

Securitization *Without* Risk Transfer¹

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First draft: March 2009

This draft: April 2009

Abstract

We analyze asset-backed commercial paper conduits which played a central role in the early phase of the financial crisis of 2007-09. Using a novel data set, we document that commercial banks set up conduits to securitize assets *without* transferring risks to outside investors. We find that banks achieved this by providing credit and liquidity guarantees to conduits. Consistent with the implied lack of risk transfer, we show that investors in conduits have had almost no losses during the crisis in spite of deteriorating quality of the collateral backing conduits. The guarantees to conduits were designed to avoid capital requirements and banks facing more stringent capital requirements – commercial banks – were more likely to set up conduits and do so with full guarantees. Thus, we interpret conduits as a form of regulatory arbitrage that allowed banks to take on exposure to tail risks that were systemic in nature. Consistent with such a risk-taking motive, we find that banks with more exposure to conduits had lower stock returns and greater widening of credit default swap spreads around 9 August 2007, the date of freeze in the asset-backed commercial paper market and inception of the financial crisis.

¹ Authors are grateful to Matt Richardson and faculty members at Stern School of Business, New York University for extended discussions on the topic and to research staff at Moody's and Fitch Ratings for detailed answers to our queries on off-balance sheet bank vehicles.

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1. Introduction

A defining feature of the ongoing crisis has been the revelation of “tail” (rare) natured, systemic risks undertaken by financial institutions. One such risk strategy, namely setting up of asset-backed commercial paper (ABCP) conduits, in fact ignited the financial crisis.

Though delinquencies on subprime mortgages had been rising through most of 2006, the financial crisis showed its first signs only in the Summer of 2007. On July 31, 2007, two Bear Stearns hedge funds that had invested in subprime mortgages filed for bankruptcy. A third Bear Stearns hedge fund blocked investors from withdrawing money. In the week to follow, more news of problems with subprime mortgages hit the markets. On August 7, 2007, BNP Paribas halted withdrawals from three investment funds and suspended calculation of the net asset values:⁴ *“[T]he complete evaporation of liquidity in certain market segments of the US securitization market has made it impossible to value certain assets fairly regardless of their quality or credit rating... Asset-backed securities, mortgage loans, especially subprime loans don't have any buyers... Traders are reluctant to bid on securities backed by risky mortgages because they are difficult to sell on... The situation is such that it is no longer possible to value fairly the underlying US ABS assets in the three above-mentioned funds.”*

This announcement had a profound effect on the asset-backed commercial paper market. ABCP debt is short-term debt issued by off-balance sheet “conduits” of large banks. Apparently investors in ABCP debt, primarily money market funds, became concerned about the collateral backing their debt. These investors could no longer be

⁴ Source: “BNP Paribas Freezes Funds as Loan Losses Roil Markets”, Bloomberg.com, August 9, 2008.

guaranteed that there was minimal risk and they stopped rolling over their ABCP debt on August 9, 2007. The interest rate on overnight ABCP debt rose from a benign 10 basis points over the Federal funds rate to over 150 basis points within one day of the announcement (see Figure 1). As a result, the sponsor banks had to effectively take assets back onto their balance-sheets. But, given that conduits held long-term investment with little liquidity, the banks needed to raise new financing for these assets. This raised concerns about counter-party risk amongst banks and caused inter-bank lending rates to shoot upwards. The crisis caused by the freeze in ABCP debt truly took hold as the European Central Bank pumped 95 billion Euros in overnight lending into the market to respond to the sudden demand for financing from banks.⁵

We provide an anatomy of ABCP conduits and analyze why they played such a central role in the early phase of the ongoing crisis. We document that commercial banks used conduits to reduce capital requirements, while taking on exposure to tail, systemic risks. Indeed, we show that conduits represent securitization *without* risk transfer since sponsoring banks provided credit guarantees to conduits, effectively creating hidden debt with recourse. Finally, we show that for banks with significant conduit exposure relative to their equity capital this recourse contributed significantly to adverse stock price and credit risk changes on August 9, 2007. Overall, we view the ABCP conduits as providing an isolated laboratory for viewing and analyzing how banks manufactured systemic risk exposures.

Conduits are independent shell companies sponsored by large financial institutions. On the asset side, conduits hold financial claims such as trade receivables,

⁵ A timeline of critical events during the early phase of the crisis (March 2007 to October 2007) is contained in Appendix I.

credit card receivables, and mortgages. On the liabilities side, they issue short-term ABCP debt. Before the ongoing crisis, conduits were an important source of short-term financing for commercial banks with ABCP outstanding of US\$1.4 trillion in June 2007.⁶

Using a novel hand-collected dataset on the universe of conduits from January 2001 to December 2008, we find that almost all conduits have credit guarantees by large financial institutions. The credit guarantees effectively insure investors in a conduit against losses on their investment. These credit guarantees distinguish conduits from traditional forms of securitization, such as pass-through securities or Collateralized Debt Obligations (CDOs), in which credit risks are fully transferred from banks to other investors. We emphasize that credit guarantees to conduits are explicit commitments, not a voluntary form of implicit recourse as sometimes offered in other securitizations. One benefit from the perspective of the provider of the credit guarantee is that ABCP debt could attract the highest short-term rating and thereby attract money-market funds and other such investors.

The other benefit is that assets covered by a credit guarantee have much lower capital charges, specifically either zero capital requirements or capital requirements that are 90% smaller than the capital requirements for holding the same assets on the balance sheet. To understand, this form of regulatory arbitrage of capital requirements, it is helpful to compare credit guarantees that trigger capital charges with credit guarantees that do not. Credit guarantees that trigger capital requirements are called *credit enhancement* and guarantee payoffs to investor independent of underlying asset value.

⁶ While other significant examples of securitization without risk transfer exist, most notably the holdings of AAA-rated mortgage-backed tranches (as we discuss below), there is no systematic data available on these holdings of different banks and over time.

Credit enhancement is effectively a full insurance for investors in conduits and regulators therefore impose the same capital requirements as if the assets are on the balance sheets. Credit guarantees that do not have capital requirements are called *liquidity enhancement* and guarantee payoffs to investors conditional on the underlying asset value. Liquidity enhancement is partial insurance for investor in conduits and regulators therefore impose lower capital requirements relative to assets on the balance sheet.

However, the distinction between credit and liquidity enhancement depends on the conditionality of the liquidity enhancement. If the liquidity enhancement is structured such that the insurance is upheld in almost all states of the world, then liquidity enhancement is effectively equivalent to credit enhancement. In fact, financial institutions structured liquidity enhancement in precisely this way. Specifically, financial institutions committed to repay investors, as long as the assets in the conduit had not defaulted. Default was defined as a function of slow-moving variables such as delinquency rates or credit ratings. At the same time, conduits only issued very short-term liabilities such as ABCP debt with median maturities of one to four days. Given that conduits only invested in relatively safe assets, the combination of short-term financing and liquidity enhancement effectively generated an unconditional credit guarantee for investors. Importantly, the enhancements left sponsoring financial institutions exposed to the tail risks that relatively safe pool of assets experiences default or that commercial paper funding dries up, both risks being primarily of systemic or economy-wide nature.⁷

⁷ Even though in theory assets could default before commercial paper matured, in practice the opposite was almost always the case. We believe that this type of ‘almost always’ structure is a defining feature of regulatory arbitrage. By labeling liquidity enhancement as a conditional guarantee but structuring it as an unconditional guarantee, banks achieved lower capital requirements without changing their risk exposure.

We further test the extent of risk transfer by examining whether investors could rely on the credit guarantees offered by financial institutions during the financial crisis. We take the perspective of an investor that was holding ABCP debt at the start of the financial crisis and examine whether the investor suffered losses by not rolling over ABCP debt. Using announcement data from rating agencies, we identify all conduits that withdrew their rating or were downgraded in the period from January 2007 to December 2008. We find that almost all investors were able to exit conduits without any losses. Only investors in 5 out of 261 conduits, or 3.4% of total ABCP outstanding, suffered losses due to the lack of credit guarantees from financial institutions. We interpret this as ex post evidence that banks structured conduits to avoid capital charges while manufacturing tail risk exposures.

We also examine the type of financial institutions that sponsored conduits. We find that the largest group of conduit sponsors is commercial banks which manage \$920 billion, or 73% of conduit assets. The remainder is distributed between structured investment groups, financial guarantors, investment banks, insurance companies, and financial guarantors. We also examine the structure of guarantees provided to conduits and find that commercial banks are more likely to provide solely liquidity enhancement than other financial institutions. This evidence suggests that financial institutions with the most stringent capital requirements were more likely to set up conduits.

As a final piece of our description of conduit activity, we analyze the growth of ABCP across countries and over time. We note that before the ongoing crisis only one country, Spain, had imposed similar capital charges for assets in conduits and assets on balance sheet, and we find that Spanish banks did not sponsor conduits. We further note

that US regulators had extensive deliberations whether to impose larger capital requirements on liquidity enhancement feature of conduits. In 2001, the energy company Enron went bankrupt, partly because of its off-balance sheet vehicles which were similar to conduits, and regulators discussed whether to bring conduits back on the balance sheet. Yet, in April 2004 US regulators decided to impose a 10% capital charge for liquidity enhancement instead of bringing assets back on the balance sheet. Among market participants the decision resolved the uncertainty around capital charges and conduits more than doubled in size in the following three years (see Figure 2). The growth was particularly strong in Europe, where regulators maintained a zero capital charge (with the exception of Spain).

Next, to show how conduits contributed to the early phase of the crisis in August 2007, we examine the impact of exposure to conduits on bank performance right at the start of the financial crisis. We find that commercial banks with larger exposure to conduits had larger declines in stock returns (see Figure 3 for a graphical illustration of this relationship) and greater widening of credit default spreads after the ABCP market froze on 9 August, 2007, a relationship that is absent in the immediately preceding period. In terms of economic magnitudes, over a three-day window, we find that bank with high exposure to conduits (e.g. Citibank) experience lower stock returns of 1.5 percentage points and an increase in CDS spreads of 4.3 basis points relative to banks with low exposure (e.g. Wells Fargo). These results are robust to using alternative measures of conduit exposure and controlling for a large set of observables bank characteristics. We interpret this as evidence that banks used conduits to take on systemic risk, which materialized in August 2007.

We also analyze the economic importance of conduits. We find a larger effect of conduit exposure on returns when we expand the event-window to one month. To test for omitted variables, we examine the effect in the months before the ABCP market freeze and find no relationship between conduit exposure and returns. We estimate that the 30 largest banks reduced equity capital by \$64 billion due to the use of conduits. However, the relative importance of conduits varies significantly across banks with some banks having exposure of more than 100% of their equity capital.

Finally, we examine the ex-ante risk taking incentives of banks by examining profits generated by conduits. Using data from two large banks, we estimate that bank sponsors were earning profits of about 10 basis points on investments in conduit assets. In contrast, we estimate that banks would have made a loss of 30 basis points if they had financed the assets on their balance sheets. Hence, even though capital requirements would not have covered all bank losses, they possibly could have discouraged banks from setting up conduits in the first place.

While our evidence on the effect of conduit exposures on bank performance is necessarily ex post, when combined with evidence on the structural features of conduits and our estimation of conduit profits, we find it unlikely that these structures were efficient from an ex-ante perspective. Conduits are well-diversified across asset classes, regions, and asset originators and, as a result, banks that sponsored conduits took on primarily systemic risk. It is possible that the tail nature of such systemic risk was ignored by management due to weak corporate governance and short-term oriented executive compensation - a phenomenon which itself may have been the result of deeper

underlying causes such as increased competition in traditional banking activities and the moral hazard due to government guarantees.

The remainder of this paper is organized as follows. Section 2 presents the theoretical background for understanding securitization without risk transfer and related literature. Section 3 presents the institutional background of ABCP conduits. Section 4 discusses our data, descriptive statistics and results on the lack of ex ante and ex post risk transfer to ABCP investors. Section 5 relates the performance of banks during the crisis to their ABCP exposure. Section 6 discusses the economic importance and risk-taking incentives of banks. Section 7 concludes.

2. Conceptual background and related literature

To understand the origins of conduits, it is useful to start with the originate-to-distribute model which became the hallmark of modern banking in the last few decades. In traditional banking, banks held on to the loans they originated while performing the role of delegated monitoring and screening on behalf of depositors (Diamond, 1984). Hence, as shown in Figure 4, bank balance-sheets had loans in assets and deposits and equity capital in liabilities. Since deposits are generally insured, equity capital may be restricted to some minimum level through prudential capital requirements.

In modern banking, this traditional model underwent a fundamental change. Now, banks originate loans and then distribute them to outside investors (Figure 5). In particular, banks began transferring financial assets, such as mortgages, trade receivables, consumer loans, corporate loans, and consumer loans off their balance sheets into separate legal entities called structured purpose vehicles (SPVs), of which ABCP

conduits are one example. SPVs own the financial assets and issue asset-backed securities to finance their liabilities. In practice, asset-backed securities are often structured using several layers of tranches with higher tranches having priority over lower tranches in case of default of the underlying assets. This process is often referred to as securitization and can improve the safety of the financial system by allocating the financial risks to investors that are best able to hold those risks (Duffie, 2007). Financial system regulators have long recognized the benefits of securitization and provided incentives for financial institutions to shed risk and securitize assets. In practice, these incentives take the form of lower capital requirements if assets are securitized. This is beneficial from the bank's perspective, because issuing equity is generally costly relative to issuing debt.

The downside of securitization is that it reduces bank incentives to properly monitor and screen borrowers relative to the traditional banking model (see, for instance, Stiglitz, 1992). Indeed, Berndt and Gupta (2008), Dell'Ariccia et al (2008), Keys et al (2008) and Mian and Sufi (2008) provide evidence that securitization and credit risk transfer weakened bank monitoring incentives in the run-up to the financial crisis of 2007-09.⁸ However, this explanation cannot necessarily explain the large losses on securitized assets realized *within* the banking sector in the ongoing financial crisis. Krishnamurthy (2008) shows that 39% of securitized mortgages were held on bank balance sheets as of June 2008. In fact, many banks securitized assets but continued to

⁸ For example, Keys et al (2008) show that loans eligible for securitization had higher default rates relative to comparable loans not eligible for securitization. If outside investors are unable to assess loan quality properly and instead rely on information provided by banks or rating agencies, banks have an incentive to originate low quality loans and sell them at inflated prices.

hold the assets *after* securitization. For instance, a report commissioned by the Swiss Banking Regulator documents that UBS, one of the world largest banks by assets in 2006, actively sought to keep and purchase assets they had previously securitized. This evidence suggests that reduced monitoring incentives only provide a partial explanation for why banks decided to originate *and* hold securitized assets.

Our answer is that while securitization frees up costly equity capital that banks can deploy elsewhere, at the same time, banks no longer collect revenues from holding and managing risk. As a result, banks started to explore how to reduce capital requirements while still earning compensation for holding risk. In particular, banks used securitization not to transfer risks fully to end investors, but to retain the tail-natured, systemic part of the underlying risks. For example, in the case of ABCP conduits, banks sold credit and liquidity guarantees so that short-term debt investors in the conduits' assets had effectively close to full recourse to bank balance-sheets (Figure 6). In particular, if asset quality deteriorated, then end investors in securitization vehicles would not roll over debt, a form of a “run” in the shadow banking sector, and the asset risks would be brought back by banks on their balance-sheets (see Figure 7 and Covitz, Liang, and Suarez, 2009).

We call this most modern banking model as ‘securitization without risk transfer’. Evidently, securitization without risk transfer violates the defining characteristic of securitization, namely, the transfer of credit risk to outside investors. Securitization without risk transfer is consistent with banks wanting to risk shift (Jensen and Meckling, 1976) or pay out private profits at the expense of transferring hidden debt risks on to others (for example, taxpayers). Such incentives in turn might have arisen because of

because of heightened competition and thinning of margins in traditional banking business (Keeley, 1990, Gorton, 2009), short-termism on part of bank management and risk-takers (Gorton and Rosen, 1995), and the presence of government guarantees such as deposit insurance and the too-big-to-fail doctrine.

In terms of related literature, Gorton and Souleles (2005), Gorton (2008) and Brunnermeier (2009) provide descriptions of the shadow banking sector consisting of off-balance sheet vehicles. Our focus, in contrast to theirs, is to provide an in-depth analysis of the structures of ABCP debt, designed and realized risk transfer through conduits, and their contribution to the start of the ongoing financial crisis. Ashcraft and Shuermann (2008) present detailed description of the process of securitization of sub-prime mortgages, of which SIVs and conduits were one important component. Nadauld and Sherland (2008) study the securitization by investment banks of AAA-rated tranches – “economic catastrophe bonds” as explained by Coval et al (2008) – and argue that the change in the SEC ruling regarding the capital requirements for investment banks spurred them to engage in excessive securitization and this affected the quality of end mortgages. Nadauld and Sherland (2008) view the banks as warehousing these risks for further distribution.

Our view in this paper is more along the lines of Acharya and Richardson (2009), Acharya and Schnabl (2009) and Shin (2009) that banks engaged in conduits as a way of securitizing without transferring risks to end investors, and in particular, taking on tail-natured systemic risk of the underlying pool of credit risks. In analysis that is focused on the economic causes of increase in the propensity of the financial sector to take such tail risks (in one class of conduits – the “credit arbitrage” vehicles), Carey et al (2008)

provide evidence consistent with government-induced distortions and corporate governance problems (see also the arguments in Calomiris, 2009).

Akerlof and Romer (1993), in their paper on “Looting”, argue that a series of unusual crises in the 1980’s in the world (e.g., in Chile and the United States) featured high levels of risk-taking that ultimately left the government with significant costs. They contrast gambling for resurrection (Jensen and Meckling, 1976) from going for broke at society’s expense (*looting*) where the latter happens due to exploitation of poor accounting, lax regulation or low penalties for abuse, giving owners of firms an incentive to pay themselves out at the cost of the society and then default on their debt obligations. They attribute such behavior as mostly driven by explicit or implicit government guarantees of debt (deposit insurance, pension obligations, etc.), especially of influential firms (e.g., too big to fail financial institutions). They illustrate their theoretical arguments with specific examples during the Latin American debt crisis, the Savings and Loans debacle and the Texas real estate crisis that represent “a sophisticated version of having a limited liability corporation borrow money, pay it into the private account of the owner, and then default on its debt.”

There is a remarkable similarity between their argument (and examples) and the setting up of conduit structures that were (i) highly opaque (in that the exact structure of guarantees and risks taken by banks could be figured only from detailed analysis of each conduit’s rating reports, see Appendix III), (ii) exploiting loopholes in capital requirements, and (iii) undertaken mostly by commercial banks that had explicit deposit insurance.

Similarly, Desai et al (2007) argue that the *level* of corporate taxes increases corporate activity aimed at diversion, for example, through setting up of opaque shell companies in tax havens, whereas the *quality* of enforcement of tax collection improves overall governance. They view the government as an effective claimant on the firm and thus see its role as one of providing corporate governance through enforcement of (small) tax collection. Indeed, they argue that when enforcement is ineffective, a lower tax rate can lead to higher tax revenues. While we do not necessarily reach the conclusion that bank capital requirements should be weakened, structures such as the ABCP conduits illustrate that it is not just the level of capital requirements that matters, but also their effective enforcement.

3. Institutional Background

Conduits are shell companies that hold financial assets such as corporate loans, trade receivables, student loans, credit card receivables, or mortgages. Typically conduits only hold AAA-rated securities or unrated assets of similar quality. Conduits have no employees or headquarters and the conduit management is outsourced to an administrator, typically a commercial bank which set ups the conduit in the first place. The administrator runs the conduit's day-to-day activities which consist of managing the asset portfolio according to pre-specified investment guidelines and issues ABCP debt to finance the conduit assets. Often the administrator invests in assets which have been generated by the administrator itself or assets generated by clients of the administrator.

We start by examining the structure of credit guarantees to conduits. Conduits usually have two types of guarantees: credit enhancement and liquidity enhancement.

Credit enhancement is an unconditional guarantee to cover losses on conduit assets. The provider of credit enhancement commits to pay the difference between the face value and the market value of an asset. This is strongest available form of a credit guarantee and similar to overcollateralization in other securitizations. If a commercial bank provides credit enhancement to a conduit, the regulator treats the underlying assets as if the assets are held on the balance sheet. The reasoning is that the credit enhancement exposes the bank to the same risks as if the bank holds the assets on its balance sheet. In practice, most conduits had some credit enhancement but usually credit enhancement covered less than 10% of conduit assets.

Liquidity enhancement is a conditional guarantee to cover losses on conduits assets. The condition is that the underlying assets have to be performing. If the assets are performing, the provider of the liquidity enhancement commits to pay the difference between the face value and the market value of an asset. In practice, the provider can commit to repurchase assets at face value, provide cash to pay off maturing ABCP, or purchase ABCP directly if the conduit is unable to roll over maturing ABCP. Liquidity enhancement is weaker guarantee than credit enhancement because the provider only repays if the underlying assets are performing. For that reason, bank regulators assign liquidity enhancement lower risk weights than credit enhancement. For example, for most of Europe the risk weight for liquidity enhancement is zero, which means that the assets are treated as if they are completely off balance sheet.

However, in practice liquidity enhancement provides almost the same strength in terms of investor protection as credit enhancement. The reason is that the definition of a performing asset is such that there is plenty of advance warning before an asset is deemed

non-performing, while at the same time ABCP is very short-term such that ABCP investors can effectively invoke the liquidity enhancement. For example, for securitized assets an asset is typically deemed non-performing if the asset is downgraded below investment grade. In July 2007, conduits were holding about 1,500 different securities. On January 1st 2008, only 18 out of 1500 had been downgraded at all (and not necessarily below investment grade).

Hence, even in the midst of a financial crisis, in which conduits were unable to roll over ABCP because of investor concerns about underlying asset values, banks were required to pay off maturing ABCP due to liquidity enhancement. As discussed below, the liquidity enhancement was so strong, that every investor in ABCP conduits with full liquidity enhancement was fully repaid. Liquidity enhancement therefore contributed to the fragility of the financial system because investors had a strong incentive to require higher interest rates or stop rolling over commercial paper once they expected an increase in future defaults. Since ABCP investors typically had little knowledge about the underlying assets, the subsequent adverse selection may have caused a market breakdown.

Before the financial crisis, bank regulators recognized that liquidity enhancement was effectively a contingent liability equivalent to credit enhancement even though the capital requirements were sharply different. For example, in the aftermath of the Enron bankruptcy, which was partly caused by off-balance sheet vehicles similar to ABCP conduits, the regulators in the United States discussed whether to impose the same capital requirements for liquidity enhancement as for assets held on the balance sheet. After two years of deliberations, in April 2004 the regulator increased the risk weight for liquidity

enhancement from 0% to 10%. A number of industry publications described this ruling as an important decision that removed uncertainty surrounding ABCP conduits and effectively maintained the preferential treatment of liquidity enhancement relative to on-balance sheet financing.

Around the same time, the Basel II accord proposed new capital requirements for liquidity and credit enhancement. Depending on the approach, the new capital requirements would either significantly increase risk weights for liquidity enhancement or eliminate the differential treatment of credit and liquidity enhancement. However, both for European and US banks the last financial statements before the financial crisis computed capital requirements still according to Basel I rules. Moreover, Basel II gave large banks more autonomy in computing their capital requirements based on internal models, so many banks expected to see reduction in capital requirements even after special treatment of liquidity enhancement was eliminated.

From a contracting point of view, conduits may be efficient because the guarantees ensure that banks have proper incentives for screening and monitoring assets in the conduit. This conduit structure therefore avoids the downside of the originate-to-distribute model of worsening incentives. The guarantees can therefore be viewed as a solution to the adverse selection problem between banks and investors (Calomiris and Mason, 2004). The reason may be that conduits reduce transaction costs from the perspective of an investor in ABCP debt – the creditor of the conduit. ABCP debt is a safe asset class because investors have both collateral and credit guarantees to satisfy their claims. In addition, ABCP debt has short maturities such that ABCP investors can react quickly to changes in the value of conduit assets. This may explain why ABCP

investors typically rely on rating agencies in monitoring conduits. In most states of the worlds, the credit rating is sufficient to satisfy the information needs of creditors.

However, in the rare state of the world in which ABCP debt appears risky, this lack of information can lead to a complete freeze. The same forces which reduce the ex-ante transaction costs may cause the market breakdown ex-post.

Hence, from an economic point of view there is no difference between keeping the asset on the balance sheet and selling an asset to a conduit while simultaneously providing a credit guarantee. In both cases, the risks remain with the bank because the bank has to cover credit losses in case of default. Even though assets are nominally securitized, there is no credit risk transfer from the bank to investors. Yet, almost all bank regulators required significantly lower capital charges on assets in conduits relative to asset on bank balance sheets. Conduits thus offered an opportunity for capital arbitrage in the sense that banks could reduce capital requirements while maintaining the same risk exposure.

The mechanics behind securitization without risk transfer are best described with an example. Suppose a financial institution has financial assets such as mortgages, corporate loans, or consumer loans with a face value of \$10 billion. Assuming the financial assets have full risk weights of 8%, the bank is required to hold \$800million of equity against these assets. Alternatively, the bank can set up an ABCP conduit to purchase the assets at face value. At the same time, the bank provides guarantees, so-called liquidity and credit enhancements, which guarantee ABCP investor to repurchase the assets at face value if the conduit is unable to roll over its debt. Assuming the liquidity enhancement is properly structured, the bank can reduce its capital requirement

to \$80m or even zero. Moreover, the guarantees ensure the highest rating by rating agencies and allow the banks to sell ABCP to other investors, typically money market funds and other investors in safe, short-term debt. By using the ABCP conduit, the bank effectively frees up equity of at least \$720m that it can use to satisfy capital requirements for other investment of up to \$9 billion. Hence, through the use of ABCP conduits the bank effectively doubles its balance sheet while keeping total equity constant.

However, now assume that investors expect a loss of 8% on the conduit assets, maybe because of a recession or an increase in the uncertainty about asset valuations. ABCP investors can simply stop investing in the conduit by not rolling over the ABCP. As a result, ABCP investors effectively exercise the guarantee provided by the banks. In this case, the bank now faces two problems. First, the maturity mismatch between conduit assets and conduit liabilities require the banks to raise new financing or sell other investment in order to be able to take back the assets on its balance sheet. Second, there is less equity to support losses on the conduit assets and other investments. The capital of \$800 million is supporting total assets of \$19 billion, which yields a capital ratio of 4.2%. This effective capital ratio is far lower than the 8% capital ratio targeted by regulators. Hence, ABCP conduits allows banks to increase short-term profits by increasing their effective leverage, but make them more vulnerable to credit risk because of lower effective capital ratios and a stronger maturity mismatch. The increase in risk exposure is particularly pronounced in a general economic downturn, because the diversification across different assets classes leads to exposure to systemic risk rather than idiosyncratic risk.

4. Data and Summary Statistics

Our empirical analysis centers on a novel dataset of conduits collected from the rating agencies Moody's, Standard & Poor's, and Fitch. All conduits have short-term debt ratings from at least one rating agency. Among the three large rating agencies, Moody's has the best coverage and the most comprehensive reports of conduits. We therefore use Moody's reports as our primary data source to construct a panel data set of conduits and use reports from other rating agencies as secondary data sources to verify and complement Moody's data set.

We collect all Moody's reports on conduits published in the period from January 2001 to October 2008. During this period, Moody's rated 938 conduits. The rating reports are typically three to five pages and contain information on conduit sponsor, conduit type, conduit assets, providers and structure of liquidity enhancement and credit enhancement, investor protection in bankruptcy, and other important conduit characteristics. Moody's publishes the first report when it publishes its first rating for a conduit and subsequently updates the reports annually for large conduits and less frequently for smaller conduits. For some conduits Moody's also publishes monthly monitoring reports. Monthly reports are typically one page and comprise updated information on conduit size, liquidity and credit enhancement, and conduit assets. In addition, Moody's publishes a quarterly spreadsheet that summarizes basic information based on the rating reports.

