Interest Rates Hikes, Collateral Deterioration and Search for Yield: Evidence from Shadow Banks

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Abstract

This paper studies the impact of interest rates hikes on the production of safe assets by shadow banks as they perform maturity transformation similar to banks, but without deposit franchise or access to central bank liquidity. Using a unique dataset of collateral transactions from Asset-Backed Commercial Paper (ABCP) conduits, we show how increases in interest rates in the years leading to the GFC led to conduits seeking higher yields to compensate their higher funding costs and support their production of safe assets. They substituted safe collateral with lower-rated and opaque assets like Mortgage-Backed Securities (MBS) and Collateralized Debt Obligations (CDOs). This shift rendered them susceptible to severe runs when concerns regarding collateral quality surfaced.

Keywords: safe assets, maturity transformation, shadow banking, interest rates
JEL Codes: G01, G23, G28, E41, E43, E44

1 Introduction

Monetary financial assets are assets that can fulfil the traditional role of money in satisfying investors' needs for liquidity services and a store of value, and are therefore considered safe assets. While government debt has historically held the role of preferred safe asset, shortages of government bonds in recent decades have spurred the expansion of private production of safe assets, including bank debt, commercial paper (CP), and more recently money-like assets produced by the shadow banking system (Gorton, Lewellen, and Metrick, 2012; Krishnamurthy and Vissing-Jorgensen, 2015; Sunderam, 2014; Kacperczyk, Pérignon, and Vuillemey, 2021; Krishnamurthy and Li, 2022). Similar to traditional banks, shadow banks are involved in the creation of money-like instruments backed by long-term debt as collateral (Gorton, 2017), a maturity transformation that entails exposure to changes in interest rates. However, differently from banks, shadow banks lack (direct) access to central bank liquidity or hedging from deposit franchise.

The growth of the shadow banking system and its vulnerability to bank-like runs has been attributed to various factors, including the demand for safe assets and regulatory arbitrage (Acharya et al., 2013; Covitz et al., 2013; Schroth et al., 2014). However, no empirical study has focused on maturity transformation performed by the system and the impact of interest rates on the ability of shadow banks to create money-like assets, which might have contributed to creating vulnerability in the sector. In this paper, we provide evidence on the role played by rising interest rates, in particular, on the quality of the collateral backing the production of shadow money-like debt. The role played by collateral in the private and shadow production of money-like assets is key as it contributes to the determination of the safe status of the asset created, together with external liquidity and credit guarantees, but also relevant as it affects the ability to recover liquidity in the event of a run.

To study these issues, we collect a novel collateral-level dataset of Asset-Backed Commercial Paper (ABCP) conduits. ABCP conduits are unregulated entities that issue commercial paper notes against a portfolio of long-term collateral accumulated over time via a bankruptcy-remote special purpose vehicle (SPV), usually set up by a bank.[1]. ABCP conduits are different from other shadow banks discussed in the literature, like MMFs or CLOs, due to their significant maturity transformation. They purchase long-term securities (similar to CLOs) and generate short-term commercial papers (with an average maturity of 30 days), which are then purchased by MMFs. The ABCP market offers an ideal setting for

[1]Institutional details of the ABCP market are described in Appendix C.

our analysis on the impact of interest rates on the production of safe assets because investors treated ABCP notes as money-like instruments as documented by Sunderam (2014)), while the cost of their liabilities increased, in almost a 1:1 relationship with policy rates, from 1% to 5% between 2004 and 2007. Moreover, after reaching $1.3 trillion in dollar amount outstanding in January 2007 (Figure 1a), fulled by the growth of the money market funds (Figure 1b), the market experienced a run in August 2007, among concerns about the quality of the collateral backing the notes.[2] The run had severe implications for banks sponsoring the conduits. As conduits drew liquidity from their sponsoring banks to repay investors, partially because of the difficulties to sell their collateral, the Federal Reserve had to intervene to mitigate the impact of ensuing banking losses. The Term Auction Facility (TAF) was used in 2007, and the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility was used later in 2010.

[Figure 1 about here.]

In this paper, we study ABCP conduits' response to increasing policy rates (federal funds rates) after controlling for demand for money-like assets (liquidity premium), in the years leading to the Great Financial Crisis. We show that to maintain a cheap financing strategy and respond to the growing demand for their liabilities (ABCP notes) amidst increasing costs, the conduits reached for yield. They did so by backing the issuance of ABCP notes with collateral of lower quality. We find that they substituted safe collateral for higher-yielding, lower-quality long-term assets, such as MBS and CDO, to compensate for higher funding costs. We base our empirical analysis on data from S&P Capital IQ, which has a unique advantage compared to other data providers. It provides comprehensive information on issuance, collateral transactions, and portfolio composition. This allows to track changes in the volume of notes and composition by asset class and rating with monthly and quarterly frequency, respectively. Our dataset covers the years from 2003 to just before the ABCP run in 2007. We use a panel data analysis with a wide set of fixed effects (time, conduit-level, and conduit-rating) and run the analysis in a time-differenced specification. The monthly frequency, combined with year-quarter fixed effects, allows us to capture changing macroeconomic conditions and isolate the impact of changes in interest rates and shits in the demand

[2]In January 2007, ABCP amount outstanding accounted for $1.3 trillion in the US market, about 59.9% of the commercial paper market (financial and non-financial), up from 7.5% in 1990. In comparative terms, the repo market - that also experienced a similar run - financed 4% of outstanding private-label ABS against about 23% financed by ABCP conduits Gorton and Metrick (2012); Krishnamurthy et al. (2014). The collapse of the ABCP market in August 2007 was specific to that market and not observed in other components of the commercial paper market, financial and non-financial, which remained stable Kacperczyk and Schnabl (2010)

for safe assets.

By recognizing the de-facto bank-like nature of ABCP conduits performing maturity transformation, we propose that the increases in interest rates may affect ABCP conduits' activity via the cost of funding. The rates paid by the conduits on ABCP notes have two components, the market short-term interest rate and a spread which depends on the rating of the conduits. To the extent that these notes are perceived as safe assets by investors, this spread is typically in the order of a few basis points, and in fact remained almost constant until the market collapsed in August 2007 as reported in Covitz et al. (2013).[3] However, the first component is tightly linked to short-term interest rates, which increased from 1% in 2003 to 5.25% in June 2007, as shown in Figure 2a. As the Federal Reserve started to increase the short-term rate from June 2004, with a +0.25% increase in almost all of the following months until June 2006, conduits faced higher and increasing funding costs on their short-term liabilities.The high responsiveness of ABCP issuance is due to their short maturity and the high degree of rate awareness of institutional money market investors. The hikes in interest rates lower the conduits' margins, i.e. their profitability, which is similar to banks' net interest margins and is typically low.[4] To the extent that the increase in interest rates is not wholly and immediately reflected on the existing and new collateral in the conduits' portfolios, i.e., there is limited flattening of the yield curve, we would generally expect conduits to adjust by lowering the issuance of ABCP notes because of the higher funding costs and thus lower margins.[5] The term spread for pre-GFC period is presented in Figure 2b. The effect of short-term interest rates on the term spread is a near-perfect negative one-to-one relationship in the US in the period before the crisis. Increasing interest

[3]To explain the low volatility of commercial paper spread, Adrian and Jones (2018) note that because commercial banks sponsoring ABCP conduits benefit from formal official sector backstops, their support in terms of liquidity and credit can distort the cost of the conduit's liabilities and lead investors to believe that these liabilities were "ostensibly" safe, so that the required spread was very low. Another explanation could be related to a more general characteristic of the CP market highlighted by Covitz and Downing (2007), whereby the yield spread for short-term CP is mostly driven by the firm's credit quality, which acts as the principal liquidity provider. For the ABCP market, the high rating of well-capitalized sponsoring banks would have been enough to maintain their spreads low and constant in the absence of a downgrade.

[4]The main purpose of these structures is to attract money market financing, and ABCP margins can be proxied by the difference between the rates paid by the ABCP notes and the yield gained on the underlying portfolio of collateral, minus the costs related to the fees paid on the liquidity and credit support, the costs for hedging with derivatives on interest rates and exchange rates, and in some cases insurance. Only a few banks reported the profitability of their conduits in their annual reports in the pre-crisis period. According to Acharya et al. (2013), estimates of funding costs (proxied by the risk-less rate) and benefits (fees) for a typical conduit in the pre-crisis period, when banks were not required to hold equity against their ABCP portfolios, suggest that ABCP conduits were a relatively low-return activity whose main scope was to attract money market financing without increasing regulatory capital.

[5]As an SPV, there are no other sources of funding than ABCP notes and no other sources of profitability than the difference between the yield paid on notes and the yield gained on collateral

rates did not correspond to higher longer-term rates on the collateral, and the term spread even turned negative between June 2006 and June 2007. Using aggregate data, Adrian and Shin (2010) found that increases in the federal funds target rate are generally associated with a slower growth rate of short-term liabilities for financial intermediaries. In a similar fashion, we hypothesise that the increases in the federal funds rate should negatively affect the ability of conduits to manufacture ABCP notes (less issuance) and lower the marginal profitability of extra collateral purchased by the conduit (fewer collateral transactions). However, we also recognize the key role of the demand for safe assets in explaining the growth of the ABCP market (Sunderam (2014)), as investors treated ABCP as money-like instruments. The theoretical literature has posit that this demand operates via the increase in the liquidity premium, proxied by the difference between Treasury bills yield and OIS. A lower liquidity premium indicates a higher demand for safe assets that is expected to be associated with higher ABCP issuance. This negative relationship is consistent with the overall growth of the market before the GFC (Figure 1a). Therefore, we test for the impact of interest rates while controlling for demand for ABCP notes as safe assets on the ABCP issuance and portfolio composition.

[Figure 2 about here.]

Our main results are as follows. The first set of results shows that ABCP conduits expanded through increased issuance of ABCP notes in response to the demand for safe assets, despite rising funding costs.[6] Furthermore, our analysis confirms that this expansion was sustained by a rise in collateral purchases rather than an increase in issuance against the existing collateral. In our second set of results, we demonstrate that both increased demand for safe assets and changes in interest rates prompted ABCP conduits to increase their purchases of collateral such as CDOs, mortgages, and mortgage-backed securities, while reducing their purchases of more traditional collateral, such as trade receivables, auto loans, and credit card loans. These traditional assets typically have shorter maturities and, compared to structured finance products, have a less opaque payoff structure. Therefore, the transition towards acquiring more CDOs and MBS as collateral implies a dual impact: heightened maturity transformation and an increased exposure to liquidity risk for the conduits. The increasing presence of CDOs and MBS in the portfolios aligns with the narrative of the challenges these conduits encountered during the crisis when attempting to liquidate their assets in the secondary market. Furthermore, our tests provide evidence of a substitution

[6]In additional tests, we add conduit-level controls, other macro-variables such as VIX and credit trends and the results are unchanged. We also test our baseline results by removing repo conduits and conduits then entered the market after the accounting changes suggested by Acharya et al. (2013) and our results hold.

effect within the investment grade asset class, with a shift towards higher-yielding assets (i.e., from the A spectrum to B). This finding aligns with the conduits' strategy of enhancing the yield on their collateral while upholding a high short-term rating, a necessity dictated by the portfolio regulations of institutional investors. To establish a more direct link between the evidence of collateral quality decline and the conduits' vulnerability to runs, we investigate whether the higher proportions of CDOs and MBS in their holdings correlate with an increased participation in the Term Auction Facility (TAF) introduced by the Federal Reserve in late 2007. We regard participation in the TAF as a proxy for the sponsoring banks' exposure to their ABCP conduits and, consequently, their liquidity vulnerabilities. Our analysis confirms this association concerning the holdings of MBS as collateral. Sponsoring banks with a higher proportion of MBS in their ABCP portfolios prior to the run received more loans from the TAF.

We conduct additional tests to enhance the identification of the impact of interest rate hikes on the conduits' activities while mitigating potential endogeneity concerns. The decisions regarding policy rates in the pre-crisis period were not directly tied to the expansion of the shadow banking sector. However, one could still argue that changes in interest rates could be related to the assets accumulated in the conduits' portfolios, e.g., to the US housing market. Also, there could be some omitted variable influencing both conduits and monetary policy decisions that we are not able to capture. Lastly, our monthly and quarterly frequency is lower than the weekly frequency used in the literature to address endogeneity of the macro-variables. To address these issues, we re-run our baseline models by using the federal funds rate components of FOMC announcements identified in Swanson (2021), and our baseline results are confirmed. In our second additional test, we conduct a difference-in-difference test centered around the first increase of the federal funds rate in June 2004 after a period of low-and-stable rates. This test helps to alleviate concerns that decisions on policy rates were indirectly related to monetary authorities' initiatives to address the increasing amount of credit in the economy, to which ABCP conduits contributed by purchasing assets such as mortgage-backed securities. In 2004, the markets for MBS and CDOs were well-established but hadn't yet experienced their growth phases. Additionally, the demand for safe assets had not yet surged at that time. Therefore, we are able to test for the impact of increasing financing costs on the conduits in a cleaner manner, i.e., in a period with limited demand for safe assets and limited supply of MBS and CDOs. In absence of the strong demand and in line with our previous evidence, we expect the increase in interest rate to lower ABCP issuance. In our difference-in-difference set up, we propose the hypothesis that conduits sponsored by US banks reduce their ABCP issuance to a lesser extent compared to non-US

sponsored banks, primarily European banks, after the interest rate increased in June 2004. Based on the evidence of Ivashina, Scharfstein, and Stein (2015), our assumption is that the interest rate hike represents a shock to the funding costs of the conduits, resulting in a higher cost for non-US banks operating with a wholesale funding model to secure dollar funding, in contrast to US banks that predominantly rely on stable insured deposits. Consequently, we expect that the issuance of non-US sponsored conduits to be more sensitive to such shocks than the issuance of US-sponsored conduits. Our test confirms a larger negative impact of higher interest rates on the ABCP issuance of non-US sponsored conduits, even when controlling for demand factors. Additionally, we re-run our baseline tests for periods with positive and negative term spreads. The results of the split regressions demonstrate that ABCP conduits responded to the increase in demand for safe assets during the period with negative term spreads (i.e. the years leading to the run) by increasing the issuance of ABCP notes, but at a decreasing rate, which aligns with our underlying assumption of them facing greater constraints.

