

# Securitization Without Risk Transfer<sup>1</sup>

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## Abstract

We analyze asset-backed commercial paper conduits, which played a central role in the early phase of the financial crisis of 2007-09. We document that commercial banks set up conduits to securitize assets worth \$1.3 trillion while insuring the newly securitized assets using guarantees. The guarantees were structured to reduce bank capital requirements, while providing recourse to bank balance sheets for outside investors. Consistent with such recourse, we find that (i) during the first year of the crisis, asset-backed commercial paper issuance and maturity fell and spreads increased, especially for conduits with weaker guarantees, riskier banks, and lower quality assets, (ii) banks with more exposure to conduits had lower stock returns, and (iii) losses from conduits remained with banks rather than outside investors. These results suggest that banks used this form of securitization to concentrate, rather than disperse, financial risks in the banking sector while reducing bank capital requirements.

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Securitization was traditionally meant to transfer risks from the banking sector to outside investors and thereby disperse financial risks across the economy. Since the risks were meant to be transferred, securitization allowed banks to reduce regulatory capital, except on pieces they retained, typically the first-loss piece, in order to ensure they had some “skin in the game.” However, in the period leading up to the financial crisis of 2007-09, banks increasingly devised securitization methods that allowed them to concentrate risks on their balance sheets, and yet did not hold much capital against these risks, a practice which eventually led to the largest banking crisis since the Great Depression. In this paper, we analyze one form of securitization, namely asset-backed commercial paper conduits (henceforth, conduits), as an example of how banks exposed themselves to such under-capitalized risks.

Conduits are special purpose vehicles set up primarily by large commercial banks. Conduits exhibit a significant maturity mismatch between assets and liabilities, as they mostly hold medium- to long-term assets, which are financed by issuing short-term asset-backed commercial paper. Conduits are thus similar to regular banks in many ways and form an integral part of financial intermediation that has over time come to be called “shadow banking.” Put simply, shadow banking is that part of the intermediation sector that performs several functions that we traditionally associate with commercial and investment banks, but which runs in the “shadow” of the regulated banks in that it is off-balance sheet and less regulated.<sup>5</sup>

As shown in Figure 1, before the financial crisis, asset-backed commercial paper grew from US\$650 billion in January 2004 to US\$1.3 trillion in July 2007. At that time, asset-backed commercial paper was the largest money market instrument in the United States. For comparison, the second largest instrument was Treasury Bills with about \$940 billion

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<sup>5</sup> Adrian et al (2010) document that shadow banking assets grew from an amount close to zero in 1980 to somewhere between \$15 to \$20 trillion by 2008. In 2007, conduits represented about 25% of total assets newly transferred to shadow banking. In terms of the stock of assets, as of July 2007, conduits held over \$1.3 trillion, compared to securities lending of \$0.6 trillion, broker-dealer repo of \$2.5 trillion, and financial commercial paper of \$0.8 trillion.

outstanding. However, the rise in asset-backed commercial paper came to an abrupt end in August 2007.

On August 9, 2007, the French bank BNP Paribas halted withdrawals from three funds invested in mortgage-backed securities and suspended calculation of net asset values. Even though defaults on mortgages had been rising throughout 2007, the suspension of withdrawals by BNP Paribas had a profound effect on the asset-backed commercial paper market.<sup>6</sup> As shown in Figure 2, the interest rate spread of overnight asset-backed commercial paper over the Federal Funds rate increased from 10 basis points to 150 basis points within one day of the announcement. Subsequently, the market experienced the modern-day equivalent of a bank run and asset-backed commercial paper outstanding dropped from \$1.3 trillion in August 2007 to \$833 billion in December 2007 and, as shown in Figure 3, average maturity of asset-backed commercial paper outstanding declined from 32 days to 15 days over the same period. Apparently, investors in asset-backed commercial paper, primarily money market funds, became concerned about the credit quality and liquidation values of collateral backing asset-backed commercial paper and stopped refinancing the maturing asset-backed commercial paper.

Our main conclusion in this paper is that, somewhat surprisingly, this crisis in the asset-backed commercial paper market did not result (for the most part) in losses being transferred to outside investors in asset-backed commercial paper. Instead, the crisis had a profoundly negative effect on commercial banks because banks had –in large part- insured outside investors in asset-backed commercial paper by providing guarantees to conduits, which required banks to pay off

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<sup>6</sup> The announcement read: “[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 [...] The situation is such that it is no longer possible to value fairly the underlying US ABS assets in the three above-mentioned funds.” (Source: “BNP Paribas Freezes Funds as Loan Losses Roil Markets,” Bloomberg.com, August 9, 2007).

maturing asset-backed commercial paper at par. Effectively, banks had used conduits to securitize assets without transferring the risks to outside investors, contrary to the common understanding of securitization as a method for risk transfer.

We establish this finding of securitization *without* risk transfer using a hand-collected panel dataset on the universe of conduits from January 2001 to December 2009. We document and describe the structure of the guarantees that effectively created recourse from conduits back to bank balance sheets. For the most part, these guarantees were explicit legal commitments to repurchase maturing asset-backed commercial paper in case conduits could not roll over their paper, not a voluntary form of implicit recourse. The guarantees could be structured as liquidity guarantees, a contract design that would reduce their regulatory capital requirements to at most a tenth of capital required to hold for on-balance sheet assets. Such a guarantee structure would cover most assets' credit and liquidity risks and effectively absorb all losses of outside investors. For comparison, banks also had the option to use weaker guarantees that did not cover all of the assets' liquidity and credit risks and only required banks to cover a share of the losses.

Consistent with the motive for setting up conduits being one of regulatory arbitrage, we find that the majority of guarantees were structured as liquidity guarantees. We show that sponsoring institutions other than commercial banks (which among financial institutions are subject to the most stringent capital requirements) were far less likely to use such liquidity guarantees. Also, we note that the growth of asset-backed commercial paper stalled in 2001 after regulators discussed an increase in capital requirements for conduit guarantees (following the failure of Enron which had employed conduit-style structures to create off balance-sheet leverage) and picked up again after a decision against a significant increase was made in 2004. Further, banks based in countries such as Spain and Portugal that do not allow such regulatory arbitrage did not sponsor conduits.

Next, we examine the effect of guarantees on the conduit's ability to roll over maturing asset-backed commercial paper. We use a novel conduit-level data set to study daily issuances, spreads, and maturity of asset-backed commercial paper both before and after the start of the financial crisis. We show that starting August 9, 2007, conduits experienced a substantial decline in asset-backed commercial paper outstanding (or in other words, a decrease in their ability to roll over maturing asset backed commercial paper), a significant widening of spreads, and a considerable shortening in the maturity of asset-backed commercial paper. In particular, conduits with weaker guarantees had a larger decline in outstandings, a larger increase in spreads, and a greater shortening in maturity. These results are robust to controlling for asset categories and conduit sponsor types, which suggests that the strength of the guarantee does not simply proxy for the quality of conduit assets or the risk of the conduit sponsor. These results also suggest that the lack of risk transfer, as measured by the strength of guarantees, was central to conduits' ability to roll-over asset-backed commercial paper after the start of the financial crisis.

We then examine the extent of realized risk transfer by analyzing whether investors could rely on the guarantees offered by financial institutions during the crisis. We take the perspective of an investor that was holding asset-backed commercial paper at the start of the crisis and examine whether the investor suffered losses by not refinancing maturing asset-backed commercial paper. Using announcement data from Moody's Investors Service, we identify all conduits that defaulted on asset-backed commercial paper in the period from January 2007 to December 2008. We find that all outside investors covered by liquidity guarantees were repaid in full. We find that investors in conduits with weak guarantees suffered small losses. In total, only 2.5% of asset-backed commercial paper outstanding as of July 2007 entered default in the period from July 2007 to December 2008. Hence, most of the losses on conduit assets remained with the sponsoring banks. Assuming loss rates of 5% to 15%, we estimate that commercial banks suffered losses of \$68 billion to \$204 billion on conduit assets.

Lastly, we examine the impact of conduit exposure on bank stock returns. To identify the impact of conduit exposure separately from other bank observables, we focus on a narrow event window around the start of the financial crisis on August 9, 2007. An increase in conduit exposure (measured as the ratio of asset-backed commercial paper to bank equity) from 0% to 100% (e.g., Wells Fargo to Citibank) reduced stock returns by 1.5 percentage points in a three-day window around the start of the financial crisis. The effect of conduit exposure on stock returns increases to 2.9 percentage points when we expand the event window to one month. The result is robust to using alternative measures of conduit exposure and controlling for a large set of observable bank characteristics.

In summary, we note that the lack of ex-post risk transfer to conduit investors coupled with the ex-ante structure of guarantees that allowed close to zero capital requirements is highly suggestive of capital-reducing incentives on the part of commercial banks. Our evidence thus suggests that bank investment decisions are at least partly motivated by activity aimed to circumvent regulatory constraints. Moreover, since these investments only default in a severe economic downturn, banks are taking on risk that is highly correlated within the financial sector. Hence, our analysis suggests that regulatory arbitrage activity - if successful – can create significant concentrations of system risk in the financial sector.

The remainder of this paper is organized as follows. Section 1 discusses the institutional background. Section 2 provides our theoretical framework. Section 3 presents the data and discusses our empirical results. Section 4 analyzes the incentives of banks to set up conduits. Section 5 reviews the related literature. Section 6 concludes.

## **1. Institutional Background**

### **1.1. Conduit structure**

Figure 4 illustrates the typical conduit structure. A conduit is set up by a sponsoring financial institution (henceforth, sponsor). The sole purpose of a conduit is to purchase and hold financial assets from a variety of asset sellers. The conduit finances the assets by selling asset-backed commercial paper to outside investors such as money market funds or other “safe asset” investors.

Conduits typically exhibit a significant maturity mismatch. Most of the conduit assets are medium- to long-term assets with maturities of three to five years. The majority of the conduit liabilities are asset-backed commercial paper with a maturity of 30 days or less. Conduits regularly roll over their liabilities and use proceeds from new issuances of asset-backed commercial paper to pay off maturing asset-backed commercial paper.

Most conduits minimize their credit risk by holding a diversified portfolio of high quality assets. Typically, they are restricted to purchasing AAA-rated assets or unrated assets of similar quality. Some conduits exclusively purchase unrated assets originated by their sponsoring financial institutions. Other conduits mostly purchase securitized assets originated by other financial institutions. Many conduits combine the two strategies by purchasing both securitized and unsecuritized assets from several financial institutions.

Outside investors consider asset-backed commercial paper a safe investment for three reasons. First, the pool of conduit assets is used as collateral to secure the asset-backed commercial paper. Second, the conduit’s sponsor provides guarantees to the conduit, which ensures that the sponsor repays maturing asset-backed commercial paper in case the conduit is unable to pay off the maturing paper itself. Third, asset-backed commercial paper is very short-term, so that investors can easily liquidate their investment by not rolling over maturing asset-backed commercial paper.

Conduits can generate significant risks for the sponsor. The sponsor’s guarantee typically covers the conduit’s roll-over risk, which is the risk that a conduit cannot refinance

maturing commercial paper, possibly because of a deterioration of conduit asset values. In that case, the sponsor has to assume the losses from lower asset values, because under the guarantee sponsors are required to repurchase assets at par. In exchange for assuming this risk, the sponsor receives the conduit profits.

From an incentive perspective, the use of guarantees to align risks and rewards within the sponsor is consistent with the optimal allocation of control rights under asymmetric information. Sponsors often use conduits to purchase assets originated by their customers, their own origination department, or other close parties, and may be better informed about asset quality than outside investors. The use of guarantees thus avoids the incentive problem inherent in other forms of securitization, in which the asset originator transfers most of the risks associated with the assets to outside investors. Instead, guarantees ensure that sponsors have strong incentives to screen the conduit's asset purchases (e.g. see Ramakrishnan and Thakor (1984), Calomiris and Mason (2004) and Keys et al. (2009)).

The guarantees are also important because they ensure that asset-backed commercial paper qualifies for the highest available rating from accredited national rating agencies. The high ratings are important because the main purchasers of asset-backed commercial paper are money market funds, which are legally restricted to invest in securities with such ratings (Kacperczyk and Schnabl (2009)). Hence, the key issue with guarantees is whether the recourse of conduits to sponsor bank balance sheets is recognized as balance sheet risk and capitalized adequately.

## **1.2. Type of guarantees**

Conduit sponsors use four different types of guarantees which provide different levels of insurance to outside investors. The four types of guarantees, ranked from strongest to weakest, are full credit guarantees (“full credit”), full liquidity guarantees (“full liquidity”), extendible



notes guarantees (“extendible notes”), and guarantees arranged via structured investment vehicles (“SIV”). We briefly describe the structure of each guarantee.

Full credit guarantees are guarantees that require the sponsor to pay off maturing asset-backed commercial paper independent of the conduit’s asset values. As discussed in more detail below, from a regulatory perspective, full credit guarantees are considered equivalent to on-balance sheet financing, because they expose banks to the same risks as assets on the balance sheet. In practice, these guarantees are infrequently used by financial institutions that have to satisfy bank capital requirements but are more common among financial institutions that follow other forms of capital regulation.

Full liquidity guarantees are similar to full credit guarantees with the main difference being that the sponsor only needs to pay off maturing asset-backed commercial paper if the conduit assets are not in default. Hence, there is a possibility that full liquidity guarantees expire before the asset-backed commercial matures. However, full liquidity guarantees are structured to make this event highly unlikely. The key idea is to define asset default as a function of a slow-moving variable, such that the asset-backed commercial paper expires prior to the date at which the assets are declared in default. Indeed, as we show below, throughout the entire financial crisis there is not a single instance in which a full liquidity guarantee expired before the assets were declared in default.

Extendible notes guarantees are similar to full liquidity guarantees with the main difference being that the conduit issuer has the discretion to extend maturing commercial paper for a limited period of time (usually 60 days or less). By extending the maturity of the commercial paper, it is more likely that the conduit’s assets are in default before the commercial paper matures. From the viewpoint of an outside investor, extendible notes guarantees are therefore riskier than full liquidity guarantees. This guarantee was used by weaker financial institutions and by conduits with ex-ante higher quality assets.

SIV guarantees are also similar to full liquidity guarantees with the main difference being that SIV guarantees only cover a share of the conduit liabilities (usually around 25%). However, conduits with SIV guarantees also issue longer-maturity debt such as medium-term notes and subordinated capital notes. Since SIV guarantees do not cover all conduit liabilities, we consider SIV guarantees as providing partial insurance to outside investors. SIV guarantees were primarily used by commercial banks and other financial institutions to cover high quality assets.

The partial transfer of risk, as in the case of extendible notes and SIVs guarantees, is consistent with security design models. In contrast, lack of any risk transfer, as in the case of full credit and full liquidity conduits is at odds with such models unless the underlying assets are mostly all of low quality, an unlikely scenario especially when these conduits were set up.

## **2. Theoretical Framework**

The economic rationale for imposing capital requirements on banks comes from the premise that individual banks do not internalize the costs their risk-taking impose on other parts of the economy, in particular, other banks and the real sectors. For example, Diamond and Rajan (2000) explain why the market discipline provided by demandable debt may have to be counteracted with bank capital when bank assets contain aggregate risk. Acharya (2001) focuses on collective risk-shifting by banks in the form of herding to exploit their limited liability options; higher capital requirements on aggregate risky assets can serve as a way to counteract this incentive. Indeed, Gordy (2003) provides the foundation for the Basel I capital requirement framework based on the assumption that each bank is holding a diversified portfolio of economy-wide loans, thereby holding aggregate risk, and the job of the Basel I capital weights is to ensure that the resulting aggregate risk does not erode bank capital beyond a desired likelihood.

In effect, capital requirements increase the bank cost of capital with the intention of preventing them from undertaking certain risks that would otherwise seem privately attractive to

banks. For instance, banks inherently perform maturity transformation, which is to borrow short and lend long. However, both on their (uninsured) liabilities and asset side, they are typically exposed to aggregate risk. To the extent that banks make profits by earning interest margins on the asset side, over and above their cost of financing, they have a private incentive to raise leverage to reduce the cost of financing and undertake greater aggregate risk so as to earn higher risk premiums. In a world with imperfectly imposed Capital requirements, banks would thus have incentives to "arbitrage" regulation and devise ways of synthesizing leveraged exposures to aggregate risks. In this paper, we examine this regulatory arbitrage hypothesis to explain the structure and performance of asset-backed commercial paper conduits. In particular, we test three hypotheses.

The first hypothesis is that commercial banks set up conduits to minimize regulatory capital requirements. In particular, commercial banks set up more conduits, and more so, with guarantees that circumvent capital requirements. This is because (i) banks taking deposits may have a natural advantage in providing guarantees (e.g., lines of credit), as argued by Kashyap, Rajan, and Stein (2002), or because commercial banks have access to federal deposit insurance, which causes economy's savings to move into bank deposits during times of aggregate stress, as documented by Gatev and Strahan (2005) and Pennacchi (2006); and (ii) commercial banks are subject to the strictest capital requirements in the financial sector and thus have greater benefits from regulatory arbitrage. Conversely, sponsors other than commercial banks set up conduits with weaker guarantees, and must substitute for weaker guarantees by choice of better assets, so that ex-ante conduits with different guarantees reflect similar levels of risk or costs of borrowing.

The second hypothesis is that, ex-post, when asset quality deteriorates and there is credit and liquidation risk to assets, conduits experience a "run" from their short-term credit providers, leading to less issuances, higher spreads, and shorter maturities. The cost of redeeming debt that cannot be rolled over and higher spreads are borne by conduit sponsors. The impact of asset

quality deterioration is larger for (i) weaker guarantees; (ii) assets more severely affected by the economic shock; and (iii) weaker sponsor types.

The third hypothesis is that no realized losses are passed on to creditors of conduits that are fully guaranteed, with some losses passed on to creditors of conduits with partial guarantees. In turn, banks with greater exposure to conduits (relative to their size) experience worse stock returns once the run on conduits is initiated because they have to absorb the losses on conduit assets.

Put together, these hypotheses amount to establishing that a significant part of the conduit activity is a form of securitization without risk transfer, that is, a way for banks to concentrate aggregate risks rather than disperse them, and do so in an under-capitalized manner.

### **3. Empirical Analysis**

#### **3.1. Data and Summary Statistics**

We use several different data sources for the analysis in this paper. We start by collecting ratings reports for asset-backed commercial paper conduits that cover all conduits rated by Moody's Investors Service from January 2001 to December 2009. During this period, Moody's Investors Service issued reports on 938 conduits. The rating reports are typically three to five pages and contain information on conduit sponsor, conduit type, conduit assets, credit guarantees, and a verbal description of the conduit. Moody's Investors Service publishes the first report when a conduit receives its first rating and subsequently updates the reports annually. For some larger conduits, Moody's Investors Service also publishes monthly monitoring reports. Monthly reports are typically one page and comprise information on conduit size, guarantees, and conduit assets. In addition, Moody's Investors Service publishes a quarterly spreadsheet that summarizes basic information on all active conduits.

Our dataset is the universe of conduits collected from Moody's Investors Service's quarterly spreadsheets. We augment the dataset with information collected from the ratings reports. Some conduits have more than one observation because they have funding operations in both U.S. dollars and Euro. Since the funding operations belong to the same conduit, we merge these observations. We drop asset-backed commercial paper issued by collateralized debt obligations because their credit guarantees are not comparable to the rest of the sample (292 out of 9,536 observations).

We merge this data set with a proprietary data set on all asset-backed commercial paper transactions conducted in the United States from January 2007 to February 2008. The data set contains 777,758 primary market transactions by 349 conduits over 292 trading days. The data are provided by the Depository Trust and Clearing Corporation (DTCC), the agent that electronically clears and settles directly- and dealer-placed commercial paper. For each transaction, DTCC provides the identity and industry of the issuer, the face and settlement values of the transaction, and the maturity of the security.

Using the DTCC data, we compute prices and quantities for asset-backed commercial paper. We compute overnight spreads as the yield on asset-backed commercial paper minus the federal funds target rate. We merge the DTCC data set with the Moody's Investors Service data.

We then use the Moody's rating reports to identify the sponsoring institution that is providing guarantees to the conduit. We first identify the type of sponsor (e.g., commercial bank, mortgage originator, structured finance group, etc.). If the sponsoring institution is a commercial bank, we look for the sponsor in the bank data set Bankscope. If we cannot identify a sponsor via Bankscope, we conduct an internet search. We match the sponsor to the consolidated financial company (e.g., we match conduits sponsored by Citibank South Dakota to Citigroup).

We construct a data set of the 300 largest banks as of January 2007 using the Bankscope database. 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 data and stock return data from Datastream. If a bank does not have an ISIN identifier, we verify with the bank's website that the bank is not listed on a stock exchange. This data set allows us to compare banks that sponsor asset-backed commercial paper conduits with banks that do not sponsor asset-backed commercial paper conduits.

Finally, we use Moody's Investors Service Weekly Announcement Reports of rating downgrades from January 2007 to December 2008. We identify all conduits that were downgraded or were withdrawn during the analysis period. For all such conduits, we search for an affirmative statement by Moody's Investors Service 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 the conduit entered default. We note that this coding procedure may overestimate the extent of investor liquidation because investors may have been repaid without an affirmative announcement by either the sponsor or the rating agencies.

Panel A of Table 1 shows the ten largest conduits ranked by asset-backed commercial paper outstanding as of January 1, 2007. Most conduits hold highly rated assets originated in the United States or the United Kingdom. If a conduit hold assets that are not rated, the Moody's reports usually state that the conduit holds assets of similar quality as highly rated assets. The main asset classes are residential mortgages and asset-backed securities.

Panel B of Table 1 shows the ten largest sponsors ranked by total asset-backed commercial paper outstanding as of January 1, 2007. In the United States, the largest sponsor was Citigroup with conduit assets of \$92.7 billion. For comparison, Citigroup's regulatory capital (Tier 1 Capital) was \$90 billion. In Europe, the largest sponsor was ABN Amro with \$68 billion of conduits assets. ABN Amro's regulatory capital was \$31.2 billion. (ABN Amro later

merged with Royal Bank of Scotland.) Most sponsors are large commercial banks based in the United States and European countries.

Panel A of Table 2 provides summary statistics for all conduits authorized to issue asset-backed commercial paper as of January 1, 2007. Panel A shows that there are 301 conduits with total commercial paper outstanding of \$1,236 billion. The average conduit size is \$4.1 billion with a standard deviation of \$5.1 billion. About 61% of asset-backed commercial paper is covered by full liquidity guarantees, 13% is covered by full credit guarantees, 18% is covered by extendible notes guarantees, and 7% is covered by SIV guarantees.

In terms of assets, we use Moody's classification for a conduit's main asset types. About 31% of conduits assets are invested primarily in asset-backed securities. Moody's rating reports suggest that this asset category includes mortgage-backed securities, collateralized debt obligations, and collateralized loan obligations. About 5% of conduits assets are invested primarily in loans. Moody's rating reports suggests that most loans are mortgage loans that are warehoused for future securitization. Some conduits also own student loans, auto loans, corporate loans, and consumer loans. About 35% of conduit assets are mainly invested in receivables. Moody's reports suggest that most receivables are trade receivables and credit card receivables. About 22% of conduits assets are primarily invested in a mix of asset-backed securities, loans, and receivables. The remaining 7% of conduit assets are mainly invested in other asset classes, which include repurchase agreements and government guaranteed loans.

We understand from the Moody's rating reports that almost all conduits are hedged against currency and interest rate exposure. The most common way for conduits to hedge their currency exposure is by matching the currency of the assets with the currency of the liabilities. Consistent with our earlier observation that most assets are originated in the United States, we find that 75% of asset-backed commercial paper is issued in U.S. dollars. About 18% is issued in Euro and the remainder is issued in Yen, Australian dollars, and New Zealand dollars.

Panel B of Table 2 presents summary statistics for all sponsors as of January 1, 2007. We define a sponsor as a single consolidated company and aggregate asset-backed commercial paper at the holding company level. In total, there are 127 sponsors, each of which, on average, sponsors \$9.7 billion of asset-backed commercial paper. The largest sponsor type is commercial banks, which sponsor \$911 billion of asset-backed commercial paper. The second largest type is structured finance groups, which sponsor \$156 billion in asset-backed commercial paper. Contrary to commercial banks, structured finance groups usually do not have the financial resources to provide guarantees. Instead they purchase guarantees from other financial institutions. Unfortunately, our data do not contain information to identify the provider of guarantees to conduits of structured finance groups. There is some evidence from industry publications that investment banks are large providers of guarantees to structured finance groups. Other large sponsor types are mortgage lenders (\$76 billion), investment managers (\$18 billion) and investment banks (\$11 billion).

In terms of geography, the majority of conduits are sponsored by financial institutions based in the United States with \$491 billion of asset-backed commercial paper. A large number of sponsors are based in Germany and the United Kingdom with asset-backed commercial paper of \$204 billion and \$195 billion, respectively. The remaining \$347 billion are sponsored by financial institutions based in other countries, including financial institutions based in Australia, Belgium, Canada, France, Netherlands, and Japan.

### **3.2. Capital Requirements**

Bank regulation requires banks to hold a certain amount of capital against its investments. One way to reduce one's capital requirements is to transfer the risks of investments to outside investors. Over the last two decades, securitization has emerged as one of the main risk transfer mechanisms for banks. Bank regulators have recognized such risk transfer and modified bank



capital regulation to reduce capital requirements accordingly. However, our analysis suggests that banks used asset-backed commercial conduits for securitization without transferring risks to outside investors. To explain the mechanics of such securitization, we first describe the capital regulation of asset-backed commercial paper conduits. Since almost all conduits were sponsored by banks based in the United States and European countries, we focus on bank regulation in these countries. We start by describing bank capital regulation in the United States.

Historically, bank regulators in the United States made a clear distinction between full credit and full liquidity guarantees. Full credit guarantees were considered to cover credit risk and thus considered equivalent to on-balance sheet financing. As a result, assets covered by full credit guarantees required the same regulatory capital charges as assets on the balance sheet. In contrast, full liquidity guarantees were considered to cover liquidity risk, which did not require the same regulatory capital as assets on the balance sheet. Similarly, extendible notes guarantees and SIV guarantees were considered weaker forms of full liquidity guarantees and did not have the capital charges of assets on the balance sheet either. As a result, there was a sharp discontinuity between the regulatory requirements of full credit guarantees and the regulatory requirements of other types of guarantees.

In response to this regulation, banks developed guarantees which were classified as full liquidity guarantees but effectively covered credit risk. The guarantees were structured as follows. The sponsor committed to repurchase assets at par value from the conduit if the conduit was unable to pay off maturing debt *and* the assets in the conduit were not in default. The banks were careful to make the guarantee conditional on asset default because otherwise regulators classified such guarantees as full credit guarantees.

The most important aspect of this guarantee was to define asset default such that assets almost never defaulted before the asset-backed commercial paper was due. In practice, most sponsors defined asset default as downgrades below investment grade (rated assets) or increases

in delinquency rates above pre-specified thresholds (unrated assets). Given the requirement that most assets were highly rated, or of similar quality, it was highly unlikely that assets entered default quickly, before the asset-backed commercial paper matured. The reason was that rating agencies usually provided ample warnings prior to downgrades (rated assets) and delinquency rates only moved slowly (unrated assets). Moreover, asset-backed commercial paper was very short-term with a median maturity at issuance of overnight and a median maturity of outstanding asset-backed commercial paper of 28 days.

Hence, even though it was possible that assets entered default prior to the expiration of the asset-backed commercial paper, it was highly unlikely. Instead, outside investors could simply stop rolling over asset-backed commercial paper upon adverse news about the credit or liquidity risk of conduit assets. In fact, the guarantees were mostly likely to be drawn in the states of the world in which assets were expected to suffer losses. As a result, full liquidity guarantees effectively covered the assets' credit risk without requiring banks to hold the same regulatory capital as that required for assets on the balance sheet.

A number of industry publications describe the benefits of circumventing capital requirements by using this type of guarantees. For example, a publication by Moody's Investors Service (2003) on the fundamentals of asset-backed commercial paper describes conduits as follows: "If a bank were to provide a direct corporate loan, even one secured with the same assets, it would be obligated to maintain regulatory capital for it. An ABCP program permits the sponsor to offer financing services to its customers without using the Sponsor's balance sheet or holding incremental regulatory capital (p. 15)"

In 2001, the Financial Accounting Standards Board (FASB) in the United States started a review of guarantees to conduits. FASB initiated this review because of the bankruptcy of the energy company Enron. Enron had used off-balance sheet vehicles for concealing its true leverage and these off-balance sheet vehicles were structured similarly to asset-backed

commercial paper conduits. This review of conduits generated considerable concern in the banking industry. For example, in July 2002 Moody's Investors Service (2002a) reports under the headline "FASB reacts to Enronitis" that FASB is proposing the consolidation of asset-backed commercial paper conduits on bank balance sheets. In October 2002, Moody's published a special report titled "The FASB Consolidation Proposal: The End of ABCP as we know it?" which suggests that sponsors may have difficulties with consolidation because it would raise regulatory capital requirements and might lead banks to violate their debt covenants.

In January 2003, FASB issued a directive for the consolidation of conduits under Interpretation No. 46 (FIN 46). In response, Forbes (2003) reported that "FASB Puts Banks in a Bind" because conduit consolidation would negatively affect bank balance sheets. The article quotes the FASB chairman as saying that "If you have risk and reward related to the operation, we thought it was enough to say it ought to be on your books." However, the FASB proposal was considered unclear with respect to certain implementation issues and several banks requested more guidance from FASB. In December 2003, FASB issued a new directive called FIN 46R ("R" for revision) which clarified the consolidation issues. The new directive effectively required commercial banks to consolidate asset-backed commercial paper conduits.