4.1. Data Collection

We begin with the universe of ABCP conduits collected from Moody's quarterly spreadsheet. Most conduits finance themselves in either US dollars or Euro and some larger conduits finance themselves in both currencies. If the funding operations are merged during the analysis period, we merge conduit backwards in order to get a consistent time series (79 out of 9536 observations). We drop conduits based in South Africa because these conduits are rated on a different scale and are relatively small (72 out of 9536 observations). We drop ABCP issued by Collateralized Debt Obligations because credit guarantees provided to ABCP of CDOs are structured differently and the rating agencies do not provide detailed information on these guarantees (292 out of 9536 observations). CDOs account for 4.3% of ABCP outstanding in January 2007.

For each conduit, we identify the sponsor and match the sponsor to the consolidated financial company (e.g., we match Citibank to Citigroup). We use several bank databases such as Bankscope and Osiris to identify sponsors. Once we identify a potential match, we verify the information using the company website. If we cannot identify a sponsor via Bankscope or Osiris, we conduct an Internet search. We can identify all sponsors via the Internet Search. Sponsors identified via the Internet Search are almost always small structured investment groups that are not listed in Bankscope or Osiris.

By far the largest group of conduit sponsors is large, well-known commercial banks. We identify the providers of liquidity and credit enhancement using the most recent Moody's Report before the financial crisis (before June 2007). In the case of commercial banks, the commercial bank typically provides liquidity enhancement directly and credit enhancement jointly with other providers, such as monoline insurers

and investment banks. In the case of sponsors other than commercial banks, the Moody's Report usually does not report the identity of the providers of liquidity and credit enhancement. Using this procedure, we can match all conduits operating in January 2007 or thereafter.

We match liquidity providers to sponsor characteristics using the Bankscope database. We first use the Bankscope database to construct a panel of the 300 largest banks as of January 2007. If a consolidated company and its subsidiaries have more than one entry in Bankscope, we only keep the consolidated company. We use the ISIN identifier to match Bankscope data to share price and stock return data from Datastream. If a bank does not have an ISIN identifier, we verify with the company website that the bank is not listed on a stock exchange.

We use Moody's Weekly Announcement Reports of Rating Changes from January 2007 to December 2008 to identify whether a conduit was downgraded or withdrawn during the analysis period. Among conduits that were downgraded and withdrawn, we search for an affirmative statement by Moody's that all outside investors were repaid prior to the downgrade or withdrawal. If there is no such affirmative statement we use announcements by the sponsor or other rating agencies to determine whether investors were repaid. If we do not find an affirmative statement that all investors were repaid, we assume that investors had to take possession of the assets and liquidate them themselves. We note that this coding procedure may overestimate the extent of investor liquidation because investors may have been repaid without a formal announcement by either the sponsor or the rating agencies.

4.2. Summary Statistics

Table 1 shows summary statistics for all conduits authorized to issues ABCP debt as of January 2007. There are 296 conduits with total ABCP debt outstanding of \$1.235 trillion. The average conduit size is \$4.2 billion and there is considerable heterogeneity in conduit size with a standard deviation of \$5.2 billion. The largest conduit has \$37.8 billion in ABCP debt and the smallest one has zero ABCP debt.

Regarding risk transfer, we find that 159 conduits (61% of ABCP debt) have full liquidity enhancement, 55 conduits (13% of ABCP debt) have full credit enhancement, 54 conduits (18% of ABCP debt) have extendible notes, and 28 conduits (7% of ABCP debt) are set up as Structured Investment Vehicles (SIV). From an ex-ante perspective, extendible notes conduits and Structured Investment Vehicles have weaker credit guarantees relative to conduits with liquidity or credit enhancements because either ABCP debt can be extended at the issuer's request (extendible notes) or credit guarantees do not cover the entire liabilities outstanding (SIV). We note that the main category is conduits with liquidity enhancement, which is consistent with the regulatory arbitrage hypothesis.

The largest conduit type is multiseller conduits with \$548 billion in ABCP debt. Multiseller conduits purchase assets from more than one seller. The assets are often not securitized and the sellers are usually clients of the conduit sponsor. The main asset types held by multiseller conduits are trade receivables (15%), securities (12%), auto loans (11%), credit card receivables (10%), and commercial loans (9%). The second-largest type is arbitrage conduits with \$213 billion in ABCP debt. Arbitrage conduits usually purchase securitized assets from many sellers. The main asset types held by

arbitrage conduits are residential mortgage loans (26%), collateralized loan obligations and collateralized bond obligations (21%), commercial mortgage loans (12%), and commercial loans (11%). The third-largest type is single-seller conduits with \$173 billion in ABCP debt. Single-seller conduits are often used by mortgage originators to warehouse assets before they are securitized. Almost all ABCP debt is issued either in US dollars (\$922 billion) or Euro (\$219 billion). The remainder is issued in Yen, Australian dollars, and New Zealand dollars.

Table 2 shows total ABCP debt per sponsor. We construct these data by aggregating ABCP debt at the sponsor level. We define a sponsor as a single consolidated company and we aggregate all ABCP debt at the holding level (e.g., we aggregate ABCP debt of Citigroup and Citibank). In total, there are 126 sponsors and average ABCP debt is \$9.8 billion.

The largest sponsor type is commercial banks. Commercial banks sponsor \$903 billion, or 73%, of ABCP debt. Commercial banks almost always provide liquidity and credit enhancement directly to conduits. The second largest group is structured finance groups with \$181 billion in ABCP debt. Structured finance groups usually do not have the financial strength to provide credit guarantees to conduits. Instead they purchase credit guarantees from other financial institutions. Unfortunately our data do not provide sufficient information to identify the provider of credit guarantees to structured investment groups. Other sponsors are mortgage lenders (\$71 billion), insurance companies and monoline insurer (\$14 billion) and investment banks (\$ 11 billion).

In terms of location, the majority of conduits are sponsored by financial institutions based in the United States with \$488 billion in ABCP debt. There is also a

large number of sponsors based in Germany and the United Kingdom with total ABCP debt of \$204 billion and \$195 billion, respectively. The remaining sponsors are based in Canada, Australia, Japan, and other European countries.

We believe the evidence in Table 1 and Table 2 shows that there was almost no ex-ante risk transfer from sponsors to outside investors. Most conduits have strong guarantees in the form of credit and liquidity enhancement from their sponsors, which were mostly large commercial banks with the necessary financial strength to provide the guarantee if called upon. To examine whether there was risk-transfer ex-post, we analyze conduit performance ex-post. In particular, we examine whether conduits repaid maturing ABCP debt in the one-year period after the start of the crisis. As discussed above, we use Moody's announcement to identify all instances in which ABCP investors were not repaid.

Table 3 presents the results. We show that all ABCP debt issued by conduits with full liquidity enhancement and full credit enhancement was repaid during the one-year period after the ABCP market freeze. Hence, not a single investor made a loss by investing in this type of conduits. We find this result striking given the sudden decline in ABCP debt.

For conduits with weaker credit guarantees such as extendible notes conduits and Structured Investment Vehicles we find that most investors were repaid. However, there are a few conduits that could not repay maturing ABCP debt and that were liquidated or are currently in liquidation. Assuming a recovery value of 50%, the total loss on these conduits is only 1.7% of total ABCP debt. Even assuming a 0% recovery value, the

maximum loss is 3.4% of ABCP debt. These findings suggest that there was little risk transfer ex-post.

Next, we analyze whether the structure of conduit growth is consistent with the regulatory arbitrage hypothesis. Table 4 shows the extent of risk transfer by sponsor type. Commercial banks set up 75% of conduits with full liquidity enhancement. For comparison, mortgage lenders set up 82% of conduits with extendible notes and structured investment groups set up conduits either with full credit enhancement (32%) or extendible notes (43%).

We believe this evidence is consistent with the regulatory arbitrage hypothesis. Commercial banks face the most stringent capital requirements and therefore have the largest benefits from circumventing capital charges. Hence, we expect commercial banks to be large sponsors and to be more likely to set them up with liquidity enhancement. This is precisely the pattern that we find. In contrast, mortgage originators and structured investment groups typically purchase credit guarantees from other large financial institutions which either face less stringent capital requirements (e.g. investment banks, monoline insurers). Hence, these sponsors are less likely to set up conduits with full liquidity enhancement relative to commercial banks.

5. Empirical Analysis

Our analysis suggests that large commercial banks set up conduits to take on tail risk without increasing their risk capital. As a result, we expect that banks with large conduit exposure were more adversely affected by the financial crisis. The difficulty in testing this hypothesis is that the financial crisis has many different aspects and ABCP

debt is only one of these aspects. Hence, if we observe that banks with conduit exposure have lower returns during the financial crisis, then this result may be driven by other bank activities that negatively affect stock prices and are correlated with conduit exposure. For that reason, it is difficult to establish a causal link between exposure to tail risks, such as ABCD debt, and subsequent stock returns.

To address this identification issue, we use the ABCP market freeze on 9 August 2007 in order to test for the impact of conduit exposure on banks. We believe the market freeze provides a good setting to answer this question for two reasons. First, the market freeze arguably ignited the financial crisis and there is little ambiguity about interpreting the event. On August 9 2007, ABCP investors stopped rolling over ABCP debt and this fact has been broadly established. Even though there was an understanding that the event was caused by the sub-prime crisis, the focus on this day was on ABCP debt. In contrast, some of the later events in the financial crisis, such as the bankruptcy of Lehman Brothers, are more difficult to interpret because they may have affected investor expectations in many different ways.

Second, our main analysis focuses on the narrow three-day window around August 9th. This short event window reduces that likelihood that the results may be confounded by other events that are happening around the same time. To the best of our knowledge, there is no other significant market event that affected the financial sector during this short period.

We start by first examining observable characteristics of banks with and without conduit exposure. We restrict our sample to the 300 largest financial institutions because only those institutions had the financial strength to support conduits. We restrict our

analysis to commercial banks based in Europe and the United States because these were the main sponsors of conduits and we want to make sure there is overlap in terms of observables. Our results are robust if we include banks outside Europe or other financial institutions (e.g., investment banks). For most of the analysis, we restrict the sample to banks with share price data (107 observations) and banks with credit defaults swap data (47 observations).

Table 5 shows the distribution of banks according to conduits exposure. We measure conduit exposure as ABCP outstanding relative to equity capital as of 1 January 2007. We sort banks into three groups: banks without conduits, banks with low conduit exposure, and banks with high conduit exposure. Consistent with our main hypothesis, we find that stock returns were lower for banks with higher conduit exposure. In fact, the data suggest that stock returns are monotonically decreasing in conduit exposure.

Comparing banks without conduits with banks with conduits, we find that banks in the first group are smaller in terms of assets and equity capital than banks in the second group. Moreover, banks without conduits have a higher equity ratio, more deposit funding, and less short-term debt funding than banks with conduits. Also, banks without conduits are more likely to be based in the United States relative to banks with conduits.

Comparing banks with low conduit exposure and banks with high conduit exposure, we find that the two groups of banks are fairly similar. Both low and high exposure banks are similar in asset size and equity capital. Banks with low conduit exposure have slightly higher equity ratios and finance less of their business with short-term debt relative to banks with high conduit exposure. Banks with low conduit exposure are more likely to be located in the United States than banks with high conduit exposure.

To control for difference in observable characteristics, we now turn the regression analysis. Our baseline specification is

$$R_i = \alpha + \beta \text{ConduitExp}_i + \gamma X_i + \varepsilon_i$$

where R_i is the cumulative stock return of bank i computed over the three-day period from August 8th to August 10th, ConduitExp_i is bank i 's conduit exposure, X_i are banks i 's observable characteristics and ε_i is an error term. We estimate the specification using robust standard errors to allow for correlation across error terms.

Table 6 presents the results. Column (1) shows that a one-unit increase in conduit exposure reduces the cumulative stock return by 2.6 percentage points. To fix ideas, a one-unit increase is approximately two standard deviations in the exposure variable or about the difference between the exposure of Citibank (high exposure) and Wells Fargo (no exposure). Column (2) controls for banks size with the natural logarithm of assets and the natural logarithm of equity. The coefficient of interest decreases to 1.4% but remains statistically significant. Column (3) adds controls for the equity ratio and the coefficient remains unchanged. Columns (4) and (5) add control variables for funding sources such as deposit funding and short-term debt funding and the results are unaffected. To control for geographic heterogeneity, Columns (6) adds indicator variables for the country of bank headquarters. Again, the coefficient of interest is unaffected and remains statistically significant.

We interpret these results as evidence that banks with higher conduit exposure were more negatively affected by the ABCP market freeze. We think that the estimated impact constitutes a lower bound of the realized impact because investors may have

underestimated the severity of the downturn or may not have been fully aware of credit guarantees provided to conduits.

To ensure that the results are not driven by outliers, we construct an alternative measure of exposure. We compute the mean exposure of all banks with positive exposure to conduits and divide the banks in two groups: banks with low exposure (below mean) and banks with high exposure (above mean). We estimate the baseline specification using indicator variables for banks with low exposure and high exposure. The omitted category is banks with no exposure.

Table 7 presents the results. Column (1) shows that returns of banks with high conduit exposure are 5.3 percentage points lower than returns of banks without conduit exposure. Column (2) finds that controlling for bank size reduces the coefficient to 2.0%. However, the point estimate remains statistically significant at the 5%-level. Columns (3) to (5) control for bank equity, share of deposits, and share of short-term debt. The results remain unaffected. Column (6) controls for geographic location and the estimated coefficient increases to 3.6 percentage points. These results show that banks with high exposure have lower stock returns during the ABCP market freeze relative to banks without exposure. Since high exposure is measured using an indicator variable, these results suggest that the impact of conduits on returns is not driven by outliers with very large exposure.

