How Do Global Banks Scramble for Liquidity?

Evidence from the Asset-Backed Commercial Paper Freeze of 2007[*]

by

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Abstract

We investigate how banks scrambled for liquidity following the asset-backed commercial paper (ABCP) market freeze of August 2007 and its implications for corporate borrowing. Commercial banks in the United States raised dollar deposits and took advances from Federal Home Loan Banks (FHLBs), while foreign banks had limited access to such alternative dollar funding. Relative to before the ABCP freeze and relative to their non-dollar lending, foreign banks with ABCP exposure charged higher interest rates to corporations for dollar-denominated syndicated loans. The results point to a funding risk manifesting as currency shortages for banks engaged in maturity transformation in foreign countries.

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In August of 2007, a significant amount of maturity transformation undertaken by the global financial sector came to a screeching halt. The market dislocation in the asset-backed commercial paper (ABCP) market put severe funding stress on bank balance sheets when many sponsoring banks took back off-balance sheet ABCP assets to their balance sheets.[1] Acharya and Schnabl (2010) document that while much of the ABCP exposure was US dollar (USD) denominated, a substantial portion of this ABCP exposure was concentrated amongst foreign banks. Many of these foreign banks with large exposure to US ABCP did not have large US-regulated banking operations.[2]

How did these global banks scramble for US dollar liquidity in response to the ABCP freeze? Did the shortage of USD liquidity affect intermediation by banks to the real sector? Were the responses different between USD and non-USD loans, and between US and foreign banks, given their differential access to the USD funding markets? These are some of the questions we attempt to answer in this paper.

Our first main finding is that in the immediate aftermath of the ABCP freeze, foreign banks were not able to increase US funding in the same ways as their US counterparts. Foreign banks grew their net repo borrowing. However, they were not able to increase deposits or interbank borrowing at their US subsidiaries, nor were many able to access advances from Federal Home Loan Banks (FHLBs). In part, this reflects the fact that deposits at this time increased in proportion to US assets, and foreign banks have less assets in the United States. Foreign banks scrambled for

[1] See also Acharya and Richardson (2009), Brunnermeier (2009), Diamond and Rajan (2009), Gorton (2008), Greenlaw et al. (2008), Kacperczyk and Schnabl (2010), and Krishnamurthy (2010) for summaries of how the financial crisis of 2007-08 unfolded, the liquidity and credit problems faced by banks in different markets, and the underlying causes behind banks being exposed in a substantial manner to these problems.

[2] Acharya and Schnabl (2010) document that ranked by ABCP outstanding to Tier 1 capital, only three of the top ten banks were US headquartered (Citigroup, Bank of America and JP Morgan ranked 1st, 3rd and 5th, respectively). The others (in increasing rank) were all foreign: ABN AMRO, HBOS, HSBC, Deutsche Bank, Societe Generale, Barclays and Rabobank.

liquidity, ultimately participating actively in the Term Auction Facilities (TAF) set up by the Federal Reserve.[3] In contrast, and as documented by Ashcraft, Bech, and Frame (2010) and He, Khang, and Krishnamurthy (2010), banks headquartered in the United States were able to tap into alternative funding sources. Especially, they accessed the deposit market, through time deposits, and in the form of advances from the FHLBs.[4] This asymmetry highlights an important funding risk in global banking, manifesting as currency shortages for banks engaged in maturity transformation in foreign countries. Importantly, many of these foreign banks play a large role in underwriting syndicated loans in the US.[5]

Do these funding frictions for foreign banks have a direct effect on their lending?[6] To address this question, we examine banks' underwriting of syndicated loans in US dollars and in European currencies (Euro and pound), recorded at the time of their origination in the Loan Pricing Corporation's DealScan dataset. Our second main finding is as follows: relative to before the ABCP freeze and relative to non-USD loans, foreign banks with ABCP exposure charged higher spreads on syndicated loans denominated in US dollars in the period following the ABCP freeze of August 2007 through mid-December 2007. This finding is particularly striking because this period is one of relative calm for large corporations in the United States, whose syndicated loans

[3] The TAF is a temporary program conducted by the Fed between December 17, 2007 and March 8, 2010, which provides term funding to depository institutions on a collateralized basis, at interest rates and amounts set by auction. See Armantier, Krieger, and McAndrews (2008) for an overview of the design and creation of TAF. See also http://www.federalreserve.gov/monetarypolicy/taffaq.htm for additional information on the TAF auctions.

[4] Congress established twelve regional Federal Home Loan Banks (FHLBs) in 1932 owned by the savings and loans (S&L) institutions and some life insurance companies. As a creation of the federal government, the FHLB System can borrow funds in the capital markets at favorable rates, and individual FHLBs can lend these funds to their member-owners, who were the primary originators of mortgages at the time. The FHLB System was thus an early "government-sponsored enterprise" (although that term was introduced decades later).

[5] More than 63% of facilities in 2007 had at least one foreign bank in the underwriting syndicate and 35% had a foreign bank leading the syndicate.

[6] There is a long literature on the relationship between bank funding and lending and business cycles. For example, see Kashyap, Rajan, and Stein (2002) and Acharya, Almeida, and Campello (2013). Empirically, see Gatev and Strahan (2006), Gatev, Schuermann, and Strahan (2009), Pennacchi (2006).

we study, as evinced by the remarkably stable behavior of the S&P500 index between August 9, and mid-December 2007 (See Figure 1).

Formally, we design a difference-in-differences test to study the terms (spread, maturity and amount) of syndicated loans denominated in USD and in euros or pounds (we will refer to these loans as "euro" loans for simplicity). We exploit several types of differences-in-differences, the first difference being between USD- and euro- loans, the second between foreign banks and US banks, and the third difference being between after and before August of 2007 (in order to exploit within-firm variation). Our difference-in-differences approach helps control for variation in characteristics across banks, differences in banks between before and after the shock, and between USD and non-USD-denominated syndicated loans for a given bank (allowing us to hold constant the bank solvency shock, if any). At the same time, the approach allows us to exploit the variation among banks due to funding shocks (ABCP-exposed versus not exposed banks) and due to differential access to funding in the USD markets (foreign versus US banks).

Our difference-in-differences test reveals that the contractual feature of bank credit that is affected is mainly the spread (rather than maturity or amount).[7] Besides documenting an important dollar funding risk for foreign banks engaged in maturity transformation in the United States, our results suggest that the transmission channel of the ABCP freeze when studied just for US banks may understate the true underlying strength of the channel. Since most US banks had access to FHLB advances and could employ their deposit franchises to raise USD funding, prevailing government interventions and market structures likely muted their response in terms of transmitting the ABCP freeze to the real sector. In this sense, studying the transmission channel of

[7] This empirical point is consistent with the evidence in Adrian, Colla, and Shin (2012) who argue that for large firms in the crisis of 2007-09, bond financing made up for the quantity of credit not provided through bank loans, albeit at higher yields just like heightened bank loan premiums.

foreign banks facing USD funding risk on to USD borrowers provides for a cleaner identification of the impact of a liquidity shock.[8] In addition, our findings suggest that the transmission channel of shocks to USD funding may overstate the underlying strength of the channel, when studied during periods of economic stress (as well as funding stress).

The rest of the paper is organized as follows. Section 1 discusses the related literature. Section 2 documents the information available on foreign banks and their funding in the US. Section 3 examines how banks scrambled for liquidity following the ABCP freeze, via private and government sources of funding. Section 4 investigates the transmission of bank funding risk – and realized funding – to the real sector. Section 5 presents concluding remarks.

1. Related Literature

Perhaps closest to our paper are Ivashina, Scharfstein, and Stein (2012) and Correa, Sapriza and Zlate (2013), who study the effect of the funding shock of money market funds' withdrawal from short-term lending to European banks during the second half of 2010-11. This shock led to substantial violations of the covered interest parity (CIP) between USD and euro exchange and interest rates. Such CIP violations became substantive for the first time after the ABCP freeze of August 2007, the time period we study in this paper (see Figure 2, adapted from Hrung and Sarkar (2012)). However, the magnitude of these violations is naturally smaller in the early phase of financial crisis relative to the highest levels reached in the second half of 2011. Ivashina, Scharfstein, and Stein find that foreign banks contracted dollar lending more than they contracted euro lending. Similarly, Correa, Sapriza and Zlate (2013) find a reduction in lending amounts of

[8] While these results suggest that access to deposits and government funding – stable liabilities – can help stabilize the banking sector and the transmission channel in a crisis, their ex-post efficacy must be weighed against any ex-ante moral hazard they induce.

US branches of foreign banks at this time. While both time periods are marked by shortages of USD funding for foreign banks, the 2010-11 European crisis occurred at a time when market perceptions of the solvency of US banks differs from that of their European counterparts, and when the macroeconomic prospects of the US and Europe may also have diverged more significantly. This prevents the difference-in-differences analysis from isolating the impact of liquidity shocks as conducted in our paper.

While Ivashina, Scharfstein, and Stein (2012) stress the private – money market based – USD funding differential between the US and European banks, our paper stresses the differential deposit base as well as the access to public funding sources such as through the Federal Home Loan Bank (FHLB) System and the Federal Reserve System. The importance of segmentation in funding different currencies for banks domiciled in different countries, arising from public funding sources, is also validated by Bottazzi et al. (2012), who focus on the role of currencies as collateral in funding contracts (such as in repos, in private markets, or with central banks).

Our paper is also related to Bord and Santos (2014) which analyzes the effect of the ABCP freeze for US-based banks. Bord and Santos (2014) find that US banks that increased their use of funding from the Federal Home Loan Bank System or the Fed's Discount Window following the ABCP freeze charge higher fees to grant new lines of credit to corporations. Their paper, however, does not exploit the differences between US-based and foreign banks, which is the focus of our paper. The economic magnitude of our findings on the impact of ABCP exposure of a bank on the cost of its credit lines appears an order smaller than in these other papers. This is likely because we are looking at the differential response between US-based and foreign banks, as well as between their US-based and foreign borrowers, which controls more conservatively for differences in the macroeconomic environment and the degree of pure (dollar) funding shock.

Our paper also contributes to the broader literature that looks at how bank deposit financing can insulate access to finance even in the face of shocks to their lenders (Ivashina and Scharfstein (2010); Cornett et al. (2011); and Gozzi and Goetz (2010)). However, these papers do not study the effect of the funding source (private versus government) and of the differential access to these sources on foreign bank lending.

Finally, our paper is also related to the recent literature on the transmission of funding shocks across borders through operations of global banks. Cetorelli and Goldberg (2011) examine the global transmission of shocks emanating from the financial crisis of 2007-08 and find that regions with higher aggregate exposure to dollar funding shocks lent less following the shock to emerging markets countries. Giannetti and Laeven (2012) show that there is a rebalancing of banks' loan portfolios back to home markets (that is, in countries where banks are domiciled) in the 2008 financial crisis. Paravisini et al. (2011) investigates the liquidity shock of the Russian default, and finds that global banks transmitted the shock to borrowers in Peru. Goulding and Nolle (2012) study the role of foreign banks in the US banking sector over the last two decades.

Our analysis is complementary to both of these sets of papers in that we focus on the effect of *lending in the crisis-affected country* from *foreign banks* whose limited access to funding in the crisis country (relative to domestic banks) helps us isolate the supply effect of bank lending terms on credit lines to the real sector.

2. Foreign Banks

2.1. Institutional Background

In the aftermath of the collapse of the ABCP market in 2007, banks with exposure to conduits financed with ABCP needed short term liquidity to finance their assets (see Acharya, Schnabl and Suarez (2013) for detailed evidence). In a nutshell, global commercial banks funded long-term assets such as mortgage- and asset-backed securities (MBS and ABS), and credit card receivables, through overnight wholesale funding in the ABCP market. The "conduits" through which the ABCP was issued had little equity capital of their own, other than the guarantees provided by sponsoring banks (which found it attractive to do so due to the favorable treatment of such guarantees in the regulatory capital requirements). When the underlying assets, especially MBS and ABS, experienced a drying up of liquidity following the housing-market collapse in various parts of the world, the ABCP investors "ran" on the conduits, that is, they reduced overnight rollovers and charged higher spreads for doing so. Specifically, the run began on August 9, 2007, following the announcement by BNP Paribas' hedge funds on August 8, 2007, that their sub-prime MBS investments could no longer be marked to market due to the evaporation of liquidity in the market for these securities.

Sponsoring banks with guarantees had to either take over the conduit assets "on balance-sheet," resulting in greater capital requirements, or to generate overnight funding against the ABCP assets through alternative sources. Acharya, Schnabl and Suarez (2013) document that this ABCP run was very large, with the market collapsing from its peak of over $1,200 billion in beginning of August 2007 to just over $600 billion by the end of 2008. Throughout the paper, we label this the "freeze" in ABCP or the ABCP "shock". We are particularly interested in understanding

differences in access to liquidity between exposed US and foreign banks exposed to this shock, and thus we first outline sources of short-term liquidity available to US and foreign banks.

Foreign banks can access USD liquidity in the short run in many ways. In terms of private sources of immediate funding, they may have US cash on hand in the form of reserves or interest bearing balances with other banks. They can borrow from other banks on an unsecured basis in the fed funds or Eurodollar market or on a secured basis in the repo market. They can also borrow from US depositors and money market funds or issue dollar denominated commercial paper. In addition, foreign banks can borrow from home country depositors or issue local currency commercial paper and swap foreign currency liquidity into USD in foreign exchange markets. Finally, they can sell liquid assets.

US branches and agencies of foreign banks that hold reserves can also access liquidity from US government sources, including the Discount Window. An alternative source of government funding is advances from FHLBs, but these funds are available only to foreign banks with US commercial bank subsidiaries. Subsequent to the time period we study in this paper, many additional government programs were designed to alleviate liquidity shortages (e.g., the Term Auction Facility (TAF) auction and the Term Asset-Backed Securities Loan Facility (TALF)) and US dollar shortages (e.g., swap lines with many foreign central banks[9]). To better isolate the liquidity shock, we restrict the analysis in our paper to the period before December 12, 2007, when the first of these programs was instituted.

Access to liquidity is a function of foreign banks' legal structure in the US. Foreign firms can engage in US banking through six principal types of organizations: representative offices, branches, agencies, banks, Edge Act and Agreement international banking corporations, and

[9] See http://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm for information on the dollar liquidity swap lines.

international banking facilities (IBFs). Reporting requirements vary depending on organizational structure. *Representative offices* are subject to minimal regulation and file no reports with the Federal Financial Institutions Examination Council (FFIEC), Office of the Comptroller of the Currency (OCC), or Federal Reserve. These offices engage in representational and administrative functions but do not conduct bank activities. *Branches and agencies of foreign banks* (*FBOs*) file FFIEC 002 (Report of Assets and Liabilities of US Branches and Agencies of Foreign Banks). The activities of a branch of an FBO are similar to those conducted by a branch of a US bank, including wholesale and foreign deposit acceptance as well as other credit fiduciary activities. However, the FDIC does not insure the deposits of foreign bank branches, and branches of FBOs are not required to join the Federal Reserve System. Foreign banks can establish *subsidiary US banks or bank holding companies*, which file the Call Report (FFIEC 031) or Y-9C.[10] These subsidiary banks have the same legal and regulatory restrictions and reporting requirements as domestic banks. Foreign banks can also create separate *Edge Act subsidiaries* to engage in international banking activities. No regulatory data on these exist in either the Call Report, Y9-C or 002 filings except for a breakdown of interest income accruing from Edge and Agreement subsidiaries. Finally, foreign banks may create an *international banking facility (IBF)* as an extension of the previous five structures. These facilities are used to book deposits unrestricted by US reserve requirements or other deposit insurance premiums. The activities of the IBF are consolidated in the 002 filing for branches and agencies of foreign banks. In addition, FBOs can own other structures including savings associations, industrial LLCs, and other securities LLC companies for which no Federal

[10] After the enactment of the Foreign Bank Supervision Enhancement Act of 1991, foreign banks accepting insured deposits must establish a US subsidiary bank. The difference between branches and agencies is that the agency primarily makes commercial and corporate loans, but does not have deposit-taking authority.

Reserve regulatory filings are available. Finally, no regulatory information is available for foreign banks' holding of dollar-denominated assets or dollar funding at non-US subsidiaries.

We review the availability of these data for foreign banks, and aggregate the various filings into a picture of foreign banks' change in USD funding at this time. Unfortunately, comprehensive data are not available for all possible liquidity sources on a daily bank-by-bank basis, and we are forced to examine funding mostly by looking at changes in quarterly figures. In order to get some estimates at a higher frequency, we also take advantage of information from the Federal Reserve's weekly survey of banks (approximately 815 domestic and 60 foreign-related institutions in 2007). Data items are a subset of call report items that are aggregated and released publicly. However, participation in this panel is voluntary and not all banks file in all weeks.

3. Bank Funding of ABCP-Exposed Banks in 2007

3.1. Data

We use Moody's data to identify 53 banks that sponsored conduits funded by US dollar-denominated ABCP and thus were exposed to a liquidity shock in August 2007 (see Acharya, Schnabl and Suarez (2013) for a detailed discussion of these data). On average, exposed banks sponsored $13.2 billion of assets with US dollar-denominated ABCP. Average exposure is very high relative to Tier 1 equity – a mean of 53x. We build a comparison set of similar banks without ABCP exposure by gathering information on US BHCs and foreign banks that file US regulatory reports. We limit the total sample of US banks to the 427 BHCs with more than $500 million in assets, since banks with ABCP tend to be larger,[11] and we include all 87 foreign banks with any US regulatory filings, since they are likely to be similar to foreign banks with a US presence. The

[11] The smallest US ABCP-exposed domestic bank holding company (BHC) has $100.7 billion in assets while the mean of all non ABCP-exposed domestic BHCs is only $9.9 billion.

resulting dataset includes 567 banks, of which 22% are foreign. Of banks with ABCP exposure, 75% are foreign. We use Bankscope to gather information on foreign banks' total assets and Tier 1 equity. ABCP-exposed foreign banks are much larger than non-ABCP-exposed foreign banks, with mean total assets of $784 billion and $176 billion, respectively. Summary statistics for these banks are presented in Table 1.

For information on foreign banks' funding, we aggregate several different US regulatory reports (Call Report (FFIEC 031), FFIEC 002, FR Y-9C) filed by foreign banks' offices (FBOs) and other subsidiaries supervised by the Federal Reserve.[12] Of the foreign exposed banks, approximately 63% file a US regulatory report of some kind. The remaining seventeen exposed banks file no US regulatory reports. We assume that these banks have no US deposits.[13] Since most regulatory report data are available on a quarterly basis, we compare funding as of the quarter immediately before (June 30, 2007) and after (September 30, 2007) the ABCP market shock on August 9, 2007. In addition, we examine the subset that file the H.8 form and look at changes from the week before (August 1, 2007) to the week after the shock (August 15, 2007).

In Figure 3, we outline the availability of US regulatory filings for foreign banks in the sample.

[12] FBOs report some consolidated regulatory capital information quarterly on the FR Y-7Q; however, balance sheet line items are not available in this reporting form. We effectively assume that all funding and loans reported in US regulatory filings are dollar denominated. However, domestic BHCs may have foreign deposits and loans included in these numbers. Similarly, foreign banks may hold dollar denominated assets or liabilities at non US entities which will not be included in their US regulatory filings.

[13] The banks in the sample that file no regulatory reports are as follow: KBC Groep NV, Credit Agricole SA, Dresdner Bank AG, Landesbank Hessen-Thueringen Girozentrale, Bayerische Hypo- und Vereinsbank AG, WestLB AG, Bayerische Landesbank, Natixis, Danske Bank A/S, Norddeutsche Landesbank Girozentrale, Eurohypo AG, ING Groep NV, Hypo Real Estate Holding AG, Sachsen Bank KG, Nomura Holdings Inc, LBB Holding AG, and Nationwide Building Society.

Figure 3: Availability of US Regulatory Reports for Foreign Banks

	ABCP Exposure	
US Regulatory filings	No ABCP	ABCP
Y9-C Filer		
Y9-C and 002 Filers	13	11
No Y9-C Filer		
CALL Filer(s) Only	6	0
CALL and 002 Filers	5	2
002 Filers Only	60	14
No Regulatory Report Filers		
No Y9-C, CALL or 002	3	13
TOTAL	87	40
H8 (FR 2644)	35	20
In reporting panel	265	31

3.2. Private Funding

We begin by looking at the change in funding between the second and third quarter of 2007 for following liability items: Total US Deposits, Repo Net, Fed Funds Net, Fed Funds Sold, and Other Borrowed Money. We also measure changes in Cash and Balances and AFS Securities, asset categories that may serve as sources of short-term liquidity. Exact variable definitions are in Appendix A.

On average, banks in the sample increase short-term liquidity in the third quarter of 2007, both by increasing short-term liabilities and by decreasing short-term assets. The ABCP-exposed sections of Table 2 present summary statistics separately for the ABCP-exposed banks. As shown in Table 2, Panel A, banks increase deposits and dramatically increase borrowing from government sources. There are large differences between banks with and without exposure – on average, banks increase deposits by $435 million, but ABCP-exposed banks increase deposits by more than $2.5 billion.

Within the sum of US deposits, we also examine changes in the following subcategories of deposits: Demand Deposits, Core Deposits, Time Deposits (<$100K), Time Deposits (>$100K), and Other Deposits. On average, as banks search for liquidity at the end of 2007, they grow time deposits (size above 100,000 USD) and other deposits, but not demand deposits nor core deposits. