investors. For example, Ashcraft et al. (2011) document that subprime MBS prices are more sensitive to ratings than ex post performance, suggesting that funding is excessively sensitive to credit ratings relative to informational content.

Dang, Gorton, and Holmström (2009) present an alternative theory where, in a world with fully rational market participants, assets are highly exposed to tail risk. Theirs is a theory of information opacity that can serve as a rationalization of credit problems for the shadow banking system. According to this theory, debt contracts are optimal because they generate opacity. Opacity, in turn, minimizes adverse selection and provides the least possible incentives to collect information. This insight justifies the growth of relatively opaque securitized products in the run-up to the crisis. Mortgages and loans were packaged into MBS and ABS and funded by CDOs, SIVs, and MMMFs that had relatively little information about the underlying credit quality. However, Dang, Gorton, and Holmström show that systemic risk is exacerbated once a bad shock hits informationally opaque, debt-funded economies. The intuition is that a bad shock leads to an increase in private information collection, which exacerbates the

incorporation of adverse information in market prices. As a result, adverse selection starts to accumulate as systemic crises deepen.

The above theory complements the explanation by Gennaioli, Shleifer, and Vishny (GSV) discussed earlier. While Dang, Gorton, and Holmström (DGH) emphasize adverse selection as an amplification mechanism, GSV emphasize awareness of risk. In GSV, the riskiness of the worst state of the world is simply neglected, and this neglect is based on behavioral arguments. In contrast, in DGH's model, the opacity of financial contracts in good times is an equilibrium outcome that maximizes the liquidity of financial contracts. The commonality between the two theories is that the severity of financial crisis is neglected, either rationally or behaviorally. As a result, the tail risk embedded in debt securities is underpriced from an ex post point of view. In both DGH and GSV, the assets that are accumulated during the boom experience large asset price declines during times of crisis. Such theories of neglected risk thus provide a rationalization for the accumulation of risk exposure to the housing market that was the major aggregate risk of the shadow banking system. In the theories of DGH and GSV, securities such as ABS and CDOs that obscure the underlying credit risks arise naturally. Such securities, in turn, generate large losses in times of crisis.

Such explanations of the boom and bust cycle of securitized credit products need to be complemented with the additional insights from theories discussed in Section 2. Those alternative theories provide additional reasons that give rise to the systematic mispricing of tail risk. In particular, the implicit or indirect access to government backstops via credit and liquidity puts from bank holding companies and insurance companies leads to the underpricing of tail risk and the excessive buildup of systemic risk. The agency conflicts arising at various stages of the shadow banking system, and particularly the misaligned incentives of credit rating agencies, will lead to excessive risk taking in good times, with associated excessive credit losses in times of crisis. Finally, the failure to provide adequate financial disclosure based on accounting rules generates an additional market failure that facilitates excessive risk taking with the associated large losses in downturns.

## **B) Funding Fragility**

The financial frictions that lead to excessive risk taking and exacerbated credit losses during downturns also interact with the fragility of funding. Per definition, funding sources for shadow banking activities are uninsured and thus runnable. In many ways, the fragility of shadow banks due to the run-ability of liabilities resembles the banking system of the 19<sup>th</sup> century, prior to the creation of the Federal Reserve and the FDIC. During that time, bank runs were common, and they often had severe consequences for the real economy.

The shadow banking system's vulnerability to runs bears resemblance to bank runs as modeled by Diamond and Dybvig (1983). Shadow banks are subject to runs because assets have longer maturities than liabilities and tend to be less liquid as well. While the fundamental reason for commercial bank runs is the sequential servicing constraint, for shadow banks the effective constraint is the presence of

fire sale externalities. In a run, shadow banking entities have to sell assets at a discount, which depresses market pricing. This provides incentives to withdraw funding—before other shadow banking depositors arrive.