We also examine the impact of conduit exposure on bank debt. We estimate the baseline specification using as outcome variable the change in five-year Credit Default Swap (CDS) spreads. We compute the cumulative change in CDS spreads over the three-day period from August 8th to 10th. We restrict the analysis to banks with actively traded

CDS contracts, i.e. we omit all banks without CDS data and all banks for which CDS prices are constant in the week before the estimation window.

Column (1) of Table 8 shows that a one-unit increase in conduit exposure raises the CDS spread by 3.7 basis points. Column (2) controls for bank size. The coefficient slightly increases to 4.7 basis points. Columns (3) to (5) control for the equity ratio, deposit funding and short-term debt funding. The coefficient of interest is unaffected and remains statistically significant at the 1%-level. Column (6) controls for geographic heterogeneity. The coefficient is stable and marginally significant at the 10%-level. These results provide support for an adverse impact of conduit exposure on bank creditors. Again, the estimate may be a lower bound on the realized impact of conduit exposure because bank creditors may underestimate the effect during the analysis period. Moreover, bank creditors may benefit from implicit too-big-to-fail guarantees which may dampen the effect.

As discussed above, our results rely on the identifying assumption that there is no omitted variable that is correlated with conduit exposure and that directly affects stock returns or CDS spreads. We think this assumption is plausible because we use to a tight estimation window to isolate the impact of the ABCP market freeze. To check the robustness of this assumption, we also estimate the base-line specification for the pre-period. We use the results from this estimation to gauge whether conduit exposure is correlated with the outcome variables in the absence of a market event.

Table 9 presents the results using a window of 15 trading days before and 15 trading days after the market event. We compute the cumulative stock return in the three-day window around each day and estimate the baseline specification using the full set of

controls. Column (2) reports the coefficients on conduit exposure and Column (3) reports the standard errors of the coefficients. In the pre-period, all coefficients are close to zero and statistically insignificant. Hence, there is no evidence that conduit exposure is correlated with stock returns in absence of a market event. In the post-period, we find five dates with a significant effect of conduit exposure on stock returns. This finding suggests that stock returns of high exposure banks were more correlated *after* the ABCP market freeze. We note that this result is consistent with an interpretation that investors continued to revise their expectations about the impact of conduit exposure after the initial ABCP market freeze.

6. Economic magnitude and risk-taking incentives

We also examine the economic magnitude of the impact of conduits on banks. As discussed above, the estimates presented so far are probably an underestimate because of the short event window. We widen the estimation window around the ABCP market freeze to see whether the magnitude of the coefficient increases. However, we caution that the identification assumption becomes more tenuous because the estimation window also includes other events of the financial crisis. Hence, if conduit exposure is correlated with other activities that negatively affect stock returns, it is more likely that the coefficient on conduit exposure also picks up other effects. With this caveat in mind, we estimate the baseline specification using as outcome variable the return from August 1 to August 31, 2007.

Column (1) of Table 10 shows that a one-unit increase in conduit exposure lowers stock returns by 3.4 percentage points. Column (2) controls for the bank size. The

coefficient decreases to 2.3 percentage points but remains statistically significant. Columns (3) to (6) add controls for equity ratio, funding sources, and geographic heterogeneity. The results are unaffected and remain statistically significant. The estimated coefficient with all controls is 2.9 percentage points. This result suggests that the ABCP market freeze had adverse effects on bank shareholders and the estimated effect is economically significant over a longer estimation window.

To ensure that this result is not driven by omitted variables, we also estimate the impact of conduit exposure before August 2007. We estimate the baseline specification with the full set of controls for each month before the ABCP market freeze in 2007. Table 11 presents the results. We find that for all months before August 2007 the estimated coefficients are close to zero and the coefficients are statistically insignificant. This evidence suggests that the main results are not driven by omitted variables.

An alternative way to gauge the magnitude of the impact of conduit exposure is by quantifying the extent of regulatory arbitrage. As discussed, banks can reduce capital requirements by holding assets in conduits instead of holding assets on balance sheets. To assess the extent of 'missing capital', we compute the additional capital if conduit asset had been on bank balance sheet. Table 12 reports the 'missing capital' for the 30 largest conduits sponsors. We find that missing capital is 6% of total capital with considerable heterogeneity ranging from 1.7% to 103%. The bank with the largest exposure, Sachsen Landesbank, was the first large bank to be bailed out on 17 August 2007. Other banks with large exposure such as Westdeutsche Landesbank, and ABN Amro (later bought by Royal Bank of Scotland) also suffered large losses and had to be bailed out. Hence, for banks with large exposures, the conduit activities were large

enough to wipe out the entire bank capital. Banks with less exposure were able to withstand the initial losses, but were weakened as the financial crisis continued.

To quantify whether the conduits were profit-maximizing from an ex-ante perspective, we conduct a simple back-of-the-envelope calculation. Assuming a risk weight of 100%, banks could avoid capital requirements of 8% by setting up conduits relative to on-balance sheet financing. We assume that banks could finance debt at the riskless rate, which is consistent with the rates paid on ABCP debt (see Figure 1). Assuming an equity beta of one and a market risk premium of 5%, banks could reduce the cost of capital by $8\% * 5\% = 0.004$ or 40 basis points by setting up conduits.

It is difficult to estimate the profits generated by conduits because only a few banks report revenues from conduits. For example, Deutsche Bank reports in its annual report in December 2007 that conduits generated fees of Euro 6 million relative to a total commitment of Euro 6.3 billion. Similarly, Bank of New York Mellon reports in December 2006 revenues of \$3 million relative to a commitment of \$3.2 billion (Carey et al., 2008). Assuming that conduits have no costs and revenues are equal to profits, banks earned 10 basis points on each dollar invested in conduits.

Comparing the cost and benefit of conduits, it seems clear that conduits would not have been profitable if banks had been required to hold equity against their assets in conduits. In fact, banks would have made a loss of 30 basis points on each dollar invested. However, given that banks were not required to hold equity, they could make a profit of 10 basis points. Hence, it appears that the cost of capital was too low – possibly because of mispriced government guarantees for bank debt. We note that a capital requirement of 8% would not have been sufficient to cover all possible losses from

conduits. However, it may have been sufficient to discourage banks from setting up conduits in the first place.

7. Conclusion

We provided in this paper an anatomy of commercial banks' hidden debt, consisting of asset-backed commercial paper (ABCP) conduits, and explained how the structure of risk-sharing in these conduits left banks, or effectively, their creditors and the government, exposed to significant tail risks that were systemic in nature. We showed using a novel data set that end investors who purchased ABCP debt in these conduits have had little loss even when collateral backing the conduits deteriorated in quality, providing a proof that conduits were a form of securitization *without* risk transfer. We also found that the stock price and credit risk deterioration of banks around the money-market freeze of August 9, 2007 was linked to the extent of their conduit exposure relative to equity capital. While these results provide an important window in to a part of what caused the financial crisis of 2007-09, especially the early phase, ABCP conduit losses are still affecting the financial system. In fact, Royal Bank of Scotland announced a record loss of \$40bln in January 2009, followed by \$10bln loss of State Street, both of which were largely due to conduit exposures (in case of RBS, due to legacy assets from its acquisition of ABN AMRO).

It is thus important to get at the root causes of bank behavior that led to setting up of such risk-sharing structures and taking on of tail, systemic risks. Our evidence is consistent with banks wanting to risk shift (Jensen and Meckling, 1976) or pay out private profits at the expense of transferring hidden debt risks on to others (Akerlof and

Romer, 1993). These incentives, in turn, may have arisen because of thinning margins in traditional banking activities (Keeley, 1990, Gorton, 2009), short-termism on part of bank management, and more broadly, risk-takers (Gorton and Rosen, 1995) and/or the presence of government guarantees such as deposit insurance and the too-big-to-fail doctrine. More research is warranted to establish firm causality between these motivations and bank activities. Carey et al (2008) provide an interesting start in this direction by analyzing potential causes for setting up of one class of ABCP conduits, namely the “credit arbitrage” vehicles. While it is difficult to draw policy conclusions before these causes have been fully ascertained, our analysis makes three points clear: first, that the quality of enforcement of regulation (such as capital requirements) is as important, if not more, as the level of regulation; second, that greater transparency of off-balance sheet vehicles can help with improving the quality of such enforcement; and, third that future bank regulation should pay greater attention to tail, systemic risk of assets and asset vehicles rather than just the first and second moments of their risks.

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Figure 1: Spread of Overnight ABCP over Federal Funds Rate

This figure shows the yield on overnight asset-backed commercial paper over the fed funds rate from 8/1/2007 to 8/31/2008. The figure is based on yields data provided by the Federal Reserve Board. We note the large increase in the yield on 9 August 2007.

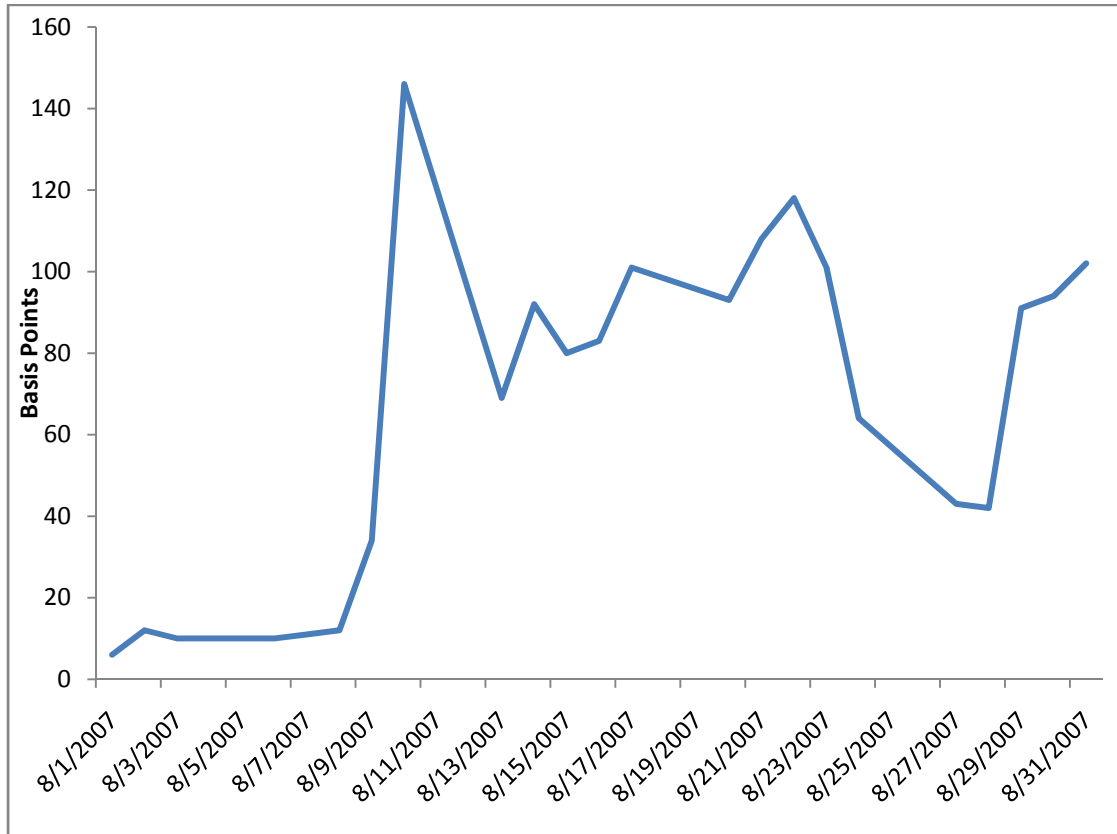


Figure 2: Rise and Collapse of ABCP Commercial Paper

This figure shows total asset-backed commercial paper outstanding in the period from January 2001 to February 2009. The figure is based on aggregate data provided by the Federal Reserve Board. The figure indicates the date of the Enron Bankruptcy (November 2001), the announcement of new accounting rules for liquidity enhancement provided to conduits (April 2004), and the start of the subprime crisis (August 2007).

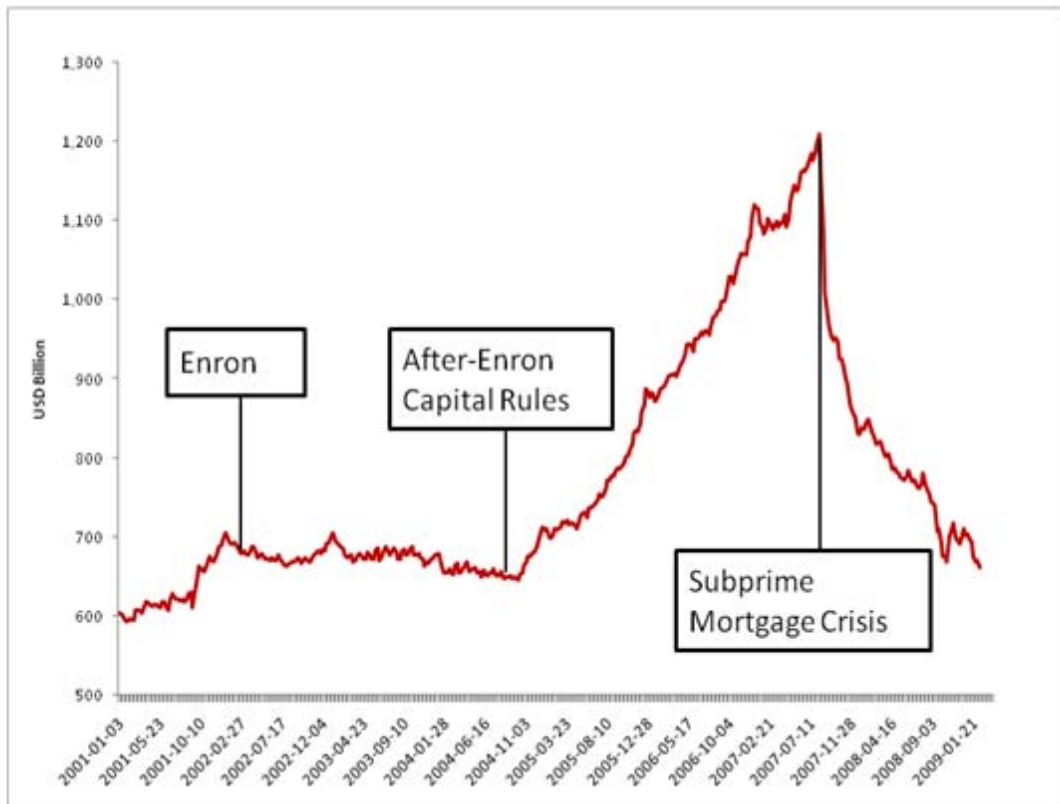


Figure 3: Stock Return and Conduit Exposure (August 8th-August 10th)

This figure shows the cumulative stock return over the three-day period from August 8th to August 10th (y-axis) and conduit exposure measured as ABCP/equity on 1/1/2007 (x-axis). The figure is restricted to banks with conduits.