Our contributions to the literature are manifold. The previous literature has largely documented on the link between the unfolding of 2007 financial crisis and the demand for safe assets (Acharya and Schnabl, 2010; Caballero, 2010; Bernanke et al., 2011; Pozsar, 2013). It has been argued that the financial crisis was driven by an insatiable global demand for safe, high-quality debt instruments. Banks responded to this demand by relying increasingly on privately produced short-term money-like assets, whose safety ultimately depended on the quality of the backing collateral (Sunderam, 2014; Moreira and Savov, 2017). Our evidence complements this literature, adding that shadow banks issued money-like assets like ABCP notes in response to increasing demand but the interplay with raising interest rates lead them to accumulate risks in their collateral portfolio. By showing conduits' preference for MBS and CDO securities when interest rates are raising, we provide novel empirical collateral-level evidence supporting the money-creation view of shadow banking and its consequences for the vulnerability of the sector. Secondly, while most of the existing literature on safe assets has focused on short-term debt produced by traditional financial intermediaries (Gorton, 2012; Krishnamurthy and Vissing-Jorgensen, 2012; Krishnamurthy, 2015; Kacperczyk and Schnabl, 2021), our focus is on the production of safe assets by offshore, off-balance, bank-sponsored entities, i.e. one of the least transparent parts of the financial system. Using balance sheet information, ratings, and portfolio data of ABCP conduits whose bankruptcy-remote SPVs are set up by banks in off-shore jurisdictions to guarantee the anonymity of the collateral purchased, we unveil dynamics of shadow banks whose main feature is the opacity of their transactions. This opacity is critical to their ability to create money-like assets (Dang

et al. (2017)). While the definition of shadow banks encompass a variety of entities, such as money market funds and finance companies, we are able to capture the impact of raising interest rates on the so-called "narrow" shadow banking, considered as the most systemic component. In addition, we uncover a novel channel of transmission of monetary policy that affects shadow banking entities and induces risk-taking outside the regular banking system. In doing so, we contribute to the literature on the bank risk-taking channel of monetary policy suggested by Borio and Zhu (2012) and explored in previous studies with reference to the traditional banking system (Jiménez et al. (2014), Ioannidou et al. (2014)). This literature empirically documents that low interest rates are associated with lower-quality bank lending. In our context, we provide evidence that monetary policy created incentives for risk-taking in the shadow banking system but in a sort of "reverse" search for yield, which binds this system when short-term interest rates are rising while long-term rates are stable. Our evidence also contributes to the emerging literature on the monetary policy transmission through shadow banks. Focusing on institution-level data, Xiao (2019) show that high interest rates expand shadow bank deposits (money market funds share). We focus on narrow shadow banks and show how the impact of interest rates rises extends not only to their liabilities but also to their portfolio activity, revealing a key interplay with the demand for safe assets and the build up of risks in the shadow banking system. Lastly, we contribute to the understanding of the mechanisms of financial crises. Our findings suggest that the funding shock caused by the increase in interest rates contributed to the vulnerability of ABCP conduits during the crisis. This highlights the importance of funding liquidity as a driver of financial fragility and the need to consider it in the design of macro-prudential policies. Overall, our study provides important insights into the role of interest rates on the production of safe assets and their implications for financial stability.

The remainder of this paper is structured as follows. Section 2 describes our dataset and summary statistics. Section 3 presents our empirical strategy and reports our main results. Section 4 provides the results of additional tests and Section 5 concludes.

2 Data and Summary Statistics

Our primary data source is S&P Capital IQ. We hand-collected data from the monthly reports published by the rating agency to inform ABCP investors on the performance of the conduits. No data is directly available for ABCP conduits' balance sheets as they are typically set up in special jurisdictions such as Delaware or Cayman Islands for tax reasons and bankruptcy-remoteness benefits. However, each issuance of ABCP notes is rated by one

or more rating agencies that verify the administration and selection of collateral transactions, i.e., collateral purchased to backing them, on inception and frequently thereafter. Rating agencies then assign or confirm a short-term rating on the conduits based on the review of each new collateral transaction. Because only a high rating ensures conduits that their notes, their only source of funding, are of interest to money markets funds and other institutional investors, their sponsors are willing to share this information.[7]

Capital IQ's reports contain detailed information at both the entity and portfolio levels. Previous research on ABCP conduits has relied on Moody's for data collection and mostly focused on conduits' issuances (Acharya, Schnabl, and Suarez, 2013; Schroth, Suarez, and Taylor, 2014; Covitz, Liang, and Suarez, 2013). Our dataset is based on S&P, whose reports contain collateral information and key institutional features such as sponsor, liquidity providers, structure type, and rating. The issuance data includes the monthly amount of ABCP outstanding as well as the overall aggregate financing limit, which proxies the dollar amount of collateral in the portfolio and thus the maximum amount of authorized debt. The collateral data includes information on the amount of collateral entering and exiting the portfolios each month, as well as the composition of the collateral by rating (ranging from AAA to below investment grade, including not rated and not available categories) and types (such as CDOs, mortgages, auto loans, consumer loans, commercial loans, trade receivables, and credit card loans) each quarter. In comparison with previous studies using Moody's, we note that Rule 2a-7 requires ABCP notes to have at least two ratings for money market funds to purchase them. Thus, our coverage of the market may not be identical but is likely similar to that of previous studies. Differently from previous studies however, we do not include data on SIVs (Structured Investment Vehicles) and CDOs (Collateralized Debt Obligation)[8] for two reasons. As to the former, SIVs used to issue ABCP notes but also Medium Term Notes (MTNs), for which information is not available.[9] As long as SIVs can substitute between ABCP notes and MTNs, we cannot discuss their financing and collateral choices only with regards to ABCPs notes. Moreover, SIVs tended to be very different in terms of operations and less likely to be affected by changes in interest rates.[10] As for CDOs, due to

[7]More details on the institutional aspects of ABCP conduits are provided in Appendix C.

[8]We refer here to the SPV/SPE behind the pooling and tranching of assets for the issuance of CDO securities.

[9]Covitz, Liang, and Suarez (2013) report 35 SIVs which accounted for 7% of the ABCP market before the collapse in 2007, and 36 CDO conduits which account for 4%. MTNs financed about 21% of the assets of the SIVs.

[10]SIVs invested in floating rate assets or fixed rate assets swapped to floating assets. Thus changes in the term structure of interest rate had minimal effect on their net asset value. The conduit could thus, in principle, survive an inverted yield curve environment because both assets and liabilities were based on short-term interest rates. Moreover, because of the lack of liquidity providers, SIVs operated under stricter limits on the ratings and liquidity characteristics of their assets.

the structure of term securitizations, where the pool of collateralized assets remains constant over time, their issuances of ABCP notes were limited and tended to remain constant over time, as there was limited or no ongoing entering and exiting of collateral. Another unique feature of the data in Capital IQ reports is that collateral transactions are aggregated at the portfolio level and not by issuer entity. A single portfolio, which is financed by different sub-entities, can purchase collateral in different currencies [11] or issuing different types of notes, such as extendible CP or based in different jurisdictions, but financing the same portfolio of collateral transactions. This aggregation reduces the number of conduits in the sample compared to previous studies, but allows to observe decisions on the collateral, avoiding a double counting effect.[12]

Capital IQ reports have been available since 2002 for a group of conduits that were established in the mid-90s to early 2000s. However, data reporting is more complete from 2003 onward. Therefore, we conducted our analysis on data from January 2003 to March 2007. We chose to restrict our sample to March 2007 because the information available from June is limited and most likely reported amidst the run. Unfortunately, for the majority of conduits, reports are not available in the period September-October 2007, right after the ABCP run. Depending on the analyst's coverage of the ABCP information, we integrated our data with other types of reports available on Capital IQ, such as market reports, rating confirmation reports, and so on.

We focused on the USD ABCP market, where both US and non-US conduits were active before the crisis. US conduits were sponsored by large US banks, as well as many European banks, and we exploited this feature for our difference-in-difference test. The sample period also included the year 2004, which allowed us to address the regulatory arbitrage hypothesis as the main driver of our results. Our final sample for the USD ABCP market consisted of 74 conduits, covering about 50% of the total amount outstanding. About half of the conduits in our sample are still operating. Figure 3 shows the aggregate total amount outstanding of ABCP notes issued by all the conduits in our final sample and the aggregate average amount outstanding of ABCP notes. Both measures confirm that the exponential growth of the market is captured by our sample.

[Figure 3 about here.]

[11] Most of the programs sponsored by European banks have a European-based vehicle issuing on the European CP market and a US-based co-issuing vehicle issuing on the USD market.

[12] An example is Compass Securitization sponsored by Westdeutsche Landesbank Girozentralem, financed by Compass Securitization Limited, issuing in Euros, and Compass Securitization LLC, issuing in US dollars.

Table 1 presents summary statistics for our final sample of ABCP conduits. Variable descriptions are provided in Appendix A. Several interesting findings stand out from the table. We learn that the ABCP market expanded dramatically between 2005 and 2006 and peaked before the run in August 2007. We also learn that, while US-sponsored ABCP conduits dominate in terms of the amount of ABCP notes outstanding, we were able to collect more observations for Non-US sponsored conduits. In fact, a large number of smaller-sized European-sponsored ABCP conduits were active in the US market in the period 2003-2007, including many sponsored by German Landesbanks. As expected, most ABCP notes carry a high short-term rating, are issued by multi-seller conduits rather than other structure types (such as repo, arbitrage, or hybrid conduits), but there is not much difference in the collateral being originated in the US or outside the US. However, the largest issuer of USD-denominated ABCP is a single-seller conduit sponsored by a Dutch bank, backing their notes with domestic collateral. Very few conduits issue notes with ratings below A-1, confirming the need for a high short-term rating to serve the money market funds' regulation requirements. In terms of collateral transactions, we find that, on average, the net collateral (i.e., the difference between the amount of collateral entering and the amount of collateral exiting the portfolio) decreased dramatically in March 2007, both in terms of absolute amount and as a percentage of the total value of the portfolio (Net Collateral %). This suggests relatively small or no changes in the collateral activity for the months before the run: conduits rolled over their ABCP notes and even increased their issuance but only against existing collateral.

[Table 1 about here.]

The summary statistics for our sample of ABCP conduits' collateral are presented in Table 2. We have computed the percentage of the portfolio holdings for each rating and type of collateral. The rating categories are as reported by S&P and range from AAA to Below Investment Grade. However, we also include the Not Rated and Not Available categories because they may provide valuable information in this context. According to S&P, the Not Rated category indicates that no rating has been requested, or that there is insufficient information on which to base a rating, or that S&P does not rate a particular obligation as a matter of policy. The Not Available category is even more opaque as no description is provided.

There are various types of collateral included in the analysis, such as trade receivables, auto loans, consumer loans, credit cards, and securitized assets such as CDO and MBS.[13] Additionally, there is an opaque category labeled as Other, which is also included in the

[13]S&P included both MBS and warehoused mortgages in the Mortgage category.

analysis.[14]

[Table 2 about here.]

This sample runs quarterly from June 2004 to March 2007. We notice that, in aggregate, ABCP portfolios are mostly composed of AAA collateral (32% on average) and of Not Available and Not Rated collateral (23% and 24%, respectively), followed by other investment grade collateral. In terms of collateral types, traditional assets as trade receivables (17%), auto loans (17%) and credit cards (15%) together with Other (17%) are important components but the largest part is invested in mortgage-backed securities/warehoused mortgages. As we are interested on the evolution of the collateral, Figure 4 reports the collateral composition of ABCP portfolios by rating category and type over time.

[Figure 4 about here.]

We notice a strong portfolio reallocation between 2004 and 2005, while the overall composition of the conduits remained quite constant in aggregate from 2006 onwards, both in terms of collateral rating and type. In terms of collateral rating, Panel A confirms that the share of collateral with AAA (right scale) remained quite stable, between 30% and 35% over the time period, but down from 55% in 2004. Other investment grades (A, AA, BBB) were preferred in the reallocation, but the most significant increase between 2005 and 2006 relates to the Not Available categories. In terms of collateral type, Panel B shows again a portfolio reallocation before 2005. We see an increase in the presence of mortgages/MBS from the first quarter of 2005, reaching more than 20% of the portfolio, up from less than 10% in 2004, when also CDO holdings started to be reported. Another category also shows a strong increase since 2005 is the more opaque 'other'. The percentage for more traditional conduits' assets, such as trade receivables, auto loans, and consumer loans, is quite flat over time. This preliminary evidence on the collateral reveals two important points: ABCP issued notes mostly backed by high-quality collateral but to a lower degree after the period 2004-5, which also corresponds to the period when securitized assets make their entrance as ABCP collateral.

[14]OTHER is a S&P category. Other types of collateral were excluded because of the lack of sufficient observations; among them we have equipment loans, student loans, lease and leasing.

3 Empirical Strategy and Results

3.1 Evidence on ABCP Net Issuance

This study aims to analyze how ABCP conduits respond to fluctuations in short-term interest rates and shifts in the demand for safe assets. We seek to determine whether these factors trigger a quality transformation, leading to collateral deterioration within these conduits. We argue that rising interest rates result in higher funding costs for these low-margin structures, potentially reducing their issuance, unless there is a concurrent surge in the demand for safe assets. In such a scenario, we anticipate that ABCP conduits would increase their issuance to meet the heightened demand but might resort to riskier collateral options.

To support this mechanism, we first examine the sensitivity of ABCP conduits' net issuance to changes in federal funds rates, a proxy for policy rates, and liquidity premiums, a proxy for the demand for safe assets. Our baseline specification is as follows:

$$\Delta log(ABCP)_{ijt} = F_i + \lambda_t + \beta \Delta fed\ rate_t + \gamma \Delta (Tbill - OIS)_t + \delta X_{ijt-1} + \epsilon_{ijt} \qquad (1)$$

where $ABCP_{ijt}$ is the total amount outstanding of ABCP notes and $\Delta \log(ABCP)_{ijt}$ is the net issuance for each conduit i, sponsored by bank j in month t. $\Delta\ fedrate_t$ is the monthly change in the federal funds rate and our proxy for funding costs. $\Delta\ Tbill - OIS_t$ is the monthly change in the difference between the yield on 3-months Treasury bills and the Overnight Indexed Swap (OIS) rate, our proxy for demand from money-like assets. This spread captures the liquidity premium that investors are willing to pay for the monetary services offered by money-like claims so that a lower spread indicates a higher demand from investors.[15] A negative and significant coefficient for β would support the hypothesis of higher financing constraints leading to lower issuance of ABCP notes, while a negative and significant coefficient for γ would support the responsiveness of ABCP issuance to higher demand for money-like assets. We include quarter-year fixed effects, λ_t to address potential concerns that interest rates might capture general economic conditions. To account for any time-invariant conduit characteristics, we include conduit fixed effect F_i. Among the controls, X_{ijt-1} includes $\Delta log(ABCP)_{ijt-1}$, $\Delta log(ABCP)_{ijt-2}$ and $log(ABCP)_{ijt-1}$, to account for rollover of the issuance and the conduit's size.

To mitigate potential concerns regarding spurious correlations caused by stochastic trends in ABCP liabilities and macro variables, we employ a time-differenced specification in our

[15] A similar specification is used by Sunderam (2014) and Kacperczyk, Pérignon, and Vuillemey (2021).

analyses. Our data's monthly frequency and the use of year-quarter fixed effects are expected to mitigate the influence of changing macroeconomic conditions and focus on funding costs or institutional demand as the driving factors. Table 3 displays the summary statistics and correlations between our key variables.

[Table 3 about here.]

Our proxies for interest rates and demand for safe assets have a correlation of 14%. The observed lower correlation aligns with our expectations, given that the measure for the liquidity premium is adjusted for the expected average of the federal funds rate, approximated by OIS. Consequently, this measure encompasses information within the Treasury bills yield that remains unaffected by the broader fluctuations in short-term interest rates.

For the estimation of model (1), we utilize a standard OLS regression model, and the results are presented in Table 4.[16] Standard errors are clustered by time and conduits. In column (1), we observe the outcomes of equation (1)'s estimation when interest rates, $\Delta fedrate_t$, is included. The results confirm the hypothesis that greater changes in short-term interest rates correspond with a decrease in ABCP notes net issuance (in excess of roll-over), as the β coefficient is negative and statistically significant.

[Table 4 about here.]

Column (2) presents the results of equation (1)'s estimation when conduit fixed-effects are added to time fixed-effects and additional controls are included. The outcome supports the adverse role of increasing interest rates, indicating that larger changes in the federal funds rates correspond with a decrease in ABCP conduits' net issuance. In Column (3), we estimate equation (1) with only the liquidity premium and the controls included. The coefficient γ is negative and significant, in line with the literature showing that investors treated ABCP now as money-like instruments.

