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Abstract

Shadow banks conduct credit intermediation without direct, explicit access to public sources of liquidity and credit guarantees. Shadow banks contributed to the credit boom in the early 2000s and collapsed during the financial crisis of 2007-09. We review the rapidly growing literature on shadow banking and provide a conceptual framework for its regulation. Since the financial crisis, regulatory reform efforts have aimed at strengthening the stability of the shadow banking system. We review the implications of these reform efforts for shadow funding sources including asset-backed commercial paper, triparty repurchase agreements, money market mutual funds, and securitization. Despite significant efforts by lawmakers, regulators, and accountants, we find that progress in achieving a more stable shadow banking system has been uneven.

Key words: shadow banking, financial regulation

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1. INTRODUCTION

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. While shadow banks conduct credit and maturity transformation similar to traditional banks, shadow banks do so without the direct and explicit public sources of liquidity and tail risk insurance via the Federal Reserve's discount window and the Federal Deposit Insurance Corporation (FDIC) insurance. Shadow banks are therefore inherently fragile, not unlike the commercial banking system prior to the creation of the public safety net.

The securitization and funding techniques that underpin shadow banking were widely acclaimed as financial innovations to achieve credit risk transfer and were commonly linked to the stability of the financial system and the real economy. The financial crisis of 2007-09 exposed fundamental flaws in the design of the shadow banking system. Volumes in the short term funding markets via asset-backed commercial paper (ABCP) and repurchase agreements (repos) collapsed during the financial crisis. Credit transformation via new issuance of asset-backed securities (ABS) and collateralized debt obligations (CDOs) evaporated.

The collapse of the shadow banking system exposed the hidden buildup of liquidity and credit tail risks, whose realizations created a systemic crisis. While the underpricing of liquidity and credit tail risks fueled the credit boom, the collapse of shadow banks spread distress across the financial system and, arguably, into the real economy. The conversion of opaque, risky, long-term assets into money-like, short-term liabilities via the shadow banking intermediation chain thus masked the amount of risk taking in the system, and the accumulation of tail risk.

The operations of many shadow banking vehicles and activities are symbiotically intertwined with traditional banking and insurance institutions. Such interlinkages consist in back up lines of credit, implicit guarantees to special purpose vehicles and asset management subsidiaries, the outright ownership of securitized assets on bank balance sheets, and the provision of credit puts by insurance companies. While the growth of the shadow banking system generated apparent economic efficiencies through financial innovations, the crisis demonstrated that shadow banking creates new channels of contagion and systemic risk transmission between traditional banks and the capital markets.

In contrast to the safety of the traditional banking system due to public-sector guarantees, the shadow banking system was presumed to be safe due in part to liquidity and credit puts provided by the private sector. These puts underpinned the perceived risk-free, highly liquid nature of most AAA-rated assets that collateralized shadow banks' liabilities. However, once the private sector's put providers' solvency was questioned, the confidence that underpinned the stability of the shadow banking system vanished. The run on the shadow banking system, which began in the summer of 2007 and peaked following the failure of Lehman in September and October 2008, was stabilized only after the creation of a series of official liquidity facilities and credit guarantees that replaced private sector guarantees entirely. In the interim, large portions of the shadow banking system were eroded.

In this paper, we are focused on identifying the gap between the optimal and actual regulation of the shadow banking sector. To accomplish this, we first outline a framework through which to understand optimal shadow financial intermediation, characterizing the asset risk, liquidity, and leverage choice of shadow intermediaries in the presence of appropriately risk-sensitive funding. We then highlight frictions which drive a wedge between optimal and actual risk choice, resulting in excessive levels of asset risk as well as maturity and risk transformation.

The remainder of the paper is organized as follows. Section 2 provides an overview of the literature on shadow banking. Section 3 gives a definition of shadow banking, and section 4 provides an economic framework. Section 5 provides an overview of the key economic frictions that are underpinning the shadow banking system. Section 6 provides a summary of regulatory reform efforts, followed by assessment of the reforms and a conclusion in sections 7 and 8.

2. LITERATURE

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. Ljungqvist (2002) calibrates a macroeconomy with public guarantees and argues that the risk taking induced by the guarantees can increase equilibrium asset price volatility. 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, and 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. Much of their insights are comprised in maps of the shadow banking system that provide a blueprint of the funding flows. An early version of a shadow banking map was presented by Pozsar (2008). Levitin and Wachter (2011) provide a quantitative assessment of the role of implicit guarantees for the supply of mortgages.

The failure of private sector guarantees to support the shadow banking system stemmed largely from the underestimation of tail risks by credit rating agencies, risk managers, and investors. Rajan (2005) pointed to precisely this phenomenon by asking whether financial innovation had made the world riskier. Gennaioli, Shleifer and Vishny (2010) formalize the idea by presenting a model of shadow banking where investors neglect tail risk. As a result, maturity transformation and leverage are excessive, leading to credit booms and busts.

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. Time 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.

The notion of neglected risks is tightly linked to the procyclicality of the financial system. Adrian and Shin (2010b) point out that financial institutions tend to lever up in times of low contemporaneous volatility. These are times when systemic risk is building up, a phenomenon sometimes referred to as the volatility paradox. Times of low contemporaneous volatility thus correspond to times of expanding balance sheets and tight risk premia, which are also linked to the building up of systemic tail risks. Leverage thus tends to be procyclical, generating a leverage cycle (see Geanakoplos (2010)).

The AAA assets and liabilities that collateralized and funded the shadow banking system were the product of a range of securitization and secured lending techniques. The securitization-based credit intermediation process has the potential to increase the efficiency of credit intermediation. However, securitization-based credit intermediation also creates agency problems which do not exist when these activities are conducted within a bank. Ashcraft and Schuermann (2007) document seven agency problems that arise in the securitization markets. If these agency problems are not adequately mitigated with effective mechanisms, the financial system has weaker defenses against the supply of poorly underwritten loans and aggressively structured securities. Stein (2010) focuses on the role of ABS by describing how ABS package pools of loans (e.g., mortgages, credit-card loans, auto loans), and how investors finance the acquisition of these ABS. Stein also discusses the economic forces that drive securitization: risk-sharing, and regulatory arbitrage.

Acharya, Schnabl, and Suarez (2010) focus on the economics of ABCP conduits. They document that commercial banks set up conduits to securitize assets while insuring the newly securitized assets using credit guarantees structured to reduce bank capital requirements, while providing recourse to bank balance sheets for outside investors. They show that banks with more exposure to conduits had lower stock returns at the start of the financial crisis and that losses from conduits mostly remained with banks rather than outside investors.

Gorton (2009) and Gorton and Metrick (2011a) describe two mechanisms that lead to the collapse of particular sectors in the shadow banking system. Firstly, secured funding markets such as the repo market experienced a run by investors that lead to forced deleveraging. The repo market deleveraging represented an unwinding of mispriced backstops, such as the intraday credit extension in the triparty repo market that will be discussed. Secondly, the ability for investors to shorten structured credit products via synthetic credit derivatives can lead to a sudden incorporation of negative information can that ultimately amplified underlying shocks. The latter mechanism is formalized by Dang, Gorton, and Holmström (2009) where the degree of opaqueness of structured credit products is endogenously determined.

3. DEFINING SHADOW BANKING

In the traditional banking system, intermediation between savers and borrowers occurs in a single entity. 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 banks perform credit intermediation services, but typically without access to public credit and liquidity backstops. Instead, shadow banks rely on privately issued enhancements. Such enhancements are generally provided in the form of liquidity or credit put options. Like traditional banks, shadow banks perform 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. Exhibit 1 lays out the framework by which we analyze official enhancements.

Official enhancements to credit intermediation activities have four levels of "strength" and can be classified as either direct or indirect, and either explicit or implicit.

1. A liability with direct official enhancement must reside on a financial institution's balance sheet, while off-balance sheet liabilities of financial institutions are indirectly enhanced by the public sector.[1] Activities with direct and explicit official enhancement include on-balance sheet funding of depository institutions; insurance policies and annuity contracts; the

[1] The treatment of off balance sheet vehicles by accounting rules and banking regulations has changed recently, a development which we will discuss in detail in later sections.

liabilities of most pension funds; and debt guaranteed through public-sector lending programs.[2]

2. Activities with direct and implicit official enhancement include debt issued or guaranteed by the government sponsored enterprises, which benefit from an implicit credit put to the taxpayer.

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.

4. Finally, activities with indirect and implicit official enhancement include asset management activities such as bank-affiliated hedge funds and money market mutual funds, and securities lending activities of custodian banks. While financial intermediary liabilities with an explicit enhancement benefit from official sector puts, liabilities enhanced with an implicit credit put option might not benefit from such enhancements ex post.

In addition to credit intermediation activities that are enhanced by liquidity and credit puts provided by the public sector, there exist a wide range of credit intermediation activities which take place without official credit enhancements. These credit intermediation activities 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.

[2] Depository institutions, including commercial banks, thrifts, credit unions, federal savings banks and industrial loan companies, benefit from federal deposit insurance and access to official liquidity backstops from the discount window. Insurance companies benefit from guarantees provided by state guaranty associations. Defined benefit private pensions benefit from insurance provided by the Pension Benefit Guaranty Corporation (PBGC), and public pensions benefit from implicit insurance provided by their state, municipal, or federal sponsors. The Small Business Administration, Department of Education, and Federal Housing Administration each operate programs that provide explicit credit enhancement to private lending.

Exhibit 1: The Topology of Pre-Crisis Shadow Banking Activities and Shadow Bank Liabilities

Institution	Direct Public Enhancement		Indirect Public Enhancement		Unenhanced
	Explicit	Implicit	Explicit	Implicit	
Depository Institutions (Commercial Banks, Clearing Banks, ILCs)	Insured deposits[1] Non-deposit liabilities[2]		Credit lines to shadow banks[9]	Trust activities Tri-party clearing[10] Asset management Affiliate borrowing	
Federal Loan Programs (DoE, SBA and FHA credit puts)	Loan guarantees[3]				
Government Sponsored Enterprises (Fannie Mae, Freddie Mac, FHLBs)		Agency debt	Agency MBS		
Insurance Companies	Annuity liabilities[4] Insurance policies[5]				Securities lending CDS protection sold
Pension Funds	Unfunded liabilities[6]				Securities lending
Diversified Broker-Dealers (Investment Bank Holding Companies)	Brokered deposits (ILCs)[7]		CP[11]	Tri-party repo[12]	MTNs Prime brokerage customer balances Liquidity puts (ABS, TOB, VRDO, ARS)
Mortgage Insurers					Financial guarantees
Monoline Insurers					Financial guarantees CDS protection sold on CDOs Asset management (GICs, SIVs, conduits)
Shadow Banks					
Finance Companies (Standalones, Captives)	Brokered deposits (ILCs)[7]		CP[11]		Term ABS, MTNs
Single-Seller Conduits			ABCP[13]	Extendible ABCP[17]	Extendible ABCP[18]
Multi-Seller Conduits			ABCP[13]		
Hybrid Conduits			ABCP[13]	Extendible ABCP[17]	Extendible ABCP[18]
TRS/ Repo Conduits			ABCP[13]		
Securities Arbitrage Conduits			ABCP[13]	Extendible ABCP[17]	Extendible ABCP[18]
Structured Investment Vehicles (SIVs)			ABCP[13]	MTNs, capital notes	Extendible ABCP[18] MTNs, capital notes
Limited Purpose Finance Companies			ABCP[13]		
Credit Hedge Funds (Standalones)			Bi-lateral repo[14]		Bi-lateral repo[15]
			Bi-lateral repo[14]		Bi-lateral repo[15]
Money Market Intermediaries (Shadow Bank "Depositors")					
Money Market Mutual Funds					$1 NAV
Overnight Sweep Agreements					$1 NAV
Cash "Plus" Funds					$1 NAV
Enhanced Cash Funds					$1 NAV
Ultra-Short Bond Funds					$1 NAV
Local Government Investment Pools (LGIPs)					$1 NAV
Securities Lenders					$1 NAV
European Banks (Landesbanks, etc)	State guarantees[8]	ABCP[16]	Credit lines to shadow banks[17]		

Source: Shadow Banking (Pozsar, Adrian, Ashcraft, Boesky (2010))

Investors in the shadow banking system---such as owners of money market shares, asset backed commercial paper, or repo---shared a lack of understanding about the creditworthiness of underlying collateral. The search for yield by investors without proper regard or pricing for the risk inherent in the underlying collateral is a common theme in shadow banking. The long intermediation chains inherent in shadow banking lend themselves to this—they obscure information to investors about the underlying creditworthiness of collateral. Like a game of telephone where information is destroyed in every step, the transformation of loans into securities, securities into repo contracts, and repo contracts into private money makes it quite

difficult for investors to understand the ultimate risk of their exposure. As a clear example, the operating cash for a Florida local government investment pool was invested in commercial paper that was sold by structured investment vehicles, which in turn held securities backed by subprime mortgages, such as collateralized debt obligations (CDOs). When the commercial paper defaulted and the operating cash of local governments was frozen following a run by investors in November 2007. Moreover, it is important to understand that access to official liquidity (without compensating controls) would only worsen this problem by making investors even less risk-sensitive, in the same way that deposit insurance without capital regulation creates well-known incentives for excessive risk-taking and leverage in banking. The challenge for regulators is to create rules that require that the provision of liquidity to shadow markets is adequately risk-sensitive.

4. CONCEPTUAL FRAMEWORK

In order to understand the need for regulation, it is first necessary to outline why the market is unable to achieve efficient outcomes on its own. Below, we sketch a simple framework to capture the impact of risk-insensitive funding on the efficiency of credit intermediation. The framework will then be applied generally to assess the need for regulation as well as the efficacy of recent regulatory reforms.

In the context of credit intermediation inside the safety net, the provision of explicit but underpriced credit and liquidity put options through deposit insurance and discount window access, respectively, create incentives for excessive asset risk, leverage, and maturity transformation. While the connection between mispriced credit put options and these incentives for excessive asset risk and leverage is well-known in the banking literature (see Merton (1977) and Merton and Bodie (1993)), the contribution here is to document the impact of simultaneously mispriced credit and liquidity put options, as well as highlight that implicit put options as well as market-based financial frictions result in similar outcomes.

Risk insensitive funding can result from different sources. The presence of implicit credit and liquidity support can result in the provision of risk-insensitive funding by investors. The presence of asymmetric information between a financial firm and investors can also result in risk-insensitive funding. Moreover, informational frictions between the beneficiaries of

investable funds and their fiduciaries can lead to an excessive reliance on credit ratings, with a similar result.

In order to fix ideas, assume a financial entity has debt in an amount of D, and equity in an amount 1, so that D is both the amount of debt and leverage of the entity. The asset risk of the entity is summarized by X, which is increasing in risk. We use L as a summary measure of firm liquidity, which could capture either the maturity of the firm's debt or the amount of its liquid assets, and a higher level of L corresponds to more liquidity.

The owner's of the entity have limited liability. The probability of default on the entity's debt is denoted P(D,X,L), which is a function that increases with leverage D or asset risk X, but decreases with liquidity L. The gross return on assets is equal to U(X,L), which increases in the amount of asset risk X but decreases in the amount of liquidity L. The interest rate on debt in efficient markets is R(D,X,L), which is increasing in firm leverage D, asset risk X, and decreasing in firm liquidity L.[3]

Given this notation, the value of firm equity can be written:

(1) $V^{*}(D,X,L) = [1-P(D,X,L)]*[U(X,L)*(1+D) - R(D,X,L)*D]$

Here the value of equity is equal to the net return in state of nature where the firm does not default, multiplied by the probability that the firm does not default. In the event that the firm defaults on its debt, the value of equity is equal to zero.

In order to illustrate the impact of frictions, we also consider the value of equity when funding is provided in a risk-insensitive fashion, so that the cost of debt is simply R. Under this condition, the value of firm equity can be written:

(2) $V^{0}(D,X,L) = [1-P(D,X,L)]*[U(X,L) *(1+D) - D*R]$

Taking derivatives of the equity value with respect to the choice variables gives a set of first order conditions for the two cases. We write the first order conditions by equating the marginal impact on net interest margin to the marginal impact of default.

(3A) $V^{*}_{X} = 0 \Rightarrow (1 - P) * (U_X * (1 + D) - D*R_X) = P_X * (U * (1 + D) - D*R)$

(3B) $V^{0}_{X} = 0 \Rightarrow (1 - P) * U_X * (1 + D) = P_X * (U * (1 + D) - D*R)$

[3] We assume the functions P(), U(), and R() also have monotone second derivatives so that optimal choice of risk, leverage, and liquidity is defined by the first-order conditions.

(4A) $V^{*}_{D} = 0 \Rightarrow (1 - P) * (U - D*R_{D} - R) = P_{D} * (U * (1 + D) - D*R)$

(4B) $V^{0}_{D} = 0 \Rightarrow (1 - P) * (U - R) = P_{D} * (U * (1 + D) - D*R)$

(5A) $V^{*}_{L} = 0 \Rightarrow (1 - P) * (U_{L} * (1 + D) - D*R_{L}) = P_{L} * (U * (1 + D) - D * R)$

(5B) $V^{0}_{L} = 0 \Rightarrow (1 - P) * U_{L} * (1 + D) = P_{L} * (U * (1 + D) - D * R)$

Comparison of equations (3A) and (3B) shows that the marginal benefit of risk taking is lower in the case of risk sensitive debt (as $R_X>0$), leading to a lower choice of risk when debt is risk sensitive. Equations (4A&B) show that the marginal benefit of leverage is lower when the cost of debt is sensitive to the degree of leverage. As a result, the leverage choice is going to be lower when the pricing of debt depends on it positively ($R_D>0$). These first two results, together, are well-known in the academic banking literature, having first been pointed out by Merton (1977) in the context of fixed-price deposit insurance.

Finally, comparison of equations (5A) with (5B) shows that the marginal benefit of liquidity is higher when the banks' debt is sensitive to the level of liquidity ($R_L<0$), leading to a more liquid balance sheet when the pricing of debt is liquidity sensitive. Risk insensitive funding thus leads to an inefficiently low level of liquidity.

5. UNDERSTANDING FRICTIONS IN THE SHADOW BANKING SYSTEM

a. Asset Backed Commercial Paper Conduits

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' 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. One particular example of a shadow banking institution that performed substantial amounts of maturity transformation are securities arbitrage vehicles which used ABCP to fund various types of securities including collateralized debt obligations (CDOs), asset-backed securities (ABS) and corporate debt.

ABCP is traditionally enhanced with an "explicit liquidity put to a commercial bank," where the amounts of the liquidity proceeds are sufficient to pay off maturing ABCP. Exceptions in the past were structured investment vehicles (SIVs) and "SIV lites" that had limited or no liquidity commitments from a commercial bank and instead relied on a sale of the securitized assets to pay off maturing commercial paper. An additional exception was extendible ABCP, where investors bore the risk that the paper would not roll, requiring a higher rate of return if extended.

The run on ABCP 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 Depository Trust Clearing Corporation (DTCC) data to document that there was 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 runs by investors that were unrelated to specific program characteristics.

The Federal Reserve responded to resulting pressures in short-term funding markets by expanding the scale of its traditional repo operations, which involved lending to Primary Dealers against US Treasury and Agency securities. Soon after, the Federal Reserve also clarified that bank borrowing from the discount window would be viewed as acceptable, reducing the spread of the discount rate over the target federal funds rate, and announcing the availability of term credit. Throughout the fall of 2007, the Federal Reserve reduced the target federal funds rate. Despite these aggressive policy actions, US depository institutions chose the least-cost option of borrowing from the Federal Home Loan Bank System. In contrast, foreign depository institutions without access to market-priced term dollar funding chose to borrow term unsecured

funds in inter-bank markets, putting upward pressure on the spread of term dollar LIBOR over the expected future federal funds rate. The significant amount of ABCP sponsorship by European banks implied that the run on these programs resulted in significant need for term dollar funding by foreign depository institutions. In fact, Covitz, Liang, and Suarez (2012) document that 30 percent of programs were sponsored by foreign banks.

In November 2007, Florida's Local Government Investment Pool experienced a run as it was heavily invested in SIVs that were invested in ABCP, which was issued by a CDO that was invested in ABS collateralized by prime and Alt-A mortgages.[4] Florida's Local Government Investment Pool had invested $900 million of its $27 billion in assets under management in ABCP and SIVs. The rapidly deteriorating collateral quality of the ABCP generated a run on the investment pool by local government entities that was halted only once the government suspended redemptions. The run resulted in a loss of 12 Billion of its total of 27 Billion under management. A fairly small credit exposure to subprime mortgages thus generated a massive reallocation of investors' funding.

In order to reduce term dollar LIBOR funding costs, it was necessary to reduce the reliance of banks on term LIBOR funding. In the fourth quarter of 2007, the Federal Reserve introduced the Term Auction Facility (TAF), which provided term dollar funding on market terms to depository institutions with collateral pledged at the Discount Window. Also in December 2007, the Federal Open Market Committee (FOMC) authorized swap lines with other central banks, facilitating the provision of short-term U.S. dollar funding to foreign banking organizations. The combination of the TAF and swap lines extended access to term market-priced dollar funding to all foreign depository institutions, providing $1.2 trillion of credit at the peak in the fall of 2008.

As documented by Kacperczyk and Schnabl (2010), the Fed introduced an explicit backstop to money market mutual funds in the fall of 2008 through the Asset Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF). This permitted bank holding companies to purchase ABCP from money market mutual funds on non-recourse basis, and peaked at just over $150 billion.

[4] http://www.bloomberg.com/apps/news?pid=20601170&refer=home&sid=aYE0AghQ5IUA and http://www.bloomberg.com/apps/news?pid=newsarchive&refer=special_report&sid=aDdJ4GDZ6eao

The Federal Reserve also introduced the Commercial Paper Funding Facility (CPFF), which was a backstop for commercial paper issuers. The CPFF purchased unsecured and asset backed commercial paper directly from eligible highly-rated issuers, and peaked at $225 billion (see Adrian, Kimbrough, Marchioni 2010). Together, these programs provided greater assurance to both issuers and investors that firms would be able to meet redemptions—in this case, to roll over their maturing commercial paper.

In the discussion below, we highlight evidence from the academic literature that one of the drivers of excesses in the ABCP market were due to capital arbitrage, in which liquidity put options given to banks by the public sector are maximized by passing on these guarantees to off balance sheet vehicles. Reforms of bank capital and liquidity rules are likely to be effective in eliminating this arbitrage, but we highlight preliminary efforts by the industry to evade these reforms, and highlight actions by the banking industry to further exploit these mispriced options by expanding secured maturity transformation through covered bond legislation.

The key frictions in the ABCP market include:

- Mispricing of credit and liquidity put options provided by banks to sponsors through risk insensitive capital regulation of backup lines of credit.
- Mispricing of credit and liquidity risk by investors created in part by information asymmetries between investors and asset managers that result in overreliance on credit ratings.

As documented by Acharya, Schnabl, and Suarez (2011), the rapid expansion of the ABCP market in 2004 appears to be driven by 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, US 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. In Europe, adoption of International Financial Reporting Standards in the early 2000s was associated with consolidation of conduits onto bank balance sheets. However, most European bank regulators, other than Spain and Portugal, did not require banks to hold capital

against liquidity guarantees.[5] As far as empirical evidence, Acharya, Schnabl, and Suarez (2011) 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 measured by the ratio of the book value of equity to assets. Finally, the authors document 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," permitting banks to engage in excessive leverage maturity transformation. As described in the model above, 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.

It is worth noting that this view is not universal, as a recent paper by Arteta, Carey, Correa, and Kotter (2010) argue that more important drivers of the market were frictions associated with inadequate compensation arrangements in the presence of owner-manager agency problems. In particular, low skill bank managers can take excessive risk to boost earnings and delay termination, or mispricing of certain types of risk in the equity market can induce a manager to improve perceived performance by taking these risks. Consistent with the paper above, the authors document an economically significant connection between sponsorship and leverage. Interestingly, the authors document that institutions with better compensation practices or a large shareholder were less likely to sponsor ABCP vehicles.

In addition to the frictions associated with banks providing contractual liquidity backstops to ABCP vehicles, it is worth noting that a number of institutions provided support to sponsored vehicles even without a contractual right to do so, wanting to protect investors from losses for reputational reasons. The provision of recourse to asset management businesses is a form of

[5] Under Basel II, which had been adopted by several European countries by 2007 but not in the US, the risk weight for liquidity guarantees increased from 0 percent to 20 percent of the risk weight for on balance sheet assets. However, note that the risk weights on highly rated securitization assets also declined significantly.

implicit credit or liquidity put, and the mispricing of these puts is an important friction. If investors believe the sponsor will provide recourse, funding will be provided in a less risk-sensitive fashion in normal times, creating the incentives for excessive risk-taking described above. Without a contractual obligation to provide support, these assets are not considered in current capital or liquidity rules. Consequently, this behavior creates a form of capital arbitrage.

Finally, an important friction in the background is an overreliance on credit ratings by investors. Money market investors generally have a very limited capacity to conduct fundamental credit analysis. This problem is amplified by minimal amount of disclosure into the credit quality of receivables to investors, and rating agency reports often note that the rating on the ABCP is driven not by the quality of receivables but by the strength of the liquidity provider. As these sponsors are themselves complex and opaque, it is very difficult for investors to perform fundamental credit analysis, meaning that they are forced to excessively rely on credit rating agencies, given their greater access to private information about the composition of conduits and sponsor balance sheets. The result is risk-insensitive funding provided by investors, giving a sponsoring institution the incentive to engage in excessive leverage and maturity transformation.

b. Tri-Party Repo

The U.S. tri-party repo market is a wholesale funding market that peaked slightly above $2.8 trillion in 2008 and is currently slightly below $1.7 trillion. The tri-party repo market brings together short-term cash-rich investors, like money market mutual funds, and 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 dealers against these securities for several hours between that afternoon unwind and the settlement of new repos in the early evening, so that dealers can repay their investors and avoid defaulting on the obligations.

Contracting conventions changed significantly in the repo market during the 1980s, in response the growth of fixed income trading and the emergence of new and previously unappreciated risks. Garbade (2006) describes three key developments: 1) the recognition of accrued interest on repo securities, 2) a change in the application of federal bankruptcy law to repos, and 3) the

acceleration of tri-party repo among other repo contracts. Garbade (2006) argues that the tri-party repo market emerged due to efforts of individual market participants who acted in their own economic self-interest. By comparison, recognition of accrued interest and the change in bankruptcy law were affected, respectively, by participants taking collective action and seeking legislative relief because uncoordinated, individual solutions would have been more costly.

In retrospect, the change in application of bankruptcy law to the treatment of repos was perhaps the most important change. 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 repos 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.[6] 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.

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 via 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 via deleveraging, financial market liquidity tends to dry up.

During the 1980s and early 1990s, the tri-party repo market was limited to highly liquid collateral such as U.S. Treasury and agency securities. The type of collateral that was financed in

[6] The expansion covered mortgage related securities (as defined in section 3 of the Securities Exchange Act of 1934), mortgage loans, and interests in mortgage related securities or mortgage loans. It did not cover ABS (generally) or corporate bonds.

tri-party changed significantly during the housing market bubble in the early 2000s. Tri-party repos proved so popular with cash investors that they demanded more tri-party repo investment opportunities and became willing to accept even illiquid collateral like whole loans and non-investment grade securities—because receiving their cash back each morning provided them with the perception of liquidity. Ultimately, the tri-party repo market peaked in March 2008 at $2.5 trillion. The largest individual borrowers routinely financed more than $100 billion in securities through these transactions. At the peak of market activity, the largest dealer positions exceeded $400 billion. Securities dealers became dependent on this form of funding to fund their securities positions. 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 to public sources of liquidity or credit backstops. Krishnamurthy, Nagel, and Orlov (2011) complement this finding by looking directly at the collateral of money market mutual funds (MMMFs). While they find that the majority of the $3.5 trillion MMMFs' collateral consists of high quality collateral, 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% of total outstanding.

In March 2008, when Bear Stearns Co. had funding difficulties, its tri-party repo clearing bank became reluctant to continue to provide it with intraday credit, which it needed to prevent a default on its repos. At this point it became clear that neither clearing banks, nor overnight cash investors, were well prepared to manage a dealer default. Each found it in their best interest to pull away from the troubled borrower before the other to avoid destabilization of their own firms. Furthermore, the liquidation of such large amounts of collateral under the extreme market pressures would have created fire sale conditions, large liquidity dislocations and undermined confidence in the whole market. Indeed, Copeland, Martin, and Walker (2011) argue that funding in the tri-party repo market has characteristics similar to a run on deposits. In contrast,

Gorton and Metrick (2009) document a "run on repo" in other segments of the repo market that is manifested through increases in haircuts.[7]

To avoid these adverse systemic consequences, the Federal Reserve created the Primary Dealer Credit Facility (PDCF) that lends to dealers against their tri-party repo collateral (see Adrian, Burke, McAndrews 2011). The facility effectively backstopped the market in the immediate aftermath of Bear Stearns's failure. When financial conditions worsened considerably in September 2008, the facility was needed to forestall multiple failures and associated systemic consequences. Arguably, the fire sale of the underlying collateral of the triparty repo market was prevented by the existence of the PDCF. Such a fire sale could have had a broad, adverse impact on real economic activity. The Fed expanded the terms of the program so it could backstop virtually any type of tri-party repo collateral. Daily use of PDCF peaked at roughly $150 billion.

The Fed also helped to reduce disruptions in funding markets with a term securities lending (TSLF) program, also introduced in March 2008. This facility provided a backstop for asset types that were experiencing illiquidity (agencies, agency MBS, and AAA-rated ABS initially) by permitting dealers to swap those less liquid asset types for Treasuries, which they could use to obtain secured funding. The amount outstanding in this program at its peak was about $200 billion.

An additional market failure in the repo market that has come into focus during the crisis is the role of re-hypothecation of collateral by dealers. Singh and Aitken (2009) investigate the role of re-hypothecation in the shadow banking system. Re-hypothecation is the practice that allows collateral posted by, say, a hedge fund to its prime broker to be used again as collateral by that prime broker for its own funding. In the United Kingdom, such use of a customers' assets by a prime broker can be for an unlimited amount of the customers' assets while in the United States rehypothecation is subject to a 140% cap. The re-hypothecation in the U.K. subsidiary of repo collateral arguably greatly exacerbated the impact of the collapse of Lehman Brothers to the broader financial system, as Lehman's U.K. clients were often left without collateral.

[7] Martin, Skeie, von Thadden (2011) argue that increase in haircuts are potentially stabilizing mechanism repo funding markets, making crisis less likely.

Frictions in tri-party repo

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 New York Fed was created with the aim of reducing the dependence of the market participants on the amount of intraday credit.[8] The task force has shortened the window of the daily unwind, with the unwind moving 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 triparty repo market is the vulnerability relative to the default of a major dealer. Such an event exposes that clearing bank to counterparty credit risk; leads to a potentially destabilizing transfer of among market participants, and furthermore 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 triparty 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 was insolvent. In our view, 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 triparty market will remain prone to runs and constitute a source of systemic risk. The key frictions that prevent the market from achieving a socially efficient outcome include:

- Implicit intraday support of term transactions by clearing banks through the daily unwinding of transactions, resulting in risk-insensitive funding by repo investors;
- Over-reliance by repo investors on credit ratings on the securities collateral and counterparty;[9]
- Inability of money market mutual funds to hold securities collateral that secure repos outright over a long enough horizon to facilitate orderly liquidation, combined with the inability of

[8] See http://www.newyorkfed.org/tripartyrepo/

[9] It should be noted here that SEC rules permit prime MMMFs to look through to the counterparty credit risk only when repos are collateralized by cash, Treasuries, or agencies (see http://www.sec.gov/rules/final/2010/ic-29132.pdf), resulting in the importance of the credit ratings for other collateral classes.

markets to absorb the sudden unwind of a large position without having a significant impact on prices that affects all holders of the asset type (even beyond triparty repo) and erodes their capital;

- Vulnerability of the tri-party repo market to self-fulfilling runs, in contrast to the bilateral repo market or the European market.

On a more positive note, we do highlight greater regulation of broker-dealers. 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 (Lehman---the fifth bank---went bankrupt and the 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 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 non-banks financial institutions (including bank holding companies) for which a systemic risk determination has been made. A question that is currently open concerns the regulation of the major US broker-dealers owned by foreign banking organizations.

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 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.. In DVP repo, only the lender is protected against the borrower's default, while both the borrower and the lender are protected against default in the triparty repo contract due to the intermediation role of the custodian bank. DVP repos are commonly term repos, while tri-party repos typically unwind daily. Adrian, Begalle, Copeland and Martin (2011) discuss various forms of repo and securities lending, and Fleming and Garbade (2003) describe GCF repo, which is conducted among dealers.

c. Money Market Mutual Funds

Money market mutual funds (MMMFs) have undergone some reform since the financial crisis of 2007-09. In particular, the SEC has moved forward with new restrictions on 2a-7 funds to limit risk and maturity transformation and reliance on ratings, but in our view, 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 MMFs to act as unsecured rather than secured investors---which is a problem from a financial stability point of view.

MMMFs exist in the parallel banking system and the value proposition for investors derives from the elements that we have been discussing: investors earn returns that benefit from a maturity mismatch between the investor funding—investors can withdraw on demand and with almost immediate execution—and the investments from which the return is generated, typically a portfolio of securities with a weighted average maturity of approximately only a few days. . Money funds have very limited ability to absorb losses and, as with other parallel banking activities, have no official liquidity or credit support, although the Federal Reserve and Treasury stepped in during the financial crisis, using emergency powers. One of the major changes of the Dodd Frank act is to limit the ability of Treasury and the Fed to create such facilities in the future on order to reduce the potential for moral hazard. While this change will obviously reduce incentives for excessive risk taking, it also limits the ability of policymakers to contain crises once they have started.

While prime MMMFs offer immediate redemptions of shares at a rounded price, which in practice essentially never deviates from one dollar, their assets are longer term and may be costly to liquidate. In times of extreme stress in the financial sector, the risk profiles of prime money fund assets can deteriorate, and the funds may not be able to meet investors' liquidity and safety requirements—full daily liquidity and a stable net asset value (NAV). As a result, the prime fund industry is vulnerable to a confidence shock that could prompt massive and rapid redemptions by shareholders. In turn, that could have broader systemic consequences by creating the impetus for large-scale asset sales to generate the liquidity needed to meet large volumes of redemptions.

Disruptions in MMMFs can quickly spread to other financial firms and the broader economy given the size of the money fund industry and its prominence in short-term financing markets. MMMFs are major investors in liabilities of financial firms, both domestic and foreign.

The fragility of money funds, and potential broader consequences were front and center in September 2008 when Lehman failed: the confidence shock and then rapid changes in money fund risk profiles and investor risk appetite moving in opposite directions. In this environment, the Prime Reserve Fund, a well-established money market fund that had exposure to Lehman commercial paper, "broke the buck." Money market fund investors at other funds voted with their feet regarding their discomfort with the lack of guaranteed credit and liquidity support for these activities, withdrawing large amounts from funds that invested in instruments that did not have full and direct government support or clearly sufficient parent support.[10] Fund managers reacted by selling assets and investing at only the shortest of maturities, thereby exacerbating the funding difficulties for other instruments such as commercial paper. The Federal Reserve and the U.S. Treasury stepped in, creating a number of emergency programs to backstop money funds. The Fed's programs that supported money funds was the AMLF.[11]

While the Federal Reserve created the liquidity puts, the U.S. Treasury provided the credit puts for money funds. It created the Money Market Fund Guarantee-Temporary Guarantee Program, which insured shareholder assets in participating money market funds.

The key frictions limiting efficiency of the sector include

- Mispricing of the implicit support by plan sponsors and official sector;
- Over-reliance on ratings by investors / incentives of financial sector to convert long-term opaque risky assets into money market eligible instruments;
- A lack of capacity for loss absorption in the event of a borrower's failure;
- The susceptibility of MMFs to runs by their own investors, which create run risk.

[10] The SEC has posted a list of MMMFs that obtained outsides liquidity nor funding support.
[11] There was also a special Money Market Investor Funding Facility (MMIFF), to provide liquidity to U.S. money market mutual funds and certain other money market investors although this backstop funding source was never used.

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 standalone funds, and funds that are owned by larger holding companies, such a bank holding companies. Kacperczyk and Schnabl find significant differences in the risk taking of standalone 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, standalone 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.