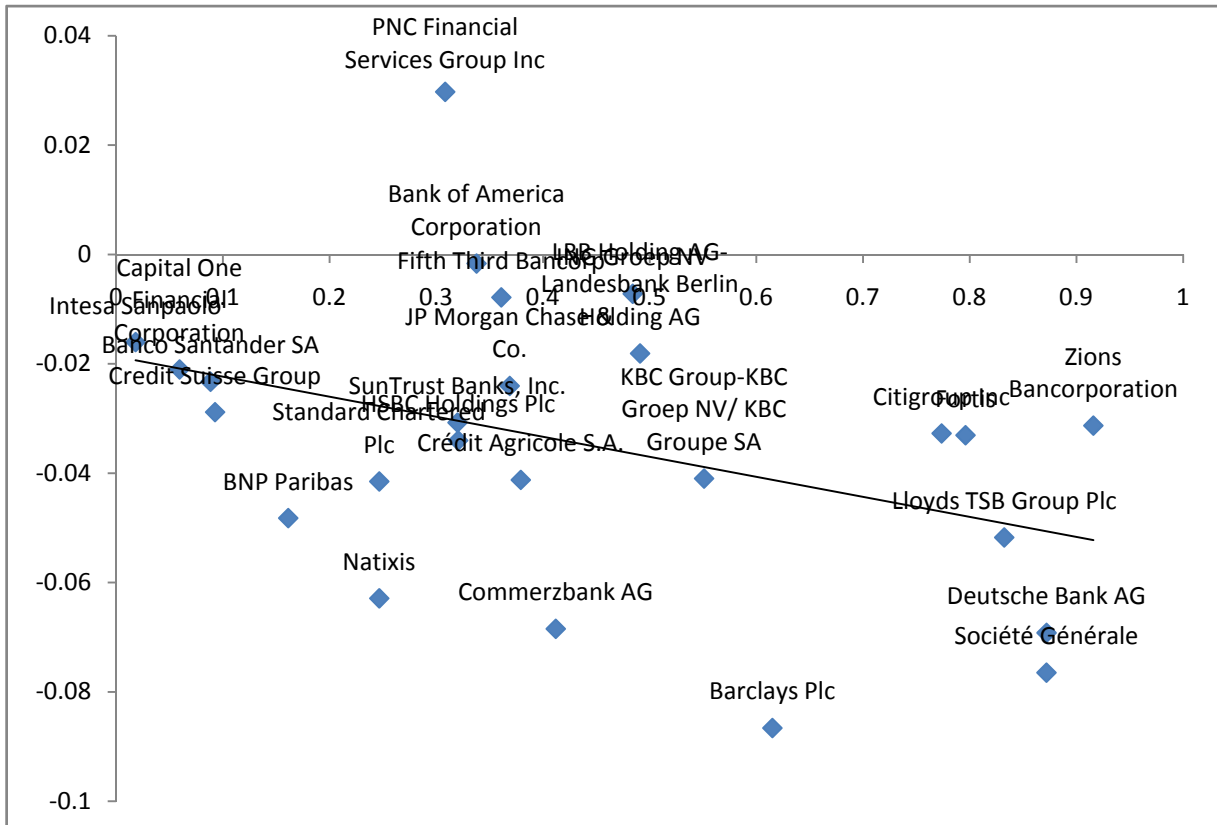


Figure 4: Traditional Banking

Bank Balance Sheet

Assets	Liabilities
Loans	Deposits
	Capital/Equity

Figure 5: Modern Banking – Securitization *with* risk transfer

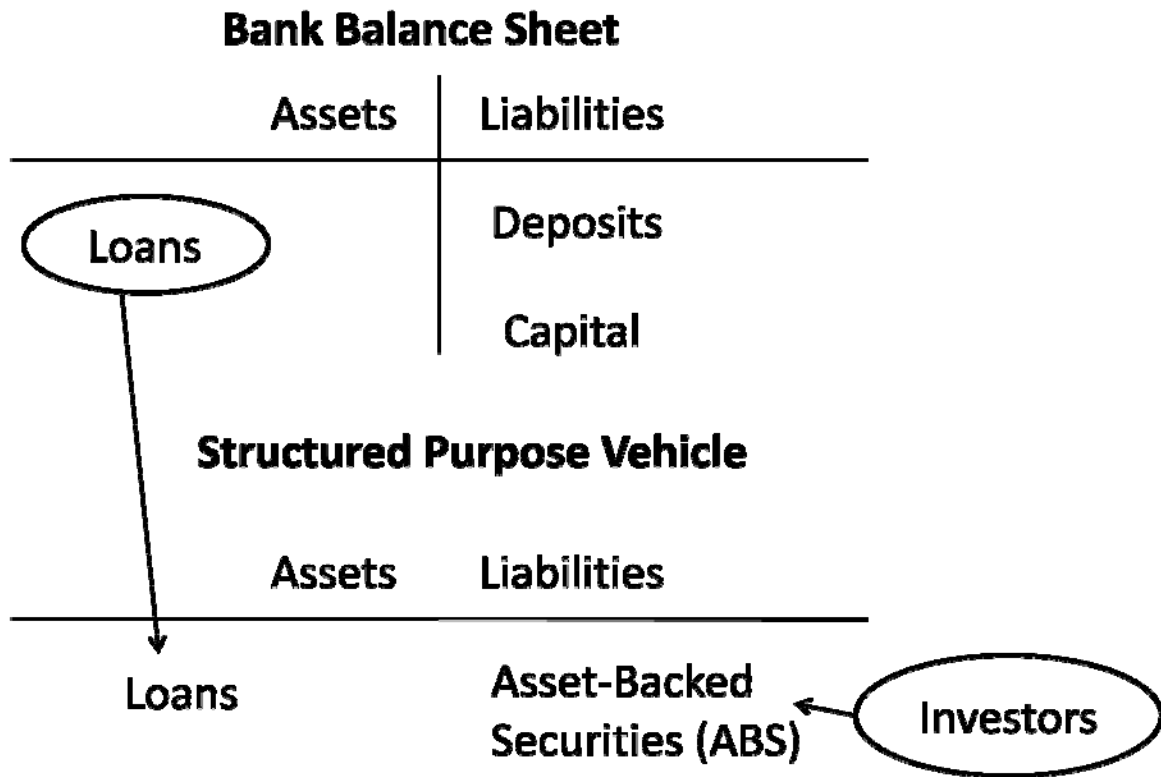


Figure 6: Modern Banking+ – Securitization *without* risk transfer using ABCP conduits

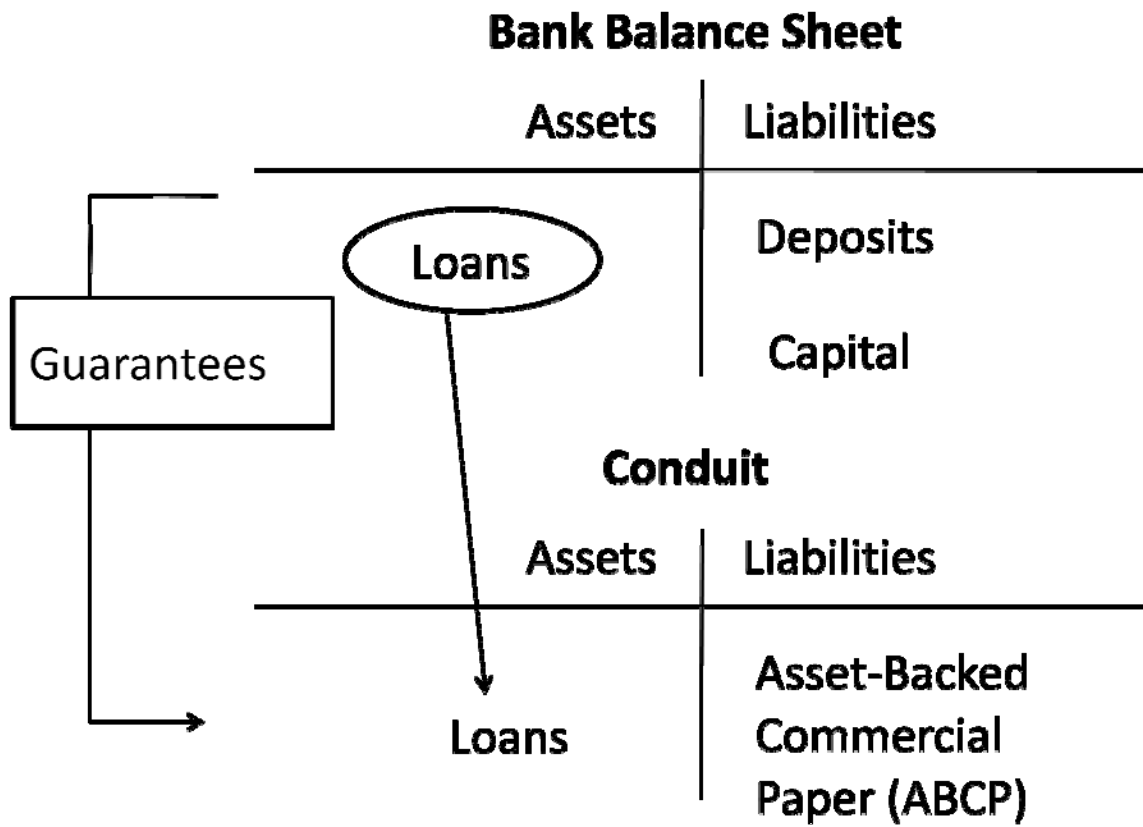


Figure 7: Modern Banking+ – Securitization *without* risk transfer using ABCP conduits: Investors return loans back to banks via guarantees

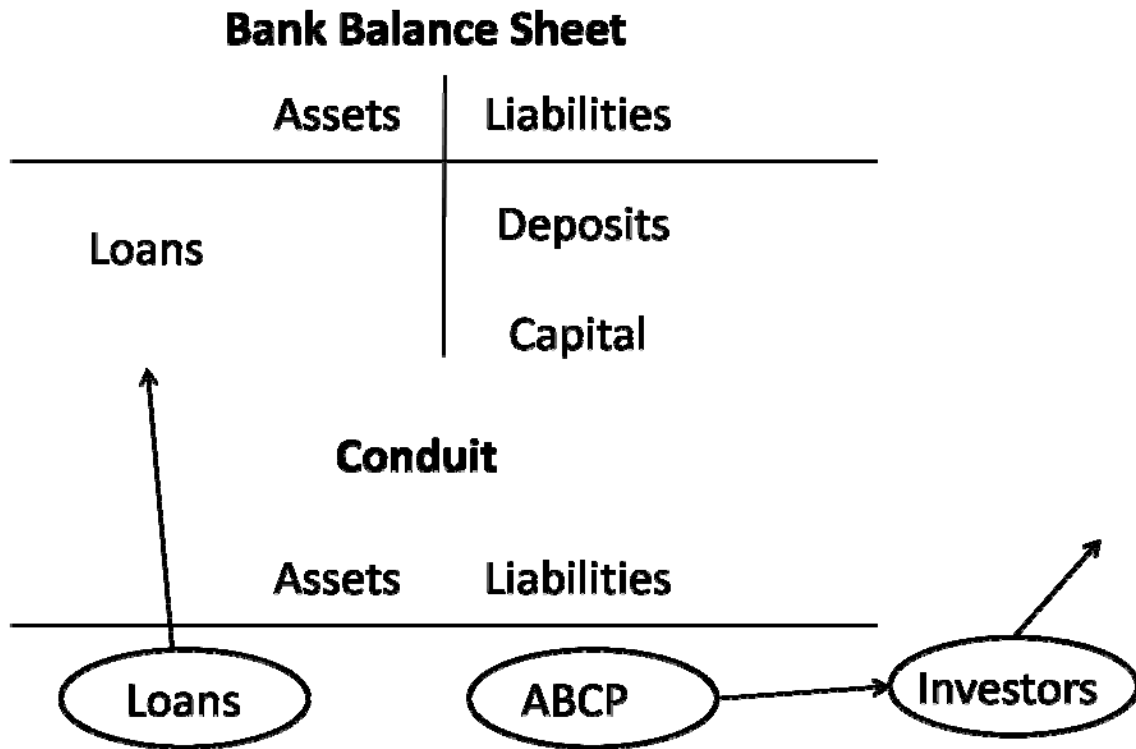


Figure 8: Growth in bank-sponsored ABCP

This figure shows the total asset-backed commercial paper outstanding by type of conduit for the period from 1/1/2001 to 10/31/2008. The figure is based on quarterly data by Moody's. 'Full Credit' are conduits with full credit enhancement, 'Full Liquidity' are conduits with full liquidity enhancement, 'Extendible Notes' are conduits with extendible notes, and 'SIV' are Structured Investment Vehicles.

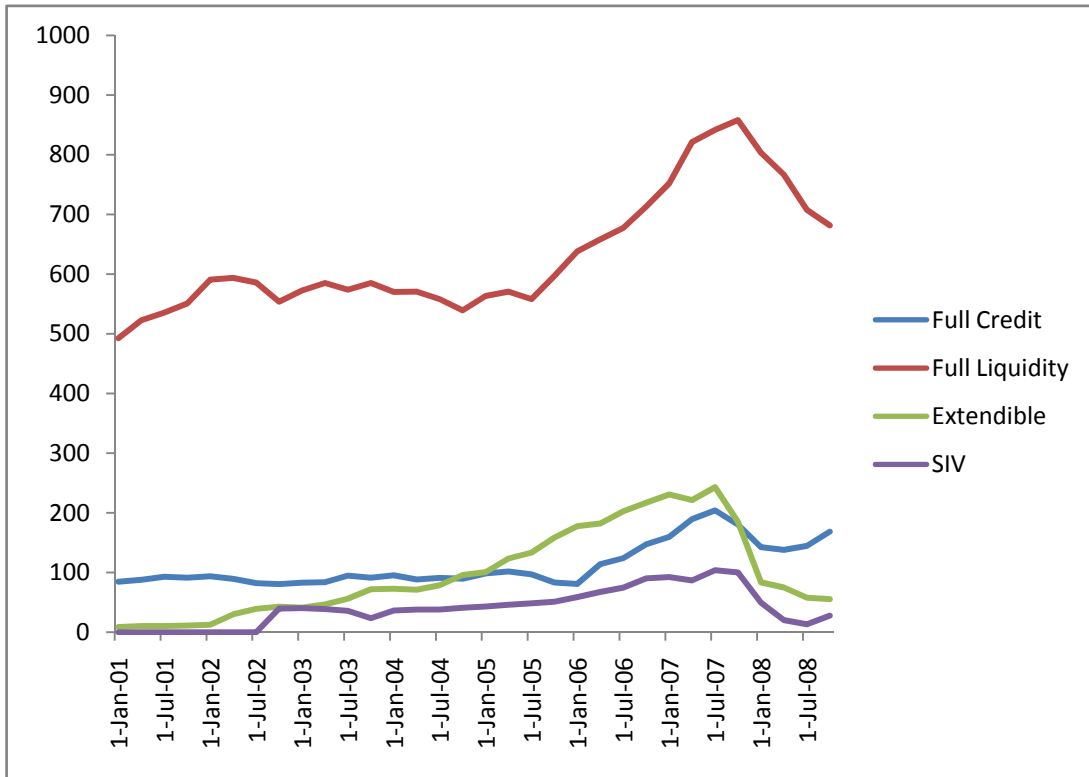


Table 1: Conduit Summary Statistics

This table includes all conduits that were rated by Moody's and authorized to issue Commercial Paper on 1/1/2007. We do not include conduits in South Africa (6 conduits) and CDOs authorized to issue Commercial Paper (35 CDOs). '# Programs' denotes the number of conduits. 'Size' denotes total outstanding ABCP in million USD. 'Mean' denotes the average size by program, 'Std' the standard deviation, 'Min' the minimum size, and 'Max' the maximum size. Conduits classified as full liquidity have liquidity enhancement covering all outstanding ABCP. Conduits classified as full credit have credit enhancement covering all outstanding ABCP.

	Market Total		Per Conduit (\$mn)			
	# Conduits	Size (\$mn)	Mean	Std.	Min	Max
All Conduits	296	1,235,281	4,173	5,129	0	37,872
Risk Transfer						
Full Liquidity	159	755,910	4,754	5,671	0	37,872
Full Credit	55	159,860	2,907	4,565	0	20,337
Extendible Notes	54	226,866	4,201	4,528	0	18,931
SIV	28	92,645	3,309	3,351	0	12,279
Type						
Multiseller	135	547,970	4,059	4,380	0	21,415
Single-Seller	63	173,549	2,755	3,964	0	18,931
Arbitrage	35	213,823	6,109	8,397	0	37,872
Hybrid	27	148,380	5,496	5,631	302	22,596
SIV	28	92,645	3,309	3,351	0	12,279
Other	8	58,914	7,364	6,323	2,373	20,337
Currency						
USD	234	972,977	4,158	4,627	0	22,596
EURO	33	219,959	6,665	8,424	0	37,872
YEN	16	22,941	1,434	2,014	0	5,976
AUD	12	19,253	1,604	1,302	142	3,944
NZD	1	151	151	0	151	151

Table 2: Sponsor Summary Statistics

This table comprises the universe of ABCP conduits as of 1/1/2007 (see Table 1 for detailed definition). We aggregate ABCP per sponsor and match the sponsors to the consolidated financial company (e.g. Citibank to Citigroup). ‘Structured Finance’ are structured finance and investment groups, ‘Mortgage Lender’ are mortgage originators and brokers, and ‘Insurance and Monoline’ are insurance companies and monoline insurer.

	Market Total		Per Conduit (\$mn)			
	# Sponsors	Size (\$mn)	Mean	Std.	Min	Max
All Programs	126	1,235,281	9,804	14,764	0	92,672
Sponsor Type						
Commercial Banks	64	903,291	14,114	17,853	0	92,672
Structured Finance	27	181,739	6,731	11,725	0	48,239
Mortgage Lender	16	71,120	4,445	6,131	26	18,931
Insurance & Monoline	3	14,118	4,706	3,914	284	7,727
Investment Banks	4	11,039	2,760	2,257	0	5,281
Country of Origin						
United States	68	488,535	7,184	14,608	0	92,672
Germany	15	204,103	13,607	11,593	1,024	38,320
United Kingdom	10	195,678	19,568	17,045	1,328	43,900
Japan	5	40,820	8,164	10,606	93	26,026
Canada	3	38,349	12,783	5,096	6,900	15,847
Australia	7	13,390	1,913	1,828	142	4,095
Other Europe	6		..			

Table 3: Performance of Credit Guarantees under Financial Distress

This table comprises the all conduits as of 1/1/2007 (see Table 1 for detailed definition). We compute the total value of ABCP conduits that were either withdrawn or downgraded in the period from 6/1/2007 to 11/30/2008. For each conduit that was withdrawn or downgraded, we verify whether ABCP investors were fully repaid using Moody's Program Reports. If we do not find an affirmative statement that ABCP were repaid, we assume that ABCP investors suffered a loss and had to liquidate assets at a recovery value of 50%.

	ABCP Total	Investor Loss (50% Recovery)		Investor Loss (0% Recovery)	
		Total	%	Total	%
All Programs	1,235,281	20,914	1.7%	41,828	3.4
Risk Transfer					
Full Liquidity	751,911	0	0.0%	0	0.0%
Full Credit	159,860	0	0.0%	0	0.0%
Extendible Notes	226,866	8,757	3.9%	17,514	7.8%
SIV	92,645	12,157	13.1%	24,314	26.2%
Sponsor					
Commercial Banks	903,291	2,139	0.2%	4,278	0.4%
Structured Finance	181,739	14,379	7.9%	28,759	15.8%
Mortgage Lender	71,120	4,396	6.1%	8,791	12.3%
Insurance & Monoline	14,118	0	0%	0	0%
Investment Banks	11,039	0	0%	0	0%

Table 4: Risk Transfer by ABCP Sponsor Type

This table comprises the universe of ABCP conduits as of 1/1/2007 (see Table 1 for detailed definition). The 'Market Total' shows total ABCP outstanding on 1/1/2007 per type of sponsor. The 'Risk Transfer' shows the breakdown of ABCP outstanding by type of risk transfer.

	Market Total		Risk Transfer			
	# Programs	Size (mio USD)	Full Liquidity	Full Credit	Extendible	SIV
Commercial Bank	64	903,291	74.8%	11.0%	7.8%	6.3%
Mortgage Lender	16	71,120	15.1%	0.0%	81.7%	3.1%
Structured Finance	27	181,739	6.4%	32.2%	43.1%	18.3%
Investment Banks	4	11,039	54.9%	0.0%	45.1%	0.0%
Insurance & Monoline	3	14,118	37.9%	6.8%	55.3%	0.0%
Other Financial	12	53,974	86.0%	1.0%	13.0%	0.0%

Table 5: Summary Statistics by Conduit Exposure

This table shows summary statistics by conduit exposure. We measure conduit exposure as the ratio of ABCP to assets. We sort banks in three groups: bank with no conduit exposure, banks with low conduit exposure, and banks with high conduit exposure. The latter two groups are below and above the mean of conduit exposure among banks with positive exposure, respectively. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. We measure ‘Stock Return’ is the total stock return in the three-day window from 7/8/2007 to 7/10/2007, ‘Exposure’ is the Asset-Backed Commercial Paper outstanding relative to Equity, ‘Log Assets’ is the natural logarithm of Assets, ‘Log Equity’ is the natural logarithm of Equity, ‘Equity Ratio’ is equity as share of assets, ‘Share Deposits’ is deposits as share of assets, and ‘Share Short-Term Debt’ is short term debt as share of assets. All variables are measure as of 1/1/2007. ‘United States’ is an indicator variable whether a bank is headquartered in the United States.

Sample:	Conduit Exposure			
	All	No	Low	High
Stock return Aug 8th - Aug 10th	-0.004 (0.052)	0.007 (0.055)	-0.028 (0.024)	-0.046 (0.026)
Exposure	0.169 (0.532)	0.000 (0.000)	0.248 (0.131)	1.199 (1.155)
Log(Assets)	3.961 (2.284)	3.154 (1.987)	6.379 (1.077)	6.325 (1.280)
Log(Equity)	1.355 (2.043)	0.67 (1.832)	3.671 (0.877)	3.025 (1.161)
Equity Ratio	0.091 (0.099)	0.101 (0.111)	0.076 (0.038)	0.043 (0.026)
Share Deposits	0.602 (0.208)	0.63 (0.223)	0.530 (0.112)	0.504 (0.145)
Share Short-Term Debt	0.073 (0.084)	0.05 (0.050)	0.122 (0.117)	0.167 (0.129)
US Indicator Variable	0.542 (0.501)	0.613 (0.490)	0.400 (0.507)	0.250 (0.452)
N	107	80	15	12

Table 6: Effect of Conduit Exposure on Stock Returns (August 8th – August 10th)

This table shows the effect of conduit exposure on stock return. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return over the three-day period from August 8th to August 10th 2007. We measure ‘Conduit Exposure’ as bank-sponsored ABCP outstanding relative to equity. Columns (2) to (6) include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity). All control variables are measures on 1/1/2007. Column (6) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Stock Return					
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure	-0.026 (0.007)**	-0.014 (0.004)**	-0.011 (0.003)**	-0.013 (0.003)**	-0.014 (0.003)**	-0.015 (0.004)**
Log(Assets)		-0.007 (0.005)	-0.022 (0.008)**	-0.024 (0.008)**	-0.027 (0.009)**	0.005 -0.015
Log(Equity)		-0.004 (0.007)	0.012 (0.009)	0.013 (0.009)	0.015 (0.009)	-0.016 (0.015)
Equity-Assets Ratio			-0.099 (0.029)**	-0.103 (0.031)**	-0.137 (0.037)**	-0.006 (0.065)
Share Short Term Debt				0.066 (0.041)	0.063 (0.041)	0.039 (0.042)
Share Deposits					-0.027 (0.017)	-0.017 (0.026)
Constant	0.000 (0.005)	0.033 (0.015)*	0.079 (0.025)**	0.082 (0.026)**	0.111 (0.032)**	0.036 (0.042)
Country FE	N	N	N		N	Y
Observations	107	107	107	107	107	107
R-squared	0.068	0.277	0.289	0.297	0.303	0.359

Table 7: Effect of Conduit Exposure on Stock Returns (August 8th – August 10th)

This table shows the effect of conduit exposure on stock return. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return over the three-day period from August 8th to August 10th 2007. ‘High Exposure’ and ‘Low Exposure’ are indicator variables for exposure to conduits (see Table 5 for definition). Columns (2) to (6) include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity). All control variables are measures on 1/1/2007. Column (6) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Stock Return					
	(1)	(2)	(3)	(4)	(5)	(6)
High Exposure	-0.053 (0.009)**	-0.020 (0.009)*	-0.015 (0.009)	-0.021 (0.010)*	-0.020 (0.010)*	-0.036 (0.011)**
Low Exposure	-0.035 (0.009)**	0.001 (0.009)	-0.001 (0.009)	-0.003 (0.009)	-0.002 (0.009)	0.002 (0.010)
Short Term Debt-Assets Ratio		-0.007 (0.006)	-0.022 (0.009)*	-0.024 (0.009)**	-0.026 (0.009)**	0.01 (0.015)
Equity-Asset Ratio		-0.005 (0.007)	0.012 (0.010)	0.012 (0.010)	0.014 (0.010)	-0.022 (0.016)
Log(Assets)			-0.098 (0.032)**	-0.1 (0.033)**	-0.128 (0.038)**	0.018 (0.065)
Log(Equity)				0.071 (0.041)	0.066 (0.042)	0.062 (0.041)
Constant	0.007 (0.006)	0.031 (0.015)*	0.079 (0.027)**	0.079 (0.027)**	0.103 (0.033)**	0.021 (0.042)
Country FE	N	N	N	N	N	Y
Observations	107	107	107	107	107	107
R-squared	0.134	0.273	0.284	0.293	0.297	0.364

Table 8: Effect of Conduit Exposure on Credit Default Swap Prices (August 8th – August 10th)

This table shows the effect of conduit exposure on Credit Default Swap (CDS) prices. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have CDS available. The dependent variable is the change in the CDS price from August 8th to August 10th 2007. We measure ‘Conduit Exposure’ as bank-sponsored ABCP outstanding relative to Equity. Columns (2) to (6) include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity). All control variables are measures on 1/1/2007. Column (6) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Change in CDS Price					
	(1)	(2)	(3)	(4)	(5)	(6)
Conduit Exposure	3.862 (1.672)*	4.757 (1.713)**	5.061 (1.859)**	4.545 (1.632)**	4.465 (1.648)**	4.228 (2.510)
Log(Assets)		-2.369 (2.286)	-10.859 (7.784)	-12.989 (6.762)	-13.183 (7.015)	-10.699 (7.037)
Log(Equity)		1.676 (2.152)	10.165 (7.761)	11.633 (6.594)	11.853 (6.834)	9.562 (6.977)
Equity-Assets Ratio			-149.405 (124.476)	-166.482 (108.542)	-170.3 (111.488)	-168.902 (113.245)
Share Short-Term Debt				15.370 (9.381)	16.702 (8.959)	15.816 (9.387)
Share Deposits					3.006 (8.173)	5.723 (8.025)
Constant	0.016 (0.929)	9.009 (7.768)	42.69 (30.262)	50.538 (26.790)	49.589 (27.273)	40.651 (27.497)
Country FE	N	N	N	N	N	Y
Observations	47	47	47	47	47	47
R-squared	0.10	0.13	0.16	0.195	0.20	0.25

Table 9: Conduit Exposure and Stock Return Around Market Freeze (+/- 15 Trading Days)

This table shows the effect of conduit exposure on stock returns for the period around the event data of August 9th. For each day, we construct the window one day before and one day after and compute the stock return over the three-day period. We estimate the same regression as in Table 6 using the full set of controls. We report the estimated coefficient and standard error for the conduit exposure variable.