However, the analogy between bank runs and shadow bank runs goes only so far. The reason is that shadow banking entities do not offer demand deposits, but instead obtain funding in wholesale money markets such as commercial paper or repo. Martin, Skeie, and von Thadden (2011) provide a model for a run in repo markets that takes the empirical facts of the Bear Stearns and Lehman crises as a starting point. In their model, repo borrowers face constraints due to the scarcity of collateral and the liquidity of collateral. Under sufficiently adverse conditions, self-fulfilling runs can occur. The model focuses in particular on the differences between the tri-party repo market and the bilateral repo market (see Adrian, Begalle, Copeland, and Martin (2013) for an overview of both markets). Arguably, runs occurred in both markets, but they were of very different natures. While the run in the bilateral market was characterized by a sharp increase in haircuts (as documented by Gorton and Metrick (2012)), the run in the tri-party repo market materialized as a simple withdrawal of funding with a rather limited impact on the level of haircuts (see Copeland, Martin, and Walker (2011)). Runs in the ABCP market were equally characterized by a withdrawal of funding (see Covitz, Liang, and Suarez (2012)).

Funding fragility of shadow banking institutions can also be interpreted as the result of the leverage cycles of market-based financial institutions. Such leverage cycles refer to equilibrium outcomes, where asset values and balance sheet capacity of intermediaries are determined endogenously. The friction in models of leverage cycles is due to the funding constraints of intermediaries, which reflect the incentive problems discussed earlier. Theories of intermediary leverage cycles have been proposed by Fostel and Geanakoplos (2008), Brunnermeier and Pedersen (2009), Brunnermeier and Sannikov (2011), Garleanu and Pedersen (2011), and Adrian and Boyarchenko (2012). Such theories of leverage cycles have the commonality that intermediaries are subject to collateral constraints, as is the case for repo and ABCP funding. The tightness of the collateral constraints depends on the underlying risk of assets, the liquidity of assets, and the collateral values. As economic conditions deteriorate, the leverage cycle acts as an amplification mechanism to underlying shocks.

Adrian and Boyarchenko (2012) show that their theory of intermediary leverage cycles has strong empirical support. Intermediary balance sheets exhibit strongly procyclical leverage, meaning that leverage expands in booms. This procyclical behavior of leverage is a hallmark of shadow banking, as documented by Adrian and Shin (2009). Shadow bank leverage tends to be high when balance sheets are large and credit intermediation is expanding. Furthermore, equity is countercyclical, both in the theory and in the data, as intermediaries tend to hold as little equity as possible during booms, but are forced to raise equity during downturns when the market risk increases. Adrian and Boyarchenko (2012) also document the close link between intermediary balance sheets and asset prices. Over time, expanding leverage tends to coincide with compressed risk premia and inflated asset prices. In busts, risk premia widen, generating asset price busts. In addition, market volatility is countercyclical. As a result, the funding of intermediaries tends to collapse during times of crisis.

The advantage of the general equilibrium theories of leverage cycles is that they allow welfare analysis, thus tying funding fragility in financial crises to possible policy interventions. In general, the market equilibrium is not welfare optimizing, and policies that mitigate the cycle can enhance welfare. In the context of shadow banking, this implies that the run-up of shadow banking just before the crisis and its collapse during the crisis are exacerbating the financial cycle in a way that does not enhance welfare.

## C) Liquidity Backstops

While the next section discusses structural changes to the regulatory environment that aim at reducing the fragility of the shadow banking system, and ultimately at reducing the amplitude of the leverage cycle, this subsection focuses on ex post policies that were deployed during the financial crisis of 2007-09 to stabilize the collapse of shadow banking. This collapse reflected problems on the asset and liability side—in other words, both credit problems and liquidity problems. While the Federal Reserve initiated programs that primarily aimed at liquidity injections, the U.S. Treasury's programs sought to resolve credit problems.

The financial crisis started in 2007 with the collapse of ABCP conduits and SIVs. The majority of those conduits were single-seller conduits that were under the umbrella of particular BHCs. As the asset quality of the ABCP conduits and SIVs deteriorated, money market investors withdrew funding, forcing the sponsoring BHCs to seek other sources of funding. As a result, assets from the conduits and SIVs were re-intermediated and funded in unsecured markets, such as the Libor market. As a result, funding in the Libor market became disrupted, and the Federal Reserve initiated two programs to address the funding liquidity shortage. The Term Auction Facility (TAF) provided term funding for commercial banks, effectively replacing the term funding that evaporated in the ABCP market (see Armantier, Krieger, and McAndrews (2008) for a description of the TAF). In addition, foreign exchange swaps provided term funding for foreign banks that did not have access to the TAF via the Fed's discount window. Institutions that held U.S. dollar assets that could no longer be funded in the ABCP market were thus able to obtain funding in foreign currencies, and swap into dollar funding at the foreign central bank by using the Fed's foreign exchange swaps.

The next dysfunction during the financial crisis occurred in the repo market. In early 2008, haircuts in the DVP repo market started to increase substantially, leading to forced deleveraging of many fixed-income and credit hedge funds. For example, Carlyle's CCC fund, which invested in agency mortgages and was funded in the DVP repo market, had to declare bankruptcy in February 2008. Subsequently, the repo funding shortage also impacted the tri-party repo market. In the week of March 11, 2008, Bear Stearns was no longer able to obtain tri-party repo funding. In order to prevent these funding difficulties from spreading to other institutions, the Federal Reserve introduced the Primary Dealer Credit Facility (PDCF) on March 15, 2008 (see Adrian, Burke, and McAndrews (2009) for a detailed exposition of the facility). The PDCF allowed primary dealers to obtain funding from the Fed and thus effectively allowed the dealer sector to join depository institutions in having access to last-resort lending. In addition, the

Term Security Lending Facility (TSLF) allowed dealers to exchange agency mortgage collateral against Treasury collateral (see Fleming, Hrung, and Keane (2010) for detail on the TSLF).

Following Lehman's bankruptcy on September 15, 2008, money markets experienced a run, leading to funding shortages of ABCP, CP, and repo issuers. The Federal Reserve introduced two facilities to address these money market dislocations: the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) and the Commercial Paper Funding Facility (CPFF). The CPFF offered a funding source to commercial paper issuers that replaced money market funding in the aftermath of Lehman. The CPFF was constructed to be a self-liquidating facility due to terms that made it attractive during the financial crisis when spreads were unusually large but that were uneconomical in a more normal spread environment. (Adrian, Kimbrough, and Marchioni (2011) describe the CPFF in greater detail.)

The Term Asset-Backed Securities Loan Facility (TALF) was created to help market participants meet the credit needs of households and small businesses by supporting the issuance of asset-backed securities (ABS) collateralized by auto loans, student loans, credit card loans, equipment loans, floorplan loans, insurance premium finance loans, loans guaranteed by the Small Business Administration, residential mortgage servicing advances, or commercial mortgage loans. Ashcraft, Malz, and Pozsar (2012) describe the facility in detail.

These liquidity facilities have the commonality of expanding the central bank's lending of last resort to institutions of the shadow banking system that do not have direct, explicit access to public liquidity backstops. The fragility of shadow banks due to vulnerable assets and liabilities makes them vulnerable to excessive collapse in times of adverse financial cycles. Lending of last resort aims to insulate real economic activity from such disorderly collapses. While lending of last resort is a necessary action ex post, once crises materialize, the anticipation of such action can result in distorted risk-taking incentives. As a result, structural reforms, reviewed in the next section, aim at mitigating incentives for excessive risk taking in the shadow banking system ex ante.

## **5) How Should Shadow Credit Intermediation Be Regulated?**

Adrian and Ashcraft (2012) review recent regulatory changes to the shadow banking system in detail. We provide a short overview of those reform efforts, focusing on three areas: 1) reforms relating to money markets, 2) implications of banking regulation for the shadow banking system, and 3) reforms of securitization and credit ratings. It should be noted that all these reform efforts are under way at this time.

## **A) Money Market Reforms: ABCP, Repo, and Money Market Mutual Funds**

### **Reforms Relating to ABCP Conduits**

In June 2009, the Financial Accounting Standards Board (FASB) announced the Statements of Financial Accounting Standards (FAS) 166 and 167, amending existing accounting rules for consolidation of securitization transactions. Sponsors of securitization transactions have generally interpreted this new guidance as requiring accounting consolidation in the event that a first-loss position and loan servicing are retained by the sponsor for securitization transactions.