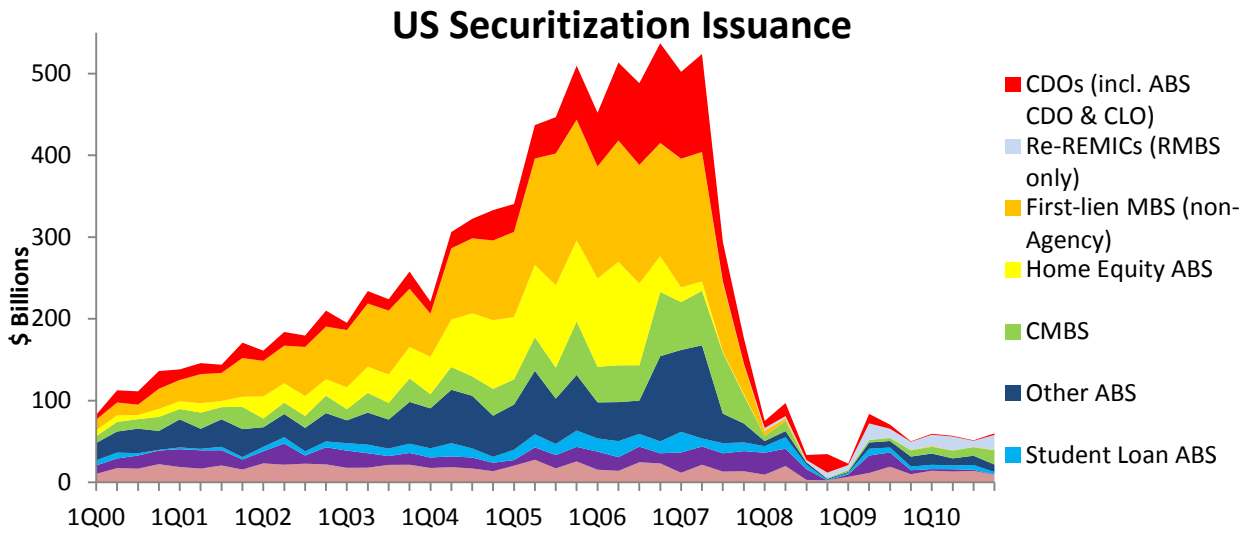
Wermers (2011) investigates the role of investment flows into and out of money market mutual funds in more details, focusing as well at the period of the financial crisis. Wermers shows that institutional investors were more likely to run than retail investors during the crisis, and institutional investors tend to spread such run behavior across various MMMF families. Institutional MMMF investors can thus be viewed as a transmission channel for contagious runs.

d. Securitization

While securitization generally involves term funding and does not involve maturity transformation, structured securities are a key component of the shadow banking system, and were at the core of the recent financial bubble and collapse.The figure below illustrates rapid acceleration of new issue in 2004, dominated by first lien and home equity mortgage-backed securities, as well as by re-securitizations like CDOs. The new issue market increased from $100 billion per quarter in 2000 to a peak of just over $500 billion per quarter. The MBS market closed following the collapse of the ABCP market in August 2007, and the rest of the new issue market collapsed following the disintermediation of prime money market mutual funds after the failure of Lehman in September 2008.

While securitization has a relatively short history, it also has a troubled history. The first known securitization transactions in the US occurred in the 1920s when commercial real estate bond houses sold loans to finance commercial real estate to retail investors through a vehicle known as commercial real estate bonds. Ashcraft and Wiggers (2012) document the performance of these bonds, which defaulted in large numbers following the onset of the Great Depression. While the

sharp deterioration in economic conditions played an important part of explaining their poor performance, so did aggressive underwriting, and sales of the bonds in small denominations to unsophisticated retail investors. During the 1990s no less 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 multi-sector CDOs in 2002 as well as RMBS and CMBS in 2005-2007. These credit cycles were more likely to involve firms using securitization for arbitrage, using securitization as a source of fee income with minimal intended risk retention, although many of them were left holding warehouses of loans when the music stopped.



Ashcraft and Schuerman (2008) describe seven important informational frictions that existed in the securitization of subprime mortgage credit, but 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 manager, and between the beneficiary of invested funds and credit rating agencies.

While each of these frictions has played their own role in the credit bubble and subsequent crisis, in our view the most important frictions include:

- Asymmetric information between investors and issuers, resulting in risk-insensitive cost of funding. For example, Keys, Mukherjee, Seru, and Vig (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
- Over-reliance on credit ratings by investors / incentives of issuers to structure long-term opaque risky receivables into AAA liabilities. For example, Ashcraft, Vickery, Goldsmith-Pinkham, and Hull (2011) document that subprime MBS prices are more sensitive to ratings than ex post performance, suggesting funding is excessively sensitive to credit ratings relative to informational content.

In order to better understand how these frictions generate incentives for excessive risk-taking and how effective regulation could be in offsetting these incentives, we return to the conceptual framework outlined in Section 4.

We start with an environment where some aspects of underwriting standards are not observable to investors, and consequently are not contractible. The presence of private non-contractible information creates the scope for an issuer to securitize loans using underwriting standards which are more aggressive than expected by the market. In this environment, the number of loans originated can be increased by lowering underwriting standards, which increases the premium value of the loan above par, and implies that the lender's marginal revenue curve is decreasing in lower underwriting standards. First we focus on the risk choice of an originate-to-fund lender, which uses securitization as one of many sources of funding for an on-going business. Here, the balance-sheet lender bears the full cost of lower underwriting standards in the form of higher losses, which implies the marginal cost is increasing in lower underwriting standards. Figure X1 illustrates the choice of risk by the balance-sheet lender which maximizes its profits. It is worth

noting that this level of risk is not necessarily the socially optimal level. Instead, the risk choice of a balance sheet lender is an important benchmark against which the choice of an originate-to-distribute lender can be evaluated, as it is the best outcome that risk retention could possibly achieve.[12] In contrast to the originate-to-fund lender, consider the risk choice of an originate-to-distribute lender. Here, the lender is compensated up front with a premium price for loan pool at issue, and consequently does not bear the cost of lower underwriting standards in the form of higher pool losses. As investors are unable to contract on these underwriting standards, the marginal cost curve is flat. As illustrated by Figure X2, the lower marginal cost with the same marginal revenue curve implies that an issuer with access to risk-insensitive securitization markets will reduce underwriting standards and produce a more aggressively underwritten quality loan pool.

6. REGULATORY REFORM OF THE SHADOW BANKING SYSTEM

The shadow banking system largely emerged in response to changes in regulations and laws that guide the financial industry. Since the financial crisis of 2007-09, a host of regulatory reform efforts have been undertaken. We expect shadow banking to adapt to these new regulations, and expect new forms of regulatory arbitrage and shadow banking to emerge. In this section, we review the impact of important reform efforts on the shadow banking system as it existed towards the end of the financial crisis. We review proposed legislation, industry efforts, and future regulatory reforms.

The most comprehensive reforms of the financial system have been initiated by the Basel Commission for Bank Supervision via its Basel III accord (Basel III), and the Dodd-Frank Wall Street Reform and Consumer Protection Act (DFA). The liquidity framework of Basel III, in conjunction with recent changes in the accounting of off-balance-sheet vehicles (FAS 166/167) profoundly changes the economics of ABCP conduits, and securitization more generally. The changes in the rules have made arbitrage ABCP conduits in their existing form largely uneconomical. The SEC's regulation AB has imposed new disclosure requirements on ABS.It also introduces a consistent servicing standard that is used to measure performance of each party

[12] While not modeled here, balance sheet lenders might have incentives for excessive risk-taking created through (a) risk-insensitive pricing of liabilities which affects shareholders' incentives or (b) flawed compensation contracts which affect managers' incentives.

participating in servicing agreements. Regulation AB significantly increases the reporting cost related to ABS issuance, but potentially increases the transparency of newly issued ABS for investors. The DFA proposes important changes to the risk retention of securitization, including ABS and ABCP. DFA aims to align the incentives of underwriters of securitizations and ultimate investors in securitized products better by requiring issuers to retain ownership of some part of the securitized product. The SEC introduced limits on the amount of maturity and liquidity transformation that 2a-7 money market mutual funds can perform. Further regulatory reform initiatives that impact the economics of shadow banking activities include the Volcker rule and proposed changes to the oversight of credit rating agencies.

Banking Regulation

Interaction between Regulatory Capital and FAS 166/167

In June 2009, the Financial Accounting Standards Board (FASB) announced the Statement of Financial Accounting Standards (FAS) 166 and 167, amending existing accounting rules for consolidation of securitization transactions.[13] In particular, the new rules require a sponsor of a variable interest entity (VIE) to consolidate that transaction into its balance sheet in the event it retains power to direct activities that most significantly affect performance as well as maintains either the obligation to absorb significant losses or right to receive significant benefits from the entity. Sponsors of securitization transactions have generally interpreted this new guidance as requiring accounting consolidation in the event that a first loss position as well as loan servicing is retained by the sponsor for securitization transactions. The assets and liabilities of ABCP conduits had been consolidated onto balance sheet since a ruling by FASB following the failure of Enron in 2004. Following revisions to the accounting rules, the US banking agencies clarified in September 2009 that depository institutions would have to hold regulatory capital against consolidated securitization transactions and ABCP conduits.[14]

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,

[13] For discussion of the new standards, please refer to http://www.fasb.org/cs/ContentServer?c=FASBContent_C&pagename=FASB%2FFASBContent_C%2FNewsPage&cid=1176155633483.

[14] For discussion, see http://edocket.access.gpo.gov/2009/pdf/E9-21497.pdf.

and will require banks to 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. While the conservative treatment prevents capital arbitrage in circumstances where there was limited risk transfer to investors, it also does not give banks any regulatory capital relief for genuine risk transfer to third parties.

Note that proposed revisions to the Securitization Framework of the Basel Accord permit a bank providing backup liquidity to a conduit sponsored by third-party to use an internal model based approach (IAA) to regulatory capital requirements.

Section 331 of the DFA 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.

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 the ability of banks to hold less capital against these exposures.[15]

One complication with implementing Basel II in the US is that Section 939A of the DFA requires that references to ratings be removed from federal regulations and that alternative measures of credit risk must be devised by regulators and be used in their place. Under the Securitization framework for Basel II, which affects the aforementioned Market Risk Amendment, capital requirements for securitization exposures are assigned based on credit

[15] See http://www.bis.org/publ/bcbs193.pdf.

ratings when they are available using a Supervisory Formula Approach (SFA). The recent notice of proposed rule-making by US regulators permits banks to use a Simplified Supervisory Formula Approach (SSFA) to computing regulatory capital, or deduct the exposure from capital.[16]

In the Securitization framework for revision to Basel II, a sponsor is permitted to use an Internal Assessment Approach for non-consolidated ABCP conduits, or is forced to use the Supervisory Formula Approach. In the case of either securitization exposures or ABCP conduits, capital requirements are clearly increasing for exposures in either the banking or trading book. Moreover, these requirements are increasing more for US banks than for foreign banks given the inability of the US rules to refer to credit ratings.

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: Liquidity Coverage Ratio (LCR) and a Net Stable Funding Ratio (NSFR).[17] 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 30 days in a stress scenario.[18] 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 of funding 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

[16] In order to use the SSFA, a bank must be able to calculate: (1) the dollar-weighted average risk weight assigned to the underlying exposures as if those exposures were held directly by the bank under the general risk-based capital rules; (2) the position of the tranche in the deal structure; and (3) the cumulative amount of losses experienced in the underlying exposures. See http://www.fdic.gov/news/news/financial/2011/fil11075.pdf.

[17] Reference for Basel Liquidity Framework. http://www.bis.org/publ/bcbs188.htm

[18] The scenario for this standard includes: (a) the run-off of a proportion of retail deposits; (b) a partial loss of unsecured wholesale funding capacity; (c) a partial loss of secured, short-term financing with certain collateral and counterparties; (d) additional contractual outflows that would arise from a downgrade in the bank's public credit rating by up to and including three notches, including collateral posting requirements; (e) increases in market volatilities that impact the quality of collateral or potential future exposure of derivative positions and thus require larger collateral haircuts or additional collateral, or lead to other liquidity needs; (f) unscheduled draws on committed but unused credit and liquidity facilities that the bank has provided to its clients; and (g) the potential need for the bank to buy back debt or honor non-contractual obligations in the interest of mitigating reputational risk.