However, in July 2004, a consortium of bank regulators, namely the Office of the Comptroller of the Currency, the Federal Reserve Board, the Federal Deposit Insurance Corporation, and the Office of Thrift Supervision (henceforth, the Agencies), issued a new rule for computing capital requirements of asset-backed commercial paper conduits. The official press release (Federal Reserve Board, 2004) by the Agencies states that "[t]he final rule will permanently permit sponsoring banks, bank holding companies, and thrifts (collectively, sponsoring banking organizations) to exclude from their risk-weighted asset base those assets in ABCP programs that are consolidated onto sponsoring banking organizations' balance sheets as a result of FIN 46R". Hence, assets in conduits were not considered assets for the purpose of

calculating capital requirements. Instead, bank regulators required banks to hold capital at a conversion factor of 10% against the amount covered by full liquidity guarantees. This implied that regulatory charges for conduit assets covered by full liquidity guarantees were 90% lower than regulatory charges for on-balance sheet financing (Gilliam (2005)).

Consistent with the regulatory arbitrage motive, Figure 5 shows that the growth of asset-backed commercial paper conduits stalled in late 2001, around the time when FASB started its review of conduits. From late 2001 to late 2004, asset-backed commercial paper outstanding was flat after several years of significant growth. However, starting in late 2004, at the time bank regulator issued their exemption, growth in asset-backed commercial paper picked up again. This time-series evidence indicates that lower capital requirement played an important role in the decision to set up conduits.

In Europe, the history of capital requirements for asset-backed commercial paper conduits was slightly different. Before 2004, most European countries had similar capital requirements for guarantees as in the United States. Full credit guarantees were considered to cover credit risk and required the same regulatory charges as on-balance sheet financing. Full liquidity guarantees were considered to cover liquidity risk and had no capital charges.

The main difference between the United States and Europe was that European banks started to adopt International Financial Reporting Standards (IFRS) in the early 2000s. IFRS, contrary to U.S. General Accepted Accounting Principles (GAAP), do not recognize asset transfers to conduits as a true sale. As a result of this regulation, European banks were required to consolidate conduits on their balance sheets. However, most European regulators did not change capital requirements in accordance with IFRS. Hence, for the purpose of computing regulatory requirements and risk weighted assets, conduits were considered off-balance sheet and European banks did not have to hold regulatory capital against conduit assets.

Another important difference between the United States and European countries was that European bank regulators were in the process of adopting the Basel II framework in 2007 (U.S. commercial banks were still operating under Basel I). Under the Basel II standardized approach, the capital requirements for conduit assets covered by full liquidity guarantees increase from 0% to 20% relative to on-balance sheet financing. Moreover, Basel II assumes lower risk weights for highly rated securities, which reduces the level of regulatory charges for both off-balance sheet and on-balance sheet financing. At the start of the financial crisis, several European banks had adopted Basel II rules, while others were still operating under Basel I. Importantly, both Basel I and Basel II rules allowed for “regulatory arbitrage” of capital requirements, although the benefit of regulatory arbitrage was smaller under Basel II than under Basel I.

We note that two European countries, Spain and Portugal, differed in their regulation of capital requirements from other European countries. These countries required sponsors to hold the same amount of regulatory capital for assets on balance sheets and for assets in asset-backed commercial paper conduits. Consistent with the regulatory arbitrage motive, we find that Spanish and Portuguese banks did not sponsor asset-backed commercial paper conduits (Acharya and Schnabl, 2010).

We also note that the incentive to use guarantees for circumventing capital requirements was particularly strong for commercial banks. Commercial banks were considered to have the strictest capital regulation of all financial institutions because of their special status as deposit-taking institutions. Commercial banks should therefore derive the largest benefits from using guarantees to reduce capital requirements.

Consistent with this motive, Panel A of Table 3 shows that commercial banks are the main sponsors of asset-backed commercial paper. They sponsor asset-backed commercial paper worth \$911 billion, or 73.7% of total asset-backed commercial paper outstanding. Also, commercial banks are more likely than other financial institutions to use full liquidity guarantees

with 74% of its conduit assets covered by full liquidity guarantees. For comparison, the second-largest group of sponsors, structured finance groups, sponsor \$156 billion, or 12.6% of total asset-backed commercial paper outstanding. Contrary to commercial banks, the main guarantees used by structured finance groups are full credit guarantees covering 37% of conduit assets.<sup>7</sup>

### **3.3. Impact of Guarantees on Outstandings, Spreads, and Maturity**

In this section, we examine the importance of guarantees in rolling over maturing asset-backed commercial paper after the start of the financial crisis. As shown in Figure 1, asset-backed commercial paper declined dramatically after the start of the financial crisis on August 9, 2007. By the end of year, the asset-backed commercial paper market was roughly 30 percent smaller than it was at its peak in July. Importantly for our analysis, the extent of the decrease varied substantially by type of guarantee.

To test for the importance of guarantees in rolling over asset-backed commercial paper after August 9, 2007, we exploit cross-sectional variation in types of guarantees. As discussed, full credit and full liquidity guarantees cover almost all risks associated with conduits assets. However, extendible guarantees are weaker, because they allow conduits to extend commercial paper for a limited period of time, an option that issuers are likely to exercise when there is adverse news about conduit assets. SIV guarantees are also weaker, because these guarantees only cover asset-backed commercial paper outstanding but not other liabilities such as medium-term notes and capital notes.

To understand the selection of sponsors and assets into guarantees, it is important to understand the sponsor's objective. Usually, sponsors aim to put together a conduit structure

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<sup>7</sup> We do not have data on the providers of guarantees to structure finance groups. However, some industry reports indicate that the main providers were large U.S. investment banks, which used internal rating models for computing capital charges (Nadauld and Sherlund, 2008). Internal rating models made less distinction between full credit and full liquidity guarantees in terms of capital requirements.

(consisting of the guarantee, conduit assets, and the sponsor's financial strength) that allows the sponsor to issue highly rated asset-backed commercial paper at rates similar to the Fed Funds rate (overnight) or LIBOR (30-days). Sponsors trade off various characteristics to achieve this pricing on the asset-backed commercial paper. For example, conduits with higher quality assets are usually covered by weaker guarantees. Also, sponsors with lower financial strength tend to provide weaker guarantees and have to provide higher quality assets.

Panel B of Table 3 provides summary statistics on assets and sponsor types by guarantees. For full liquidity guarantees, the main sponsor type is commercial banks covering 89.9% of asset-backed commercial paper outstanding. The three main asset types covered by full liquidity guarantees are receivables (42.6%), asset-backed securities (29.2%), and mixed assets (20.8%). For full credit guarantees, the main sponsor types are commercial banks (62.4%) and structured finance groups (36.5%). The three main asset types are mixed assets (39.4%), receivables (37.9%), and asset-backed securities (10.2%). These results suggest that conduits covered by full liquidity and full credit guarantees are similar in terms of assets. Regarding sponsors, the main difference is that structured finance groups are more likely to provide full credit guarantees than full liquidity guarantees.

For extendible notes guarantees, we find that the main sponsor types are commercial banks (33.8%), mortgage originators (27.1%), and structured finance groups (23.6%). The main asset types are asset-backed securities (28.8%), receivables (24%), mixed assets (23%), and loans (15.6%). For SIV guarantees, the main sponsor types are commercial banks (61.8%) and structured finance groups (34.5%). SIVs only invest in asset-backed securities (91.3%) and loans (8.7%). These summary statistics suggest that weaker financial institutions, such as mortgage originators, are more likely to provide weaker guarantees, in particular extendible notes guarantees. Also, extendible and SIV guarantees are more likely to cover asset-backed securities, which were considered of higher quality before the financial crisis.

We note that the average spread of overnight asset-backed commercial paper over the Fed Funds rate was only one basis point prior to the financial crisis. Importantly, there was practically no variation across guarantees, which suggests that, from an ex-ante perspective, outside investors perceived conduits with different guarantees to have similar risks.

To test the cross-sectional impact of guarantees formally, we compute weekly asset-backed commercial paper outstanding and maturity and daily spreads of overnight asset-backed commercial paper. We restrict our sample to the period four months before and four months after the start of the financial crisis on August 9, 2007. We choose this period because it captures the main decline in asset-backed commercial paper but excludes later events that may confound our analysis (e.g., Bear Stearns merger, Lehman bankruptcy). We find qualitatively and quantitatively similar results if we extend our data set to the period six months before and six months after the start of the financial crisis.

We first examine the impact of guarantees non-parametrically. Figure 6 shows that asset-backed commercial paper covered by extendible guarantees and SIV guarantees decreased significantly more than asset-backed commercial paper covered by full credit and full liquidity guarantees. Figure 7 shows that the overnight spread on asset-backed commercial paper covered by extendible guarantees and SIV guarantees increased more than the spread on asset-backed commercial paper covered by full credit and full liquidity guarantees.<sup>8</sup> Figure 8 shows that the average maturity of paper outstanding covered by extendible guarantees and SIV guarantees decreased significantly more than asset-backed commercial paper covered by full credit and full liquidity guarantees. These figures indicate that there was a negative shock to the supply of funds provided by outside investors leading to a large decline in quantity, a large increase in price, and a large shortening of maturity, especially for conduits with weaker guarantees.

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<sup>8</sup> We focus on overnight spreads because most newly issued ABCP has maturities of one to four days. According to data from the Federal Reserve Board, roughly 60 percent of newly issued ABCP in the U.S. has maturities of one to four days prior to the crisis. Our results are similar when considering one-month spreads (one month is the second most frequent maturity after overnight).



We test whether the patterns on issuance and spreads by type of guarantee are statistically significant and robust to controlling for sponsor and conduit characteristics. Our baseline specification is:

$$\log (CP_{it}) = \alpha + \beta_j \text{Guarantee}_j + \gamma_j \text{After}_t * \text{Guarantee}_j + \delta \text{After}_t + \varepsilon_{it}$$

where  $\log (CP_{it})$  represents the natural logarithm of the face value of commercial paper outstanding of conduit  $i$  in week  $t$ .  $\text{Guarantee}_j$  is an indicator variable by type of guarantee.  $\text{After}_t$  is an indicator variable that equals one after the start of the crisis (after August 9, 2007) and zero before the crisis. We also estimate regressions in which we control for time fixed effects, conduit fixed effects, and sponsor-time fixed effects.

We are primarily interested in the coefficient  $\gamma_j$  on the interaction of  $\text{After}_t$  and  $\text{Guarantee}_j$ , which captures the average change in commercial paper outstanding by guarantee after the start of the financial crisis. The omitted guarantee category is full liquidity guarantees. We cluster standard errors at the conduit level, because our variable of interest varies at the conduit level and we want to allow for the correlation of error terms within conduits.

If the financial crisis makes investors more concerned about conduit risks, we expect that the interactions between indicator variables for weak guarantees and the  $\text{After}_t$  indicator to be more negative than those for strong guarantees. Furthermore, if outside investors perceived that full credit and full liquidity guarantees provided the same level of protection, we expect that the interaction between the indicator variable for full credit support and the  $\text{After}_t$  dummy to be statistically insignificant. Together these hypotheses are aimed at uncovering whether guarantees were important for outside investors to roll over maturing asset-backed commercial paper upon adverse news about asset quality.

Column (1) in Table 4 reports the results of estimating our baseline specification. The significant coefficient on the interaction between the  $\text{After}_t$  indicator and the dummies for programs with extendible notes and SIVs suggest that asset-backed commercial paper decreased

more for conduits with weaker guarantees compared to conduits with stronger guarantees. The coefficient on the interaction between the  $After_t$  indicator and the dummies for full credit programs shows that there is no statistically significant difference between full liquidity and full credit guarantees. Column (2) adds controls for time fixed effects. The time fixed effects control for a non-parametric time-trend but have no effect on the coefficients of interest. Column (3) adds controls for conduit fixed effects. The conduit fixed effects control for time-invariant characteristics at the conduit-level. We find no change in the coefficients of interest. These results suggest that conduits with weaker guarantees experienced a significantly larger decline in asset-backed commercial paper outstanding.

Column (4) adds controls for sponsor-time fixed effects. These fixed effects control for time-varying changes at the sponsor level such as changes in the financial strength of the sponsor. In other words, the coefficients are identified off variation within sponsors at a given point in time (e.g., comparing conduits with full credit guarantees, full liquidity guarantees, extendible guarantees, and SIV guarantees for the *same* sponsor). We find that the point estimates are robust to controlling for these fixed effects. The standard errors in Column (4) are larger than in Columns (1) to (3), but the effect of extendible guarantees remains statistically significant. This result suggests that guarantees significantly affect the conduit's ability to roll over asset-backed commercial paper.

One possible concern is that our results may reflect differences in asset quality across conduits with different guarantees. As discussed above, conduits with weaker guarantees are more likely to hold asset-backed securities and are less likely to hold receivables. Even though asset-backed securities may have been perceived of higher quality ex-ante, these assets may be of lower quality ex-post, which could bias our results. We therefore control for asset quality by including indicator variables for asset categories and interactions between the  $After_t$  indicator and the asset category indicators.

Columns (1) to (3) in Table 5 report the results of adding controls for asset categories to our regressions.<sup>9</sup> Column (1) shows the baseline specification with time-fixed effects.<sup>10</sup> We find that our asset controls have significant explanatory power for changes in asset-backed commercial paper outstanding. In particular, the coefficient on the interaction of the *After<sub>t</sub>* indicator and loans is negative and statistically significant. This result indicates that loans, which are primarily mortgage loans, had a negative impact on the conduit's ability to roll over asset-backed commercial paper. The coefficient on the interaction of the *After<sub>t</sub>* indicator and receivables is positive and statistically significant. The point estimate indicates that receivables, which are primarily trade receivables and credit card receivables, had a positive impact on the conduit's ability to roll over asset-backed commercial paper. These results are consistent with the BNP Paribas announcement having a more negative effect for mortgage assets relative to receivables.

Importantly, the controls for asset categories have almost no effect on the coefficients of interest. We still find that extendible and SIV guarantees have a significantly larger decline in outstandings than full liquidity and full credit guarantees. The results are robust to controlling for conduit fixed effects (Column 2) and sponsor-time fixed effects (Column 3). Hence, even though our asset controls can explain a conduit's ability to roll over asset-backed commercial paper, they have little impact on the coefficients of interest. This result suggests that guarantees are an important determinant of a conduit's ability to roll over asset-backed commercial paper upon adverse news, even after accounting for the quality of the assets.

Another possible concern with these results is that guarantees proxy for the quality of the sponsor. Our results may be biased if sponsors of full liquidity and full credit guarantees are of higher quality after the start of the financial crisis. One way to address this concern is to control

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<sup>9</sup> All regressions include the direct effects for guarantees and asset categories (coefficients not reported).

<sup>10</sup> A specification with the "After" indicator instead of time-fixed effects yields almost identical results and is therefore omitted from the Table.

for time-varying sponsor quality by using sponsor-time fixed effects. As discussed above, our results are robust to including these fixed effects. Alternatively, we can also control for sponsor quality using indicators for sponsor types. Commercial banks are considered the most stable sponsors, because they often receive deposit inflows and government support during times of crisis. In contrast, mortgage originators are considered unstable, because the BNP announcement was directly related to mortgage assets. We therefore control for sponsor type by including interactions between the  $After_t$  indicator and sponsor types.

Columns (4) to (6) in Table 5 report the results of adding controls for sponsor types to our regressions.<sup>11</sup> We find that sponsor types have explanatory power for changes in asset-backed commercial paper outstanding. The coefficient on the interaction of the  $After_t$  indicator and commercial bank is positive. This result indicates that conduits with bank sponsors are better able to roll over asset-backed commercial paper after the BNP announcement. In contrast, the coefficient on the interaction of the  $After_t$  indicator and mortgage originators is negative and statistically significant. This result indicates that conduits with mortgage originators as sponsors were less able to roll over asset-backed commercial paper.

However, the controls for sponsor types have little effect on the coefficients of interest. Extendible and SIV guarantees have a significantly larger decline in outstandings than full liquidity and full credit guarantees. The results are robust to controlling for time fixed effects (Column 5) and conduit fixed effects (Column 6). Note that we cannot control for sponsor-time fixed effects, because they are collinear with the sponsor-type interactions (but see Column 4 of Table 4 for results with sponsor-time fixed effects). This result shows that guarantees are an important determinant of a conduit's ability to roll over asset-backed commercial paper upon adverse news, even after accounting for the quality of the assets and sponsor types.

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<sup>11</sup> All regressions include the direct effects for guarantees, asset categories, and bank sponsors (coefficients not reported).

We also estimate the impact of guarantees on overnight spreads of asset-backed commercial paper. Again, our baseline specification is:

$$Spread_{it} = \alpha + \beta_j Guarantee_j + \gamma_j After_t * Guarantee_j + \delta After_t + \varepsilon_{it}$$

where  $Spread_{it}$  is the overnight spread (1 to 4 days of maturity) over the Federal Funds rate on new issues by conduit  $i$  on day  $t$ . All right-hand side variables have the same interpretation as in the outstandings regression, but time-dependent variables are now measured daily.

Column (1) in Table 6 reports the results of estimating our baseline specification. The significant coefficients on extendible notes and SIVs suggest that spreads increase more for conduits with weaker guarantees compared to conduits with stronger guarantees. The coefficient on full credit guarantees shows that there is no statistically significant difference between full credit and full liquidity guarantees. Columns (2) and (3) show that the results are robust to controlling for time fixed effects and conduit fixed effects. Column (4) controls for sponsor-time fixed effects, such that the coefficients are estimated off variation across guarantees for the same sponsor. We find that the results are robust to including sponsor-time fixed effects but the point estimate on extendible is not statistically significant. Overall, these results suggest that guarantees affect the spreads on overnight asset-backed commercial paper, especially for SIV guarantees.

Table 7 controls for asset quality and sponsor types. Consistent with Table 5, we find that conduits with mortgage loans experience a larger increase in overnight spreads than conduits with receivables. Also, we find that mortgage originators experience a larger increase in overnight spreads than commercial banks. However, the coefficients of interest are unaffected by controlling for asset quality and sponsor type. Conduits with extendible guarantees and SIV guarantees experience a larger increase in spreads than conduits with full liquidity and full credit guarantees.

We also estimate the impact of guarantees on weighted average maturity of asset-backed commercial paper. We compute the weighted average maturity of conduit  $i$  at time  $t$  by averaging the maturity of asset-backed commercial paper outstanding using total face value per maturity as weights. Our baseline specification is:

$$WAM_{it} = \alpha + \beta_j \text{Guarantee}_j + \gamma_j \text{After}_t * \text{Guarantee}_j + \delta \text{After}_t + \varepsilon_{it}$$

where  $WAM_{it}$  is the weighted average maturity of conduit  $i$  in week  $t$ . We assume  $WAM_{it}$  is equal to zero if a conduit does not have asset-backed commercial paper outstanding during the analysis period. All right-hand side variables have the same interpretation as in the outstandings regression.

Table 8 reports the results. Column (1) shows that the average maturity declined by 6.5 days. The impact is strongest for the maturity of SIV guarantees, which decreased by 11 days relative to full liquidity guarantees. In contrast, full credit guarantees increased by 9.2 days relative to full liquidity guarantees. These results suggest that the shortening of maturity is stronger for weaker guarantees and guarantees that are conditional on asset performance. Columns (2) to (4) show that the results are robust to controlling for time fixed effects, conduit fixed effects, and sponsor-time effects.

Table 9 reports the results controlling for asset categories and sponsor types. As shown in Column (1) to (3), the point estimates are robust to controlling for asset categories. Also, the coefficient on SIV guarantees is stable and remains significant in all specifications except the one with conduit and sponsor-time fixed effects. Consistent with the results on outstandings and spreads, the average maturity increases for conduits investing in receivables and decreases for conduits investing in loans. Columns (4) to (6) show that these results are robust to controlling for sponsor type. The coefficient on SIV guarantees is significant in all specifications.

In summary, we find that, after the start of the financial crisis, conduits with weaker guarantees decreased issuance more, paid higher spreads, and experienced stronger shortening of

average maturity than conduits with stronger guarantees. These results are robust to controlling for asset categories and sponsor types. Hence, our findings suggest that the full credit guarantees and full liquidity guarantees were an important part of rendering asset-backed commercial paper risk-free for outside investors.

### **3.4. Losses of Outside Investors**

This section examines the extent of realized risk transfer by analyzing whether outside investors in asset-backed commercial paper were fully repaid after the start of the financial crisis. We take the perspective of an investor that was holding asset-backed commercial paper at the start of the crisis and examine whether the investor suffered losses by not rolling over maturing asset-backed commercial paper. We test the performance of credit guarantees using Moody's Investors Service announcement data from January 2007 to December 2008. Since all conduits are rated, Moody's Investors Service always issues an announcement if a conduit defaults on its obligation to pay off maturing asset-backed commercial paper.

Table 10 presents the results on the ex-post risk transfer. Column (1) reports asset-backed commercial paper outstanding per credit guarantee in July 2007. Columns (2) to (4) show the value-weighted percentage in three categories: (i) conduits that were closed down and repaid all maturing asset-backed commercial paper before December 2008; (ii) conduits that remained active and repaid all maturing commercial paper up to December 2008; and (iii) conduits that failed to repay maturing asset-backed commercial paper and entered default by December 2008.

The table shows that not a single conduit using full credit or full liquidity guarantees defaulted by December 2008. In contrast, 7.4% of asset-backed commercial paper covered by extendible notes guarantees and 16.7% of asset-backed commercial paper covered by SIV guarantees entered default by December 2008, respectively. Regarding the sponsor type, we find that conduits sponsored by structured finance firms and mortgage companies were significantly

more likely to enter default than conduits sponsored by commercial banks. Overall, we note that 97.5% of outside investors in asset-backed commercial paper were fully repaid.

We do not have data on the losses on conduit assets. Losses depend on the loss rate on conduit assets and unfortunately there is no publicly available information with respect to such loss rates. However, we can use different pieces of information to form an estimate. For example, State Street (2009) announced an after-tax loss of \$3.7 billion on conduit asset of \$21.8 billion, which amounts to a loss-rate of 22.6% (assuming a tax rate of 25%). Consistent with this estimate, the AAA-tranche of ABX-index suggests that the value of collateralized mortgage obligations backed by subprime mortgages dropped by up to 60 percent over the same period. The losses on conduit assets are likely to be smaller because many conduits hold both mortgage and non-mortgage assets. We therefore assume more conservative loss rates of 5% and 15%. Under these assumptions, we estimate total losses on conduit assets of \$68 billion and \$204 billion, respectively. The estimated losses for outside investors are \$1.8 billion and \$5.2 billion respectively. Consistent with the lack of risk transfer, this analysis shows that most of the losses were borne by sponsors rather than outside investors. However, the level of the estimated losses is only suggestive because we lack the data to compute actual losses.

### **3.5. Effect of Conduit Exposure on Sponsor Stock Returns**

This section analyzes whether banks with higher conduit exposure experienced lower stock returns during the financial crisis. The difficulty in testing this hypothesis is that the financial crisis also affected banks in other ways, some of which may be correlated with conduit exposure. Hence, if we observe that banks with higher conduit exposure have lower returns, then this result may be driven by other bank activities that negatively affect stock prices and are correlated with conduit exposure.



To address this identification issue, we focus on the start of the crisis in the asset-backed commercial paper market on August 9, 2007. We believe this provides a good setting to identify the impact of conduit exposure for two reasons. First, the financial crisis arguably started with the announcement of difficulties in the mortgage market. As shown in Figures 1 and 2, starting on August 9, 2007, investors drastically reduced refinancing of maturing asset-backed commercial paper and, as a result, overnight spreads jumped from 10 basis points to 150 basis points. Hence, it is unlikely that the event study is confounded by other events that happened just prior to August 9, 2007. Second, our analysis focuses on the narrow three-day window around August 9, 2007. This short event window reduces the likelihood that the results may be confounded by other events that happen around the same time.

We start by examining observable characteristics of banks with and without conduit exposure. We restrict our sample to banks with assets of \$5 billion or more as of January 1, 2007, because only these banks had the financial strength to support conduits (our results are robust to including smaller banks). We further restrict our analysis to commercial banks based in Europe and the United States and to banks for which share price data is available. We choose this restriction because some countries outside the United States and Europe (in particular Canada) allowed for differently structured credit guarantees which are not comparable.

Table 11 shows the distribution of banks by conduit exposure. We measure conduit exposure as asset-backed commercial paper outstanding relative to equity capital as of January 1, 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 monotonically decreased in conduit exposure.

To control for difference in observable characteristics, we estimate the baseline specification:

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

where  $R_i$  is the cumulative stock return of bank  $i$  computed over the three-day period from August 8, 2007, to August 10, 2007,  $\text{ConduitExp}_i$  is bank  $i$ 's conduit exposure,  $X_i$  are bank  $i$ 's observable characteristics as of January 1, 2007, and  $\varepsilon_i$  is a bank-specific error term. We estimate this equation using robust standard errors to allow for correlation across error terms.

Table 12 presents the results. Column (1) shows that an increase in conduit exposure from 0% to 100% (e.g., Wells Fargo to Citibank) reduces the stock return during the three-day event window by 2.6 percentage points. Column (2) controls for bank characteristics such as bank size, leverage ratio, share of asset funded with deposits, share of assets funded with short-term non-deposit debt, and indicator variables for the country of the sponsoring institution's headquarters. The coefficient of conduit exposure decreases to 1.5 percentage point but remains statistically significant.

We interpret these results as evidence that banks with higher conduit exposure were more negatively affected by the crisis in the asset-backed commercial paper market. The coefficient is probably a lower bound of the impact, because investors may have underestimated at first the severity of the downturn or may not have been fully aware of the (relatively opaque) credit guarantees provided to conduits. Also, investors may have anticipated some of the losses because of prior announcements about losses on subprime assets.

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 bank with high exposure and in unreported results find qualitatively and quantitatively similar effects. We also drop outliers in terms of conduit exposure and banks with less than \$50 billion in assets and our results are qualitatively and qualitatively unchanged.

We also examine the relation of conduit exposure and stock returns in August and the months prior to August 2007. For each month from January 2007 to August 2007, we estimate the same set of regressions as in Column (2). We find no statistically significant relationship between conduit exposure and stock returns from January 2007 to July 2007 (Columns 4 to 10). However, in the month of the crisis in the asset-backed commercial paper market, August 2007, we find a negative and statistically significant effect of conduit exposure on stock returns after controlling for the full set of observables (Column 3). The coefficient is twice as large as the coefficient in Column 2. Again, this finding suggests that investors revised their expectation of the negative effect of conduit exposure on stock returns upwards for several days after the start of the financial crisis. However, we caution our interpretation because the estimation is over a longer event window and therefore may be confounded by other factors.

#### **4. Benefits to banks of securitization without risk transfer**

The empirical analysis shows that banks suffered significant losses because conduits were unable to roll over maturing asset-backed commercial paper. This raises the question of how large was the benefit to banks from by setting up conduits.

We can assess the benefits to banks by quantifying how much profit conduits yielded to banks from an ex-ante perspective, using a simple back-of-the-envelope calculation. Assuming a risk weight of 100% for underlying assets, banks could avoid capital requirements of roughly 8% by setting up conduits relative to on-balance sheet financing. We assume that banks could finance debt at close to the riskless rate, which is consistent with the rates paid on asset-backed commercial paper before the start of the financial crisis. Further 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 relative to on-balance sheet financing.

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 (Arteta et al., 2008). Assuming that conduits have no costs and revenues are equal to profits, banks earned about 10 basis points on conduit assets.

Comparing the costs and benefits of conduits, it seems clear that conduits would not have been profitable if banks had been required to hold equity against the assets in their conduits to the same extent as for assets on their balance sheets. 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 to the same extent as for assets on their balance sheets, they could earn a “profit” of 10 basis points. Conduits were thus a relatively low-return activity but offered a way for banks to attract money-market savings and increase bank size without increasing regulatory capital.

Table 13 lists the 30 largest conduit sponsors. We find that “missing” capital - the additional capital if conduit assets had been on bank balance sheet - was on average 6.1% of total equity or about \$68 billion in total across banks. This is not necessarily a large amount of equity capital, but it masks considerable heterogeneity across banks as the proportion of missing capital ranges from 1.7% to 79.9% of capital levels. The bank with the largest exposure relative to bank size, Sachsen Landesbank, was the first large bank to be bailed out on August 17, 2007, because it was unable to provide the guarantees it had extended to its conduits. Other banks with large exposure such as Westdeutsche Landesbank and ABN Amro (later bought by Royal Bank of Scotland) also suffered large losses due to recourse from conduits and had to be bailed out. Hence, for some smaller banks the conduit activities were in fact large enough to wipe out the

entire bank capital. For larger banks, conduit activities were small enough to withstand the losses on conduit assets, but these banks were weakened as the financial crisis continued.

In summary, we point out that an ex-ante capital requirement of 8% against conduit assets would not have been sufficient to cover all possible losses from conduits when the assets declined in value. However, the key observation is that a capital charge for guarantees, similar to capital charges for on-balance sheet assets, would have most probably discouraged banks from setting up conduits in the first place.

## **5. Related literature**

Gorton and Souleles (2004), Gorton (2008), Brunnermeier (2009), and Kacperczyk and Schnabl (2009) provide examples of maturity transformation outside the regulated banking sector. Our focus, in contrast to theirs, is to provide an in-depth analysis of the structure of asset-backed commercial paper conduits: how risk transfer was designed to take place through conduits and how it materialized and contributed to the start of the financial crisis of 2007-09.

Ashcraft and Schuermann (2008) present a detailed description of the process of securitization of subprime mortgages, of which conduits were one 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. Nadauld and Sherland (2008) view the banks as warehousing these risks for further distribution whereas Shin (2009) argues that banks were concentrating highly-leveraged risk exposures (given the low capital requirements) by so doing.

Our view in this paper is more along the lines of Shin (2009), Acharya and Richardson (2009), and Acharya and Schnabl (2009), that banks were securitizing without transferring risks to outside investors, and in particular, conduits were a way of taking on systemic risk of the

underlying pool of credit risks. In an analysis focused on the economic causes of the increasing propensity of the financial sector to take such risks (in one class of conduits – the “credit arbitrage” vehicles), Arteta et al. (2008) provide evidence consistent with government-induced distortions and corporate governance problems being the root causes (see also the arguments in Calomiris (2009)). Beltratti and Stulz (2009) examine bank stock returns during the financial crisis and find that stricter country-level capital regulation is correlated with better bank performance during the crisis). Covitz et al. (2009) use data on asset-backed commercial paper and show that the decline in securitized assets was driven by both market-wide factors and program fundamentals.

Our results on the difficulty in rolling over asset-backed commercial paper and the rise in their spreads are somewhat akin to the analysis of the run on the repo market by Gorton and Metrick (2009). They document that a counterparty risk measure for the banking sector as a whole, the “LIB-OIS” spread, explained over time the variation in the credit spreads of a large number of securitized bonds and the rise in repo haircuts, that is, the difference between the market value of an asset and its secured borrowing capacity. However, there are important differences between our “laboratory” and theirs. While conduits resemble repo transactions to some extent, the presence of explicit guarantees to conduits by sponsoring financial institutions establishes a direct linkage between the ability to issue commercial paper and the guarantee provided by the sponsor. We can therefore test directly for the impact of the guarantees on commercial paper issuance and spreads using variation across and within conduit sponsors over time, rather than relying on market-wide measures of banking sector health.

## **6. Conclusion**

In this paper we analyze asset-backed commercial paper conduits and show how the structure of risk-sharing in these conduits implies recourse back to bank balance-sheets. We find

that outside investors who purchased asset-backed commercial paper suffered small losses even when collateral backing the conduits deteriorated in quality, supporting our main finding that conduits were a form of securitization without risk transfer. We also find that the stock price deterioration of banks at the start of the financial crisis was linked to the extent of their conduit exposure relative to equity capital. Once the crisis broke out, asset-backed commercial paper spreads rose and issuance fell, and more so where guarantees were weaker and sponsoring banks were weaker.

Our analysis makes it clear that from an economic standpoint conduits are “less regulated banks” that operate in the shadow banking world, but with recourse to fully regulated entities, mainly commercial banks, that have access to government safety net. Our results also indicate that when these “less regulated banks” do not have such recourse (extendible notes and SIVs), they struggle to survive a systemic crisis. While some may interpret this finding to justify the accordance of government safety net to all those parts of the shadow banking world that perform maturity mismatch like banks, the bigger lesson in our view is that banks have incentives to get around regulatory capital requirements in order to invest in aggregate risks in a leveraged manner.

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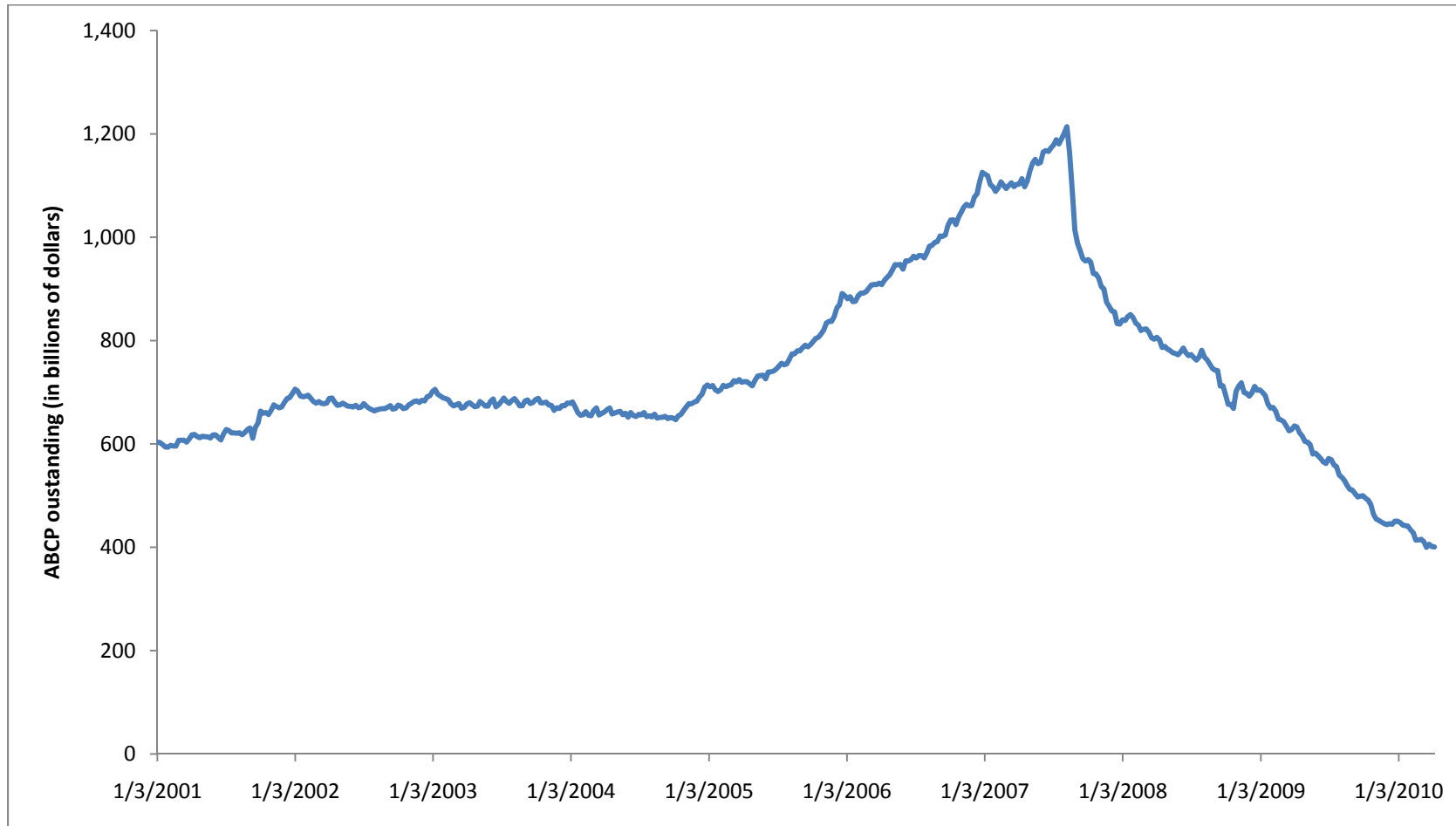
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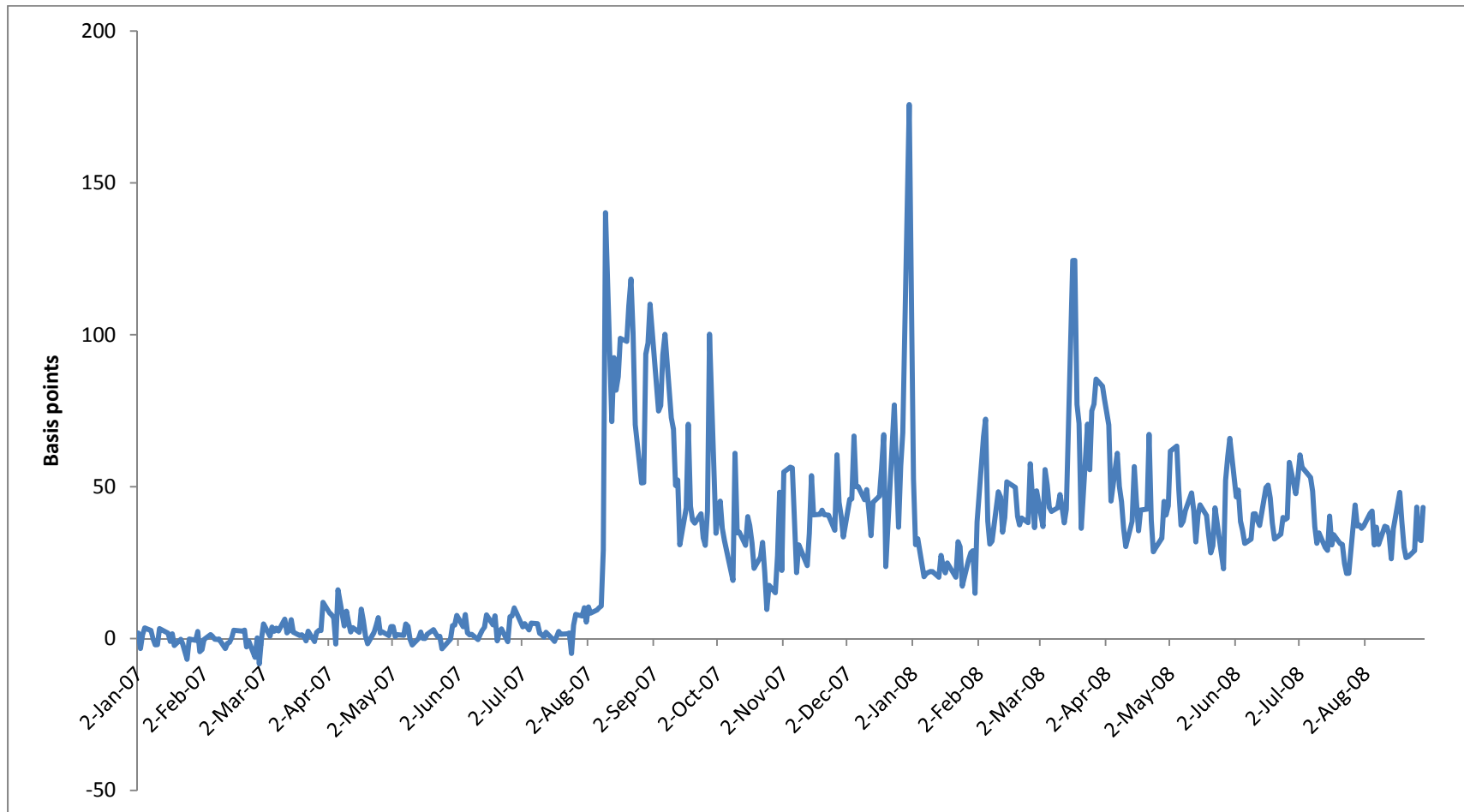
**Figure 1: Asset-Backed Commercial Paper Outstanding**

This figure shows total asset-backed commercial paper outstanding in the U.S. market from January 2001 to April 2010. The figure is based on weekly data published by the Federal Reserve Board.



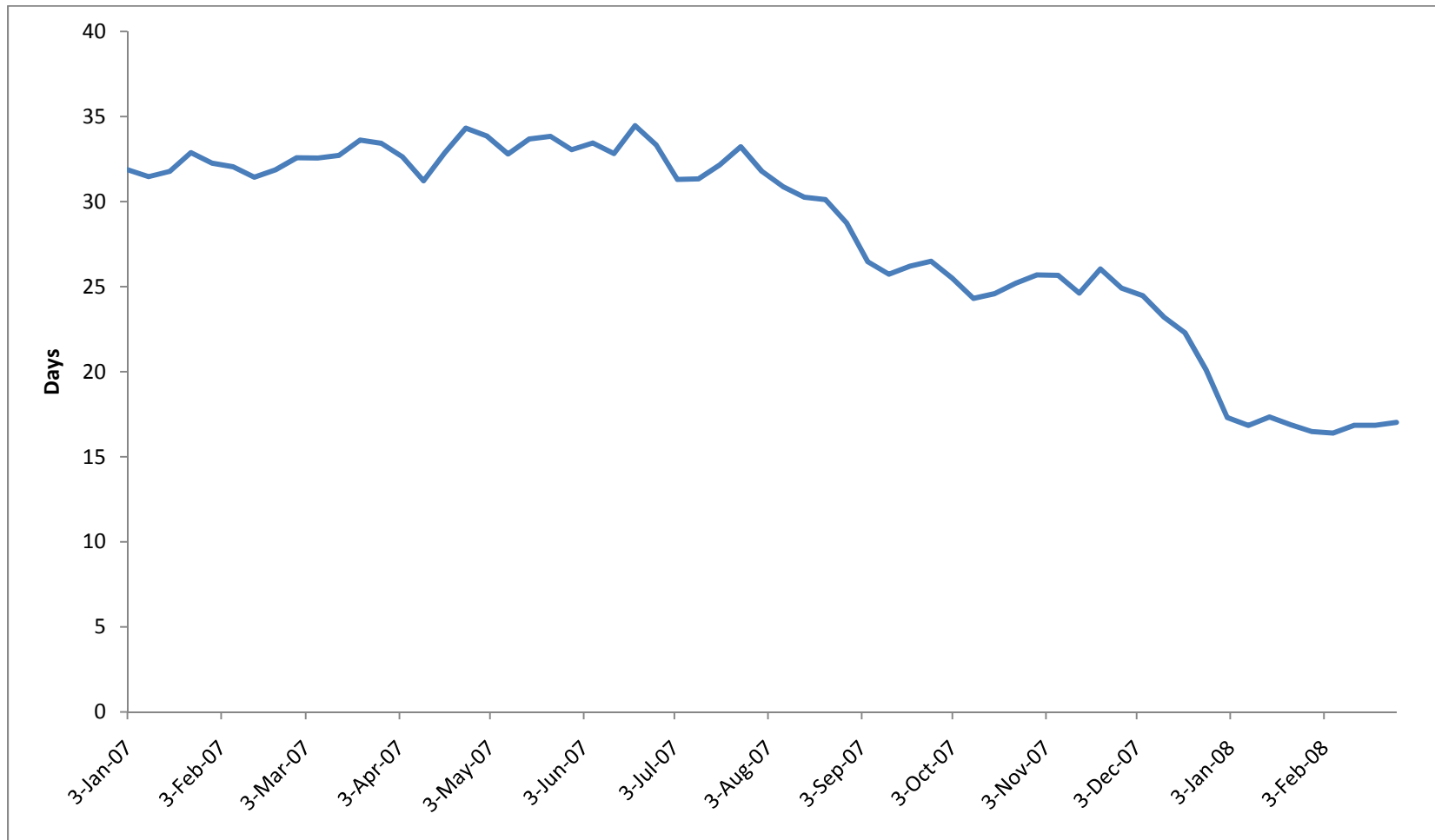
**Figure 2: Asset-Backed Commercial Paper Spread**

This figure shows the spread of overnight asset-backed commercial paper over the Federal Funds rate from January 2007 to August 2008. The figure is based on market data published by the Federal Reserve Board.



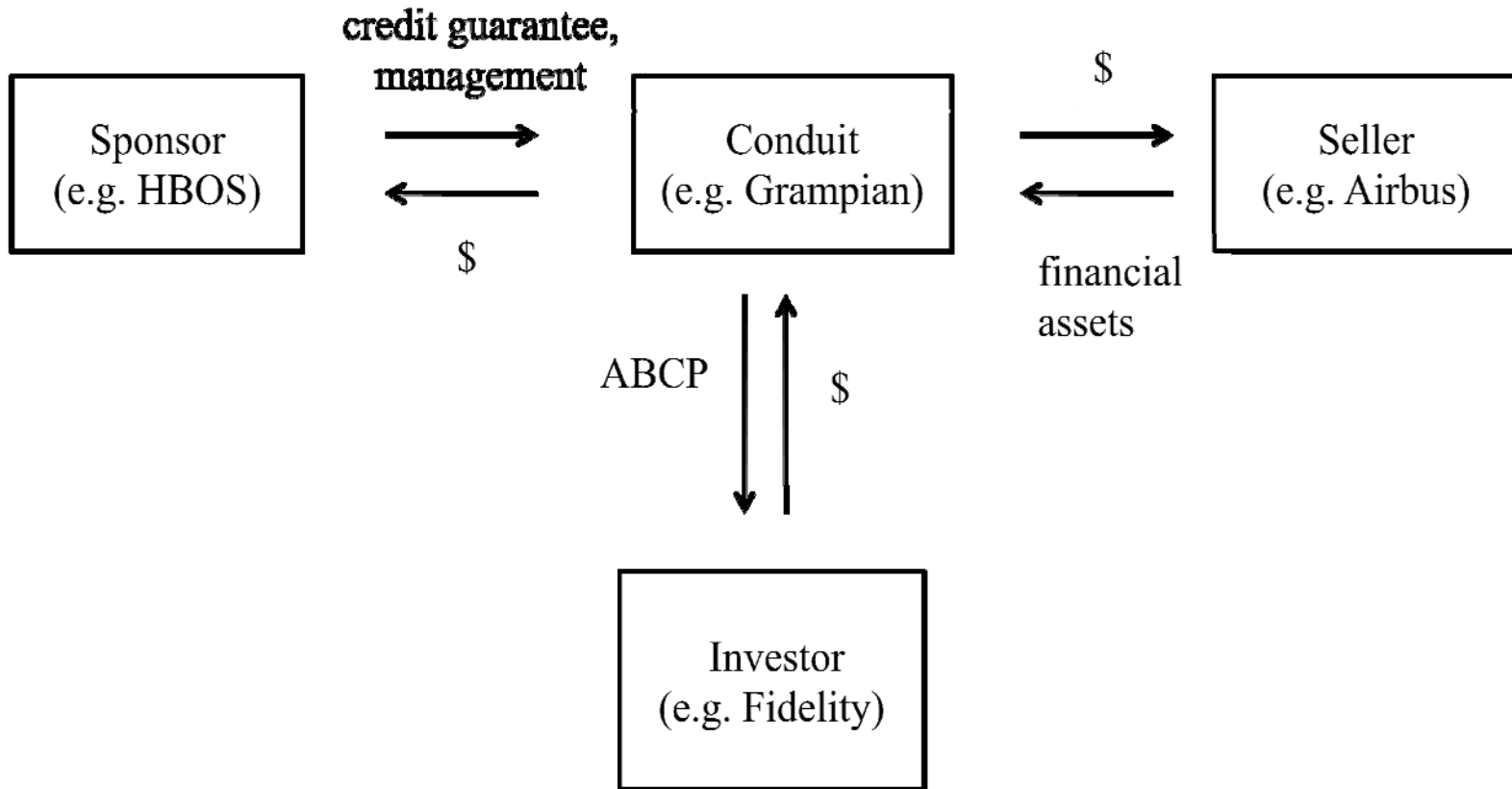
**Figure 3: Average Maturity of Asset-Backed Commercial Paper**

This figure shows the average maturity across conduits of asset-backed commercial paper outstanding from January 2007 to August 2008. The figure is based on Federal Reserve Board data.



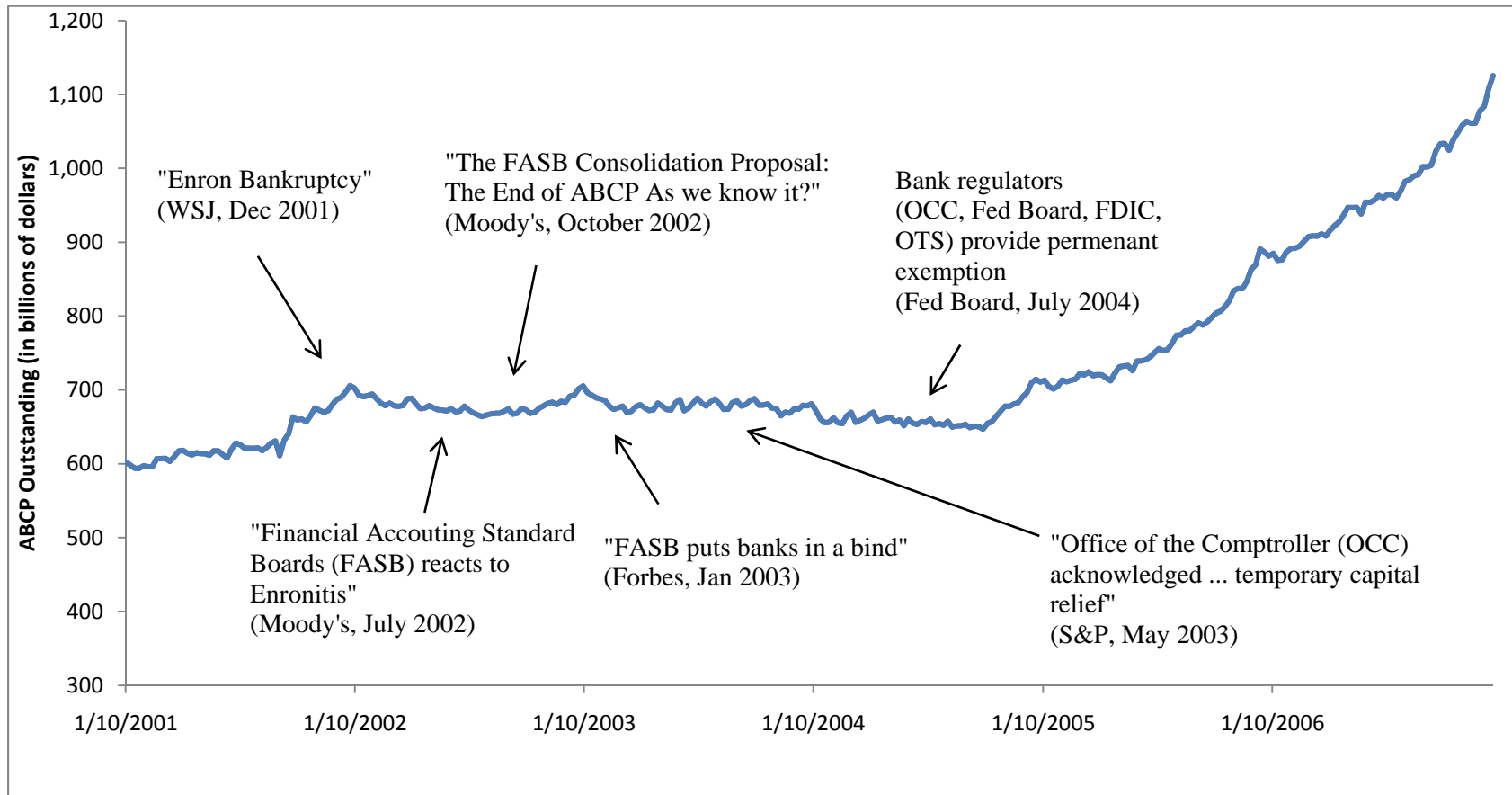
**Figure 4: Conduit Structure**

This figure illustrates how a conduit is related to its sponsors, outside investors, and asset sellers.



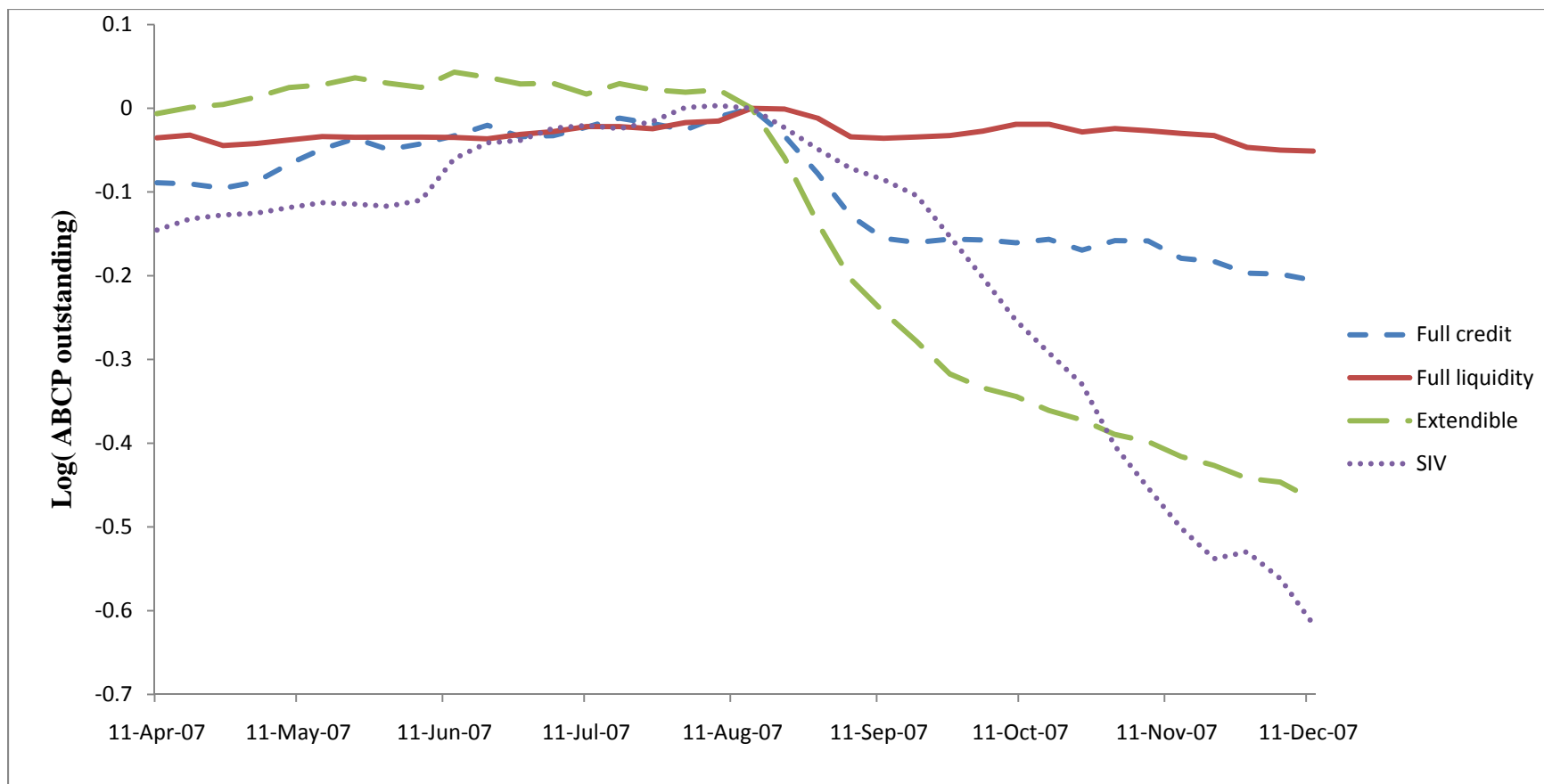
**Figure 5: Capital Regulation and ABCP outstanding**

This figure shows total ABCP outstanding from January 2001 to December 2006. The figure also shows the timeline of regulatory decisions on regulatory capital required for guarantees provided to conduits. The references for the regulatory decisions are in the text.



**Figure 6: Asset-Backed Commercial Paper Outstanding by Credit Guarantee**

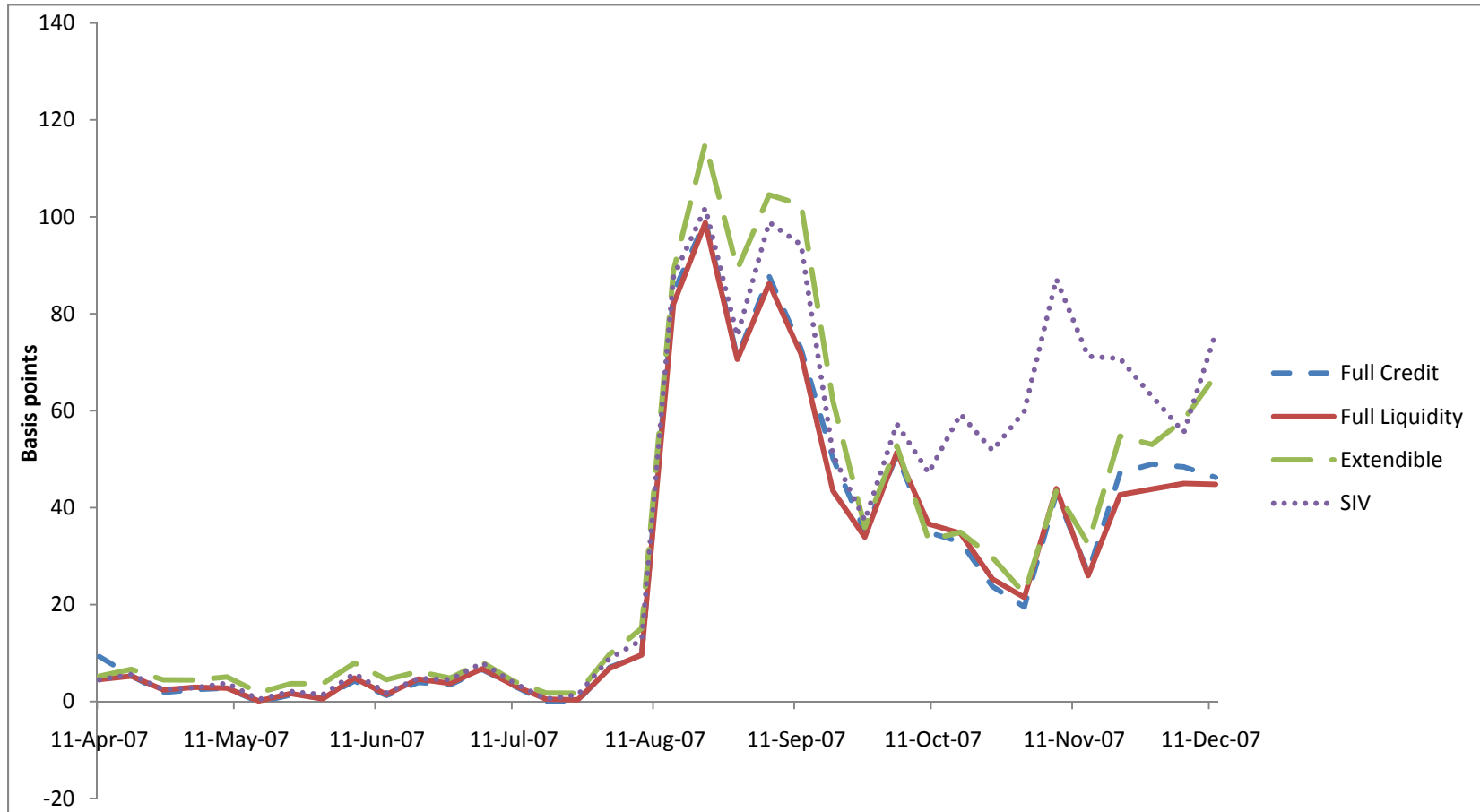
This figure shows the natural logarithm of asset-backed commercial paper outstanding by the type of credit guarantee four months before and four months after the BNP Paribas announcement (April 11, 2007 to December 12, 2007). Asset-backed commercial paper outstanding is normalized to zero as of one day before the BNP Paribas announcement (August 8, 2009). The figure is based on weekly data from DTCC and reports from Moody's Investors Service.