Column (4) displays results for the full model in equation (1), where we test interest rates and institutional demand contemporaneously. The inclusion of the demand for safe assets proxy indicates that the ABCP issuance primarily responds to the demand. There is

[16] In Appendix B, we address concerns regarding the use of OLS with our panel data's structure (large T relative to N) and the dynamic nature of our dependent variable (Nickell bias). We report estimations of the baseline model using the iterative bootstrap-based bias-corrected fixed effect estimator proposed by De Vos, Everaert, Ruyssen et al. (2015) based on Everaert and Pozzi (2007). Standard errors are also adjusted to account for global cross-sectional dependency and any cross-sectional dependence of residuals due to the commonality of interest rates and liquidity premium across conduits. Results in Table B1 are consistent with our baseline model.

evidence that conduits increase their notes issuance to satisfy the demand (negative and significant coefficient), while the coefficient for the interest rates is negative but not significant. There are a number of reasons for the conduits to engage in this behavior. The conduits' strategy may involve maintaining strong relationships with institutional investors and retain money market financing, particularly during periods of higher interest rates when deposits tend to move away from the sponsoring bank (Drechsler et al. (2017)).

Table 5 presents a battery of additional tests. Columns (1) to (6) show the results of Equation (1) augmented with additional controls for conduits' financial constraints and other potential drivers of the demand and supply of ABCPs. Columns (1) and (4) include the federal funds rates, Columns (2) and (5) include the liquidity premium, while Columns (3) and (6) present the full model (1). The estimations from Columns (4) to (6) are augmented with conduit rating fixed effects. We include additional fixed effects for the short-term rating of the conduit to capture the different abilities to react to increases in issuance costs depending on the initial rating, as well as the fact that higher-rated conduits face higher demand than lower-rated conduits.

As additional controls for a conduit's financial constraints, we add the lagged change in the conduit collateral value limit (aggregate financing limit), which proxies for the change in the maximum amount of notes a conduit is authorized to issue from the rating agency (acting as a sort of cap), and the capacity of utilization defined as the amount outstanding of ABCP notes divided by the collateral value limit, which proxies for the leverage/over-collateralization on the overall portfolio. As additional controls for the macro conditions at which the demand operates, we also include macro-variables such as the GDP, the VIX, a proxy for credit spreads on securitized assets (Credit Trend), and the exchange rate USD to Euro.[17] In all specifications, we obtain results that are in line with our baseline results.

[Table 5 about here.]

One could argue that the expansion of the ABCP market in 2004 was mainly driven by new players entering the market to take advantage of the change in accounting rules described by Acharya, Schnabl, and Suarez (2013). It is also possible that these conduits have some unobserved characteristics that allow them to respond to the demand without facing the same funding constraints as established ones. Table 6 presents the results of our extended regressions in Table 5 for a sub-sample of conduits that entered the ABCP mar-

[17]The inclusion of the exchange rate USD/Euro is motivated by the large number of European banks sponsoring conduits operating in the USD market.

ket before 2004.[18] We find similar results to our previous specifications. In particular, in columns (1) and (4), we find that the coefficient of the federal funds rate is negative and significant, supporting the funding hypothesis of a negative impact of raising interest rates on conduits' issuance due to higher costs. In Columns (2) and (5), we find that the coefficient of the spread on Treasury bill yield is negative and significant, supporting the demand-side hypothesis of an increase in the manufacturing of safe assets by shadow banks when investors are willing to receive a lower yield on Treasury bills (higher liquidity premium). In Columns (3) and (6), we test for both drivers contemporaneously and find the prevailing effect of the demand. Overall, we can exclude that our results are driven by new entrants in the market, as the evidence is consistent for long-established conduits.

[Table 6 about here.]

3.2 Evidence on Collateral Purchases

The shadow intermediation function of ABCP conduits consists of issuing short-term debt against a pool of collateral purchased from large firms and other financial institutions. The issuance of new notes is conditional on the financing of these new transactions, meaning that more collateral must enter the portfolio of the conduits. However, conduits can also increase the issuance of notes against existing collateral. In this section, our test aims to reveal whether conduits adjust their portfolio with new collateral in response to changes in interest rates and shifts in the demand for safe assets or simply increase their leverage (under the scrutiny of rating agencies).

To capture portfolio activity, we introduce a new variable, $NetCollateral\ \%\ _t$, which represents the the value of new collateral (also referred to as total financing limit) as a percentage of the overall portfolio. This variable captures the expansion or contraction of the portfolio based on the collateral purchased or dismissed by the conduit. Higher demand for safe assets (as indicated by lower Treasury bill spreads) is expected to increase the demand for collateral while higher interest rates are likely to decrease the amount of collateral entering or even increase the amount exiting the portfolio.

As in our baseline model, we evaluate the impact of institutional demand and increasing interest rates on the conduits' portfolio activity using the following specification:

$$\Delta\ Net\ \%\ _t = F_i + \lambda_t + \beta \Delta fed\ rate_t + \gamma \Delta (Tbill - OIS)_t + \delta X_{ijt-1} + \epsilon_{ijt} \qquad (2)$$

[18] The starting date of the conduits' operations corresponds to the date of the first rating. Seven conduits, including repo conduits, are excluded from the sample.

where $\Delta\ Net\ \%\ _t$ is the change in the net dollar amount of collateral entering as a percentage of the overall portfolio for each conduit i, sponsored by bank j in month t. $\Delta\ fedrate_t$ is the monthly change in the federal funds rate and our proxy for funding costs. $\Delta\ Tbill-OIS_t$ is the monthly change in the difference between the yield on 3-months Treasury bills and the Overnight Indexed Swap (OIS) rate, our proxy for demand from money market investors. To support our hypothesis of binding funding costs (i.e., increasing interest rates reducing the purchase of new collateral), we expect the coefficient β to be negative and significant. To support our hypothesis of a demand-driven conduits' expansion (i.e., an increase in the demand for money-like assets, indicated by a lower spread, leading to the entry of new collateral into the portfolio), we expect the coefficient γ to be negative and significant. To address the potential concern that interest rates might proxy for general macro trends in the data, we include quarter-year fixed effects, λ_t. We also include a conduit fixed effect, F_i, to account for any time-invariant characteristics specific to each conduit. X_{ijt-1} includes $\Delta\ Net\ \%\ _{t-1}$, $\Delta\ Net\ \%\ _{t-2}$ and $log(ABCP)_{ijt-1}$, to controls for the changes in portfolio activity in the previous period and the market size of the conduit, respectively.

Table 7 presents the OLS regression results. In Columns (1) and (2), we test the effect of changes in federal funds rates on changes in net collateral entering the conduit. In Column (3), we test the effect of changes in the liquidity premium, and in Column (4), we test for the effect of both factors.

We find a negative and significant coefficient for our proxy of funding costs in Column (1), and in Column (2), when we add the change in the net collateral purchased in the previous period and conduit fixed effects. An increase in interest rates is associated with a reduction in portfolio activity, as the conduit purchases less collateral. We find a negative and significant coefficient for the spread over the Treasury bill yield in Columns (3) and (4), while the coefficient for the federal funds rate is negative but insignificant. Consistent with the evidence on the conduits' ABCP issuance, these findings suggest that the expansion of the conduits' portfolios is driven by institutional demand for safe assets through the acquisition of more collateral, despite the increased cost of funding these purchases.[19]

Our results so far reveal that to manufacture short-term safe assets and meet the growing demand, conduits increase their demand for collateral. Many institutional investors, such as money market funds, are only allowed to invest in short-term money-like instruments with a

[19]In unreported tables, we estimate model (2) using the iterative bootstrap-based bias-corrected fixed effect estimator proposed by De Vos, Everaert, Ruyssen et al. (2015) based on Everaert and Pozzi (2007). We also adjust standard errors for global cross-sectional dependency to account for any cross-sectional dependence of residuals due to the commonality of interest rates and liquidity premium across conduits. We find that our results are unchanged, and they are available upon request.

higher short-term rating (A-1+, A-1), due to regulatory constraints. Therefore, the demand for collateral we have found is largely a demand for relatively safe collateral. However, satisfying this demand is coming at higher costs because of the higher interest rates and would require collateral with higher yields. Therefore, in the next section we investigate the type and the rating of collateral purchased by the conduits in response to increasing interest rates and demand for safe assets.

[Table 7 about here.]

3.3 Searching for Yield: Evidence on Collateral Ratings and Types

We now turn to the analysis of the impact of changes in interest rates and liquidity premiums on the collateral composition of ABCP portfolios. Building on our previous findings, in this part of the analysis, we aim to provide evidence of a search for yield strategy put in place by the conduits to manufacture money-like assets while remaining profitable under rising funding costs. We define the following specification:

$$\Delta\ \%\ Portfolio\ Holdings_{ijt} = F_i + \lambda_t + Q_t + \beta \Delta fed\ rate_t + \gamma \Delta (Tbill - OIS)_t + \delta X_{ijt-1} + \epsilon_{ijt} \tag{3}$$

The dependent variable in this analysis is $\Delta\%Portfolio\ Holdings_{ijt}$, which represents the change in the holdings of a specific type of collateral or a particular rating category for each conduit i, sponsored by bank j in quarter t. The independent variables include $\Delta\ fedrate_t$, which is the quarterly change in the federal funds rate and a proxy for funding costs, and $\Delta\ Tbill - OIS_t$, which is the quarterly change in the difference between the yield on 3-months Treasury bills and the Overnight Indexed Swap (OIS) rate, and a proxy for demand for safe assets. The model includes half-year fixed effects, λ_t, to address concerns about the interest rates proxying for general macro trends. It also includes quarter-of-the-year fixed effects Q_t to account for seasonality in the completion of collateral transactions. Finally, it includes conduit fixed effect F_i to account for any time-invariant conduit characteristics. X_{ijt-1} includes $log(ABCP)_{ijt-1}$, which is a proxy for the size of the conduit.

We begin with a test on changes in the percentage of holdings for different rating categories. To support our hypothesis of a search for yield, we expect an increase in holdings of collateral with lower credit quality (higher-yielding collateral). However, given the necessity to maintain a high conduit rating, we expect the impact of increasing interest rates and demand for safe assets to lead to changes within the investment grade. Table 8 provides the results of OLS regressions of Equation (3), where the dependent variable is the quarterly

change in the percentage of holdings for different rating categories. Standard errors are two-way clustered by conduits and time.

In Columns (1) to (3), the dependent variable is the change in the percentage holdings of AAA-rated collateral, the largest category in the holdings of the portfolios, and the lowest-yielding type of collateral. In Column (1), we test for the change in interest rates separately and find a negative and significant coefficient. That is, an increase in funding costs is associated with a lower percentage of holdings of AAA-rated assets in favor of all other rating categories, supporting a search for yield strategy adopted by the conduits. In Column (2), we test for the impact of changes in the liquidity premium on the holdings of AAA collateral. We find no evidence of a decrease in the holdings of higher-quality collateral when the demand increases, which would be consistent with our reach-for-yield hypothesis. However, indirectly, the evidence suggests that the demand for money-like assets is not satisfied only with the asset transformation of AAA collateral. In Column (3), the effect of the funding constraints disappears when the liquidity premium is included. Overall, these results on the percentage holdings of AAA collateral offer some preliminary evidence of a portfolio reallocation towards higher-yield collateral to the extent that they confirm that money-like assets were manufactured also with non-AAA collateral. Columns (4) to (8) present the results of regressions where the dependent variable is the change in the percentage of holdings for rating categories other than AAA, in order of lower credit quality.

All regressions include our proxies for funding costs and the liquidity premium contemporaneously. We find that both higher interest rates and lower spreads are associated with lower holdings of collateral at the higher end of the investment grade spectrum (AA and A) and below investment grade collateral, in favor of holdings of collateral rated at the lower end of the investment grade spectrum (BBB). These results are more supportive of an overall reallocation of the portfolio towards higher-yielding collateral (lower quality) but still within the boundaries of the investment grade, consistent with the need to maintain a relatively high rating.

In unreported tables, we also control for the different risk-taking abilities of the conduits by adding conduits' rating fixed effects. Conduits with different ratings may have access to different sets of investment opportunities, such as the support they can offer or is required by the rating agency. The results confirm our findings.

While the evidence on the effect of funding costs in creating incentives for more risk-taking of shadow banks is novel in the literature, the evidence on the role of the demand for safe assets provides empirical support to Gennaioli et al. (2013). The authors predict that high demand for risk-less debt drives shadow banks' response by providing incentives to buy risky assets, as the good collateral has become exhausted. They also add that banks would

try to diversify risk by pooling and tranching assets, predicting higher holdings of securitized assets.

We also investigate our hypothesis of a search for yield by examining the conduits portfolio composition by collateral type. While the analysis of collateral ratings provides insight into collateral yields, analyzing the types of collateral can give us a clearer picture of the types that were in demand from shadow banking to maintain their manufacturing of money-like assets. Some types of collateral, such as CDOs and MBSs, result from securitization and can be considered more opaque and less liquid than traditional assets like trade receivables and auto loans.

[Table 8 about here.]

Table 9 presents the results of OLS regressions of Equation (3), where the dependent variable is the quarterly change in the percentage of holdings for each type of collateral.[20] Our proxies for the funding costs and investors' demand are included simultaneously. We find a positive and significant coefficient for the change in federal funds rates when the dependent variable is the change in the percentage of holdings of CDOs (Column (2)), consumer loans (Column (4)), and mortgages (Column (7)). We find a negative and significant coefficient when the dependent variable is the change in the percentage of holdings of auto loans (Column (1)) and other assets (Column (8)). This suggests that higher interest rates lead to a reallocation of the portfolio from more traditional assets, such as auto loans, to securitization-related assets.

The coefficient for the liquidity premium is negative and significant for the same collateral types affected by the federal funds' rates (CDOs, consumer loans, and mortgages) and commercial loans. Higher demand for ABCP notes leads to purchases of structured products and a reduction in the purchase of more traditional assets. Overall, the results seem to confirm the mechanism at work: higher demand in times of increasing interest rates leads the conduits to purchase collateral types that are more opaque, less liquid, have longer maturity, and thus presumably carry higher yields. In the next section, we test whether the holdings of these more opaque and illiquid assets as collateral correlate with the conduits' exposure to runs in August 2007.

[Table 9 about here.]

[20] The results are robust to including conduits' rating fixed effects.

3.4 Sponsors Borrowing from the Term Auction Facility

To further extend our analysis on the search for yield strategy of the conduits, we aim to establish a link between the increase in collateral, such as CDOs and Mortgages, that was documented in the previous section and the exposure of the conduits to the runs in the ABCP market in August 2007. As a proxy of the exposure to runs of the conduits, we collect data on the number of collateralized loans that the sponsors borrowed from the Term Auction Facility (TAF). The Term Auction Facility of the Federal Reserve was established in December 2007 to promote liquidity distribution, as unsecured bank funding markets were under severe stress. Only depository institutions were eligible, and all depository institutions that sponsored conduits in our sample participated in the facility. We posit that higher holdings of collateral, such as CDO and MBS, should be positively associated with the sponsoring banks' need for liquidity during the run. We proxy this liquidity need by the number of loans granted by the TAF to the sponsoring banks, $No.\ of\ TAF\ loans$. We test this hypothesis with a simple cross-sectional regression, where the dependent variable is the number of loans from the TAF, and our variables of interest are the percentages of CDO and MBS in conduits' portfolios at the end of December 2006. We add other conduit-level variables to control for the overall riskiness of the conduits, such as rating, arbitrage conduit-type, and number of liquidity providers.

Table 10 presents a cross-sectional regression for the sample of ABCP conduits operating in December 2006 whose sponsor was a depository institution (42 conduits). In Column (1), we find a positive and significant coefficient for the percentage of mortgages (or MBS). Larger holdings of mortgages in the portfolio at the end of 2006 led to a higher need for liquidity from the TAF. In Column (2), we do not find evidence for CDO collateral. In Column (3), we add the holdings in CDO and mortgages (or MBS) contemporaneously and find a positive and significant coefficient for the holdings in mortgages (or MBS). We conclude that portfolio vulnerability to runs seems to be strongly linked to the holdings of MBS as collateral, which is consistent with the narrative of investors' fears in August 2007 that ABCP conduits had a large exposure to the US real estate market.

[Table 10 about here.]

4 Additional tests

4.1 Exogenous shocks in monetary policy

The assumption that interest rate changes induced by monetary policy are exogenous to ABCP issuances is a key element of our identification approach. This means that interest rates did not respond to changes in the amount of ABCP notes issued and the financing of new collateral. Given the unique characteristics of these entities, such as being SPVs based in special jurisdictions, the anonymity of the assets, and the exemption of liabilities from SEC regulation, along with the lack of active monitoring and supervision of the ABCP market by policy-makers and regulators before the financial crisis, this assumption is reasonable. As Dell'Ariccia et al. (2017) argue, financial stability concerns were not a priority on the agenda of monetary authorities before the financial crisis, at least in advanced economies, as this was deemed the task of bank regulators and supervisors. We can therefore assume that monetary authorities paid little attention to the growth of the shadow banking system before 2007.

However, one could argue that changes in interest rates could be responsive to the assets accumulated in the conduits' portfolios. For instance, to the extent that conduits financing could have contributed to the inflated credit market conditions, such as those created in the mortgage market in the US economy in 2006-2007, they would have been indirectly influencing monetary policy decisions. Also, there could be some omitted variable influencing both conduits and monetary policy decisions that we are not able to capture. In both cases, endogeneity concerns may persist.

To mitigate these concerns we present some additional tests. In our first additional test we use surprise changes in the federal funds to proxy for exogenous changes in interest rates and re-run our baseline regression. We use the federal funds rate components of FOMC announcements identified in Swanson (2021). Extending the methods by Gürkaynak et al. (2005), they separately identify surprise components of the changes in federal funds rate, forward guidance and large-scale asset purchases (LSAPs) at each FOMC announcement from July 1991 to June 2019. Results reported in Table 11 show evidence consistent with our baseline results.

[Table 11 about here.]

4.2 Difference-in-difference test: US vs Non-US Sponsored Conduits

To address endogeneity concerns and strengthen our identification of a causal link between interest rates and ABCP conduits' behavior, in our second additional test we run a difference-in-differences test on a short window around the first federal funds rate increase in June 2004. We use the federal funds rate increase in June 2004 as a shock to the funding costs of the conduits to isolate the effect of funding stress. In June 2004, the federal funds rates were first increased after a relatively long period of low and flat rates. Moreover, we note that back in 2004, the ABCP market was still small and conduits held a small fraction of mortgages and securitized assets, as they mainly purchased trade receivables, auto, and credit card loans.

Figure 4 illustrates that the largest types of collateral for our sample during that period were trade receivables and auto loans. This period was before the boom of the securitization market and before the rising demand for money-like instruments from institutional investors.[21] Therefore, it is plausible to assume that this was a period of relatively low and stable demand, during which financial stability considerations related to collateral markets were less likely to have influenced monetary policy. Therefore, we believe that endogeneity issues are strongly alleviated by setting our analysis in 2004. debt We leverage the variability in the funding constraints of the conduits and specifically examine sponsor-level funding constraints since the sponsor is ultimately responsible for the conduit's portfolio decision and relies on the conduit's performance for dividend payments. Our sample is divided between conduits that have non-US sponsors and those that are sponsored by US banks. It is worth noting that most non-US sponsors in our sample are European banks, and the EONIA rate is almost flat during the period under investigation in the difference-in-difference tests. We argue that the former group will react differently to the funding shock, i.e., the increase in the federal funds rate in June 2004, because their sponsors are headquartered outside the US and operate in the USD ABCP market. As a result, they might be less flexible in their funding response since their primary funding sources are not in USD dollars. Following a similar argument to Ivashina, Scharfstein, and Stein (2015), we anticipate that global banks (non-US) with a wholesale funding model will be more severely impacted by an increase in funding costs to the extent that they are unable to rely on sticky insured deposits to the same degree as US sponsors or use the FX market to raise US dollars synthetically. As a result, when funding costs rise, we expect a more pronounced decrease in ABCP notes outstanding for non-US sponsors than for US sponsors. Additionally, the multinational nature

[21] After peaking in 2001, the amount of debt securities in the portfolio of money market funds remained stable and even decreased until the end of 2005, and then increased by about 40% until 2007.

of the sponsor does not directly imply greater flexibility at the conduit-level in the source of funding because the conduit's special purpose entity status prohibits it from issuing any debt type other than ABCP notes. Furthermore, the EUR ABCP market, the second-largest market after the US market, was of limited size and could not entirely substitute for the USD issuances.

The specification of the difference-in-difference model is the following:

$$log(ABCP)_{ijt} = \alpha + F_i + \beta POST_t + \gamma US\ Sponsor_i + \lambda POST_t \cdot US\ Sponsor_i + \epsilon_{ijt} \quad (4)$$

where $log(ABCP)$ is the log of the total amount outstanding of ABCP notes for conduit i, sponsor j and month t. $POST$ is equal to one for a 6-month period after June 2004 and 0 for 6-month period pre-June 2004. $US\ Sponsor$ is equal to 1 for US-sponsored conduits, and 0 otherwise. To account for time-invariant characteristics of the conduits, we include conduit-type fixed effects F_i (multi-seller, single-seller, arbitrage, hybrid, repo). Standard errors are clustered by time.

While the impact of increased funding costs on ABCP issuance is expected to be immediate, our six-month window is motivated by the fact that the first increase in June 2004 was followed by further increases in the federal fund rate in the following months.[22] The sensitivity of ABCP issuance is expected to be highest soon after the shock and higher than that of the ABCP collateral because the assets in the portfolio were originated in the previous low-and-flat interest-rate environment, and pooling and arranging new collateral requires time. We define a pre-shock window of the same length. To support a funding shock, we expect the effect of the increase in interest rates to affect ABCP issuance rather than collateral.

Before presenting the results of the difference-in-difference test, we verify the following assumptions. First, we discuss the overall effect of the shock and verify its exogeneity. Second, we discuss the pre-trend assumption.

Figure 5a presents ABCP notes outstanding and the aggregate financing limit, a proxy for the collateral value in the ABCP portfolio, around the rate increase in June 2004 (Panel a). We observe a sharp reduction in the conduits' liabilities but not in their portfolios. This evidence suggests that the reduction in issuance is not due to the conduits' decision to reduce their portfolio of assets, which would be an alternative explanation to our funding explanation. It supports our view that the reduction is driven by factors that are exogenous to the portfolio activity.

In Panel b, we discuss the pre-trend assumption. Figure 5b presents the outstanding

[22]The first rise in June 30 was followed in the same year by other increases in August, September, November, and December. Each rise increased the previous target rate by 0.25%.

amount of ABCP for the two sub-samples of US-sponsored and Non-US-sponsored conduits around the funding shock. Graphically, the two groups show similar behavior before the shock, confirming that the pre-trend assumption holds. In other words, in the absence of the shock, the two groups would have continued to issue following a similar trend as before. Instead, their behavior diverges soon after the rate increase in June 2004.

[Figure 5 about here.]

Table 12 presents the results of our difference-in-differences test estimation based on equation (4), which shows whether conduits sponsored by US banks were less affected by the increase in funding costs after June 2004 ($POST$) than conduits sponsored by non-US banks. The table has six columns, where columns (1) to (3) show the results of our regression using the amount of ABCP notes outstanding as the dependent variable with a six-month window around the shock. Columns (2) to (4) present the same analysis using the aggregate financing limit as the dependent variable, representing the aggregate value of collateral in the conduit's portfolio. Columns (1) and (4) exclude fixed effects, columns (2) and (5) include conduit-type fixed effects, and columns (3) and (6) include both conduit-type and time fixed effects. The standard errors in the table are clustered by time. We obtain similar results with conduit fixed effects and robust standard errors (in an unreported table).

[Table 12 about here.]

In all specifications, we observe a positive and significant coefficient for conduits sponsored by US banks, indicating that they issued more ABCP and held larger portfolios before the shock compared to conduits sponsored by non-US banks. In columns (1) to (3), we find a negative and significant coefficient for $POST$, confirming a larger reduction in ABCP issuance for non-US sponsored conduits after the shock, while there is no significant reduction in the aggregate value of their collateral portfolios (columns (4) to (6)). Lastly, the coefficient of the interaction term of interest is positive and significant in columns (1) to (3), confirming that conduits sponsored by non-US banks reduced their ABCP issuance more after the June 2004 increase in the federal fund rate compared to conduits sponsored by US banks. In columns (4) to (6), we find a positive but insignificant coefficient for the interaction term, suggesting that the reduction in ABCP outstanding is not driven by the decision of the conduits to reduce their portfolio of assets, and there is no immediate negative impact on the portfolio of the conduits resulting from the funding shock.

Table 13 presents the regression results of an augmented specification of equation (4), including additional time-invariant controls at the conduit-level. The aim is to test whether

the evidence we found in the previous results regarding the reduction in ABCP issuance is due to our assumption of different funding responses between US sponsors and non-US sponsors, or to other conduit-level characteristics that may proxy for other types of constraints.

In column (1), we add $Non-USasset$, a dummy equal to 1 if the overall portfolio is composed of assets originating outside the US, and we interact this variable with $POST$ and $USSponsor$. In column (2), we add the interaction of $POST$ with $Arbitrage$, a dummy equal to 1 if the conduit is of an arbitrage type, as arbitrage-type conduits are typically considered to adopt riskier strategies. In column (3), we add the interaction with $Highrating(A-1+)$, a dummy equal to 1 if the short-term rating assigned to the conduit is the highest in the S&P rating scale, as one can assume that the higher the rating of the conduits, the fewer the constraints they face. We also control for our proxy of the demand for money-like assets, i.e., $Tbill-OIS$, and add the interaction with $POST$ in column (4), where we also include time fixed effects in addition to conduit-type fixed effects. The inclusion of this variable is meant to test our initial assumption that there is no relevant role for institutional demand in this period.

In all specifications, we find that the coefficient for our interaction term of interest, $USSponsorxPOST$, is positive and significant. This confirms that non-US sponsors had to decrease their ABCP issuance more than US sponsors after the increase in funding costs in June 2004. Results are robust to the inclusion of conduit fixed effects, time fixed effects, and robust standard errors. Overall, this additional test supports our view that the expansion of the ABCP market was indeed characterized by increasing pressure on the funding costs of the conduits and thus their margins, which led them to search for yield in the years leading to the run in August 2007.

[Table 13 about here.]

4.3 Additional Test: High vs Low Term Spread periods

Our final test aims to provide additional support for the evidence of an expansion under funding stress. An important assumption in our baseline setup is that the increased funding costs are linked to the decision of monetary authorities to increase federal fund rates. We noted that if the increase in short-term rates (higher funding costs) is not reflected in increasing longer rates (yields on collateral), this will reduce the profitability of the conduits (low margins). To support this assumption, Figure 2b shows the narrowing of the term spread before 2005 until it turned negative in the years leading to the run. For our story of portfolio reallocation induced by higher funding constraints to hold, we should expect that when the term spread is negative (i.e., when the funding constraints worsen), the conduits

reduce their ABCP issuance more while still responding to the demand. To test this, we split our sample period into a low term spread period and a high term spread period. The term spread is defined as the difference between the 10-Year Treasury Constant Maturity rate and the 3-Month Treasury Constant Maturity rate.

In Table 14, we run OLS regressions similar to our baseline equation in columns (1) and (2) for the high term spread period and in columns (4) and (5) for the low term spread period. In columns (3) and (6), we add an interaction term by multiplying the change in the federal fund rate with the change in the liquidity premium. We find that, when the term spread is negative, an increase in federal fund rates reduces the ABCP net issuance when there is no change in the demand (column 6), while there is no impact in periods with high term spread (column 3). In this latter period, the short-term rates and longer-term rates are moving in the same direction, so the impact in terms of financial constraints on the conduits is limited. We also find that the interaction term confirms that the ABCP response to the increase in demand during the period with a negative term spread is to issue more but at a decreasing rate.

[Table 14 about here.]

5 Conclusions

The ABCP market was a core short-term funding market before its collapse in August 2007, playing a unique role in the growth of shadow banking and in the spread of contagion between this system and the regular banking system. Entities in this market are typically set up offshore by banks to create short-term notes perceived as money-like assets by money market investors. Using a unique dataset of ABCP conduits operating in the USD ABCP market over the period 2003-2007, we provide evidence that increases in interest rates, combined with strong demand for money-like assets, led constrained conduits to search for yield. This resulted in conduits backing their production of money-like assets with lower-rated and more opaque collateral such as MBS and CDOs, ultimately increasing their vulnerability to runs. This novel evidence reveals how the ability to meet the demand for safe assets by shadow banking entities was impaired by the increase in issuing costs created by monetary policy decisions to increase interest rates. The implications of such a mechanism are not only restricted to the shadow banking system but also extend to the extent that shadow banks are sponsored by banks that provide liquidity guarantees in support of their rating and often also credit guarantees. As a result of such guarantees, they are likely to receive lower-quality collateral during liquidity dry-ups, effectively creating a collateral channel for contagion from

the shadow banking system to the regular banking system. The private production of safe assets is of particular interest given the growing demand in many developed and developing economies where there is an increasing shortage of public safe assets. The implications for financial stability are even more relevant when this production is offshore, off-balance sheet, and interlinked with the banking system.

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Table 1: Summary Statistics - Our Sample of ABCP conduits

ABCP Amount Out. (Mil. $)	N	Mean	SD	Min	p25	Mdn	p75	Max
2003	551	6149.339	5109.25	266	2645	5086	7659	30095
2004	674	5982.423	4264.212	304	2776	4855	7752	22785
2005	782	6085.779	4381.159	203	2724	5173.5	8796	25849
2006	829	6818.659	5064.249	12	3047	5829	10021	27775
2007m3	204	7139.27	5195.72	305	2961.5	5980	10463.5	27086
Total	3040	6344.93	4757.298	12	2753.5	5324.5	8769.5	30095
US Sponsor	1081	7812.669	4213.492	463	4466	7746	10657	30095
Non-US Sponsor	1959	5535.02	4846.50	12	2372	4228	6970	27775
A-1+ (High Rating)	2037	6943.895	5047.942	12	3322	5729	9188	30095
Below A-1+	1003	5128.5	3827.958	149	2297	3881	7182	19107
Multi-seller	2322	6248.833	4079.246	12	3211	5575	8454	30095
Other types	718	6555.72	6475.52	203	2136	3737	11085	27775
US-asset	2059	6710.37	4021.74	463	35220	6111	8916	30095
Non-US asset	981	5577.92	5945.26	12	1512	3365	7220	27775

Net Collateral (Mil. $)	N	Mean	SD	Min	p25	Mdn	p75	Max
2003	506	110.94	459.74	-2425	0	0	193	3925
2004	651	126.34	354.08	-1587	0	0	204	2265
2005	749	200.19	933.83	-6714	-10	0	225	15509
2006	797	241.94	776.63	-3555	0	44	313	11399
2007m3	195	21.26	493.35	-1414	-53	0	0	3415
Total	2898	167.46	690.18	-6714	0	0	228	15509
Net Collateral (%)	N	Mean	SD	Min	p25	Mdn	p75	Max
2003	506	.01581	.06475	-.4666	0	0	.03018	.4179
2004	651	.01433	.04013	-.1706	0	0	.02751	.3505
2005	749	.01944	.06721	-.2685	-.0011	0	.0307	.7943
2006	797	.02101	.07304	-.5699	0	.0047	.0350	.7943
2007m3	195	.0004	.04436	-.3618	-.005	0	0	.2577
Total	2898	.01681	.06231	-.5699	0	0	.0289	.7942

This table presents the summary statistics for our sample of ABCP conduits operating on the USD ABCP market between January 2003 and March 2007. Monthly data. See Appendix A for variables definitions.