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 it will require banks 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 30 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 its stress liquidity needs for a 30-day time horizon.

FDIC Safe Harbor

In September 2010, the FDIC approved revisions to its safe harbor from repudiation powers in receivership.[19] 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 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, documentation, compensation, and risk retention to be aligned with the inter-agency implementation of DFA 941. The rule has more stringent requirements for bank-sponsored RMBS transactions, including the need for a 5 percent cash reserve for 12 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 this will shift securitization activity to the non-bank sector.

<u>Regulation AB</u>

[19] See http://www.fdic.gov/news/board/10Sept27no4.pdf.

In April 2010 the SEC proposed revisions to Regulation AB which provides guidance on required disclosure by sponsors of securitization transactions. The proposal by the SEC was largely confirmed in Section 942 of the DFA. These rules were re-proposed in April 2011 in part to respond to the requirement of Section 932A to remove references to credit ratings and in part to respond to comments to the original proposal.[20] 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, market participants over-relied on credit ratings, and that there is incentive misalignment between sponsors and investors.

The most substantive aspect of the proposal is the requirement that all issuers of ABS provide standardized asset-level information at the time of issue and over time about the composition and performance of the underlying collateral. This information must be disclosed in Schedule L at the time of issue and Schedule L-D over time through 8-K filings. While this disclosure is formally required for transactions sold to the public, sponsors of private 144A transactions are required to adhere to and make similar disclosures if asked by an investor.

The other substantive requirement is a requirement that sponsors provide to investors in the preliminary prospectus computer code describing the waterfall, along with a narrative of how the transaction waterfall works. This is an important tool to give to investors in order to conduct serious due diligence on the risk of the transaction, as popular vendors typically do not model the waterfall for investors until after issue. In addition to greater information, there is a requirement that investors have at least five business days to evaluate this information before the securities are priced.

Beyond these disclosures which apply to both public and private transactions, the SEC has proposed revisions to the public Shelf registration requirements. The Shelf registration provides important timing and flexibility benefits, as an issuer can conduct delayed offerings ‘‘off the shelf’’ under Securities Act Rule 415 without SEC staff action. Existing rules permit ABS to be registered on Form S-3 statement and later offered off the shelf if the securities met standards which included investment grade credit ratings by a NRSRO. In order to reduce reliance on credit ratings, the SEC has proposed to replace the rating requirement for shelf registration with the following:

[20] See http://www.sec.gov/rules/proposed/2011/33-9244.pdf.

- A certification filed at the time of each offering off of a shelf registration statement, or takedown, by the chief executive officer of the depositor that the assets in the pool have characteristics that provide a reasonable basis to believe that they will produce, taking into account internal credit enhancements, cash flows to service any payments on the securities as described in the prospectus;
- Retention by the sponsor of a specified amount of each tranche of the securitization net of the sponsor's hedging (also known as ''risk retention'' or ''skin-in-the-game''
- A provision in the pooling and servicing agreement that requires the party obligated to repurchase the assets for breach of representations and warranties to periodically furnish an opinion of an independent third party regarding whether the obligated party acted consistently with the terms of the pooling and servicing agreement with respect to any loans that the trustee put back to the obligated party for violation of representations and warranties and which were not repurchased;
- An undertaking by the issuer to file Exchange Act reports so long as non-affiliates of the depositor hold any securities that were sold in registered transactions backed by the same pool of assets

Risk Retention

In April 2011, regulators jointly proposed rules implementing Section 941 of the DFA, requiring that sponsors retain meaningful risk of securitization transactions.[21] In the proposal, the sponsor of a securitization transaction is required to hold at least five 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 non-recourse financing. The proposed rule provides for exemptions from risk retention for securitizations sponsored by US 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

[21] See http://www.federalreserve.gov/newsevents/press/bcreg/20110331a.htm.

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.

NRSRO reform

The 2010 DFA includes a range of provisions intended to improve rating agency incentives and performance. We summarize each of these below. Notable academic contributions to the debate about NRSRO reform include:

- McAndrews and Rochet (2011) 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 (2011) document evidence 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 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.
- On the other hand, Covitz and Harrison (2003) document that corporate bond rating downgrades are 75 percent anticipated by the market, and fail to find any evidence that anticipation is correlated with variables that proxy for conflicts of interest. In particular, they find no evidence that downgrades below investment grade or of large issuers,which would be delayed if conflicts of interest were important, are less anticipated than other downgrade actions.

- 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 2001-2007, but would affect issuers' and CRAs' incentives in an environment where rating shopping was present.

Expert liability

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 a consent to liability form the expert. While rule 436(g) historically exempted credit rating agencies from this requirement, this exemption was removed by the DFA.

However, this exemption has never gone into effect, as 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.[22]

Shadow ratings (17-g-5)

The DFA 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 (NRSRO)s.[23] The latter will receive this information through a password-protected website maintained by the arranger and accessible only to the non-hired NRSROs. Non-hired NRSROs seeking to access this information are required to provide the SEC with an annual certification documenting the purpose of this access is to determine credit ratings, that information will be treated as material nonpublic information, and it will produce a minimum number of credit ratings from this information. An amendment to Regulation FD permits the disclosure of material non-public information to an NRSRO regardless of whether the NRSRO makes its ratings publicly available. To date, very few shadow ratings have been produced under this new mechanism. One problem is that non-hired NRSROs are not able to disclose information in the website to

[22] See http://www.law.com/jsp/nlj/PubArticleNLJ.jsp?id=1202517569077&slreturn=1.
[23] See http://www.mofo.com/files/Uploads/Images/100407CreditRatingAgencies.pdf/

investors, which limits their ability to provide rationale for a given shadow rating, which they are also required to do (see below)

SEC oversight of NRSROs[24]

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 for the first time formal oversight authority for the rating agencies, the law expressly prohibited regulation of the substance of credit ratings or the procedures and methodologies. In June 2007, the Commission 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, and prohibit certain other conflicts of interest outright and prohibit NRSROs from engaging in certain unfair, coercive or abusive practices.

The Commission staff began examinations of the three largest NRSROs for the first time in late 2009. In order to address deficiencies that were identified in those examinations, and to take further action to improve the integrity of the ratings process, the Commission adopted two substantial new sets of rules:

- One set of rules expanded the SEC's conflict of interest rule to prohibit an NRSRO from: (1) structuring the same products that it rates; (2) allowing analysts who participate in determining credit ratings from negotiating the fees that issuers pay to be rated; and (3) allowing analysts to accept gifts in any amount over $25 from entities that receive ratings from the NRSRO.
- Another set of rules increased mandatory disclosures: requiring an NRSRO to publish performance statistics for 1, 3, and 10 years within each rating category; to disclose how frequently credit ratings are reviewed; whether different models are used for new issue and surveillance; and whether changes made to models are applied retroactively to existing ratings; and make publicly available in a machine-readable format ratings action histories for all credit ratings.

[24] See http://www.sec.gov/news/testimony/2011/ts072711jr.htm

In response to new authority granted under the DFA, the SEC recently proposed additional rules in May 2011, focused on disclosure, corporate governance, and conflicts of interest.

- With respect to disclosure, NRSROs are now required to disclose information about the potential limitations of the rating and information about the methodology used to determine the rating, including the main assumptions underlying the methodology. There is also standardization of the production and presentation of the transition and default rates, with the goal of making these performance statistics more comparable among NRSROs. Finally, NRSROs are required to have policies and procedures reasonably designed to: (1) assess the probability that an issuer of a security or money market instrument will default, fail to make timely payments, or otherwise not make payments to investors in accordance with its terms; (2) clearly define each symbol in the rating scale used by the NRSRO; and (3) apply any such symbol in a consistent manner.
- With respect to corporate governance, the proposed rule would require methodologies used to determine credit ratings be approved by its board of directors or a body performing a similar function and that such methodologies are developed and modified in accordance with the policies and procedures of the NRSRO; that any material changes to the methodologies are applied consistently; and that the NRSRO promptly publishes notice of material changes to rating methodologies and of any significant errors that are identified in a rating methodology.
- With respect to conflicts of interest, the SEC has strengthened the existing conflict of interest rule to more completely separate the credit analysis function from sales and marketing activities: prohibiting an employee who participates in sales or marketing activities to also participates in determining a credit rating or in developing the procedures or methodologies used to produce the credit rating; require a one-year look-back review when a credit analyst leaves the NRSRO to work for an entity rated by the NRSRO or an issuer, underwriter, or sponsor of securities being rated by the NRSRO. Moreover, new rules require the NRSRO to have standards training, experience, and competence for its credit analysts that are reasonably designed to ensure that the NRSRO produces accurate credit ratings. Finally, it is now clearer what findings the SEC would need to make in order to suspend or revoke the registration of an NRSRO which violated the conflict of interest rule.

A December 2010, study mandated by the DFA, that will address the feasibility and desirability of standardizing credit rating terminology.

NRSRO compensation model

Section 939F of the DFA instructed the SEC to carry out a study the compensation model for NRSROs, focused on each of four areas, focusing on structured credit ratings:

- Conflicts of interest created by the issuer-pay and subscriber pay
- Feasibility of establishing a system in which a public or private utility to assign an NRSRO rating a transaction
- Identifying measures of structured finance product rating accuracy
- Identifying alternative means of compensating NRSROs that would create incentives for accurate credit ratings.

The DFA also instructs the SEC to, following the submission of the report to Congress, establish by rule a system for assignment of NRSROs to determine new issue credit ratings.

Other parts of the Dodd-Frank Act affecting Shadow Banking

As discussed by Chapman and Cutler (2011), there are some other parts of Dodd-Frank which could affect securitization markets.[25] In particular, the Volcker rule prohibits banks from sponsoring private funds, the definition of which might include most ABCP conduits. Moreover, the DFA will expand the scope of Sections 23A and 23B of the Federal Reserve Act to possibly restrict transactions between a bank and an ABCP conduit it sponsors, advises, or manages. In addition, DFA removed the private advisors exemption from registration as "investment advisors" under the Investment Advisors Act used by foreign banks and non-banks, which will force these sponsors of ABCP conduits to register as investment advisors.

Section 621 of DFA prohibits sponsors of asset-backed securities (ABS) from engaging in transactions for a year following the issuance of the ABS that would involve or result in any material conflict of interest with an investor in the ABS. This provision could be interpreted to prohibit (i) providing credit and liquidity support to such conduits, and/or (ii) underwriting or placing term securitizations of assets for which their sponsored conduits provided a warehouse

[25] For discussion, see http://www.chapman.com/media/news/media.957.pdf

line or from entering into hedging facilities in connection with transactions entered into by their sponsored conduits.

Section 932 of DFA imposes an obligation on issuers and underwriters of registered and unregistered ABS to make the findings of any third party diligence reports obtained by them publicly available. In June 2011, the SEC proposed Rule 15Ga-2 implementing this legislation, making these requirements apply to private transactions, including ABS financed by ABCP conduits.[26] Finally, Section 943 of DFA imposes an obligation on sponsors of registered and unregistered ABS to periodically disclose repurchase activity with respect to breaches of representations and warranties where asset repurchases are required by transaction documents. In March 2011, The SEC adopted Rule 15Ga-1 that specifies the timing and content of such reports implementing this legislation.[27] No exemption was provided for ABCP conduit transactions, meaning customers of conduits with repurchase requirements in their transaction documents (and perhaps the conduits themselves) would be required to provide such reports.

7. ASSESSING THE COLLECTIVE IMPACT OF REGULATORY REFORM ON THE SHADOW BANKING SYSTEM

a. Asset Backed Commercial Paper

The reforms described above eliminate the most obvious incentives for a depository institution to engage in capital arbitrage by moving assets off balance sheet. However, the revised rules will only be as effective in limiting excess leverage and risk taking as the accuracy of capital requirements on underlying assets.

The impact of the greater capital and liquidity requirements for bank-sponsored conduits likely will include higher-cost lines of credit to finance companies and the end of programs that exist solely for off-balance-sheet capital arbitrage. Mitigating behavior by the industry might include: a shift in conduit sponsorship from U.S. banks to non-banks or foreign banks with balance sheet capacity, or a re-structuring of conduits in order to avoid accounting consolidation. For example, conduits could be structures so that a first-loss tranche is sold to a third-party to avoid accounting consolidation. Some ABCP conduits have engaged in these transactions. It is worth

[26] See http://www.sec.gov/rules/final/2011/33-9175.pdf.
[27] See http://www.sec.gov/rules/final/2011/33-9175.pdf.

emphasizing that the capital and liquidity rules do not address implicit credit and liquidity puts written by banks that exist in sponsored asset management businesses.