Following revisions to the accounting rules, the U.S. banking agencies clarified in September 2009 that depository institutions would have to hold regulatory capital against consolidated securitization transactions and ABCP conduits. The movement of assets onto the balance sheet will result in an increase in capital requirements under the minimum leverage ratio, an increase in risk-weighted assets and capital requirements given the inability of banks to use a 10 percent credit conversion factor for liquidity guarantees, and a requirement that banks provision for losses on loans held in consolidated conduits and securitization trusts. The close link between regulatory capital and accounting treatment has eliminated the scope for using securitization of loans serviced by the sponsor to reduce capital requirements. Furthermore, Section 331 of the Dodd-Frank Act requires FDIC assessments on consolidated assets minus tangible equity of large banks rather than the historical practice of counting only deposit liabilities. The consolidation of conduits onto bank balance sheets means that banks will pay assessments on these liabilities, making conduit sponsorship more expensive.

### **Reforms Relating to Tri-party Repo**

Reforms in the tri-party repo market are ongoing. An important friction in the tri-party repo market is the dependence of market participants on intraday credit of the custodian banks. In 2009, an industry task force sponsored by the Federal Reserve Bank of New York was created with the aim of reducing market participants' dependence on intraday credit. The task force has shortened the window of the daily unwind, moving it from 8:30 in the morning to 3:30 in the afternoon. However, between 3:30 and the settlement of all repos, the dealers are still dependent on the credit of the clearing banks.

Another major source of systemic risk in the tri-party repo market is vulnerability to the default of a major dealer. Such an event exposes that clearing bank to counterparty credit risk. Moreover, it leads to a potentially destabilizing transfer of risk across market participants and directly impacts the dealers' clients who are no longer able to obtain leverage through the dealer in question. The vulnerability of short-term funding markets with respect to single institutions is a major concern for the stability of these funding markets. The tri-party repo task force has not been successful in identifying a solution to the problem of how money market fund investors would be able to liquidate collateral in the event a large broker-dealer became insolvent. As long as the tri-party repo market accepts a significant amount of collateral other than U.S. Treasury and agency securities (such as private-label ABS and corporate bonds), the tri-party market will remain prone to runs and constitute a source of systemic risk.

The major broker-dealers that are the most important borrowers in the tri-party repo market have become subject to tighter regulation. In particular, one of the consequences of the financial crisis has

been that two of the formerly five major investment banks have been transformed into bank holding companies and two have merged with bank holding companies. The fifth dealer, Lehman Brothers, declared bankruptcy, and its dealer subsidiary was acquired by foreign banks. As a result, all of the formerly major independent investment banks are now regulated on a consolidated basis by the Federal Reserve and will be subject to the reformed Basel capital and liquidity standards. In addition, the Dodd-Frank Act instituted enhanced prudential standards for large bank holding companies and the designation of “systemically important nonbank financial institutions.” Furthermore, the Orderly Liquidation Authority provides the FDIC with the authority to act as receiver for the resolution of nonbank financial institutions (including bank holding companies) for which a systemic risk determination has been made. A currently open question concerns the regulation of the major U.S. broker-dealers owned by foreign banking organizations.

### **Reforms Relating to MMMFs**

MMMFs have undergone some reform since the financial crisis of 2007-09. In particular, the SEC has put new restrictions on 2a-7 funds to limit risk and maturity transformation and reliance on ratings. However, these restrictions do not address the key friction that exists in the market, which is implicit support for a stable net asset value (NAV) by plan sponsors and the official sector through historical experience. The MMMF rules as amended in 2010 also increase the funds’ incentives to lend for short tenors and decrease their incentives to look through to the collateral. The SEC rules incent MMMFs to act as unsecured rather than secured investors—which is a problem from a financial stability point of view. However, these reforms continue to leave MMMFs as a source of systemic risk.

The susceptibility of MMMFs to runs is illustrated in the aftermath of Lehman’s failure in September 2008 when a stand-alone MMMF—the Reserve Fund—broke the buck. In the following weeks, institutional investors broadly withdrew from MMMFs, thus forcing massive liquidations of MMMF assets, which led to downward pressure on prices, and instances of funds breaking the buck. When investors run on money market funds, they are forced to liquidate assets, putting downward pressure on the mark-to-market values of the money market mutual fund assets and potentially leading to more funds breaking the buck. The market friction that makes MMMFs unstable is thus the stable NAV that gives rise to fire sale dynamics that occur when investors withdraw investments.