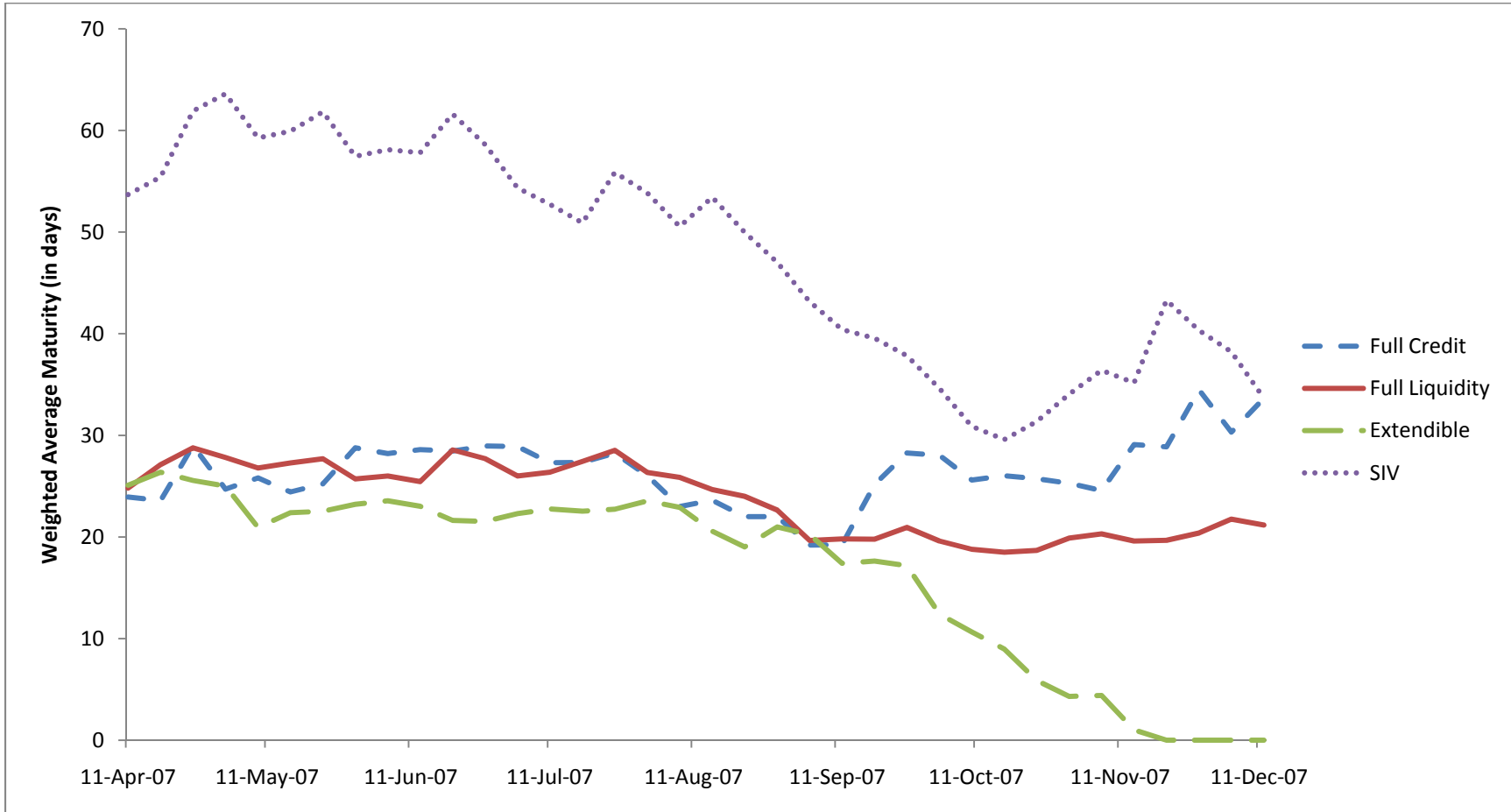
**Figure 7: Asset-backed Commercial Paper Spreads by Credit Guarantee**

This figure shows spreads of overnight asset-backed commercial paper over the Federal Funds rate by the type of credit guarantee four months before and four months after the BNP Paribas announcement (April 11, 2007 to December 12, 2007). The figure is based on weekly data from DTCC and reports from Moody's Investors Service.



**Figure 8: Weighted Maturity by Credit Guarantee**

This figure shows the median across conduits of the weighted average maturity in days by the type of credit guarantee four months before and four months after the BNP Paribas announcement (April 11, 2007 to December 12, 2007). Conduits without outstandings are included with zero maturity. The figure is based on weekly data from DTCC and reports from Moody's Investors Service.



**Table 1: Conduits and Sponsors**

This table shows the ten largest conduits and sponsors as of 1/1/2007. The sample is restricted to bank-sponsored conduits. The information is collected from Moody's Rating Reports and Bankscope. "ABCP (bn)" denotes asset-backed commercial paper outstanding per conduit and sponsor, respectively. "Asset Origin," "Asset Rating," and "Asset Type" denote characteristics of the main asset class owned by a conduit.

Panel A: Ten Largest Conduits						
Program Name	Sponsor	ABCP (bn)	Guarantee	Asset Origin	Asset Rating	Asset Type (Share %)
Grampian Funding	HBOS	37.9	Full Liquidity	United States	AAA	Residential Mortgages (36%)
Amstel Funding	ABN Amro	30.7	Full Liquidity	Netherlands	AAA	CDO/CLO (84%)
Scaldis Capital	Fortis Bank	22.6	Full Liquidity	United States	AAA	Asset backed securities (77%)
Sheffield Receivables	Barclays	21.4	Full Liquidity	n.a.	NR	Mortgages (43%)
Morrigan TRR	Hypo Public	18.9	Full Credit	n.a.	n.a.	Bonds (51%)
Cancara Asset	Lloyds	18.8	Full Liquidity	Great Britain	AAA	Residential Mortgages (43%)
Solitaire Funding	HSBC	18.5	Full Liquidity	United States	AAA	Residential Mortgages (45%)
Rhineland Funding	IKB	16.7	Full Liquidity	United States	AAA	CDO/CLO (95%)
Mane Funding	ING	13.7	Full Liquidity	n.a.	AAA	Asset backed securities (91%)
Atlantis One	Rabobank	13.5	Full Liquidity	United States	NR	Commercial Loans (100%)

Panel B: Ten Largest Sponsors						
Sponsor	Country	ABCP (bn)	Assets (bn)	Tier 1 Capital (bn)	ABCP/Tier1 (%)	Tier1 Ratio (%)
Citigroup	United States	92.7	1,884.3	90.9	102.0%	8.6%
ABN Amro	Netherlands	68.6	1,300.0	31.2	219.5%	8.5%
Bank of America	United States	45.7	1,459.7	91.1	50.2%	8.6%
HBOS Plc	Great Britain	43.9	1,161.7	44.0	99.7%	8.1%
JP Morgan	United States	42.7	1,351.5	81.1	52.7%	8.7%
HSBC	Great Britain	39.4	1,860.8	87.8	44.9%	9.4%
Deutsche Bank AG	Germany	38.7	2,070.0	31.0	125.0%	8.5%
Société Générale	France	38.6	1,260.2	29.4	131.3%	7.8%
Barclays Plc	Great Britain	33.1	1,956.7	45.2	73.2%	7.7%
Rabobank	Netherlands	30.7	732.9	34.8	88.3%	10.7%

**Table 2: Conduit and Sponsor Statistics**

This table includes all conduits rated by Moody's Investors Service as of 1/1/2007. Panel A shows summary statistics by conduit. "Risk Transfer" refers to the guarantees provided by the sponsor. "Assets" is the main asset type as provided by Moody's Investors Service. "Currency" is the conduit's issuing currency. Panel B aggregates conduits by sponsor. "Sponsor Type" is the type of sponsoring institution. "Country of Origin" denotes the sponsor's headquarters.

Panel A: Conduits				
	Total		Per Conduit	
	# Conduits	Size (bn)	Mean	Std.
All Conduits	301	1,236.2	4.1	(5.1)
Risk Transfer				
Full Liquidity	163	752.9	4.6	(5.7)
Full Credit	55	159.9	2.9	(4.6)
Extendible Notes	55	230.9	4.2	(4.5)
SIV	28	92.6	3.3	(3.4)
Assets				
Asset-backed Securities	91	387.4	4.2	(5.9)
Loans	39	65.3	1.6	(2.4)
Receivables	88	436.7	3.5	(4.9)
Mixed asset categories	59	272.9	4.6	(5.3)
Other	24	74.0	4.9	(4.7)
Currency				
U.S. Dollar	233	973.0	4.2	(4.6)
Euro	33	220.0	6.7	(8.4)
Other	35	43.2	1.2	(1.6)
Panel B: Sponsors				
	Total		Per Sponsor	
	# Sponsors	Size (bn)	Mean	Std.
All Programs	127	1,236.2	9.7	(14.7)
Sponsor type				
Commercial Banks	67	911.4	13.6	(17.6)
Structured Finance	19	155.8	8.2	(13.7)
Mortgage Lender	18	75.5	4.2	(5.8)
Investment Manager	5	17.6	3.5	(3.3)
Investment Banks	4	11.0	2.7	(2.2)
Other	14	64.8	4.6	(6.2)
Country of Origin				
United States	67	491.8	7.3	(14.7)
Germany	15	204.1	13.6	(11.6)
United Kingdom	10	195.7	19.6	(17.0)
Other	35	344.5	9.8	(14.4)

**Table 3: Conduits and Sponsor Statistics by Guarantee**

This table includes all conduits rated by Moody's Investors Service as of 1/1/2007. Panel A shows summary statistics by sponsor type. Panel B shows summary statistics by type of guarantee. The column 'Spread' shows the mean spread of overnight asset-backed commercial paper over the Fed funds rate in percentage points from 1/1/2007 to 8/1/2007. The standard deviations are below in brackets. The column 'Maturity' shows the average maturity in days as of 1/3/2007. The column 'Sponsor' reports, for each type of guarantee, the percent of ABCP outstanding by type of sponsor: Banks, Structured Finance groups (SF), Mortgage Finance companies, and Other. The column 'Asset' reports, for each type of guarantee, paper outstanding by main asset type: Asset-Backed Securities (ABS), Loans, Receivables, Mix of the previous categories, and Other.

Panel A: Sponsor Types						
	# Sponsors	Size	Full Liquidity	Full Credit	Extendible	SIV
Commercial Banks	64	911.4	74.2%	10.9%	8.6%	6.3%
Structured Finance	19	155.8	7.0%	37.2%	34.7%	21.1%
Mortgage Lender	18	75.5	14.3%	0.0%	82.8%	2.9%
Investment Mgmt	5	17.6	0.0%	1.3%	98.7%	0.0%
Investment Banks	4	11	54.9%	0.0%	45.1%	0.0%
Other	14	64.8	74.8%	2.3%	22.9%	0.0%

Panel B: Guarantees by Sponsor and Asset Class						
Guarantee	Spread	Maturity	Sponsor	%	Asset	%
Full Liquidity	0.010 (0.091)	30.6	Banks	89.9%	ABS	29.2%
			SF	1.5%	Loans	3.7%
			Mortgage	1.4%	Receivables	42.6%
			Other	7.2%	Mix	20.8%
					Other	3.6%
Full Credit	0.025 (0.155)	27.2	Banks	62.4%	ABS	10.2%
			SF	36.5%	Loans	0.5%
			Mortgage	1.1%	Receivables	37.9%
			Other	0.0%	Mix	39.4%
					Other	11.9%
Extendibles	0.017 (0.081)	26.9	Banks	33.8%	ABS	28.8%
			SF	23.6%	Loans	15.6%
			Mortgage	27.1%	Receivables	24.0%
			Other	15.6%	Mix	23.0%
					Other	8.5%
SIV	0.022 (0.040)	50.4	Banks	61.8%	ABS	91.3%
			SF	34.5%	Loans	8.7%
			Mortgage	2.4%	Receivables	0.0%
			Other	1.4%	Mix	0.0%
					Other	0.0%

**Table 4: Effect of Guarantee on Asset-Backed Commercial Paper Outstanding**

This table shows the effect of credit guarantees on asset-backed commercial paper outstanding. The sample covers the period April to December 2007. The dependent variable is the log of paper outstanding measured in millions of dollars at a weekly frequency. “Full Credit,” “Extendible Notes,” and “SIV” are indicator variables for the type of credit guarantee. The indicator variable “After” denotes dates after August 9, 2007. Columns (2) and (3) include time fixed effects. Columns (3) and (4) include conduit fixed effects. Column (4) includes sponsor-time fixed effects. Standard errors in brackets are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Log(ABCP outstanding)			
	(1)	(2)	(3)	(4)
Full Credit*After	-0.068 (0.124)	-0.062 (0.125)	0.061 (0.130)	-0.005 (0.202)
Extendible*After	-0.725*** (0.201)	-0.748*** (0.204)	-0.880*** (0.200)	-0.681* (0.404)
SIV*After	-0.697*** (0.156)	-0.694*** (0.157)	-0.563*** (0.157)	-0.454 (0.290)
Full Credit	-0.419 (0.376)	-0.419 (0.377)		
Extendible	0.132 (0.204)	0.132 (0.204)		
SIV	-0.336** (0.167)	-0.336** (0.167)		
After	-0.213** (0.084)			
Observations	7630	7630	7630	7630
R-squared	0.053	0.057	0.849	0.937
Time-fixed effects?	No	Yes	Yes	No
Sponsor-time-fixed effects?	No	No	No	Yes
Conduit-fixed effects?	No	No	Yes	Yes

**Table 5: Effect of Guarantee on Asset-Backed Commercial Paper Outstanding Controlling for Asset Quality and Sponsor Type**

This table shows the effect of credit guarantees on asset-backed commercial paper outstanding controlling for asset quality and sponsor type. The sample covers the period April to December 2007. The dependent variable, the credit guarantee variables, and the “After” indicator are defined as in Table 4. “Receivables,” “Loans,” “Mix,” and “Other Assets” are indicator variables based on the main asset type reported to Moody’s Investors Service. The omitted asset category is “Asset-backed securities. Columns (1) to (6) include direct effects for guarantees and asset categories and Columns (3) to (5) include direct effects for sponsor types (coefficients not reported). Columns (1), (2), (5), and (6) include time fixed effects. Columns (2), (3) and (6) include conduit fixed effects. Column (3) includes sponsor-time fixed effects. Standard errors in parentheses are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Log(ABCP outstanding)					
	(1)	(2)	(3)	(4)	(5)	(6)
Full Credit*After	-0.016 (0.134)	0.065 (0.135)	0.023 (0.212)	-0.002 (0.143)	0.007 (0.145)	0.073 (0.141)
Extendible*After	-0.775*** (0.201)	-0.818*** (0.201)	-0.683* (0.404)	-0.597*** (0.227)	-0.621*** (0.231)	-0.623*** (0.229)
SIV*After	-0.570*** (0.169)	-0.451** (0.176)	-0.391 (0.330)	-0.548*** (0.177)	-0.544*** (0.179)	-0.451** (0.183)
Receivables*After	0.392** (0.153)	0.371** (0.153)	0.212 (0.228)	0.363** (0.147)	0.370** (0.148)	0.324** (0.145)
Loans*After	-0.580* (0.307)	-0.384 (0.289)	-0.506* (0.278)	-0.213 (0.252)	-0.253 (0.255)	0.039 (0.208)
Mix*After	-0.034 (0.196)	0.033 (0.200)	-0.078 (0.285)	-0.067 (0.189)	-0.063 (0.191)	-0.018 (0.193)
Other Assets*After	0.209 (0.172)	0.173 (0.162)	0.001 (0.208)	0.149 (0.167)	0.15 (0.167)	0.102 (0.158)
Bank*After				0.053 (0.231)	0.051 (0.233)	0.046 (0.249)
Mortgage*After				-1.082** (0.525)	-1.110** (0.526)	-1.524*** (0.435)
Observations	7,630	7,630	7,630	7,630	7,630	7,630
R-squared	0.162	0.853	0.938	0.183	0.189	0.859
Time-fixed effects?	Yes	Yes	No	No	Yes	Yes
Sponsor-time fixed effects?	No	No	Yes	No	No	No
Conduit-fixed effects?	No	Yes	Yes	No	No	Yes