It is worth noting that the proposed disclosure requirements for ABCP are quite meaningful, as they would permit investors to actually conduct fundamental credit analysis of their exposures.

Liquidity and credit puts by non-banks

Most of the focus on the ABCP providers has been on the "internal" shadow banking institutions, such as bank-sponsored finance companies, rather than the "external" shadow banking institutions (see Pozsar, Adrian, Ashcraft, Boesky 2010 for a classification of shadow banks into “internal” and “external” institutions). As investor appetite returns, there will be incentives to use highly rated, unregulated counterparties. Supervisors will need to be vigilant about supervised banks that rely on these types of companies for credit protection and capital relief. Investors too need to carefully evaluate the credit and liquidity protection provided by unregulated but highly rated entities. Rating agencies will need to evaluate the capital adequacy of rated entities, the ability of these entities to meet the likely calls for liquidity and monitor the ongoing viability of unregulated entities. For example, ABCP issued by ABS CDOs was often enhanced with liquidity puts to AIG Financial Products, which used the Aaa rating of its parent company.

Other forms of term secured maturity transformation by banks

US depository institutions continue to rely extensively on government-sponsored shadow banking system for term secured funding. Ashcraft, Bech, and Frame (2009) illustrate that as the ABCP market collapsed, US banks increased borrowing significantly through the Federal Home Loan Bank System, which offered funding on better terms than from the Discount Window. At the onset of the crisis, US depository institutions had about $500 billion in Advances outstanding, and this amount increased to almost $1 trillion at the peak in 2008. During the crisis, several large thrift institutions failed with a large amount of Advances outstanding. Academic literature studying FHLB advances has long raised concerns about depository institutions using Advances as a means to exploit the under pricing of deposit insurance as well as a different subsidy related to implicit support of FHLB liabilities by the US Government. The secured nature of an advance, as well as the lien the Federal Home Loan Bank has on the other assets of the borrower, means that the claims of the taxpayer in a failed bank are subordinated to those of the Federal Home Loan Bank. The insensitivity of deposit insurance assessments to the

amount of secured funding means that depository institutions have an incentive to rely excessively on Advances for funding.

Over the past year, Congress has been considering proposed legislation which would facilitate the development of a covered bond market, which like ABCP or FHLB Advances is simply another form of secured maturity transformation. The purpose of the legislation is to significantly limit powers of the FDIC in receivership in order to provide investors with a maximum amount of protection and certainty about cash flows in the event of a bank failure. As with FHLB Advances, covered bonds would subordinate the taxpayer's interest in the depository institution, and the risk-insensitive nature of pricing for deposit insurance and official liquidity means that banks will be able to monetize subsidizes from the public sector in the form of cheaper funding costs.[28]

We expect that proposed accounting and capital rules will eliminate the capital arbitrage which motivated excesses in the ABCP market during 2004-2007, and that activity will be limited to financing receivables underwritten by the sponsoring bank. On the margin, liquidity rules will adversely affect the economics of ABCP relative to term securitization, and induce firms to term out their funding where possible.

Over time, ABCP could be displaced by other sources of secured maturity transformation sponsored by banks, given the limited availability of insured deposits combined with the mispricing of liquidity and credit puts offered by the official sector. Until there is meaningful GSE reform, we expect FHLB funding will remain important cheap source of funding and contingent liquidity. The development of covered bonds could be significant source of funding, especially if the instruments are exempt from new disclosure requirements for securitization and ABCP under the SEC's proposed revisions to Regulation AB.

b. Tri-Party Repo

Tri-party repo is the most important funding source for major securities brokers-dealers. All of the major U.S. chartered securities brokers-dealers operate under the umbrella of bank holding companies (BHCs) since the fall of 2008. As such, there is a presumption of increased implicit

[28] http://www.americansecuritization.com/uploadedFiles/ASF%20Covered%20Bonds%20Discussion%20Paper%20Final.pdf

support for the large securities dealers from the Federal Reserve, at the cost of tighter prudential regulation. While there is a presumption of public sector support for broker-dealers, it should be noted that any such support is severely restricted by DFA. Emergency backstop powers of the Federal Reserve under section 13(3) are limited to broad based support for many institutions in a systemic risk event and are subject to approval by Treasury. Institution-specific support is ruled out. The hurdle is also higher for a PDCF post DFA. More approval, more justifications and attestations, more process around the launch of a backstop are required.

The tri-party repo market received several forms of backstops during the crisis. For the security brokers-dealers that are part of BHCs, the Federal Reserve extended discount window lending to open market operation (OMO) eligible collateral from the tri-party repo market by suspending Federal Reserve rule 23A which regulates the relationship between commercial bank and broker dealer subsidiaries. However, the transfer of assets would only be possible to OMO eligible assets, not for private label mortgages, asset backed securities, and corporate bonds. The Primary Dealer Credit Facility (PDCF) was aimed at a larger class of borrowers (all primary dealers, not just the ones that are part of BHCs), and the eligible collateral was broadened from Discount Window eligible assets to all tri-party repo collateral following the Lehman bankruptcy. While these lending facilities could only be reinstated under extreme and unusual circumstances, they can certainly not be ruled out.

The reduction in the time window for the daily unwind reduces the time window during which a self-fulfilling run by repo investors can occur, but does not make the market more stable during that remaining hour. However, as we pointed out earlier, the unwind of trades continues to be undertaken daily in the tri-party repo market, thus exposing the market to one of its major frictions. One mitigation mechanism might be to impose quantitative limits of intraday credit exposure of the clearing banks for each of the dealers, such as a 10% limit on credit per dealer per repo book. Such limits would further reduce the problem of the intraday credit exposure, but certainly wouldn’t fully resolve the issue. But this can’t be achieved until the daily unwind ends and further operational changes are made. It should also be noted that a 10% limit does not automatically reduce the likelihood of runs due to headline risk concerns. However, it might reduce investors’ level of concern about a dealer given their greatly reduced rollover risk exposure.

The changes that are being undertaken in the market infrastructure for repo are bringing the U.S. market into line with practices in Europe and other parts of the world, and will dampen an important channel for the transmission of systemic risk by making it less likely that a troubled dealer can destabilize its clearing bank and vice versa through its tri-party repo activities. Intraday credit will be limited and provided by clearing banks only on a committed basis, once reforms are implemented.

These changes will also force cash investors to more accurately assess and price the credit and liquidity risks they face in these transactions, because they can no longer assume that the clearing banks will provide an implicit credit and liquidity backstop. As a result, we expect some tri-party repo cash investors to strengthen their risk management by paying closer attention to their counterparties' ability to repay their loans and by accepting a narrower, more liquid, higher quality set of collateral. Some may exit the market altogether if they conclude that the risks inherent to this activity are not in line with their risk appetite. A smaller, more conservatively collateralized tri-party repo market may well emerge. The tri-party repo market will also more conservatively price the credit intermediation it conducts.

However, reform to date has not directly addressed the ability of investors to deal with the failure of a large dealer in an orderly manner. The inability of some investors to hold collateral directly and liquidate it in a gradual, orderly fashion remains an important source of systemic concern. As discussed above, the liquidation of large amounts of collateral under extreme pressure would most certainly be disorderly, creating fire sale market conditions that erode the capital of all holders of the assets being dumped, and undermining confidence in the repo market. A desired outcome of the new liquidity buffer requirements and the new settlement procedures would be that dealers are less vulnerable to runs on their tri-party repo financing. Cash investors, to avoid triggering a dealer default, would begin to withdraw funding from a potentially troubled dealer earlier and more gradually, providing a troubled dealer with an opportunity to rely on its liquidity buffer as it sells off assets that it can no longer finance. Further clarification on FDIC rules regarding the resolution of a large, non-bank under Title II of the Dodd-Frank Act will also inform the need to take further action to avoid a disorderly liquidation of a defaulting dealer's tri-party repo collateral. As these regulatory reforms and settlement procedures reshape the tri-party repo market, market participants and policymakers will need to also think about the role that private resolution mechanisms might play.

The failure of a large broker dealer would still leave MMMFs with collateral that they are not allowed to own, providing them incentives to run early. This remains a major issue, and one that is very hard to tackle. Even if eligible collateral in the tri-party repo market were to be restricted to Treasury and agency collateral, the maturity and liquidity requirements of the 2a-7 MMMFs would likely be violated if the fund were to get possession of the collateral. The obvious solution here is to put in place liquidation facilities. The private sector has no economic incentive to create a liquidation facility on their own, and regulators have no clear authority to impose one on the market. This remains a challenging open issue concerning a key fragility of the repo market.

Gorton and Metrick (2011b) put forward a radical proposal to achieve reform of the shadow banking system, and the repo market in particular. They propose the creation of "Narrow Funding Banks" (NFB), which in order to achieve stability in the maturity transformation of the shadow banking system. The narrow funding banks would have tradable assets both on the asset and liability side of the balance sheet --- in contrast to traditional commercial banks, that have largely non-tradable loans on the asset side and nontradable deposits on the liability side. The NFBs would fund primarily securitized products---such as the AAA tranches of ABS and MBS---by issuing commercial paper or repo to MMMFs. The NFBs would have some access to the safety net in exchange for light regulation. Gorton and Metrick also discuss the central role of safe harbor provisions the bankruptcy safe harbor of repos for shadow banking maturity transformation.

Impact on the market of industry reform

The primary impact of reduced intraday credit and the shortening of the window for the daily unwind will be the reduced exposure of the tri-party clearing banks to potential distress of security broker dealers. The collective impact of reforms may further incent tri-party participants to use higher quality collateral with higher, less cyclical margins. These changes directly impact the funding of security broker-dealers. The cost of funding for dealers would likely increase, they would need to find different counterparties. Broker-dealers might alos curtail their activity as underwriters and market makers for risk assets. . Dealers have always been highly adaptable, quickly changing firms, and the full impact of regulatory reforms will induce further changes in the broker dealer business model. The major security broker-dealers now have liquidity

backstops at the holding company level due to their BHC designation. However, they will be subject to leverage requirements and prudential supervision instead of voluntary oversight.

Collateralized Commercial Paper

Collateralized commercial paper (CCP) is a new alternative to repo funding used by several banks for risky assets. To issue CCP, a bank sets up a special purpose entity (SPE) that issues commercial paper and uses the proceeds of that issuance to enter into a reverse repo agreement with the bank's broker dealer. This is similar to an ABCP conduit, except that the ABCP conduit would normally buy term assets instead of entering into repo agreements.

The motivation for CCP is driven in part by contradictory regulatory mandates. In particular, bank regulators, including the Federal Reserve, have encouraged banks to term out funding through the Liquidity framework of Basel III. However, recent SEC rule changes governing 2a-7 money funds, which are a significant source of repo funding to banks, reclassified repo agreements of more than 7 days as illiquid instruments and reduced the permissible amount of illiquid instruments that money funds could hold. CCP gets around these changes because it allows banks to get longer-dated repo funding, but because it is commercial paper, it is considered liquid for money funds regardless of tenor.

While many large banks have circulated proposals for CCP programs, actual issuance has been limited to relatively small amounts from two banks.

Issuance to date does not appear to increase the banks' consolidated risk exposures. Under both existing programs, accounting treatment of the SPE serving as the repo counterparty limits the opportunity for regulatory capital arbitrage. Ratings on the CCP issued are pegged to the rating of the sponsoring bank, rather than receiving a "ratings uplift" from the bank's rating based on support from potentially illiquid, difficult-to-price collateral or other structural features.

Because only two firms have issued CCP to date and the amounts outstanding are small, the financial stability risks posed by CCP currently are de minimis. However, because CCP increases the linkages between the CP and repo markets, if the CCP market were to grow to account for a nontrivial source of repo funding or of CP issuance, CCP could increase the speed of propagation of financial disruptions across CP and repo markets.