As a result of the stable NAV rule, investors of MMMFs effectively treat the funds like demand deposit accounts. In fact, many MMMFs market the funds as alternatives to demand deposits. However, MMMFs have no explicit backstop that would protect them against declines in asset values. MMMFs do rely on implicit discretionary support by sponsors. However, in a financial crisis, investors cannot necessarily count on the sponsors to provide support. The second friction we would highlight in the context of MMMFs is thus the implicit guarantee provided by the funds’ sponsors.

One of the proposals for further reforms of MMMFs is to abandon the stable NAV rule and operate MMMFs with floating NAV. Money funds would then mark their asset values to market at all times. This would remove some of the incentives for investors to run. However, changing money funds from stable to floating NAVs would not remove all incentives of investors to run. In the presence of some illiquidity in the asset market, early withdrawal of funds can lead to temporary under-valuations of assets and

provide incentives for early withdrawal. There are, indeed, some instances of runs in certain European countries that have money market funds with floating NAVs.

The SEC is currently considering a range of reform options, and the Financial Stability Oversight Council (FSOC) has highlighted the need for MMMF reforms in its annual reports of 2011 and 2012. In general, these were intended to address the fact that MMMFs have a number of characteristics—including a stable NAV, redemption upon demand, and extremely risk-averse investors—that interact to make these entities vulnerable to runs. Several of these proposals entail the creation of liquidity and capital buffers. The former provide additional near-cash assets to deal with redemptions, while the latter enhances the loss absorption capacity available to deal with a credit event. Broadly speaking, two kinds of buffers can be set up: *ex ante* and *ex post*.

One type of *ex ante* buffer is to create a private emergency liquidity facility, capital reserve, or insurance. Regulated fixed NAV funds would benefit from an *ex ante* buffer, but be forced to pay the cost. Another approach to an *ex ante* buffer is for individual funds to set aside resources in advance to absorb losses should they occur, serving the same purpose as capital reserves in traditional banks. As an alternative, the Investment Company Institute has proposed a private-sector "liquidity bank" that would provide a backstop but might itself benefit from access to official liquidity.

An *ex post* buffer does not require any resources to be set aside in advance, but is created by taking steps to ensure that investors absorb losses when they occur and that they cannot flee and leave the losses behind. In particular, such measures are designed to forestall investors redeeming shares at a NAV of one dollar once a credit event or liquidity event has begun. A variable NAV may be helpful in this regard, because it could, if properly computed, adjust rapidly in response to losses or liquidity shocks. However, this would be a fundamental change in the nature of MMMFs.

The Squam Lake Group (2011) put forward a proposal for MMMFs to have two share classes. The senior tranche would be a stable net asset value fund that would be backed by a liquidity buffer amounting to  $x$  percent of the current NAV. The liquidity buffer could be implemented in at least four different ways. Most recently, McCabe (2012) has investigated the feasibility of requiring a two-share system for MMMFs (labeled A and B shares). McCabe calibrates the returns to the tranches under realistic scenarios about asset returns and run risk. The advantage of this two-share proposal is that it would preserve the stable NAV feature of money market funds under much more severe circumstances than is currently the case, while lowering the returns to investors into the stable NAV shares only slightly. However, it should be noted that the two-share proposal does not fully protect funds against runs in all states of the world. For any realistic capital requirement, there are some tail events that will induce the fund to have to unwind. McCabe, Cipriani, Holscher, and Martin (2012) have proposed that MMMFs be made subject to a "minimum balance at risk" (MBR). The MBR would be a small fraction of each MMMF investor's balance demarcated to absorb losses if the fund is liquidated. This feature accounts for the credit risk that MMMFs hold. Furthermore, redemptions of the MBR would be delayed by thirty days, thus accounting for the illiquidity of MMMF assets in times of crisis and reducing fire sale incentives. Large redemptions would subordinate part of the MBR, creating a disincentive to redeem if the fund is likely to have losses and thus reducing incentives for investors to run.

## **B) Banking Regulation Reforms: Capital and Liquidity**

### **Capital Requirements for Securitization Exposures**

In February 2011, regulators announced planned changes to the treatment of securitization exposures held by banks in the trading book. In general, assets held in the trading book face lower capital charges than those in the banking book given the stated intent of the institution to actively trade, and the presumption of regulators was that the institution will be able to exit the position before incurring credit losses. However, the behavior of banks during the recent financial crisis suggested that these institutions were unwilling to trade out of positions, given the large decline in prices relative to projected losses. The proposed revisions to the Market Risk Amendment of Basel II recognize this behavior and require banks to hold capital against securitization exposures in the trading book as if they were in the banking book, eliminating banks' ability to hold less capital against these exposures.

### **FDIC Safe Harbor**

In September 2010, the FDIC approved revisions to its safe harbor from repudiation powers in receivership. In particular, as receiver of a failed bank, the FDIC has the authority to repudiate contracts, which could possibly include the sale of assets to a bankruptcy-remote trust as part of a bank-sponsored securitization transaction. Historically, the FDIC created a safe harbor from use of this authority tied to the accounting treatment of the transaction. However, the aforementioned changes to FAS 166/167 implied that many securitization transactions would now be consolidated on a bank's balance sheet, implying that investors would no longer benefit from the existing safe harbor.

In the new safe harbor, the FDIC requires bank-sponsored securitizations to meet minimal standards for capital structure; disclosure requirements to be aligned with the SEC's proposed revisions to Regulation AB; and documentation, compensation, and risk retention to be aligned with the inter-agency implementation of Dodd-Frank 941. The rule has more stringent requirements for bank-sponsored RMBS transactions, including the need for a 5 percent cash reserve for twelve months to fund representations and warranties and a requirement that compensation to rating agencies be based in part on the performance of the underlying transactions. The stated motivation for using the safe harbor in this fashion is to protect the FDIC as guarantor of bank deposits from the bank's investment in securitization transactions. As the scope of the rule applies only to banks sponsoring securitization transactions, it is possible that, when binding, it will shift securitization activity to the nonbank sector.

### **Bank Liquidity Regulation**

In December 2010, the Basel Committee proposed new liquidity requirements for banks. In particular, in addition to capital requirements, banks would have to meet two liquidity standards: a liquidity coverage ratio (LCR) and a net stable funding ratio (NSFR). The LCR is intended to promote short-term resilience of a bank's liquidity risk profile by ensuring that it has sufficient high-quality liquid assets to survive a significant stress scenario lasting for one month. In particular, the bank is required to hold unencumbered high-quality liquid assets in an amount no less than 100 percent of total net cash outflows over the next thirty days in a stress scenario. The NSFR is intended to promote resilience over

a longer time horizon by creating additional incentives for banks to fund their activities with more stable sources on an ongoing basis. In the NSFR requirement, stable funding is defined as “the portion of those types and amounts of equity and liability financing expected to be reliable sources of funds over a one-year time horizon under conditions of extended stress.” The amount of required stable funding is a function of the liquidity characteristics of the institution’s financial exposures. Collectively, these liquidity rules are expected to have an impact on the costs of providing liquidity guarantees to ABCP conduits, as banks will now be required to hold an adequate level of unencumbered high-quality liquid assets for draws on lines underlying the exposures in the conduits, as well as any ABCP with a maturity of thirty days or less. Moreover, new proposed liquidity requirements for banks could make backup lines more expensive by requiring an adequate level of liquid assets to meet stress liquidity needs for a thirty-day time horizon.

## **C) Credit Market Reforms: Securitization and Credit Ratings**

### **FDIC Safe Harbor**

In April 2010, the SEC proposed revisions to Regulation AB that provide guidance on required disclosure by sponsors of securitization transactions. The proposal by the SEC was largely confirmed in Section 942 of the Dodd-Frank Act. These rules were re-proposed in April 2011, partly in response to the Section 932A requirement to remove references to credit ratings and partly in response to comments on the original proposal. The motivation for revisions to the rule is the conclusion that investors did not have adequate information or time to conduct due diligence on new issue securitization transactions, that market participants over-relied on credit ratings, and that incentive misalignment exists between sponsors and investors.