Table 2: Summary Statistics for ABCP Collateral (%)

	N	Mean	SD	Min	p25	Mdn	p75	Max
AAA	522	0.32	0.33	0	0.07	0.17	0.56	1
AA A	545	0.22	0.18	0	0.09	0.18	0.3	1
BBB	438	0.17	0.14	0	0.05	0.14	0.25	0.6
Below Investment	388	0.1	0.08	0	0.04	0.08	0.15	0.38
Not Rated	380	0.25	0.23	0	0.06	0.16	0.42	1
Not Available	348	0.28	0.24	0	0.08	0.23	0.43	0.95
Auto	510	0.17	0.11	0	0.09	0.15	0.24	0.39
CDO	347	0.13	0.12	0	0.02	0.08	0.22	0.37
Commercial	424	0.11	0.09	0	0.03	0.07	0.16	0.31
Consumer	421	0.07	0.06	0	0.03	0.07	0.1	0.21
Credit Cards	454	0.15	0.10	0	0.06	0.14	0.22	0.32
Trade	544	0.17	0.15	0	0.04	0.14	0.24	0.66
Mortgage	579	0.2	0.17	0	0.06	0.14	0.31	0.6
Other	537	0.17	0.2	0	0.04	0.11	0.20	1

The Table reports the summary statistics for the holdings of different types of collateral and their rating categories for our sample of ABCP conduits, as a percentage of the overall portfolio. All categories are from Capital IQ. The data are quarterly and span from 2004q2 to 2007q1.

Table 3: Key Variables - Correlation Matrix

	Δ $fed\ rate_t$	Δ $fed\ rate_{t-1}$	Δ $(Tbill - OIS)_t$	$log(ABCP)_t$	Δ $log(ABCP)_t$
Mean	0.085	0.086	−0.005	8.425	0.011
SD	0.099	0.1	0.085	0.871	0.08
Min	−0.21	−0.21	−0.255	2.485	−0.149
Max	0.25	0.25	0.194	9.628	0.204
$\Delta\ fed\ rate_t$	1				
$\Delta\ fed\ rate_{t-1}$	0.592*	1			
$\Delta\ (Tbill - OIS)_t$	0.1435*	−0.1246*	1		
$log(ABCP)_t$	−0.0142	−0.0124	−0.001	1	
$\Delta\ log(ABCP)_t$	−0.0102	0.0409*	−0.0763*	0.0288	1

This table presents the summary statistics and pair-wise correlations for the key variables used in this paper. $fed\ rate$ is the federal funds rate, our proxy for the cost of funding. $(Tbill - OIS)$ is the spread of 3-month Treasury bills over the 3-month overnight indexed swap (OIS) rate, our proxy for the demand for money-like assets. $log(ABCP)_t$ is the log of the Amount of ABCP notes outstanding. See Appendix A for the variables' definitions. The sample runs monthly from January 2003 to March 2007. Significance level: * $p < 0.05$

Table 4: ABCP Net Issuance - OLS Analyses

	(1) $\Delta\ log(ABCP)_t$ β / SE	(2) $\Delta\ log(ABCP)_t$ β / SE	(3) $\Delta\ log(ABCP)_t$ β / SE	(4) $\Delta\ log(ABCP)_t$ β / SE
$\Delta\ fed\ rate_t$	−0.063**	−0.075**		−0.013
	(0.029)	(0.032)		(0.035)
$\Delta\ (Tbill - OIS)_t$			−0.096***	−0.092***
			(0.023)	(0.026)
$\Delta\ log(ABCP)_{t-1}$	−0.067**	−0.089***	−0.086***	−0.086***
	(0.029)	(0.025)	(0.024)	(0.024)
$\Delta\ log(ABCP)_{t-2}$		−0.049*	−0.042	−0.042
		(0.026)	(0.026)	(0.026)
$log(ABCP)_{t-1}$		−0.057***	−0.057***	−0.057***
		(0.009)	(0.009)	(0.009)
Time FE	Yes	Yes	Yes	Yes
Conduit FE	No	Yes	Yes	Yes
$AdjR^2$	0.017	0.092	0.099	0.099
Observations	3041	2963	2963	2963
No. of Conduits	74	74	74	74

This table reports the results of estimations based on OLS regressions. Standard errors are clustered by time and conduit. All variables - except rates - are winsorezed at 5%. See Appendix A for the variables' definitions. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 5: ABCP Net Issuance - OLS Analyses - Additional Controls

	(1) $\Delta\ log(ABCP)_t$ β / SE	(2) $\Delta\ log(ABCP)_t$ β / SE	(3) $\Delta\ log(ABCP)_t$ β / SE	(4) $\Delta\ log(ABCP)_t$ β / SE	(5) $\Delta\ log(ABCP)_t$ β / SE	(6) $\Delta\ log(ABCP)_t$ β / SE
$\Delta\ fed\ rate_t$	−0.083**		−0.030	−0.087**		−0.035
	(0.031)		(0.033)	(0.034)		(0.036)
$\Delta\ (Tbill - OIS)_t$		−0.092***	−0.084***		−0.091***	−0.082***
		(0.019)	(0.022)		(0.020)	(0.022)
$\Delta\ log(ABCP)_{t-1}$	−0.098***	−0.096***	−0.096***	−0.104***	−0.102***	−0.102***
	(0.026)	(0.025)	(0.025)	(0.027)	(0.025)	(0.025)
$\Delta\ log(ABCP)_{t-2}$	−0.051*	−0.045*	−0.045*	−0.055**	−0.048*	−0.048*
	(0.026)	(0.026)	(0.026)	(0.027)	(0.026)	(0.026)
$log(ABCP)_{t-1}$	−0.053***	−0.053***	−0.053***	−0.051***	−0.052***	−0.052***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$\Delta\ log(Fin.Limit)_{t-1}$	0.032	0.032	0.032	0.037	0.036	0.037
	(0.021)	(0.021)	(0.021)	(0.023)	(0.022)	(0.023)
$Capacity_{t-1}$	−0.082***	−0.081***	−0.081***	−0.078***	−0.077***	−0.078***
	(0.027)	(0.027)	(0.027)	(0.026)	(0.026)	(0.026)
US GDP	0.007	0.009*	0.009*	0.008	0.010**	0.010**
	(0.007)	(0.005)	(0.005)	(0.006)	(0.004)	(0.004)
VIX	−0.002**	−0.002**	−0.002*	−0.002**	−0.002*	−0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
US EUR exch. rate	0.268**	0.229**	0.235**	0.265**	0.226*	0.233**
	(0.108)	(0.109)	(0.105)	(0.111)	(0.113)	(0.108)
$CreditTrend_{t-1}$	0.079	0.080	0.101	0.078	0.074	0.099
	(0.113)	(0.108)	(0.109)	(0.110)	(0.108)	(0.108)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	No	No	No	Yes	Yes	Yes
Observations	2961	2961	2961	2863	2863	2863
$AdjR^2$	0.106	0.111	0.111	0.105	0.109	0.109

This table reports the results of the estimations based on OLS regressions. Standard errors are clustered by time and conduit. All variables - except rates - are winsorezed at 5%. See Appendix A for the definitions of the variables. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 6: ABCP Net Issuance - OLS Analyses - Excluding Repo conduits and New players (after June 2004)

	(1) $\Delta\ log(ABCP)_t$ β / SE	(2) $\Delta\ log(ABCP)_t$ β / SE	(3) $\Delta\ log(ABCP)_t$ β / SE	(4) $\Delta\ log(ABCP)_t$ β / SE	(5) $\Delta\ log(ABCP)_t$ β / SE	(6) $\Delta\ log(ABCP)_t$ β / SE
$\Delta\ fed\ rate_t$	−0.074**		−0.022	−0.077**		−0.027
	(0.032)		(0.034)	(0.035)		(0.038)
$\Delta\ (Tbill - OIS)_t$		−0.089***	−0.083***		−0.088***	−0.080***
		(0.019)	(0.022)		(0.020)	(0.023)
$\Delta\ log(ABCP)_{t-1}$	−0.114***	−0.112***	−0.112***	−0.121***	−0.119***	−0.120***
	(0.027)	(0.026)	(0.026)	(0.028)	(0.027)	(0.027)
$\Delta\ log(ABCP)_{t-2}$	−0.048*	−0.042	−0.042	−0.052*	−0.046*	−0.046*
	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)	(0.027)
$log(ABCP)_{t-1}$	−0.052***	−0.052***	−0.052***	−0.050***	−0.051***	−0.051***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
$\Delta\ log(Fin.Limit)_{t-1}$	0.040*	0.039*	0.040*	0.046*	0.045*	0.045*
	(0.022)	(0.022)	(0.022)	(0.024)	(0.023)	(0.023)
$Capacity_{t-1}$	−0.077***	−0.076***	−0.076***	−0.073**	−0.072**	−0.072**
	(0.028)	(0.028)	(0.028)	(0.027)	(0.027)	(0.027)
US GDP	0.006	0.008*	0.008*	0.007	0.008**	0.009**
	(0.006)	(0.004)	(0.004)	(0.006)	(0.004)	(0.004)
VIX	−0.002*	−0.002*	−0.002	−0.002*	−0.002	−0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
US EUR exch. rate	0.254**	0.220**	0.224**	0.251**	0.217*	0.223**
	(0.109)	(0.109)	(0.106)	(0.112)	(0.113)	(0.109)
$CreditTrend_{t-1}$	0.077	0.086	0.101	0.076	0.080	0.099
	(0.111)	(0.105)	(0.108)	(0.109)	(0.106)	(0.107)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes	Yes	Yes
Rating FE	No	No	No	Yes	Yes	Yes
Observations	2823	2823	2823	2725	2725	2725
$AdjR^2$	0.102	0.107	0.107	0.101	0.106	0.106

This table reports the results of the estimations based on OLS regressions. Standard errors are clustered by time and conduit. All variables - except rates - are winsorezed at 5%. See Appendix A for the definitions of the variables. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 7: Net Amount of Collateral Entering the ABCP Portfolio (%)

	(1) Δ Net % $_t$ β / SE	(2) Δ Net % $_t$ β / SE	(3) Δ Net % $_t$ β / SE	(4) Δ Net % $_t$ β / SE
Δ $fed\ rate_t$	−0.043*	−0.034**		−0.010
	(0.024)	(0.016)		(0.018)
Δ $(Tbill - OIS)_t$			−0.039***	−0.036***
			(0.006)	(0.008)
Δ Net % $_{t-1}$	−0.491***	−0.670***	−0.669***	−0.669***
	(0.020)	(0.024)	(0.024)	(0.024)
Δ Net % $_{t-2}$		−0.361***	−0.354***	−0.354***
		(0.022)	(0.023)	(0.022)
$log(ABCP)_{t-1}$	−0.002***	−0.016***	−0.016***	−0.016***
	(0.000)	(0.004)	(0.004)	(0.004)
Time FE	Yes	Yes	Yes	Yes
Conduit FE	No	Yes	Yes	Yes
$AdjR^2$	0.248	0.341	0.344	0.344
Observations	2902	2831	2831	2831
No. of Conduits	71	71	71	71

This table reports the results of the OLS estimations for the period January 2003 to March 2007. The dependent variable is the change in the difference between the amount of new collateral entering the portfolio of the conduit and the amount exiting as a percentage of the overall portfolio for each month. Standard errors are clustered by time and conduit. All variables - except rates - are winsorized at 5%. Similar results are obtained with bootstrap-corrected Fixed Effects (LSDV) estimator for the dynamic panel (unreported table). See Appendix A for variables definitions. Significance level: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 8: ABCP Portfolio Composition by RATING of Collateral

	(1) Δ AAA β / SE	(2) Δ AAA β / SE	(3) Δ AAA β / SE	(4) Δ AA A β / SE	(5) Δ BBB β / SE	(6) Δ Below/NR β / SE	(7) Δ Not rated β / SE	(8) Δ NA β / SE
Δ $fed\ rate_t$	−0.144**		−0.441	−0.657***	0.404**	−1.005***	−0.078	0.786
	(0.049)		(0.280)	(0.190)	(0.136)	(0.193)	(0.241)	(0.507)
Δ $(Tbill - OIS)_t$		−0.096	0.391	0.761***	−0.555***	1.105***	−0.024	−0.882
		(0.094)	(0.364)	(0.212)	(0.149)	(0.262)	(0.387)	(0.622)
$log(ABCP)_{t-1}$	−0.005	−0.005	−0.004	−0.014	−0.015	0.019	0.013	0.009
	(0.019)	(0.019)	(0.019)	(0.013)	(0.013)	(0.019)	(0.017)	(0.048)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-of-the-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Adj.R^2$	0.018	0.016	0.018	-0.049	0.004	0.036	0.005	-0.073
Observations	444	444	444	473	388	435	321	315

This table presents the results of the OLS estimation based on quarterly data from 2004q2 to 2007q1. The dependent variable in each column is the change in the percentage of holdings of a rating category to the overall amount in the portfolio. Categories are from Capital IQ. Standard errors are clustered by quarter and conduit. In an unreported table, we add Conduit-rating FE and the results are unchanged. Conduits variables are winsorized at 5%. Significance level: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 9: ABCP Portfolio Composition by Type of Collateral

	(1) Δ Auto β / SE	(2) Δ CDO β / SE	(3) Δ Commercial β / SE	(4) Δ Consumer β / SE	(5) Δ Credit cards β / SE	(6) Δ Trade β / SE	(7) Δ Mortgage β / SE	(8) Δ Other β / SE
$\Delta\ fed\ rate_t$	−0.120***	0.535***	−0.023	0.570***	0.024	−0.104	0.732***	−0.338***
	(0.005)	(0.123)	(0.015)	(0.056)	(0.046)	(0.109)	(0.081)	(0.090)
$\Delta\ (Tbill - OIS)_t$	0.155***	−0.592***	−0.037***	−0.741***	0.045	0.178	−1.024***	0.494***
	(0.036)	(0.175)	(0.011)	(0.068)	(0.052)	(0.126)	(0.125)	(0.080)
$log(ABCP)_{t-1}$	0.025**	0.018	−0.028	−0.020*	−0.004	0.026	−0.035	−0.005
	(0.010)	(0.024)	(0.024)	(0.010)	(0.005)	(0.017)	(0.019)	(0.023)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter-of-the-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$Adj.R^2$	-0.019	0.321	0.029	0.155	-0.035	-0.033	0.035	0.0.061
Observations	444	302	376	363	405	476	517	460

This table presents the results of the OLS estimation on quarterly data from 2004q2 to 2007q1. The dependent variable in each column is the change in the percentage of holdings of a collateral type to the overall amount of collateral in the portfolio. Categories are from Capital IQ. Standard errors are clustered by quarter and conduit. In an unreported table, we add Conduit-rating FE and the results are unchanged. Conduits variables are winsorized at 5%. Significance level: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 10: Participation in Fed Term Auction Programme

	(1) No. TAF loans β / SE	(2) No. TAF loans β / SE	(3) No. TAF loans β / SE
Mortgage (%)	2.718***		3.030***
	(0.895)		(0.891)
CDO (%)		0.522	−1.766
		(1.682)	(1.308)
High Rating A-1+	−1.250***	−0.955***	−1.182***
	(0.304)	(0.285)	(0.304)
Arbitrage Type	0.381	1.008**	0.353
	(0.245)	(0.395)	(0.288)
Liquidity providers (ln)	0.066**	0.048	
	(0.027)	(0.029)	
Constant	2.857***	3.168***	3.198***
	(0.239)	(0.240)	(0.192)
$Adj.R^2$	0.307	0.147	0.247
Observations	42	43	40

This table reports the results of the OLS cross-sectional regressions for the sample of conduits operating in December 2006 and sponsored by eligible sponsors. The dependent variable is the log of the total number of loans a sponsor of a conduit has borrowed under the Term Auction Facility established by the Federal Reserve in December 2007, i.e. after the ABCP collapse in August. Mortgage and CDO variables are the percentage of holdings in the conduits' portfolio reported in December 2006. The number of conduits is reduced because only depository institutions were eligible for the facility. Robust standard errors are reported. Results are robust to conduit-level clustering. Significance level: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 11: ABCP Net Issuances - Surprise Changes in Federal Funds Rates

	(1) $\Delta\ log(ABCP)_t$ β / SE	(2) $\Delta\ log(ABCP)_t$ β / SE	(3) $\Delta\ log(ABCP)_t$ β / SE	(4) $\Delta\ log(ABCP)_t$ β / SE
FFR factor	−0.014***	−0.012***		−0.023***
	(0.006)	(0.006)		(0.005)
$\Delta\ (Tbill - OIS)_t$			−0.087***	−0.099***
			(0.023)	(0.022)
$\Delta\ log(ABCP)_{t-1}$	−0.055	−0.078**	−0.075**	−0.074*
	(0.040)	(0.034)	(0.033)	(0.033)
$\Delta\ log(ABCP)_{t-2}$		−0.078	−0.067	−0.067
		(0.047)	(0.045)	(0.045)
$log(ABCP)_{t-1}$		−0.060***	−0.061***	−0.060***
		(0.011)	(0.011)	(0.011)
Time FE	Yes	Yes	Yes	Yes
Conduit FE	No	Yes	Yes	Yes
$AdjR^2$	0.019	0.065	0.103	0.104
Observations	2025	1998	1998	1998
No. of Conduits	74	74	74	74

This This table reports the results of the estimations based on OLS regressions. The federal funds rate component of FOMC announcements are from Swanson (2021). Standard errors are clustered by time and country-sponsor. All variables - except rates - are winsorezed at 5%. See Appendix A for the definitions of the variables. Significance level: $^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$

Table 12: Difference-in-Difference: US vs Non-US Sponsored Conduits

	(1) $log(ABCP)_t$ β / SE	(2) $log(ABCP)_t$ β / SE	(3) $log(ABCP)_t$ β / SE	(4) $log(Fin.\ Limit)_t$ β / SE	(5) $log(Fin.\ Limit)_t$ β / SE	(6) $log(Fin.\ Limit)_t$ β / SE
US Sponsor x POST	0.049**	0.048**	0.048**	−0.013	−0.018	−0.018
	(0.020)	(0.020)	(0.021)	(0.028)	(0.028)	(0.028)
US Sponsor	0.387***	0.296***	0.296***	0.167***	0.104***	0.104***
	(0.014)	(0.012)	(0.012)	(0.011)	(0.017)	(0.017)
POST	−0.065***	−0.063***		0.007	0.009	
	(0.011)	(0.010)		(0.012)	(0.012)	
Time FE	No	No	Yes	No	No	Yes
Conduit-type FE	No	Yes	Yes	No	Yes	Yes
Observations	684	684	684	684	684	684
$AdjR^2$	0.063	0.106	0.107	0.103	0.045	0.045

This table reports the results of OLS estimations for a 6-month period around the federal funds rate increase in June 2004. Standard errors are clustered by time. Conduit types are Multi-seller, Single-seller, Arbitrage, and Hybrid. See Appendix A for the description of the variables. Results are robust to the inclusion of Conduit FE, Time FE and robust standard errors (unreported tables). Significance level: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 13: Difference-in-Difference: US vs Non-US Sponsored Conduits - Extended Models

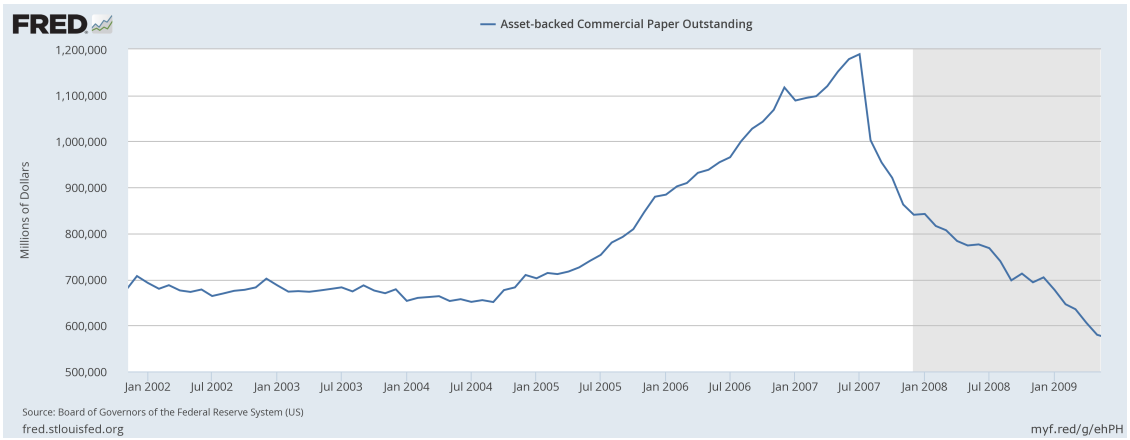
	(1) $log(ABCP)_t$ β / SE	(2) $log(ABCP)_t$ β / SE	(3) $log(ABCP)_t$ β / SE	(4) $log(ABCP)_t$ β / SE
US Sponsor x POST	0.050**	0.050**	0.050**	0.050**
	(0.016)	(0.018)	(0.018)	(0.018)
US Sponsor	0.204***	0.300***	0.300***	0.300***
	(0.005)	(0.007)	(0.007)	(0.007)
POST	−0.023**	−0.064**	−0.057*	
	(0.008)	(0.023)	(0.029)	
Non-US Assets	−0.330***	−0.333***	−0.333***	−0.333***
	(0.019)	(0.019)	(0.019)	(0.019)
US Sponsor x Non-US Assets	−1.509***	−1.750***	−1.749***	−1.747***
	(0.023)	(0.033)	(0.032)	(0.034)
Non-US Assets x POST	−0.092***	−0.063**	−0.064**	−0.063**
	(0.027)	(0.027)	(0.027)	(0.027)
Arbitrage x POST		−0.015	−0.016	−0.015
		(0.066)	(0.066)	(0.066)
High rating (A-1+)		0.589***	0.589***	0.589***
		(0.022)	(0.022)	(0.022)
High rating (A-1+) x POST		0.060**	0.060**	0.060**
		(0.023)	(0.023)	(0.023)
$(Tbill - OIS)_t$			0.062	0.115
			(0.106)	(0.157)
$(Tbill - OIS)_t$ x POST				−0.168
				(0.164)
Time FE	No	No	No	Yes
Conduit-type FE	Yes	Yes	Yes	Yes
Observations	684	684	684	684
$AdjR^2$	0.154	0.285	0.285	0.285

This table reports the results of the OLS estimations for a 6-month period before and after the federal funds rate increase in June 2004. Standard errors are clustered by time. Conduit types are Multi-seller, Single-seller, Arbitrage, and Hybrid. See Appendix A for the description of the variables. Results are robust to the inclusion of Conduit FE, Time FE and robust standard errors (unreported tables) Significance level:
$^{*}\ p < 0.10, \quad ^{**}\ p < 0.05, \quad ^{***}\ p < 0.01$

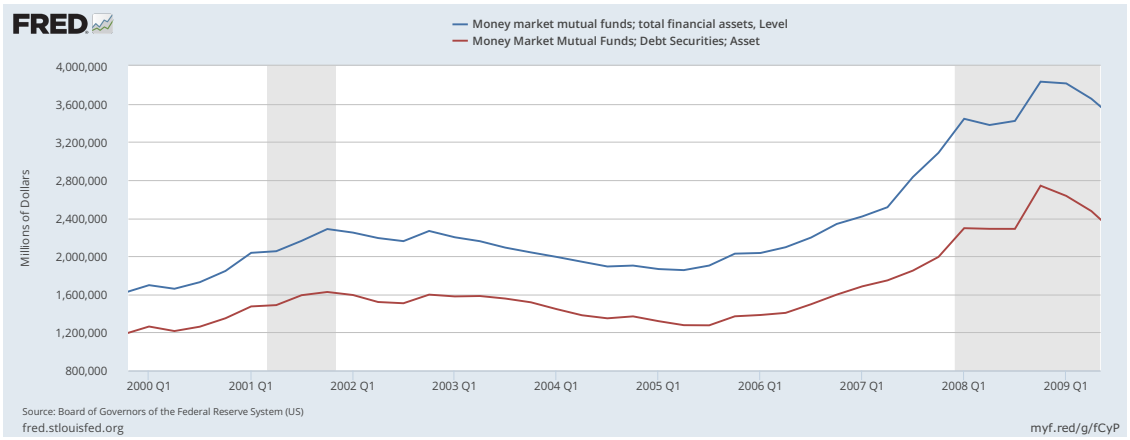
Table 14: ABCP Net Issuance - OLS Analyses - High vs Low Term Spread Periods

	(1) $\Delta\ log(ABCP)_t$ β / SE $Term\ Spread >= 0$	(2) $\Delta\ log(ABCP)_t$ β / SE $Term\ Spread >= 0$	(3) $\Delta\ log(ABCP)_t$ β / SE $Term\ Spread >= 0$	(4) $\Delta\ log(ABCP)_t$ β / SE $Term\ Spread < 0$	(5) $\Delta\ log(ABCP)_t$ β / SE $Term\ Spread < 0$	(6) $\Delta\ log(ABC$ β / SE $Term\ Sprea$
$\Delta\ fed\ rate_t$	−0.004	−0.000	−0.008	−0.017***	−0.004	−0.248
	(0.004)	(0.005)	(0.005)	(0.003)	(0.004)	(0.012
$\Delta\ (Tbill - OIS)_t$		−0.004**	0.002		−0.012**	0.080
		(0.002)	(0.003)		(0.004)	(0.006
$\Delta\ fed\ rate_t\ x$						
$\Delta\ (Tbill - OIS)_t$			−0.010**			0.108
			(0.004)			(0.005
$\Delta\ log(ABCP)_{t-1}$	−0.063**	−0.064**	−0.063**	−0.205***	−0.182***	−0.191
	(0.028)	(0.028)	(0.027)	(0.036)	(0.036)	(0.038
$\Delta\ log(ABCP)_{t-2}$	−0.033	−0.029	−0.028	−0.162***	−0.137**	−0.136
	(0.027)	(0.027)	(0.027)	(0.045)	(0.043)	(0.043
$log(ABCP)_{t-1}$	−0.071***	−0.071***	−0.072***	−0.074***	−0.079***	−0.079
	(0.010)	(0.010)	(0.010)	(0.021)	(0.022)	(0.021
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2274	2274	2274	678	678	678
$AdjR^2$	0.101	0.102	0.104	0.153	0.173	0.179
No. of Conduits	71	71	71	73	73	73

This table reports the results of the estimations based on OLS regressions. Key variables (fed funds and liquidity premium) are standardized to mitigate multi-coll with the interaction term. Term Spread is the spread between 10-Year Treasury Constant Maturity and 3-Month Treasury Constant Maturity. Standard errors are cl for time and conduit-levels. All variables - except rates - are winsorized at 5%. See Appendix A for variables definitions. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

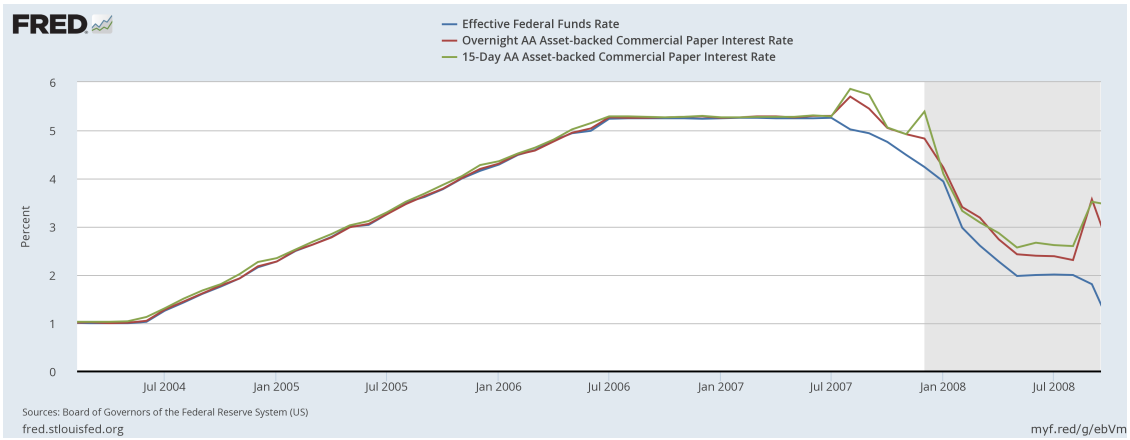


(a) Growth of Asset backed Commercial Paper Market in US in the run-up of the 2007-2008 crisis

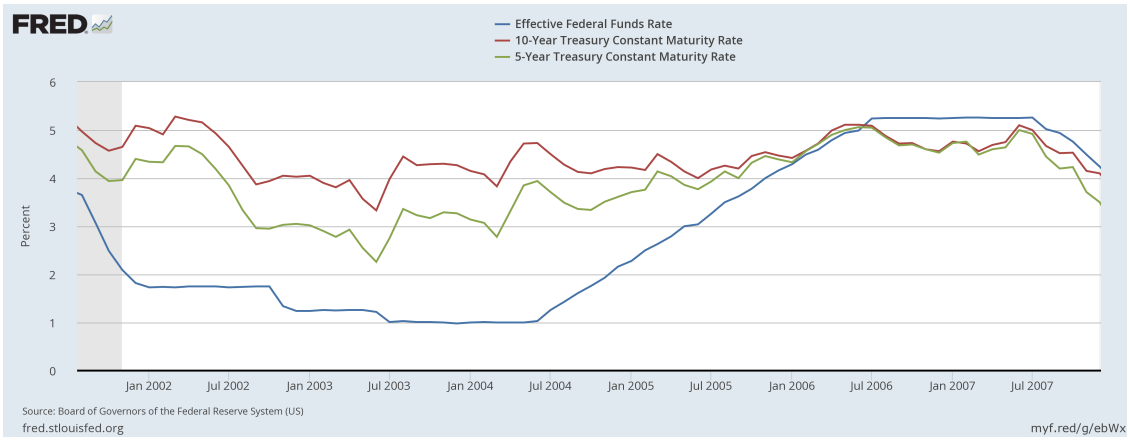


(b) Growth Money Market Funds - Total Financial Assets

Figure 1: Asset-Backed Commercial Paper Market and Money Market Funds Assets. The Figure presents (a) the expansion of the ABCP market (Amount Outstanding in mil.$) in the US. Outstanding amounts are calculated from issuance, with a maturity of 270 days or less. and (b) the expansion of financial assets held in Money Market Mutual Funds before the financial crisis. Money Market Mutual Funds are major investors in commercial papers and asset-backed commercial papers. Source: Board of Governors of the Federal Reserve System (US)