Current CCP structures are fairly simple: they are not designed to engage in significant maturity transformation (CP issuance tenors are meant to match those of the underlying repo agreements), they are on the sponsoring bank's balance sheet, and they are not funding unusual assets at unusual tenors or prices. However, further innovation is in the works, and future structures may become less straightforward. Monitoring future growth and evolution in the product will be challenging. As with other structured products, program or transaction features can be adjusted to meet different constraints. Monitoring such adjustments may require a case-by-case review of prospectuses for specific issuances. Even more challenging will be monitoring new related structures that may not be classified as CCP, which are reportedly being discussed by sponsoring financial institutions.

c. Money Market Mutual Funds

The goal of MMMF reform is to reduce the fragility of these institutions and their susceptibility to runs, the rapid flight of investors, which can destabilize the broader financial system. To date, the Securities and Exchange Commission (SEC) has approved amendments to the rules applicable to MMMFs that focus on reducing risk on the asset side of funds' balance sheets. For example, the new rules require money market funds to have a minimum percentage of their assets in highly liquid securities; there is both a daily and a weekly requirement. These rule amendments also further restrict the ability of money market funds to purchase lower quality securities.

While the SEC's MMMF reforms passed in 2010 mitigate the risks primarily from an individual investor's point of view, they certainly do not go far enough to prevent runs from occurring. The crucial ingredient that is making runs possible is the net stable value rule (NAV rule). The stable NAV rule distinguishes MMMFs from other mutual funds. Purchases and redemptions in MMMF shares occur at the amortized cost of the funds' assets, rounded to the nearest penny. MMMF shares thus trade at book value, not market value. However, when the asset values of a fund falls below $0.995, the fund has to mark its shares to market, an event that is called "breaking the buck".

The susceptibility of MMMFs to runs is illustrated in the aftermath of the failure of Lehman in September 2008 when a standalone MMMF---the Reserve Fund---broke the buck. In the

following weeks, institutional investors broadly withdrew from MMMFs, thus forcing massive liquidations of MMMF assets, leading to downward pressures in prices, and potentially leading to self fulfilling instances of funds breaking the buck. When investors run on money market funds, they are forced to liquidate assets, pushing downward pressure on the mark to market values of the money market mutual fund assets and potentially lead 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 which occurs when investors withdraw investments due to the stable NAV rules of the MMMFs.

Due to 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 financial crisis, investors cannot, necessarily, count on the sponsors to provide support. The second friction that we would like to 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.

Abandoning the stable NAV of money market funds might also pose challenges to the accounting and tax treatment of investors.[29] All share sales would become tax-reportable events, potentially increasing tax and recordkeeping burdens of investors. Investors would have to mark the value of their MMMF holdings to market. Companies could not enter and reconcile cash transactions nor calculate the precise amount of operating cash on hand. MMMFs would thus likely lose their appeal as alternatives to deposit accounts or cash holdings. The fact that

[29] See the report of the money market working group by investment company institute on http://ici.org/pdf/ppr_09_mmwg.pdf.

MMMFs provide a market based alternative to deposit accounts in commercial banks is generally viewed as positive, as it increases competition. The move from a stable to a floating NAV rule would, however, put MMMFs at a distinct disadvantage relative to checking accounts. This explains why there is a continuous search for additional MMMF reforms that aim at removing the systemic risk of MMMFs, while preserving their demand deposit like features. We will discuss some of these further proposals.

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 first annual report of 2011. 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—which 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, as capital does in traditional banks. As an alternative, the Investment Company Institute has proposed a private sector "liquidity bank" which would provide a backstop but itself might benefit from access to official liquidity.

An ex post buffer does not require any resources to be set in advance, but is created by taking steps to ensure that investors absorb losses when they occur, and cannot flee leaving the losses behind. In particular, such measures are designed to forestall investors redeeming shares at a NAV of one dollar once credit event or liquidity event has begun. A variable NAV may be helpful in this regard, as such an NAV, if properly computed, could 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.[30] The senior tranche would be a stable net asset value fund that would be backed by a liquidity buffer amounting to x% of the current NAV. The liquidity buffer could be implemented in at least four different ways. First, the Squam Lake Group argues that liquidity requirements of MMMFs could be held in the form of Federal Reserve deposits. Such deposits would contractually buffer the fund against breaking the buck. A second implementation of the buffer is via a segregated account that is invested in cash or Treasury bills. This account would also contractually buffer the MMMF against breaking the buck. A third way to implement the liquidity buffer would be via insurance from a third party provider, subject to appropriate credit and liquidity supervision of the insurance provider. Finally, the liquidity buffer could be implemented with an equity tranche for MMMF shares. The equity tranche would be a claim on the pool of MMMF assets whose senior claimant is the money market fund. That is, equity-tranche investors would only receive distributions to the extent that the total market value of the assets meets the buffer requirement. MMMF investors, however, can redeem at one dollar per share.

The idea to introduce two separate share classes for MMMFs has received considerable attention in recent months, and was picked up by the SEC in February 2012.[31] In such proposals, the senior tranche is the stable NAV tranche, while the junior tranche is an equity tranche. The equity tranche would claim cash flows arising from the difference in the mark-to-market value and the book value of the NAV shares, provided that this difference is positive. The equity tranche of the money market fund would be marked to market daily.

The proposal of an equity tranche for MMMFs has been circulating informally for some time. The current interest in such proposals was triggered by the "Report on Money Market Funds" by the President's Working Group (PWG) (2010). The PWG report discussed a number of additional proposals to mitigate the systemic riskiness of MMMFs, including emergency lending facilities, insurance schemes similar to the Treasury's Temporary Guarantee Program for Money

[30] The Squam lake group consists of Martin Baily, John Y. Campbell, John Cochrane, Douglas Diamond, Darrell Duffie, Kenneth French, Anil Kashyap, Frederic Mishkin, David Scharfstein, Robert Shiller, Matthew Slaughter, Hyun Song Shin, Jeremy Stein, and René Stulz.

[31] *Wall Street Journal*, February 7, 2012 "U.S. sets Money Market Plan" see http://online.wsj.com/article/SB10001424052970204136404577207601101417664.html?KEYWORDS=us+sets+money+market+plan

Market Funds, two tier systems with some stable and some floating NAV funds; and, finally, regulation of MMMFs as special purpose banks.

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 protecting 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.

An alternative proposal is to regulate stable NAV MMMFs as special purpose banks. This was put forward by the Group of Thirty (2009).[32] MMMFs as special purpose banks would imply capital regulation as well as discount window access, and would thus solve the frictions that make MMMFs vulnerable to runs and systemic risk. The chartering of stable NAV MMMFs as special purpose banks would give rise to a two tier system, where some MMMFs could offer floating NAV, without being chartered as banks. One challenge with the special purpose bank proposal is that it would require legislation, new forms of supervision (by the Federal Reserve, the FDIC, and possibly state banking regulators), and would thus potentially lead to a substantial increase in the costs of running MMMFs.

In summary, regulators have made some significant improvements to the structure of the MMMF industry, which may reduce the likelihood of runs and improve its resiliency. However, until more significant reforms are undertaken, a clear systemic vulnerability remains. It is important to note that there may well be no single measure that adequately addresses this issue, and some combination of measures may ultimately be the most appropriate course.

d. Securitization

The impact of proposed revisions to Regulation AB on securitization markets

[32] The Group of Thirty "Financial Reform: A Framework for Financial Stability" is at http://www.group30.org/rpt_03.shtml

Proposed revisions to Regulation AB are likely to help improve the risk sensitivity funding by capable investors with better information. In particular, the increase in granularity and depth of static pool and performance data will permit investors to build more powerful credit risk models, putting them on a more level playing field with rating agencies. Moreover, for the first time, investors will have cash flow models supplied by the sponsor at time of issue in order to facilitate meaningful due diligence.

While these measures are likely to benefit more sophisticated investors, their effectiveness on the risk sensitivity of funding provided by the market generally depends on the nature of the agency problem. For example, it is worth noting that the market for commercial mortgage backed securities set the standard for depth and standardization of senior investor disclosure in securitization markets, and junior investors with market power had adequate information to fully underwrite the loan pool. However, this level of disclosure did not prevent a severe credit cycle in the asset class associated with a significant deterioration in underwriting and large scale defaults. In the case of CMBS, it is likely that over-reliance by investors on credit ratings played an important role, as senior investors conduct limited independent due diligence and junior tranches were sold into CRE CDOs. While disclosure in non-agency RMBS was not as granular or standardized as in CMBS, it was generally better than exists in consumer ABS asset classes which have performed well through the cycle. In the end, disclosure is unlikely to be an adequate reform of securitization on its own.

The impact of risk retention on securitization markets

While disclosure is unlikely to be the magic bullet to prevent another significant credit cycle in securitization, the potential use of risk retention to regulate leverage has significantly more potential. Unfortunately, the proposed "choose your own" approach to risk retention is likely to result in sponsors choosing the least effective form of risk retention, permitting them to minimize the amount of capital in the intermediation process and do very little to improve underlying incentive problems. In the analysis below, we will demonstrate that vertical retention is generally an ineffective form of risk retention while the horizontal form has the potential to replicate the incentives of the originate-to-fund lender. However, we also document that the deferral of compensation can have an important impact on incentives, suggesting that premium capture could be an important backstop to the weaknesses of the menu approach.

a. Vertical retention is not effective in improving loan underwriting

Consider an environment where the issuer is paid up front in the form of a premium price above the unpaid principal balance of an originated loan pool, but retains a vertical slice of the loan pool. While the sponsor receives all of the upside up front in a risk-insensitive fashion, it only bears a fraction of the marginal loss on the pool, resulting in a marginal cost curve which lies between that of the originate to fund and originate to distribute lenders. If the vertical slice is small (i.e .5 percent), as illustrated in Figure X3, it will obviously be much closer to the latter than the former. While the vertical slice does reduce the incentive of the issuer to underwrite aggressively, by forcing them to bear a fraction of the marginal pool losses, the change in incentives is small relative to the marginal benefit of being able to sell the entire loan pool at a premium price. Unless a vertical slice is quite large, it is an ineffective mechanism to mitigate the problems created by risk-insensitive funding.

b. Horizontal retention could be the optimal form, but it is difficult to implement

In contrast to the vertical form of retention, the horizontal form resembles real capital, and the mandatory Horizontal retention could provide an important leverage constraint on shadow banking.

In order to understand this point, consider an environment where the issuer retains a first loss position in securitization. If the size of this first loss position is sufficiently large, the marginal cost curve will look very similar to the marginal cost curve for the originate-to-fund lender, as illustrated by Figure X4. In this case, the lender bears the full marginal cost of lower underwriting standards, which gives it the incentive to underwrite like a balance sheet lender. However, if the size of the horizontal tranche is too small, the marginal cost curve will look closer to that of the originate to distribute lender, as it bears none of the marginal cost.

The obvious challenge in using a horizontal slice is identifying a tranche size which is large enough so that the marginal incentives of the originator are similar to those of a balance sheet lender. As a starting point, the B-rated (BBB-rated) tranche of most amortizing securitizations is able to absorb a level of pool losses equal to 1x (2x) expected loss. Consequently, in order for a sponsor to be on the hook for marginal loss above expected loss, this could be accomplished

through retention of the non-investment grade tranches of the trust capital structure. However, the problem is complicated by the inability of regulators to write rules which rely on NRSRO ratings. The inability to exploit the risk sensitivity of credit ratings across issuers and over time raises the prospect that the amount of required Horizontal is inadequately risk sensitive, undermining the efficacy of retention in improving underwriting.

c. Need for minimal restrictions on structure to limit sponsor arbitrage

Outside using the vertical form retention, there are two other ways for the sponsor to avoid putting meaningful own funds at risk. First, the sponsor can adjust the capital structure of the securitization transaction in order to reduce the amount of own funds needed to purchase a Horizontal tranche. In particular, it is common practice in residential and commercial mortgage securitizations to move cash flow from the bottom of the waterfall to the top of the waterfall, creating interest-only tranches which can be sold at lower discount rates to investors. These incentives are aggravated by reasonably conservative approaches by investors and rating agencies to excess spread as a form of credit enhancement. The consequence of this structure is that the value of first loss tranches is a fraction of face value, permitting the sponsor to use fewer own funds to purchase the position. In order for risk retention to be a binding leverage requirement, it is necessary to either limit structuring of deals in this fashion, or require the sponsor to offset this structure through more required retention.