Trading Days +/- Event Date	Conduit Exposure Coefficient	Standard Error
-15	0.007	(0.004)
-14	-0.005	(0.006)
-13	-0.009	(0.006)
-12	-0.006	(0.005)
-11	0.001	(0.003)
-10	0.009	(0.006)
-9	0.001	(0.004)
-8	-0.002	(0.004)
-7	-0.006	(0.007)
-6	-0.001	(0.007)
-5	-0.001	(0.007)
-4	0.001	(0.007)
-3	0.002	(0.005)
-2	-0.001	(0.005)
-1	-0.009	(0.006)
0	-0.015	(0.004)**
1	-0.005	(0.004)
2	0.000	(0.002)
3	-0.010	(0.005)*
4	-0.022	(0.010)*
5	-0.020	(0.012)
6	-0.009	(0.012)
7	0.001	(0.010)
8	0.000	(0.003)
9	0.003	(0.003)
10	0.005	(0.007)
11	0.008	(0.003)**
12	0.000	(0.002)
13	-0.003	(0.004)
14	-0.010	(0.004)*
15	-0.006	(0.002)**

Table 10: Conduit Exposure and Stock Return Before and After Market Freeze (August 1st – August 31th)

This table shows the effect of conduit exposure on stock return in the month of August. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return over the period from August 1th to August 31th 2007. We measure ‘Conduit Exposure’ as bank-sponsored ABCP outstanding relative to equity. Columns (2) to (6) include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity). All control variables are measures on 1/1/2007. Column (6) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

	Dependent Variable: Stock Return					
	(1)	(2)	(3)	(4)	(5)	(6)
Exposure	-0.034 (0.007)**	-0.023 (0.005)**	-0.020 (0.006)**	-0.022 (0.008)**	-0.022 (0.008)**	-0.029 (0.009)**
Log(Assets)		-0.008 (0.009)	-0.027 (0.015)	-0.029 (0.017)	-0.029 (0.017)	-0.006 (0.025)
Log(Equity)		-0.002 (0.011)	0.018 (0.017)	0.019 (0.018)	0.019 (0.018)	-0.002 (0.026)
Equity-Assets Ratio			-0.123 (0.055)*	-0.122 (0.072)	-0.122 (0.072)	-0.058 (0.115)
Share Short Term Debt				0.084 (0.087)	0.084 (0.087)	0.029 (0.106)
Share Deposits				0.005 (0.037)	0.005 (0.037)	0.008 (0.052)
Constant	0.018 (0.007)*	0.051 (0.023)*	0.109 (0.044)*	0.107 (0.060)	0.107 (0.060)	0.009 (0.068)
Country FE	N	N	N	N	N	Y
Observations	107	107	107	107	107	107
R-squared	0.062	0.15	0.159	0.166	0.166	0.258

Table 11: Conduit Exposure and Stock Return in Months Before Market Freeze (1st January – 30th August)

This table shows the effect of conduit exposure on stock return in the months before the market freeze. We restrict the sample to commercial banks that (i) are among the 300 largest financial institutions (ii) are located in the Europe or the United States, and (iii) have share price data available. The dependent variable is the total stock return for the month indicated at the top of each column. We measure ‘Conduit Exposure’ as bank-sponsored ABCP outstanding relative to equity. All columns include control variables for the ratio of short-term assets to debt, the ratio of equity to assets, log(Assets) and log(Equity), and geographic controls. All control variables are measures on 1/1/2007. Robust standard errors are in parentheses below coefficients. * significant at 5%; ** significant at 1%

Month	Dependent Variable: Stock Return							
	Jan (1)	Feb (2)	Mar (3)	Apr (4)	May (5)	Jun (6)	Jul (7)	Aug (8)
Exposure	0.008 (0.012)	-0.006 (0.005)	0.003 (0.005)	-0.005 (0.009)	0.004 (0.010)	0.006 (0.008)	0.014 (0.011)	-0.029 (0.009)**
Log(Assets)	-0.026 (0.024)	-0.03 (0.018)	-0.033 (0.023)	-0.005 (0.024)	-0.042 (0.021)	-0.012 (0.021)	-0.037 (0.032)	-0.006 (0.025)
Log(Equity)	0.033 (0.024)	0.031 (0.018)	0.029 (0.024)	0.02 (0.023)	0.043 (0.021)*	0.01 (0.022)	0.043 (0.031)	-0.002 (0.026)
Equity-Assets Ratio	-0.058 (0.120)	-0.117 (0.082)	-0.134 (0.099)	0.016 (0.112)	-0.2 (0.110)	0.105 (0.078)	-0.098 (0.172)	-0.058 (0.115)
Share Short Term Debt	-0.036 (0.044)	-0.081 (0.041)	0.096 (0.050)	0.078 (0.072)	-0.064 (0.090)	0.064 (0.048)	0.012 (0.071)	0.029 (0.106)
Share Deposits	-0.053 (0.036)	-0.013 (0.028)	-0.005 (0.035)	-0.021 (0.046)	-0.055 (0.052)	0.071 (0.056)	0.057 (0.086)	0.008 (0.052)
Constant	0.08 (0.067)	0.092 (0.051)	0.168 (0.059)**	0.04 (0.066)	0.149 (0.059)*	-0.077 (0.050)	0.082 (0.092)	0.009 (0.068)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	107	107	107	107	107	107	107	107
R-squared	0.648	0.337	0.376	0.522	0.301	0.196	0.295	0.258

Table 12: Missing Capital

This table lists the 30 largest banks sponsors of ABCP as of 1/1/2007. For each bank, we compute the required capital assuming ABCP requires a capital charge of 8%, i.e. $ABCP * 0.08 = \text{Total}$. We also compute the 'missing capital' as a share of a bank's equity. We measure equity as Tier 1 Capital. If a bank does not report Tier 1 Capital, we multiply shareholder equity with the average Tier 1/equity shareholder ratio of banks that report both shareholder equity and Tier 1 ratio.

Name	Equity	ABCP	Missing Capital	
			Total	%
Citigroup Inc	90.9	92.7	6.7	7.3%
ABN Amro Holding NV	31.2	68.6	5.5	17.6%
Bank of America Corporation	91.1	45.7	3.7	4.0%
HBOS Plc	44.0	43.9	3.5	8.0%
JP Morgan Chase & Co.	81.1	42.7	3.4	4.2%
HSBC Holdings Plc	87.8	39.4	3.2	3.6%
Deutsche Bank AG	31.0	38.7	3.1	10.0%
Société Générale	34.1	38.6	3.1	9.1%
Barclays Plc	45.2	33.1	2.6	5.9%
Rabobank Group	34.8	30.8	2.5	7.1%
WestLB AG	9.5	29.9	2.4	25.1%
ING Groep NV	42.0	26.4	2.1	5.0%
Group Mitsubishi UFJ Financial Group	63.9	26.0	2.1	3.3%
Dresdner Bank AG	16.4	23.2	1.9	11.3%
Fortis	21.9	22.6	1.8	8.3%
Bayerische Landesbank	14.1	22.4	1.8	12.7%
State Street Corporation	6.5	21.9	1.6	24.3%
Crédit Agricole S.A.	39.5	19.5	1.6	3.9%
Hypo Real Estate Holding AG	6.1	18.9	1.5	24.8%
Lloyds TSB Group Plc	25.2	18.8	1.5	6.0%
Royal Bank of Scotland Plc (The)	52.3	15.8	1.3	2.4%
Royal Bank of Canada RBC	19.1	15.6	1.2	6.5%
KBC Group	17.6	12.6	1.0	5.7%
Sachsen Bank	1.0	12.5	1.0	103.8%
BNP Paribas	55.6	11.6	0.9	1.7%
Banque de Montreal-Bank of Montreal	14.8	11.5	0.9	6.2%
Wachovia Corporation	39.4	10.8	0.9	2.2%
Sumitomo Mitsui Financial Group, Inc	39.6	9.6	0.8	1.9%
Landesbank Baden-Wuerttemberg	14.1	8.4	0.7	4.8%
Total	1069.8	812.4	64.1	6.0%

Appendix I: Timeline of the Financial Crisis

<u>Date</u>	<u>Event</u>
5 Mar. 07	HSBC announces one portfolio of purchased subprime mortgages evidenced much higher delinquency than had been built into the pricing of these products.
22 June 07	Bear Stearns pledges a collateralized loan to one of its hedge funds but does not support another.
24 July 07	Countrywide Financial, largest US mortgage lender, slashed its full-year forecast after reporting a big fall in three-month earnings.
30 July 07	IKB announces that profit will be 'significantly' lower than forecast as a result of sub-prime mortgage exposures.
9 Aug. 07	BNP Paribas suspends calculation of asset values of three money market funds exposed to sub-prime and halts redemptions. AXA had earlier announced support for its funds.
9 Aug. 07	European Central Bank (ECB) injects €5 billion overnight to improve liquidity. Injections by other central banks.
17 Aug. 07	Sachsen LB receives bailout form German savings bank association
17 Aug. 07	Federal Reserve approves temporary 50 basis points reduction in the discount window borrowing rate, extends term financing, and notes it will 'accept a broad range of collateral.'
13 Sep 07	Bank of England announces that it will widen the range on banks' reserves targets within which they are remunerated at Bank Rate.
14 Sep. 07	Bank of England announces it has provided a liquidity support facility to Northern Rock.
17 Sep. 07	Following a retail deposit run, the Chancellor announces a government guarantee for Northern Rock's existing deposits.
18-20 Sep.07	Lehman Brothers, Morgan Stanley, Goldman Sachs and Bear Stearns announce mark downs on leveraged loan commitments.
19 Sept. 07	Bank of England announces plan to undertake a series of three-month auctions against a broader range of collateral (including mortgage collateral).
1-15 Oct 07	Citigroup, Deutsche Bank, Merrill Lynch and UBS report significant write-downs. Reports that JPMorgan and Bank of America will announce markdowns on leveraged loan commitments.
19 Oct. 08	Dutch Government injects €10 billion into ING.
21 Oct. 08	Federal Reserve Board announces the creation of the Money Market Investor Funding Facility.
24-25 Oct. 08	Ambac and MBIA, US monocline insurers, announce losses on credit derivatives portfolios.

Appendix II: Conduit Sponsors

This table comprises the universe of ABCP conduits as of 1/1/2007 (see Table 1 for detailed definition). For each sponsor, we list the country of origin, total ABCP, the total number of conduits and number of conduits per conduit type (P=partially supported, F=fully supported, and SIV=structured investment vehicle.)

Commercial and Investment Banks	Country	ABCP	#	P	F	SIV
Citigroup	US	92,672	16	8	1	7
ABN Amro	NL	68,575	9	8	1	0
Bank of America	US	45,691	12	7	5	0
HBOS	UK	43,900	2	2	0	0
JPMorgan Chase	US	42,714	6	5	1	0
HSBC	UK	39,426	6	5	0	1
Societe Generale	FR	38,639	7	6	0	1
Deutsche Bank	GE	38,320	14	10	3	1
Barclays	UK	33,070	3	3	0	0
WestLB	GE	29,946	6	4	0	2
Rabobank	NL	29,893	9	7	1	1
ING Bank	NL	26,417	4	4	0	0
Bank of Tokyo-Mitsubishi UFJ	JP	26,026	10	2	8	0
Dresdner Bank	GE	23,191	5	3	1	1
Fortis	BE	22,596	1	1	0	0
Bayerische Landesbank	GE	22,352	3	3	0	0
HVB	GE	22,263	5	4	1	0
State Street	US	21,855	3	3	0	0
Credit Agricole	FR	19,480	4	3	1	0
Hypo Real Estate	GE	18,931	1	0	1	0
Lloyds Bank	UK	18,782	1	1	0	0
Royal Bank of Scotland	CN	15,847	2	2	0	0
Royal Bank of Canada	CN	15,602	3	3	0	0
KBC Bank	BE	12,606	4	2	2	0
Sachsen Landesbank	GE	12,528	1	1	0	0
BNP Paribas	FR	11,647	6	6	0	0
Wachovia	US	10,791	2	1	1	0
Sumitomo Mitsui Banking Corporation	JP	9,618	4	1	3	0
Landesbank Baden-Wuerttemberg	GE	8,432	1	1	0	0
Commerzbank AG	GE	8,308	2	2	0	0
HSH Nordbank	GE	8,266	2	1	0	1
Bank of Nova Scotia	CN	6,900	1	1	0	0
Santander	ES	6,338	2	2	0	0
Natixis	FR	5,926	3	3	0	0