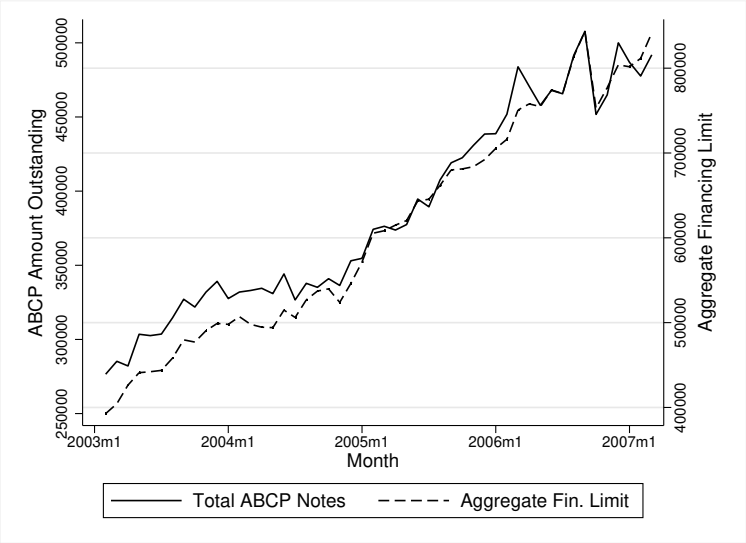


(a) ABCP rates and Federal fund rates

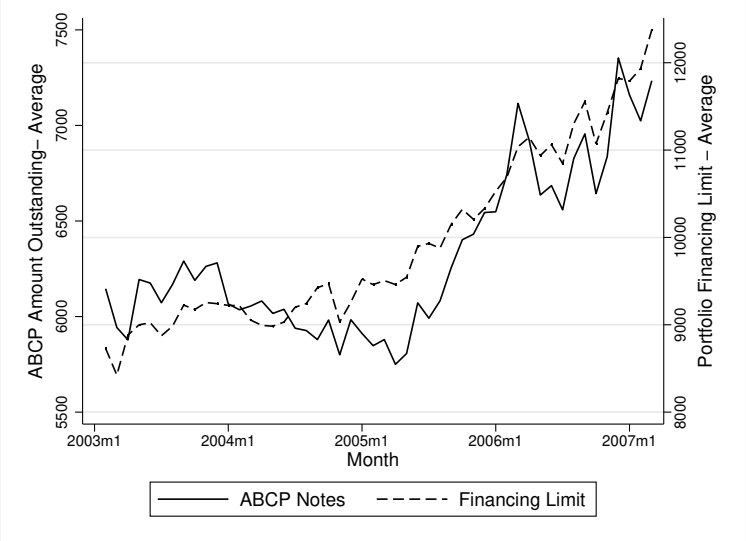


(b) Term Spread

Figure 2: Interest rates and Asset-Backed Commercial Paper rates.
The Figure presents (a) the federal funds rates and the ABCP commercial rates overnight and 15-days maturity. The difference between federal funds rates and ABCP rates is a proxy of the additional spread money market investors require. The panic spread in the ABCP market in August 2007, widening the spread; (b) the components of the term spread for different maturities: the 10-year Treasury Constant Maturity Rate, the 5-year Treasury Constant Maturity Rate and the effective federal funds rate. In the period before the ABCP run, the term spread is negative.

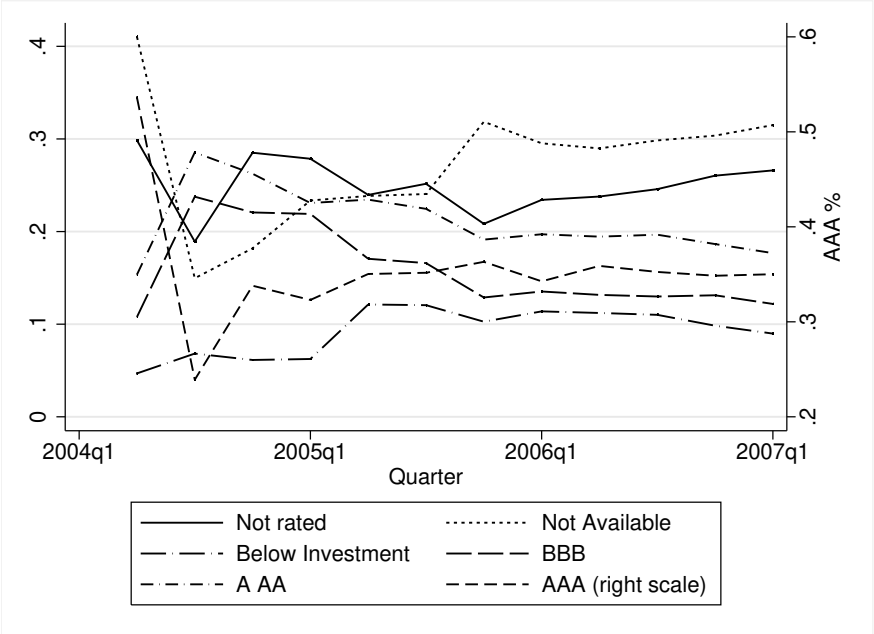


(a) Aggregate Amount of ABCP Outstanding and Financing Limit (Portfolio) (mil.$)

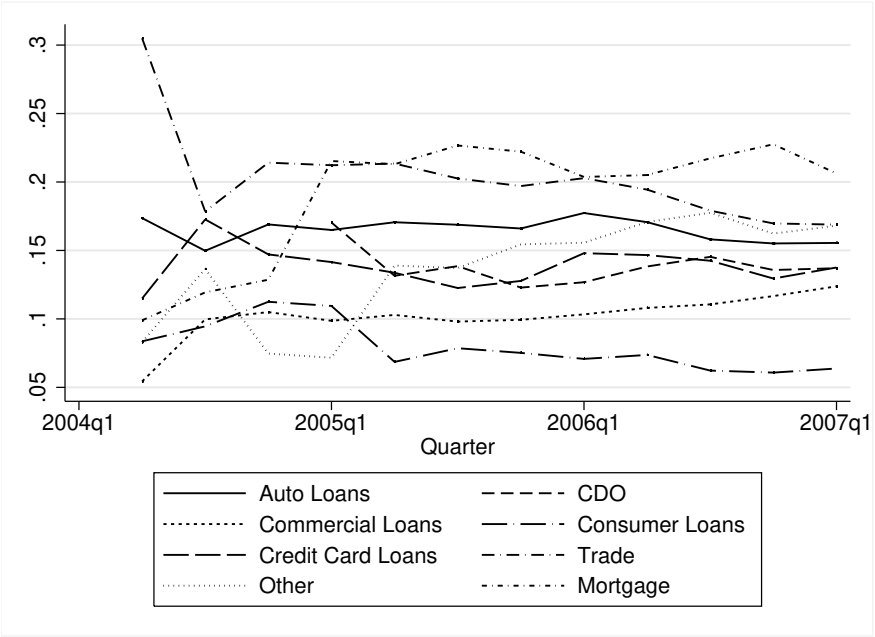


(b) Average Amount of ABCP Outstanding and Financing Limit(Portfolio) (mil.$)

Figure 3: Our sample of ABCP Conduits.
The Figure presents (a) the aggregate amount of ABCP notes issued by the conduits in our sample and the aggregate value of the collateral in the portfolio backing the notes; (b) the average amount of ABCP notes issued by the conduits in our sample and the average value of the collateral in the portfolio backing the notes. Our sample covers about 50% of the ABCP market in the months before the crisis. We exclude SIVs and CDO conduits because of their different operations compared to ABCP conduits. The number of players increased over time, and in particular repo conduits entered the market after 2005.

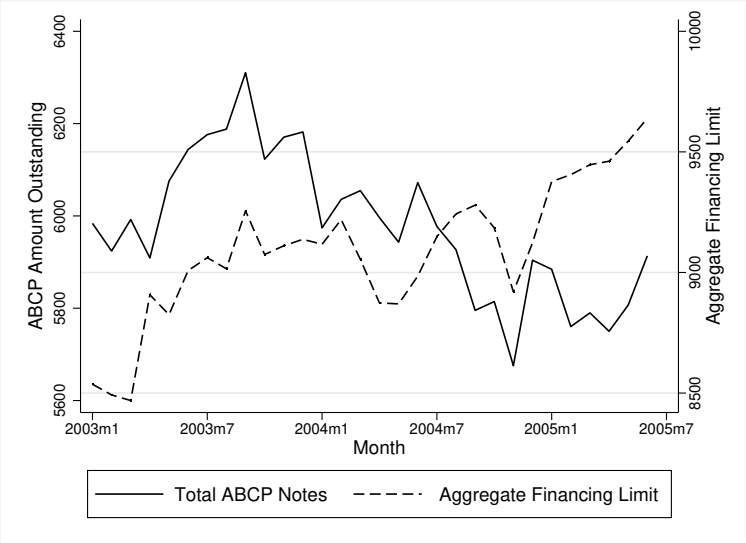


(a) Portfolio Composition by Rating of Collateral

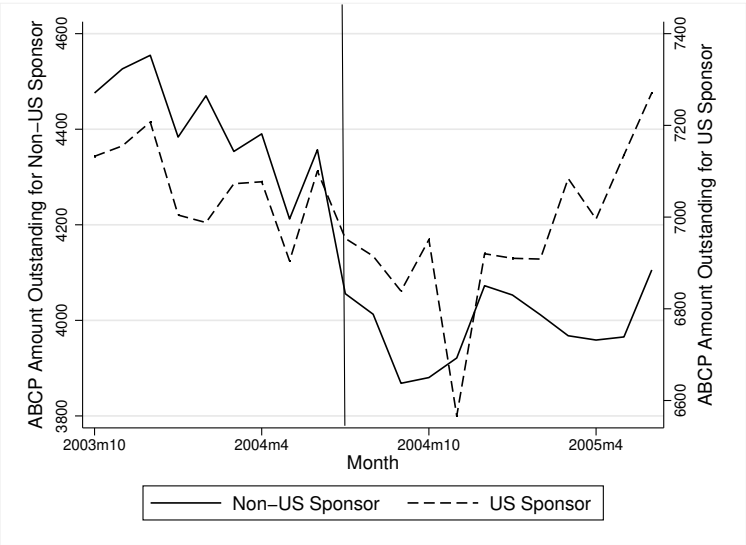


(b) Portfolio Composition by Type of Collateral

Figure 4: Portfolio Composition of ABCP Conduits over the period 2004q2 to 2007q1.
The Figure presents (a) the evolution of the percentage of collateral in the portfolio by rating category; (b) the evolution of the percentage of collateral in the portfolio by collateral types.



(a) ABCP outstanding and Financing Limit around the federal funds rate increase in June 2004 - Average in mil$



(b) ABCP outstanding for US and Non-US sponsored conduits around the federal funds rate increase in June 2004 - Average in mil$

Figure 5: ABCP conduits' behaviour around the federal funds rate increase in June 2004. The Figure presents (a) ABCP market around the Fed decision to increase the interest rate in June 2004 (red line); (b) the amount outstanding of ABCP notes for the sub-samples of conduits sponsored by US banks and Non-US banks. Figure (a) shows the negative impact of the change in the interest rate on the ABCP market but not a reduction in the amount of collateral in the portfolio. Figure (b) shows a parallel pre-trend between the two sub-samples before the shock.

Appendix A Variables description

Table A1: Variables Definitions

Variables	Description	Frequency
Conduit variables		
$log(ABCP)$	Log of Amount of ABCP notes outstanding (mil \$) issued by the conduit and backed by the portfolio. The conduit's portfolio consists of transactions/sellers collateralized by underlying assets. In a typical ABCP conduit, maturing CP is paid down with the proceeds of newly issued CP. During the revolving phase, an ABCP conduit typically acquires and retires transactions at the same time as it issues and retires CP (Liabilities).	Monthly
$\Delta\ log(ABCP)$	Net Financing proxied by the change in log (ABCP).	Monthly
$Log\ (Finan.Limit)$	Log of Aggregate Financing Limit (mil \$). It is the maximum amount of ABCPs notes that an ABCP conduit is authorized to issue by a rating agency. It is defined as the sum of the financing limit of each transaction/collateral in the portfolio. Actual ABCP amount outstanding could be significantly less than the authorized amount. ABCP may be issued up to the authorized amount only if sufficient credit enhancement and liquidity support are available (Assets).	Monthly
Capacity	Capacity of Utilization. It is defined by S&P as the ratio between the amount of ABCP outstanding and the Aggregate Financing limit of the conduit.	Monthly
Net	Net Amount of Collateral Entering. The difference between the total financing limit of the transactions/collateral entering the portfolio minus the total financing limit of the existing transaction exiting the portfolio. All new transactions entering the conduits are subject to review by the rating agency.	Monthly
Net %	Net Amount of Collateral Entering divided by the Aggregate Financing Limit of the portfolio.	Monthly

Table A1: Variable Definitions - Continued

Variables	Description	Frequency
Conduit variables		
Liquidity provider	Log of the Number of Liquidity Providers. Typically the sponsor of the conduit is the liquidity provider. Some conduit may have more than one liquidity providers. Liquidity support is required by the rating agency for potential repayment shortfalls caused by asset and liability timing mismatches.	Quarterly
US Sponsor	A dummy equal to 1 if the sponsor of the conduit is a bank headquartered in US. The sponsor is identified at the parent-company level.	-
Non-US Assets	A dummy equal to 0 if the conduit is listed by S&P as a US conduits and 1 if it is listed as an EMEA (Europe, Middle East, Africa) ABCP conduit. A US-conduit has its assets predominately originated in US, while a EMEA conduit has its assets mainly originate in Europe.	-
High Rating	A dummy equal to 1 if the short-term rating assigned to the conduit is A-1+, 0 otherwise (A-1, A-2, A-3). The vast majority is A-1+ and A-1. The rating of the conduit is typically aligned with the short-term rating of the sponsor providing the liquidity support. When the rating of the conduit is not available, we use the short-term rating of the sponsor. In evaluating these programs, Standard & Poor's Ratings Services analyses the risks associated with credit, liquidity, interest rates, foreign currencies, legal issues, structural features, cash flows, and, where appropriate, the financial viability of the asset originator.	Monthly
Rating Date	The date the rating is assigned to the ABCP program for the first time. Ratings agencies verify the administration and selection of assets, on inception and frequently thereafter.	-
No of TAF loans	Log of the total number of loans a sponsor of a conduit has borrowed under the Term Auction Facility established by the Federal Reserve in December 2007 - after the ABCP collapse in August - and ended in 2010. The TAF helped promote the distribution of liquidity when unsecured bank funding markets were under stress. Only depositary institutions were eligible. Data from the Federal Reserve System.	Monthly