Second, the sponsor can limit the amount of own funds it uses to purchase required retention by relying on funding through deal proceeds. In particular, it is common practice in residential and commercial mortgage securitizations for the aggregate proceeds from the transaction to be larger than the cash used to originate the assets, implying the pool is sold at a premium to par value. The consequence of premium proceeds is that the sponsor does not need to come out of pocket to fund risk retention, and when a requirement is binding has a strong incentive to structure the loans to generate more premium. In order to prevent arbitrage of the risk retention rules in this fashion, it is necessary to limit the use of deal proceeds as a source of funds, and require the sponsor to put a meaningful amount of their own skin, and not that of investors, in the game

Regulators have incorporated device in the proposed rule-making called premium capture to deal with both of these issues. In particular, the proposed rule requires deal sponsors to put excessive

deal proceeds into a first-loss premium capture cash reserve account, creating an incentive for deal sponsors to comply with the requirement to put meaningful own funds at risk. The proposal does not prohibit traditional deal structures, but instead requires the sponsor to increase the amount of retention in order to keep the amount of leverage to own funds constant.

The impact of NRSRO reforms

While over-reliance by investors on rating agencies is the likely source of risk insensitive funding, simply demanding less reliance without an adequate alternative is likely to result in bad outcomes. If investors and regulators replace risk-sensitive ratings with less risk sensitive rules, it is possible that the underlying friction associated with risk insensitive funding is aggravated. At the same time, encouraging competition among rating agencies without a change in the compensation model is likely to worsen rating shopping, making ratings less risk-sensitive, and amplify the securitization credit cycle.

On the other hand, changes to the rating agency compensation model could have significant consequences. Investors are too small to have meaningful influence over issuers to generate appropriately risk-sensitive funding, which suggests the need to either coordinate to have market power or have an agent negotiate with only their interests in mind. As coordination between investors might raise antitrust issue, making rating agencies effective representatives of investors is likely an important part of the solution. However, as long as they are chosen and paid by the issuer, it seems difficult to imagine them working exclusively as a fiduciary of investors. While a number of solutions are being discussed, the right conceptual model would appear to be rating agency risk retention. At one end of the spectrum, this might involve rating agencies simply being compensated for their services by the sponsor in the form of a vertical slice of securities rated. At the other end of the spectrum, this might involve rating agencies having balance sheets, and only being permitted to disclose ratings to investors if they hold a vertical share of a security outstanding.

8. CONCLUSIONS

As noted above, it is maturity transformation that renders financial intermediaries intrinsically fragile, since by definition an entity engaging in maturity transformation can at no time honor a sudden request for full withdrawals. The explicit, official liquidity and credit backstops by central authorities have reduced this fragility for banks, an arrangement that comes with the quid pro quo of subjecting these institutions to oversight and regulatory capital and liquidity requirements. Consistent with the structures put in place over time between banks and a variety of non-bank intermediaries, the crisis revealed—and was in many respects propagated by—the extent to which banks had become the core of the backstop arrangements for the non-bank sector. The crisis also revealed the woeful inadequacy of these arrangements, as banks struggled and failed to effectively play this backstop role and governments and central banks had to resort to a variety of extraordinary measures to preserve broader financial stability. Thus, a key lesson emerging from the financial crisis is that our non-bank based system of financial intermediation needs less leverage, asset risk and maturity transformation to survive periods of extreme stress.

Much regulatory reform is focused on better aligning the costs and incentives for banks to provide the backstop support for these activities, with the intent of inducing more socially efficient levels of shadow banking activities. Other reforms are focused on reducing reliance by shadow institutions on traditional banks, by having the shadow banking entities themselves provide for the necessary credit and liquidity backstops, and shadow investors bearing the full ex ante economic cost of maturity transformation. Reforms of these types are necessary to ensure that liquidity is provided in a risk-sensitive manner and that full and credible resolution does not depend on official liquidity support.

The dilemma of the current regulatory reform efforts is that the motivation for shadow banking has likely become even stronger as the gap between capital and liquidity requirements on traditional institutions and non-regulated institutions has increased. The objective of reform should be to reduce the risks associated with shadow maturity transformation through more appropriate, properly priced and transparent backstops—credible and robust credit and liquidity "puts." Regulation has done some good, but more work needs to be done to prevent shadow credit intermediation from continuing to be a source of systemic concern.

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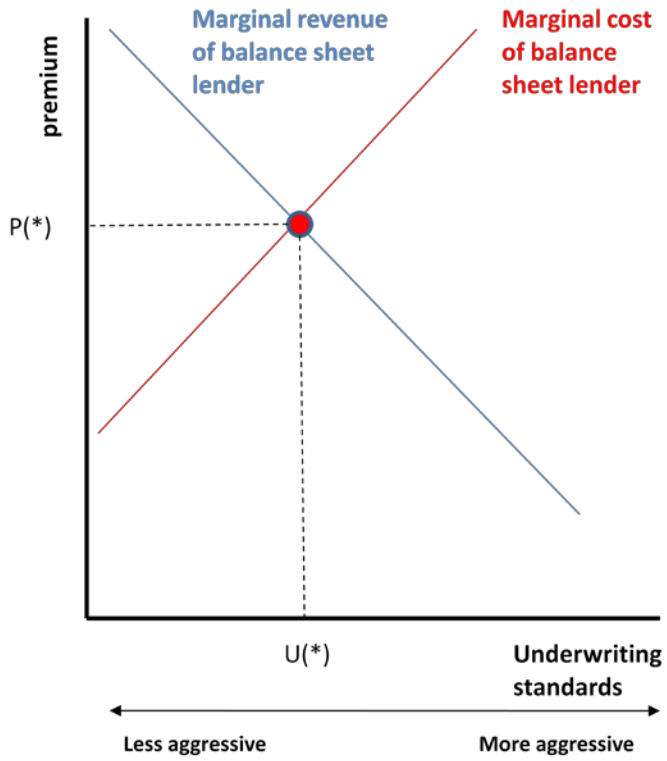
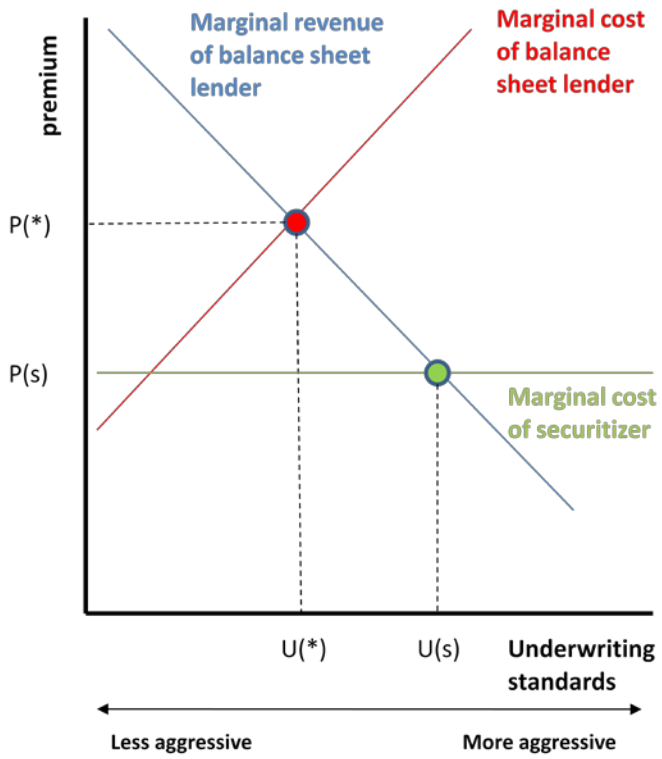


Premium: NPV of interest and fees

Marginal revenue:
Increase in amount of lending typically requires lower price, but lender can also increase lending through more aggressive underwriting. However, incremental impact on revenue declines with each easing in underwriting

Marginal cost:
More aggressive underwriting leads to higher losses absorbed by the lender, and incremental losses increase with each easing of underwriting

Figure x1: The Risk Choice of a Balance Sheet Lender

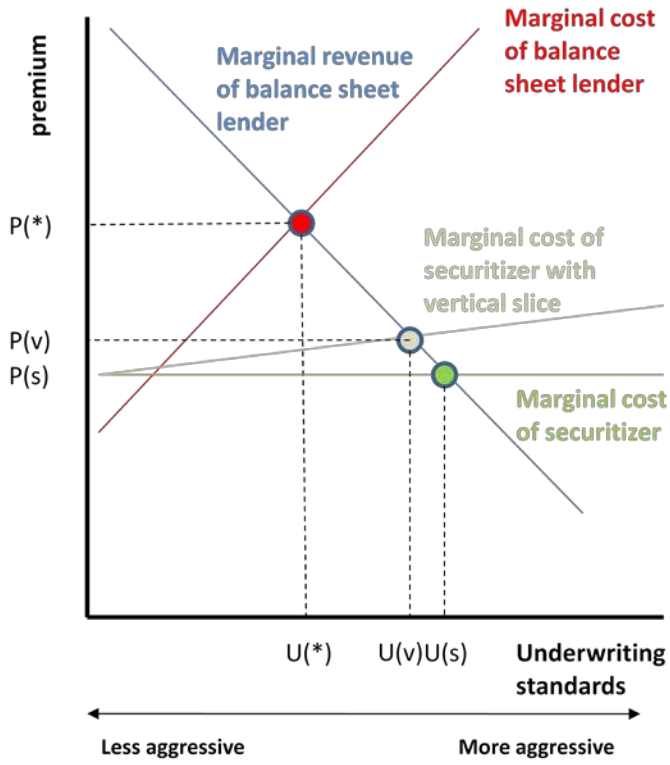


Marginal cost of securitizer:
More aggressive underwriting leads to higher losses, but these are shifted completely onto investors

Risk choice:
Ability to shift risk to investors leads to more aggressive underwriting

Result depends on other parts in the securitization chain not working adequately:
•market discipline by investors and credit rating agencies
•need for future access to securitization markets to protect issuer franchise value

Figure x2: Risk Choice of Originate-to-Distribute Lender

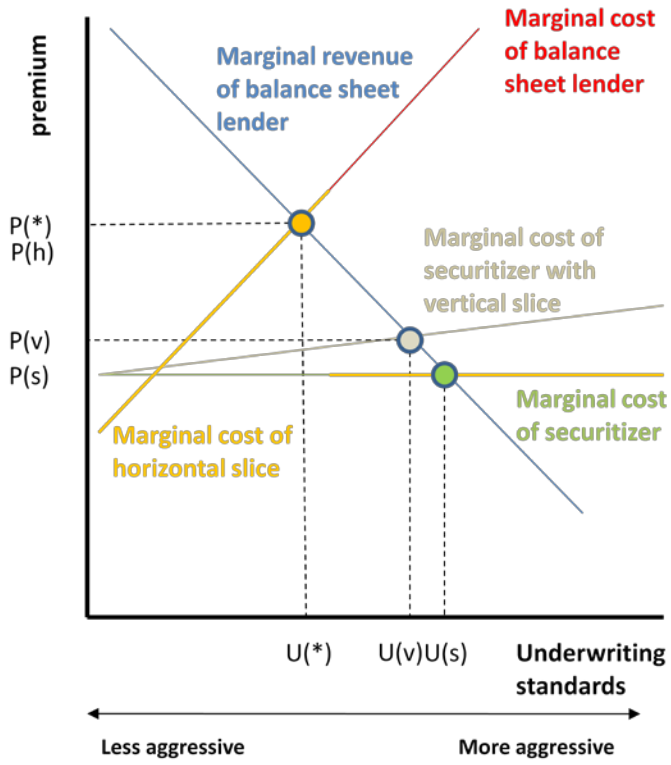


Marginal cost with vertical slice:
Lender incurs a fraction of incremental losses (i.e 5 percent), which adds a little slope to the marginal cost curve

Risk choice:
Vertical slice has small positive impact on choice of underwriting standards

Caveat:
If risk management is more of an "on/off" switch than the "continuous decision" outlined here, it is possible a vertical slice could have a more significant impact.

Figure x3: Risk Choice of Originate-to-Distribute Lender with Vertical Risk Retention



Marginal cost with large horizontal slice:
Lender incurs every dollar of incremental loss to point above standard chosen by balance sheet lender

Risk choice:
Large horizontal slice aligns incentives of issuer with those of a balance sheet lender

Figure x4: Risk Choice of Originate-to-Distribute Lender with Horizontal Risk Retention