Sun Trust	US	5,700	1	1	0	0
Merrill Lynch	US	5,281	2	2	0	0
DZ Bank	GE	5,080	2	2	0	0
Zions First National Bank	US	4,607	1	1	0	0
Credit Suisse	CH	4,475	1	1	0	0
Bank of Montreal	US	4,287	2	0	0	2
Standard Chartered Bank	UK	4,278	2	0	0	2
Westpac Banking	AU	4,095	2	2	0	0
National Australia Bank	AU	4,034	2	2	0	0
Bear Stearns	US	3,681	1	1	0	0
Fifth Third Bank	US	3,618	1	1	0	0
PNC Bank	US	3,600	1	1	0	0
Bank of New York Mellon	US	3,085	2	1	1	0
Norinchukin Bank	JP	3,005	1	1	0	0
US Bankcorp	US	2,425	1	1	0	0
Mizuho Corporate Bank	JP	2,078	5	1	4	0
Lehman	US	2,077	1	1	0	0
Norddeutsche Landesbank	GE	1,895	1	1	0	0
Eurohypo	GE	1,870	1	0	1	0
IndyMac	US	1,801	1	1	0	0
Danske Bank	DE	1,796	1	1	0	0
Skandinaviska Enskilda	SW	1,719	1	1	0	0
Bankgesellschaft Berlin	GE	1,697	1	1	0	0
Capital One Bank	US	1,500	1	1	0	0
Bank Intesa	IT	1,365	1	1	0	0
Compass Bank	US	1,289	1	1	0	0
NMFM Lending	AU	1,105	1	1	0	0
Landesbank Hessen-Thuringen	GE	1,024	1	1	0	0
Unibank	US	353	1	1	0	0
ANZ Bank	AU	350	1	1	0	0
Commonwealth Bank of Australia	AU	326	1	1	0	0
Marshall & Ilsley Bank	US	302	1	1	0	0
Nomura Trust and Banking	JP	93	1	0	1	0
First National Bank of Omaha	US	88	1	0	1	0
Morgan Stanley	US	0	1	1	0	0
U.S. Central Federal Credit Union	US	0	1	1	0	0

Subtotal Banks		980,953	213	155	38	20
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Structured Finance and Investment Managers

Liberty Hampshire	US	48,239	8	0	8	0
BSN	UK	36,572	3	0	3	0
Stanfield Global	US	24,353	4	1	2	1

Hudson Castle	US	13,858	4	1	3	0
Gordian Knot	UK	11,210	1	0	0	1
KKR	US	8,723	2	2	0	0
BMO Capital Markets	US	7,241	1	1	0	0
Northcross Capital	UK	5,477	1	1	0	0
FBR Group	US	4,449	2	2	0	0
Alliance Capital	US	3,000	1	0	1	0
Cheyne	US	2,817	1	0	0	1
American Home Mortgage	US	2,470	1	1	0	0
Eiger Capital	US	2,343	1	0	0	1
Paramax Capital	US	2,001	1	0	1	0
Ameritrust Mortgage	US	1,909	1	1	0	0
Cairn Financial	UK	1,635	1	0	0	1
Solent Capital	UK	1,328	1	0	0	1
Avendis Financial Services	CH	1,269	1	0	0	1
Omni	US	967	1	1	0	0
QSR Management Limited	US	847	2	1	0	1
Promontory Asset Finance	US	625	1	0	1	0
Century Capital Markets	US	205	1	0	1	0
Titrisation et Finance Internationales		139	1	0	1	0
Lord Securities	US	62	1	1	0	0
International Asset Transactions	US	0	1	1	0	0
CDR Financial Products	US	0	1	1	0	0
Institutional Credit Partners	US	0	1	0	1	0

Subtotal SF		181,739	45	15	22	8
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Mortgage Lenders

Countrywide	US	18,305	2	2	0	0
Thornburg Mortgage	US	8,791	1	1	0	0
Long Beach Mortgage	US	4,230	1	1	0	0
TB&W Mortgage	US	2,907	1	1	0	0
Nationwide	US	2,603	1	1	0	0
Accredited Home Lenders	US	1,311	1	1	0	0
Centex Mortgage	US	1,205	2	2	0	0
New Century Mortgage	US	1,201	2	1	1	0
Newcastle	US	1,178	1	1	0	0
EMC Mortgage	US	1,166	2	2	0	0
Cedant Mortgage	US	586	1	1	0	0
Luminent Mortgage	US	326	1	1	0	0
Redwood Trust	US	88	1	1	0	0
Ahorro y Titulizacion	ES	26	1	1	0	0

Subtotal Mortgage		43,923	18	17	1	0
Other Financials						
AIG	US	7,727	2	0	2	0
MBIA	US	6,107	3	1	1	1
Prime Group	AU	3,338	3	3	0	0
National Education Loan Network	US	1,920	1	1	0	0
Transamerica	US	284	3	0	3	0
Liberty Financial	AU	142	1	1	0	0
Iowa Student Loan Liquidity Corporation	US	32	1	0	1	0
Subtotal Other Financials		19,550	14	6	7	1
Non-financial companies						
Ford	US	19,040	2	2	0	0
General Motors	US	16,428	4	4	0	0
General Electric	US	6,724	1	1	0	0
Chrysler	US	3,797	1	1	0	0
Glencore	CH	1,500	1	1	0	0
Wal-Mart	US	504	1	0	1	0
McDonalds	US	353	1	1	0	0
Dollar Auto	US	196	1	1	0	0
Subtotal Non-financials		48,542	12	11	1	0
Total		1,274,707	302	204	69	29

Appendix III: Nature of liquidity and credit enhancement provided to ABCP conduits

This table provides a description of liquidity and credit enhancement provided to ABCP conduits as of 1/1/2007. The information is collected from Moody's ABCP Review Reports.

	Program Name	Sponsor	US CP		Liquidity				Credit Enhancement			
			Authorized	Outstanding	As of	Type	Provider	Outs to Funding	Dilution coverage	Type	Support Amount or %	Provider
1	Grampian Funding LLC	HBOS Treasury Services plc	40,000 EUR	26,958	5/07	Liquidity agreements	Halifax plc	Bankruptcy of the relevant borrower		Letter of Credit	USD 1.2bln	HBOS Treasury Services plc
2	Sheffield Receivables Corporation	Barclays Bank PLC	26,260	21,415	4/07	Seller-specific revolving loans, asset purchase agreements	Barclays	Sheffield bankruptcy	Generally covered by liquidity	Letter of Credit	Minimum 325mln	Barclays
3	Amstel Funding Corporation	ABN AMRO Bank N.V.	35,000 EUR	20,361	6/07	Liquidity loan facilities	ABN AMRO	Bankruptcy of entity purchasing receivables	Fully covered	Letter of Credit, Yield reserve	Currently zero	ABN Amro
4	Morrigan TRR Funding LLC	HI Asset Management, Inc.	20,000	18,931	1/07	N/A				Total return swaps		HPFB (Hypo Public Finance Bank)
5	Ebury Finance LLC	BSN Holdings Limited / QSR Management Limited	20,000	17,162	10/06	N/A				Repo agreements, Total return swaps		
6	Concord Minutemen Capital Company LLC	The Liberty Hampshire Company, LLC	17,100	15,364	5/07	Asset-specific liquidity asset purchase commitments	Various	Concord bankruptcy	Fully covered	N/A		
7	Lexington Parker Capital Company, LLC	The Liberty Hampshire Company, LLC	25,320	15,314	4/07	Asset-specific liquidity asset purchase commitments	Various	Lexington bankruptcy	Fully covered	N/A		

8	Bavaria TRR Corporation	Bayerische Hypo-und Vereinsbank AG	20,000	15,256	2/07	N/A				Total return swaps		HVB (Bayerische Hypo-und Vereinsbank)
9	FCAR Owner Trust	Ford Motor Credit Company	17,000	14,650	3/07	Refunding loans, exiting lender loans	Various (50 total)	FCAR bankruptcy		N/A		
10	Crown Point Capital Company LLC	The Liberty Hampshire Company, LLC	14,980	13,920	4/07	Asset-specific liquidity asset purchase commitments	Various	Crown Point bankruptcy	Fully covered	N/A		
11	Scaldis Capital LLC	Fortis Bank S.A./N.V.	25,000	13,672	9/07	Pool-specific Multicurrency Liquidity Loan Agreements or Liquidity Asset Purchase Agreements	Fortis Bank S.A./N.V.	Scaldis bankruptcy		Letter of Credit	Varies dynamically with the composition of the asset portfolio	Fortis Bank S.A./N.V.
12	Atlantis One Funding Corporation	Rabobank Nederland	14,070	13,469	6/07	Cash collateral accounts	Rabobank	None		N/A		
13	CRC Funding LLC	Citibank, N.A.	15,000	13,249	6/07	Secondary Market Agreements for asset purchases by Citibank, seller-specific Asset Purchase Agreements supporting specific assets, and General Liquidity loan facilities provided under loan agreements	SMA and general liquidity are provided by Citibank N.A.; the APAs are provided by financial institutions other than Citibank	SMA and APAs have no conditions precedent to purchases		Total of up to \$2 billion consisting of a) a surety bond from Ambac Assurance Corporation (Ambac); b) a subordinated investment tranche and c) \$600,000 of common stock	10% of outstanding ABCP, excluding ABCP used to finance asset-backed securities (ABS) rated Aa2 or higher and assets supported by surety bond providers rated Aa2 or higher; minimum USD 250mln	Surety bond provided by Ambac

14	Thames Asset Global Securitization No. 1, Inc	Royal Bank of Scotland PLC	14,000	13,081	11/07	Asset-specific liquidity loan or asset purchase facilities, which cover 100% of the face value of ABCP outstanding; supplemental liquidity covering any shortfalls in interest on extended notes	The Royal Bank of Scotland plc	TAGS insolvency	Asset-specific	Standby Letter of Credit	5% of the amount of outstanding ABCP for each asset pool (other than highly-rated assets); denominated in the currency of each asset pool; fully cross-collateralised across all pools	
15	Barton Capital LLC	Société Générale	15,000	12,984	6/07	100% stand-by purchase facilities relating to each separate pool of receivables	Société Générale and other P1-rated institutions	Barton bankruptcy (with 60-day grace period in the case of involuntary proceedings)		Letter of Credit, Surety Bond	Letter of Credit	Letter of Credit: Société Générale, Surety Bond: Ambac
16	CAFCO, LLC	Citibank, N.A.	17,000	12,905	6/07	Secondary Market Agreements for asset purchases by Citibank, seller-specific Asset Purchase Agreements supporting specific assets, and General Liquidity loan facilities provided under loan agreements	SMA and general liquidity are provided by Citibank N.A.; the APAs are provided by financial institutions other than Citibank	SMA and APAs have no conditions precedent to purchases; general liquidity providers do not fund if any event of default has occurred, including if the remaining program-wide credit enhancement has been reduced below \$100 million		Total of up to \$1.6 billion consisting of a) a surety bond from Ambac Assurance Corporation (Ambac); b) a subordinated investment tranche and c) \$600,000 of equity	8% of outstanding ABCP and ECNs, excluding ABCP issued to finance assets supported by surety bond providers rated Aa2 or higher and ABS rated Aa2 or higher; minimum USD 300mln	Surety bond provided by Ambac

17	Park Granada LLC	Countrywide Home Loans Inc.	21,000	12,415	1/07	Combination of the collateral value of underlying mortgage assets and a cost of funds swap	Swap Providers: Bank of America, BNP Paribas, ABN AMRO, WestLB, Calyon, Royal Bank of Canada, Societe Generale, and JPMorgan Chase	Park Granada bankruptcy	Cash collateral account equal to 0.60% of the authorized amount, and 4.4% subordination of the outstanding amount of SLNs and CNs		
18	DAKOTA CP Notes Program	Citibank (South Dakota), N.A.	15,000	12,330	8/05	Master Trust consisting of credit card receivables originated by Citibank or its affiliates	Citibank	Subordinated amount of Class C Notes is reduced to zero	Class C Notes of the Citiseries of the CCIT	6.95% of aggregate DAKOTA CP balance	
19	Solitaire Funding Limited	HSBC Bank PLC	18,000	12,211	7/06	Liquidity Agreements provided to each Solitaire Purchasing Company	HSBC Bank plc and P1-rated banks	Bankruptcy	Letter of credit	Varies	HSBC
20	Stanfield Victoria Funding LLC	Stanfield Global Strategies LLC / Deutsche Bank Trust Company Americas	40,000	11,798			Various				

21	Gemini Securitization Corp LLC	Deutsche Bank AG	11,800	11,418	6/07	Seller-specific (1) liquidity loan facilities or (2) total return swaps	(1) DBNY and other Prime-1-rated financial institutions or (2) Deutsche Bank London Branch	Gemini bankruptcy		Cash collateral advance		
22	CHARTA, LLC	Citibank, N.A.	13,000	11,078	6/07	(1) Pool-specific asset purchase agreements (APA) or liquidity asset purchase agreements (LPA) or (2) a program-level liquidity facility.	LPAs and program-level liquidity facility provided by Citibank; APAs provided by other liquidity providers	CHARTA bankruptcy; for assets supported by a surety bond, insolvency of, or payment default by, surety bond provider; program-level credit enhancement is below \$15 million; or Ambac insolvency or in default of payment obligations to CHARTA		Surety bond	Up to USD 2bln; minimum USD 250mln	Ambac Assurance Corporation
23	Falcon Asset Securitization LLC	JPMorgan Chase Bank	23,000	10,865	3/07	Seller-specific asset purchase agreements, general program-wide uncommitted revolving loan	JPMorgan Chase Bank and a syndicate of P1-rated financial institutions	Falcon bankruptcy	Fully covered	Letter of Credit, Surety Bond	LOC: USD 325mln, Surety Bond: USD 754mln; minimum total USD 500mln	LOC: JPMorgan Chase Bank; Surety Bond: Ambac Assurance Corporation

24	Chesham Finance LLC	BSN Holdings Limited / QSR Management Limited	20,000	10,861	7/06	N/A				Repurchase agreements, total return swaps or securities lending agreements with P1-rated counterparties
25	Variable Funding Capital Corporation	Wachovia Bank, N.A.	20,000	10,791	7/06	Seller-specific (1) asset purchase agreements or loan agreements, (2) APAs or loan agreements w/ eligible credit enhancement facilities, (3) APAs or loan agreements that will be reviewed by Moody's prior to the inclusion of the related seller	Wachovia Bank, National Association or other P1-rated institutions	VFCC bankruptcy or bankruptcy/payment default of credit enhancement provider	Fully covered	N/A