### **Risk Retention**

In April 2011, regulators jointly proposed rules implementing Section 941 of Dodd-Frank, requiring that sponsors retain meaningful risk of securitization transactions. In the proposal, the sponsor of a securitization transaction is required to hold at least 5 percent of an eligible form of risk retention measured using par value. Eligible forms of risk retention generally include vertical retention, where the sponsor retains a fraction of every tranche; horizontal retention, where the sponsor retains a first-loss position; and a specific combination of the two forms of equal size, referred to as L-shaped. The sponsor is not permitted to sell or hedge the retained interest for the life of the transaction and is not permitted to pledge for nonrecourse financing. The proposed rule provides for exemptions from risk retention for securitizations sponsored by U.S. government agencies, for government-sponsored enterprises as long as they are in receivership, and for qualified loan pools that meet strict underwriting requirements. The proposed rule permits the sponsor of a CMBS transaction to sell a horizontal tranche to a B-piece investor that re-underwrites every loan in the transaction and permits the sponsor of an ABCP transaction to recognize risk retention by the originator in the underlying receivables being financed in the conduit.

## **Credit Rating Agencies**

The 2010 Dodd-Frank Act includes a range of provisions intended to improve rating agency incentives and performance. Under Sections 7 and 11 of the Securities Act of 1933, when an issuer includes statements in a prospectus from experts like lawyers or accountants, the prospectus must also include consent to liability from the expert. While Rule 436(g) historically exempted credit rating agencies from this requirement, this exemption was removed by Dodd-Frank. However, the exemption has never gone into effect because the SEC issued a no-action letter, acknowledging refusal by the credit rating agencies to consent to expert liability, threatening to bring new issuance to a halt. As of this writing, the repeal of 436(g) is still not in force.

Dodd-Frank made amendments to Rule 17g-5 in order to provide investors with more views on the creditworthiness of structured finance products and to improve the quality of ratings by limiting rating shopping. In particular, these amendments require a rating agency hired by an issuer to disclose the rating assignment and obtain representation from the arranger that they will provide information to both hired and certified non-hired nationally recognized statistical rating organizations (NRSROs). In practice, this provision has not been used to produce many shadow ratings, given concerns by NRSROs about legal liability they would face from disclosing this information without explicit permission of the issuer.

The Credit Rating Agency Reform Act of 2006 (Rating Agency Act) mandated that the SEC establish a registration and oversight program for NRSROs. While the SEC was given formal oversight authority for the rating agencies for the first time, the law expressly prohibited regulation of the substance of credit ratings or the procedures and methodologies. In June 2007, the SEC adopted new rules establishing a regulatory program for NRSROs. These rules require NRSROs to have written policies and procedures to prevent the misuse of material nonpublic information and to manage certain conflicts of interest. They also disallow certain other conflicts of interest outright and prohibit NRSROs from engaging in certain unfair, coercive, or abusive practices.

## **6) Conclusion**

In this paper, we define shadow credit intermediation to be the intermediation of credit without the direct or explicit support of the U.S. taxpayer. Over the past sixty years, the fraction of credit funded using commercial banks' maturity transformation has declined significantly, as market-based credit intermediation has increased in importance. The decline of credit intermediation financed through traditional banks has been offset only in part by the rise of shadow banks.

We explore three motivations for the growing importance of shadow banking. First, we highlight financial innovation in the composition of the aggregate money supply. Second, we discuss the incentives of financial institutions to avoid taxes, accounting rules, or capital requirements. Third, we review the presence of agency problems in financial markets, which create perverse incentives.

We provide a topology for understanding different parts of the shadow intermediation process as well as different sectors that engage in shadow banking. We furthermore articulate the market failures that ultimately justify the need for regulation of this sector. In particular, we discuss how complexity can result in neglected risk by investors, permitting the buildup of systemic risks. Moreover, we note the well-documented externalities associated with runs on institutions involved in maturity transformation. We also document how the public sector has provided lending-of-last-resort facilities during the financial crisis in order to shield real economic activity from a run on the shadow banking system.

Finally, we provide an overview of new rules targeting shadow banking and highlight the uneven impact they will have on the likely size of the shadow banking sector in the future. While changes to accounting and capital requirements will reduce incentives by banks to engage in types of arbitrage activities at the core of the financial crisis—that is, ABCP and securitization activity—significant increases in the overall level and risk sensitivity of capital will provide strong incentives for credit intermediation to be funded outside of the banking system.

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