Table A1: Variable Definitions - Continued

Variables	Description	Frequency
Conduit types		
Arbitrage	A Securities/Credit Arbitrage is a limited-purpose, bankruptcy-remote vehicle that buys fixed income securities for the purpose of regulatory capital relief, yield arbitrage and increasing funds under management.	-
Repo	Repo conduits is limited-purpose, bankruptcy remote vehicle that issue ABCP whose maturity is matched and secured against A-1 / P-1 rated banks. The conduit issues ABCP and re-invests the cash proceeds under a Repo with an A-1 / P-1 bank with a matched or shorter maturity than the CP. The collateral is held in a Tri-Party account, and is marked-to-market on a daily basis, and held at market standard haircuts (over-collateralised).	-
Multi-seller	A multi-seller conduit is a limited-purpose, bankruptcy-remote vehicle that serve the financing needs of several unaffiliated originators by combining their assets into one diverse, non-fungible portfolio supporting CP issuance.	-
Single-seller	A single-seller conduit is a limited-purpose, bankruptcy-remote vehicle that provides funding to a single seller in exchange for interests in its pool of receivables. Single-seller programs are popular among large credit-card issuers, major auto manufacturers and mortgage originators. Single-seller programs are established to benefit an individual asset originator by providing a way to finance its lending activities.	-
Hybrid	A type of conduit set up as hybrid to hold both pools of receivables as multi-seller conduits as well as highly rated ABS as securities arbitrage conduits.	-
Portfolio Composition by Rating of Collateral (AAA, AA, A ,..)		
AAA%	Percentage of AAA collateral in the portfolio.	Quarterly
Portfolio Composition by Type of Collateral (Trade receivables, Auto loans, Mortgage, CDO,..)		
Trade receivables %	Percentage of Trade receivables in the portfolio.	Quarterly

Table A1: Variable Definitions - Continued

Variables	Description	Frequency
Macro variables		
Fed rate	Effective Federal Funds Rate, Percent Change. Source: Federal Research Economic Data.	Monthly
Tbill-OIS	T-bill-OIS is the spread of 3-month Treasury bills over 3-month overnight indexed swap (OIS) rate. Source: Federal Research Economic Data and Bloomberg.	Monthly
US GDP	US Gross Domestic product, Percent Change of. Source: Federal Research Economic Data.	Quarterly
US CPI	US Consumer Price Index, Percent Change of (Index 1982-1984=100). Source: Federal Research Economic Data.	Monthly
VIX	S&P500 Volatility Index (basis points, %). Chicago Board of Option Exchange. The VIX Index is a widely used indicator of financial market distress. S&P Global Fixed Income Research.	Monthly
Credit Trend	Global SF Credit Quality Trend by Corporate Risk Premium. Trailing 12-month change in credit quality (avg. no. of notches changed). It is computed as the difference in yields between BBB and AAA. S&P Capital IQ.	Monthly
USD/EUR rate	USD / Euro Foreign Exchange rate. US Dollars to One Euro. Source: Federal Research Economic Data.	Monthly
Term Spread	10-year Treasury Constant Maturity yield minus 3 months Treasury Constant Maturity yield. Source: Federal Research Economic Data.	Monthly

Appendix B Other Robustness tests

Table B1: ABCP Net Issuance - Bootstrap-corrected Fixed Effects (LSDV) estimator for Dynamic Panel

	(1) $\Delta\ log(ABCP)_t$ β / SE	(2) $\Delta\ log(ABCP)_t$ β / SE	(3) $\Delta\ log(ABCP)_t$ β / SE	(4) $\Delta\ log(ABCP)_t$ β / SE
$\Delta\ fed\ rate_t$	−0.061**	−0.074***		−0.011
	(0.029)	(0.028)		(0.030)
$\Delta\ (Tbill - OIS)_t$			−0.096***	−0.093***
			(0.018)	(0.020)
$\Delta\ log(ABCP)_{t-1}$	−0.086***	−0.049***	−0.048**	−0.048**
	(0.018)	(0.019)	(0.019)	(0.019)
$\Delta\ log(ABCP)_{t-2}$		−0.005	−0.005	−0.005
		(0.017)	(0.017)	(0.017)
$log(ABCP)_{t-1}$		−0.053***	−0.054***	−0.054***
		(0.005)	(0.005)	(0.005)
Time FE	Yes	Yes	Yes	Yes
Conduit FE	Yes	Yes	Yes	Yes
Observations	2977	2903	2903	2903
No. of Conduits	74	74	74	74

This table reports estimations based on an iterative bootstrap-based bias correction for the fixed effects model for dynamic panels. Adjusted Standard errors for global serial correlations. Conduit variables are winsorezed at 5%. Significance levels: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Appendix C ABCP conduits: Institutional setting

This section provides a description of the fundamental mechanisms behind the production of safe assets by ABCP conduits. ABCP conduits are an integral part of the shadow credit intermediation process described by Pozsar, Adrian, Ashcraft, and Boesky (2013). The role of the ABCP conduits is the financing of different types of shadow banks performing credit, maturity and liquidity transformation similar to traditional banks.

	Step (1)	Step (2)	Step (3)	Step (4)	Step (5)	Step (6)	Step (7)
Function	Loan Origination	Loan Warehousing	ABS Issuance	ABS Warehousing	ABS CDO Issuance	ABS Intermediation	Wholesale funding
Shadow Banks	Banks Finance Comp.	**Single Seller Multi-seller**	SPV by broker-dealer	**Hybrid**, TRS/Repo broker-dealer	SPV by broker-dealer	SIV, **securities arbitrage**, HFs	2a-7MMFs Cash funds
Shadow Banks Funding	Deposits CP, Bonds	**ABCP**	ABS	**ABCP** Repo	ABS CDO CDO squared	**ABCP**, MTN Repo	$1 NAV shares

Shadow Credit Intermediation Process (Pozsar, Adrian, Ashcraft, and Boesky, 2013)

An ABCP conduit is a special-purpose vehicle (SPV) structured to be minimally capitalized, bankruptcy remote and legally separate from its sponsor. ABCP conduits are often established and administered by major commercial banks, finance companies and large manufactures. The purpose of an ABCP entity is limited in its activities for purchasing assets and funding those purchases through the issuance of ABCP notes. In the United States, the SPV takes the form of a limited purpose company, established and organized under the laws of Delaware[23], co-issuing with an offshore SPV based in the Cayman Islands.[24] In Europe, the typical conduit is organized as a limited purpose corporation under Jersey or Channel Island law, with a charitable trust as owner.[25]

ABCP notes are issued against transactions that have been accumulated over time. During the revolving phase, an ABCP conduit typically acquires and retires transactions at the

[23] An SPV may also be organized as a cooperative corporation, a trust, a limited liability corporation or partnership, or a limited partnership.

[24] Cetorelli and Peristiani (2012) show that more than 70% of private asset-backed issuance were organized via a US-based SPV. ABCP conduits are typically organized as an offshore SPV.

[25] Similar structures are possible in other English law jurisdictions such as Bermuda, the Bahamas or the Cayman Islands. In France, the SPV may be organized as a Societe Anonyme.

same time as it issues and retires CP (commercial paper).[26] Conduits generally use the proceeds thereof to pay maturing CP in a process called rolling the CP. The ABCP conduit contains limits on the amount of CP that can be issued in aggregate and against each transaction at any time based on a variety of factors, including the amount of performing assets in the conduit or in the new pool which are defined as the aggregate financing limit and transaction financing limit, respectively. Rolling the CP typically repays 100% of the principal component of maturing CP. Because of the diversity of the assets that back the conduits' notes and the lack of cash flow matching (which makes them different from a term securitization), third party liquidity provisions are a key determinant of ABCP credit quality and thus for eligibility in the portfolio of institutional investors such as money market mutual funds. Conventional CP issues are typically supported by a line of credit from a commercial bank, generally guaranteeing 102% of the amount of ABCP outstanding.[27] Typically, the sponsoring bank provides such liquidity facility for each transaction to address timing mismatches between payment streams of the assets and the CP maturity dates, or to repay CP investors in the event that CP cannot be rolled, namely a market disruption.[28] Under the Basel I and II frameworks, little capital (or zero in the case of Basel I) was required for liquidity support to banks' off-balance sheet asset-backed commercial paper conduits (Adrian and Jones, 2018).

The owner of the conduit receives nominal dividend payments and because the SPV does not generally have any employees, fees are paid to an administrator (normally the sponsoring bank) to manage the flow of CP and funds. The ability to pay fees and dividends depends on the conduits' profitability. The profitability of the conduits (margin) results from the difference between the rates paid on the short-term notes issued and the yield gained on the portfolio of underlying assets, minus the costs related to the fees paid for the distribution via dealers, liquidity and credit support, for hedging interest rate and exchange rate risk, and in some cases insurance.

Banks sponsor asset-backed commercial paper programs to minimise regulatory capital re-

[26]This is different from a term securitization having a fixed pool of collateral and issuing fixed-income medium-long term bonds with an exact matching of the cash flows between assets and liabilities. While ABCP conduits share certain features with term securitization, they differ in the following ways: conduits' investments in assets can be revolving and fluctuate in size; conduits may invest in various asset types, thereby creating diversified portfolios. conduits frequently fund long-term assets by issuing short-term liabilities, relying on liquidity support for potential repayment shortfalls caused by asset and liability timing mismatches; in conduits, there is no scheduled amortization of assets and liabilities since the additional issuance of CP may be used to, and in most cases is expected to, maintain the conduits' investment in assets.

[27]The additional 2% is for the coverage of the interest rates to be paid to investors on the notes issued.

[28]Liquidity facilities generally support a transaction in one of three ways: (i) they may cover the vast majority of risks except for defaulted assets; (ii) they may cover a portion of the credit risk by short tailing a transaction; (iii) they may fully wrap a transaction by covering all credit risk. Sponsoring banks providing liquidity may use the facility to transfer the transaction out of the conduits for any reason.

quirements, to take advantage of the special fiscal and accounting treatment provided by the jurisdiction in which the SPV is based (Belmontes, 2004), and to generate fee income. More importantly, it enables the sponsoring bank to attract money market financing.

1 ABCP assets

The portfolio of an ABCP conduit consists of transactions collateralized by underlying assets. Such assets are referred to as collateral, while the conduit's interest in these transactions is referred to as "asset interests". The conduit acquires assets via an asset purchase or a secured lending transaction from a seller which is often an SPV of a company or of a bank that is set up to facilitate the conduit's acquisition of the transactions. Each transaction that is added to the portfolio must be structured and credit enhanced so that the resulting risk profile of the CP conduit is commensurate with its CP rating. The maintaining of a high short-term rating is necessary to place ABCP notes with money market mutual funds, so that conduits mostly purchase transactions with highly-rated assets. The sellers are typically other financial institutions (or their SPV) or non-financial firms (or their SPV), that are unable to access the CP market because of their rating (Lemmon et al., 2014). If the sellers' short-term rating is high enough, they may act as the liquidity providers at transaction-level. If not, one bank or a syndicate, may serve as the liquidity provider. Program wide-credit enhancements (PWCE) are available as a fungible layer of credit support across all transactions.[29] This is the second loss protection which is at conduit-level, as the first loss protection is provided by the seller at the transaction level (i.e., over-collateralization).

Some common assets or asset interests that ABCP conduits finance are trade receivables, auto and equipment loans and leases, credit-card receivables. Since late 1990s, conduits started investing in products of a range of securitization and secured lending techniques. Securitized assets have typically longer maturity than trade receivables, so that their inclusion in the ABCP portfolios created a higher maturity mismatch. The type of assets in the conduit's portfolio is determined by the type of conduits. The main types of conduits are: multi-seller, single-seller, arbitrage, hybrid and repo.

Multi-seller ABCP conduits, the most traditional type of conduits, provide funding to a multitude of unaffiliated originators/sellers in exchange for asset interests. Individual sellers' assets are acquired transaction by transaction, typically accumulating into a diversified

[29] An integral part of assessing CP risk profile of a conduit is the size of its PWCE relative to the size and composition of its portfolio of transactions.

portfolio across asset types and industries to support the CP issued by the conduit. They purchase assets with short duration such as receivables and lease, but also temporarily warehouse mortgages until the pool is built. Similarly, Single-seller conduits purchase assets only originated by the sponsoring banks and its subsidiaries.

An arbitrage ABCP conduit mainly finance investments in securities and aims to take advantage of upward sloping yield curve, issuing highly rated paper paying an interest rate less than the yield on the assets backing the notes. The strategy requires the conduit to invest in assets with rating higher than AA to reduce the cost of their financing. Since 2005, some conduits were created to include both the features of the multi-seller and arbitrage conduits, and were defined as hybrid ABCP conduits.

A different type is the repo conduit that issue ABCP whose maturity is matched and secured against highly rated banks. The conduit issues ABCP and re-invests the cash proceeds under a repo with an A-1 / P-1 bank with a matched or shorter maturity than the CP. Effectively, investing in the ABCP issued by a repo conduit is akin to lending money to a diversified portfolio of highly rated banks on a collateralised basis since the investor is a senior creditor to the pool of collateral the banks have pledged. The collateral is held in a Tri-Party account, and is marked-to-market on a daily basis, and held at market standard haircuts (over-collateralised).

2 ABCP liabilities

The commercial paper market is a key source of short-term funding for major businesses.[30] The raise of money market funds is typically associated with the growth of this market since the 1970, as investors moved funds from deposits to MMFs shares. CP generally is classified in three categories: non-financial, financial, and asset-backed. Traditional non-financial and financial paper, respectively, are unsecured short-term debt issued by highly rated corporations, including industrial firms, public utilities, bank holding companies, and consumer finance corporations. Companies issued CP as a low-cost alternative to bank loans (exempted from Securities and Exchange Commission (SEC) registration[31]), to finance trade receivables and inventories. Similar to Treasury bills, CP is typically issued at a discount, meaning that the buyer pays less than face value and receives face value at maturity and the interest paid is equal to the face value minus the purchase price. Although CP is issued

[30] For further discussion of the commercial paper market, see Stigum (1990).

[31] CP is exempt from SEC registration if the following three criteria are met: (i) the maturity of the paper is less than 270 days, (ii) notes must be of a type not ordinarily purchased by the general public, and (iii) issues must be used to finance current transactions.

at short maturities to minimize interest expense, many issuers roll over CP by selling new paper to pay off maturing paper. Because of modest credit risk, yields on CP are slightly higher than on Treasury bills of similar maturity. Large denominations and short maturities typically limit the CP market to large institutional investors, such as MMFs. Asset-backed commercial papers are a relative recent innovation of the market, which gained market share between 1985 and 1990. ABCP, by means of securitization, were able to meet the need of medium-grade issuers, whose attractiveness for investors disappeared after a series of defaults in the late 80' and the consequent tighter regulation on MMF holdings (Rule 2a-7). ABCP trades exactly as conventional CP, but they are issued against transactions that have been accumulated over time in an SPV. The administration and legal treatment is also more onerous because of the need to establish the CP trust structure and issuing SPV. ABCP tenors are generally limited to 365 days but can be as long as 397. In US market, maturities range up to 270 days but average about 30 days. All ABCPs notes are rated by all major rating agencies and the majority has the highest short-term rating to meet the regulation of MMFs that restricts their holdings to high-quality papers. ABCP yields are generally higher that conventional CP and thus higher than Treasury bills yields.(Anderson and Gascon, 2009) attributes the yield premium specifically to the opaque nature of the SPV entity that holds assets from anonymous sellers. As for other CPs, there is a very limited secondary market for ABCP notes.

Large and well-know finance companies and banks used to sell their papers directly to investors, with their other wholesale liabilities. Smaller banks, and less-known financial institutions (as foreign banks) require a dealer to promote and distribute their papers. The relationship build between the conduits (via the sponsor) and the dealer is very close, as finding suitable investors may be costly (Anderson and Gascon, 2009). Dealers advice on the market conditions, investor demand and may implicitly guarantee ABCP unsold. In the dealer-placed ABCP market, the issuer decides on the quantity to issue for each maturity. The share of dealer-placed papers increased before the crisis, as smaller issuers become more frequent in the market and higher competition lower the dealer spread, reaching about 90% of the ABCP outstanding in June 2007. Goldman Sachs, Merrill Lynch and Lehman Brothers dominated the market as underwriters for the all types of CP before the crisis, but with a fierce competition from bank dealers.