**Table 6: Effect of Guarantee on Overnight Asset-Backed Commercial Paper Spreads**

This table shows the effect of guarantees on asset-backed commercial paper spreads. The sample covers the period April to December 2007. The dependent variable is the overnight asset-backed commercial paper spread over the Fed Funds rate in the primary market measured daily. The explanatory variables are defined the same way as in Table 4. Columns (2) and (3) include time fixed effects. Columns (3) and (4) include conduit fixed effects. Column (4) includes sponsor-time fixed effects. Standard errors in parentheses are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Spread			
	(1)	(2)	(3)	(4)
Full Credit*After	0.023 (0.055)	0.025 (0.055)	0.041 (0.058)	-0.004 (0.103)
Extendible*After	0.129** (0.054)	0.093** (0.047)	0.135*** (0.050)	0.068 (0.110)
SIV*After	0.316*** (0.099)	0.254*** (0.082)	0.260*** (0.093)	0.315** (0.132)
Full Credit	0.000 (0.005)	0.001 (0.005)		
Extendible	0.022** (0.009)	0.022** (0.009)		
SIV	0.001 (0.006)	0.006 (0.005)		
After	0.474*** (0.028)			
Observations	14,862	14,862	14,862	14,862
R-squared	0.444	0.717	0.843	0.952
Time-fixed effects?	No	Yes	Yes	No
Sponsor-time-fixed effects?	No	No	No	Yes
Conduit-fixed effects?	No	No	Yes	Yes



**Table 7: Effect of Guarantee on Overnight Asset-Backed Commercial Paper Spreads Controlling for Asset Quality and Sponsor Type**

This table shows the effect of guarantees on asset-backed commercial paper spreads controlling for asset quality and sponsor type. The sample covers the period April to December 2007. The dependent variable is the overnight asset-backed commercial paper spread over the Fed Funds rate in the primary market measured daily. The explanatory variables are defined the same way as in Table 5. Columns (1) to (6) include direct effects for guarantees and asset categories and Columns (3) to (5) include direct effects for sponsor types (coefficients not reported). Columns (1), (2), (5), and (6) include time fixed effects. Columns (2), (3) and (6) include conduit fixed effects. Column (3) includes sponsor-time fixed effects. Standard errors in parentheses are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Spread					
	(1)	(2)	(3)	(4)	(5)	(6)
Full Credit*After	-0.004 (0.054)	-0.015 (0.054)	-0.100 (0.077)	-0.043 (0.051)	-0.039 (0.053)	-0.061 (0.048)
Extendible*After	0.013 (0.057)	0.021 (0.061)	-0.119 (0.214)	-0.036 (0.075)	-0.069 (0.064)	-0.089 (0.071)
SIV*After	0.196** (0.091)	0.166 (0.109)	0.245** (0.107)	0.220** (0.104)	0.171** (0.082)	0.134 (0.095)
Receivables*After	-0.182*** (0.062)	-0.221*** (0.074)	-0.150* (0.089)	-0.210*** (0.059)	-0.192*** (0.060)	-0.228*** (0.069)
Loans*After	0.161 (0.159)	0.066 (0.171)	0.450*** (0.083)	0.152 (0.160)	0.158 (0.161)	0.063 (0.179)
Mix*After	0.066 (0.063)	0.059 (0.077)	0.073 (0.101)	0.035 (0.061)	0.051 (0.061)	0.042 (0.073)
Other Assets*After	-0.054 (0.089)	-0.056 (0.097)	0.012 (0.104)	-0.052 (0.082)	-0.048 (0.084)	-0.044 (0.089)
Bank*After				-0.152** (0.065)	-0.148*** (0.055)	-0.185*** (0.057)
Mortgage*After				0.048 (0.125)	-0.071 (0.150)	0.079 (0.177)
Observations	14,862	14,862	14,862	14,862	14,862	14,862
R-squared	0.766	0.865	0.96	0.5	0.772	0.869
Time-fixed effects?	Yes	Yes	No	No	Yes	Yes
Sponsor-time-fixed effects?	No	No	Yes	No	No	No
Conduit-fixed effects?	No	Yes	Yes	No	No	Yes

**Table 8: Effect of Guarantee on Weighted Average Maturity**

This table shows the effect of guarantees on weighted average maturity of outstandings. The sample covers the period April to December 2007. The dependent variable is the weighted average maturity measured in days at a weekly frequency. Conduits without outstandings are included with zero maturity. The explanatory variables are defined the same way as in Table 4. Columns (2) and (3) include time fixed effects. Columns (3) and (4) include conduit fixed effects. Column (4) includes sponsor-time fixed effects. Standard errors in parentheses are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Maturity			
	(1)	(2)	(3)	(4)
Full Credit*After	9.228* (4.760)	9.251* (4.775)	6.321* (3.648)	4.173 (5.458)
Extendible*After	0.479 (2.949)	0.492 (2.957)	-0.446 (2.948)	-2.568 (5.699)
SIV*After	-11.024*** (2.673)	-11.020*** (2.678)	-11.236*** (2.719)	-12.452*** (5.515)
Full Credit	-1.519 (2.834)	-1.517 (2.840)		
Extendible	-2.485 (2.489)	-2.489 (2.494)		
SIV	28.894*** (3.055)	28.890*** (3.061)		
After	-6.582*** (1.215)			
Observations	8,339	8,339	8,339	8,339
R-squared	0.165	0.17	0.689	0.832
Time-fixed effects?	No	Yes	Yes	No
Sponsor-time-fixed effects?	No	No	No	Yes
Conduit-fixed effects?	No	No	Yes	Yes

**Table 9: Effect of Guarantee on Weighted Average Maturity Controlling for Asset Quality and Sponsor Type**

This table shows the effect of guarantees on maturity controlling for asset quality and sponsor type. The sample covers the period April to December 2007. The dependent variable is the weighted average maturity of outstandings measured in days at a weekly frequency. Conduits without outstandings are included with zero maturity. Columns (1) to (6) include direct effects for guarantees and asset categories and Columns (3) to (5) include direct effects for sponsor types (coefficients not reported). Columns (1), (2), (5), and (6) include time fixed effects. Columns (2), (3) and (6) include conduit fixed effects. Column (3) includes sponsor-time fixed effects. Standard errors in parentheses are clustered at the conduit level. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

	Maturity					
	(1)	(2)	(3)	(4)	(5)	(6)
Full Credit*After	8.983* (4.842)	6.007* (3.616)	5.55 (5.263)	7.612** (3.855)	7.634** (3.866)	5.463* (3.213)
Extendible*After	1.986 (2.995)	0.945 (2.966)	-3.146 (5.298)	-0.942 (3.129)	-0.931 (3.141)	-1.235 (2.785)
SIV*After	-7.047** (3.217)	-5.654* (3.056)	-3.518 (6.011)	-7.875** (3.580)	-7.878** (3.589)	-6.142* (3.151)
Receivables*After	8.857*** (2.969)	11.210*** (2.330)	13.947*** (4.037)	9.764*** (2.761)	9.756*** (2.769)	11.922*** (2.222)
Loans*After	-4.394 (3.271)	-1.694 (2.731)	-8.551 (5.276)	-5.804 (3.947)	-5.823 (3.956)	-3.319 (3.589)
Mix*After	6.552 (4.137)	9.307** (3.726)	12.330* (7.197)	6.752* (3.908)	6.748* (3.917)	9.572*** (3.455)
Other Assets*After	3.125 (3.852)	5.564* (3.338)	6.268 (5.159)	3.198 (4.029)	3.186 (4.041)	5.578 (3.520)
Bank*After				-12.502* (6.684)	-12.531* (6.702)	-9.203* (5.282)
Mortgage*After				-4.898 (7.467)	-4.922 (7.485)	-1.718 (6.911)
Observations	8,339	8,339	8,339	8,339	8,339	8,339
R-squared	0.219	0.702	0.842	0.229	0.234	0.708
Time-fixed effects?	Yes	Yes	No	No	Yes	Yes
Sponsor-time-fixed effects?	No	No	Yes	No	No	No
Conduit-fixed effects?	No	Yes	Yes	No	No	Yes

**Table 10: Estimated Losses for Sponsors and Outside Investors**

This table shows the ex-post risk transfer by credit guarantee. “Pre-crisis” denotes total asset-backed commercial paper outstanding as of 7/1/2007. Post-crisis denotes the value-weighted share that is “Active” (conduit continues to issue), “Repaid” (conduit closed and repaid investors), and “In Default” (Conduit closed and investors were not repaid). “Estimated losses” estimates the losses of sponsor and outside investors assuming a recovery rate on conduit assets of 95% and 85%, respectively.

	Pre-Crisis ABCP (bn)	Post-Crisis			Estimated Loss (bn)			
		Active	Repaid	In Default	Loss rate: 5%		Loss rate 15%	
					Sponsor	Investor	Sponsor	Investor
All	1,395.5	76.6%	20.8%	2.5%	68.0	1.7	204.1	5.2
Risk Transfer					0.0	0.0	0.0	0.0
Full Liquidity	844	87.9%	12.1%	0.0%	42.2	0.0	126.6	0.0
Full Credit	204.2	70.9%	29.1%	0.0%	10.2	0.0	30.6	0.0
Extendibles	243.1	47.0%	45.5%	7.4%	11.3	0.9	33.8	2.7
SIV	104.1	65.7%	17.7%	16.6%	4.3	0.9	13.0	2.6
Sponsor Type					0.0	0.0	0.0	0.0
Commercial Bank	1,035.6	83.0%	16.4%	0.6%	51.5	0.3	154.4	0.9
Structured Finance	199.2	58.1%	36.4%	5.5%	9.4	0.5	28.2	1.6
Mortgage Lender	60.2	44.5%	40.2%	15.3%	2.5	0.5	7.6	1.4
Other	100.4	63.3%	24.4%	8.9%	4.6	0.4	13.7	1.3

**Table 11: Event Study Summary Statistics**

This table shows summary statistics by conduit exposure. We sort banks in three groups: bank with no conduit exposure, banks with low conduit exposure, and banks with high conduit exposure. 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’ as the total stock return in the three-day window from August 8, 2007, to August 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 control variables are measured as of January 1, 2007. ‘United States’ is an indicator variable whether a bank is headquartered in the United States.

Sample:	Conduit Exposure			
	All (1)	No (2)	Low (3)	High (4)
Stock return Aug 8th - Aug 10th	-0.004 (0.052)	0.007 (0.055)	-0.028 (0.024)	-0.046 (0.026)
Conduit 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)	0.670 (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)	0.050 (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 12: Effect of Conduit Exposure on Stock Returns**

This table shows the effect of conduit exposure on stock returns. 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. In Columns (1) and (2), the dependent variable is the total stock return over the three-day period from August 8, 2007 to August 10, 2007. In Columns (3) to (10), the dependent variable is the stock return in the month indicated under “time.” We measure ‘Conduit Exposure’ as asset-backed commercial paper relative to equity. Columns (2) to (10) 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 measured as of January 1, 2007. Columns (2) to (10) includes fixed effects for Germany, Great Britain, and the United States. Robust standard errors are in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Time	Dependent Variable: Stock Return									
	Event regressions			Placebo regressions						
	8 Aug – 10 Aug	Aug	Jan	Feb	Mar	Apr	May	Jun	July	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Conduit Exposure	-0.026 (0.007)***	-0.015 (0.004)***	-0.029 (0.009)***	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)
Log(Assets)		0.005 (0.015)	-0.006 (0.025)	-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)
Log(Equity)		-0.016 (0.015)	-0.002 (0.026)	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)
Equity-Assets Ratio		-0.006 (0.065)	-0.058 (0.115)	-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)
Share Short Term Debt		0.039 (0.042)	0.029 (0.106)	-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)
Share Deposits		-0.017* (0.026)	0.008* (0.052)	-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)
Country FE	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	107	107	107	107	107	107	107	107	107	107
R-squared	0.068	0.359	0.258	0.648	0.337	0.376	0.522	0.301	0.196	0.295

**Table 13: 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.  $ABCP \times 0.08 = \text{Total}$ , expressed in billions of US dollars. We also compute the 'missing capital' as a share of the 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	Tier 1	ABCP	Missing Capital	
			Total	%
Citigroup Inc	90.9	92.7	7.4	8.2%
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	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	38.7	3.1	10.0%
Société Générale	29.4	38.6	3.1	10.5%
Barclays Plc	45.2	33.1	2.6	5.9%
Mitsubishi UFJ Financial Group	68.5	32.0	2.6	3.7%
Rabobank Nederland	34.8	30.8	2.5	7.1%
WestLB AG	9.5	29.9	2.4	25.1%
ING Groep NV	54.3	26.4	2.1	3.9%
Dresdner Bank AG	18.7	23.2	1.9	9.9%
Fortis	16.4	22.6	1.8	11.0%
Bayerische Landesbank	15.8	22.4	1.8	11.3%
Bayerische Hypo-und Vereinsbank	14.1	22.3	1.8	12.6%
State Street Corporation	24.1	21.9	1.7	7.2%
Crédit Agricole S.A.	6.5	19.5	1.6	24.1%
Hypo Real Estate Holding AG	4.5	18.9	1.5	33.4%
Lloyds Banking Group Plc	6.1	18.8	1.5	24.6%
Countrywide Financial Corporation	25.2	18.3	1.5	5.8%
GMAC LLC	15.4	17.5	1.4	9.1%
Royal Bank of Scotland	75.2	15.8	1.3	1.7%
Royal Bank of Canada RBC	52.3	15.6	1.2	2.4%
Bear Stearns Companies LLC	19.1	13.8	1.1	5.8%
KBC Group	22.9	12.6	1	4.4%
Sachsen Landesbank	1.3	12.5	1	79.9%
BNP Paribas	62.3	11.6	0.9	1.5%
Bank of Montreal	45.3	11.5	0.9	2.0%
<b>Total</b>	<b>1,124.0</b>	<b>861.5</b>	<b>68.9</b>	<b>6.1%</b>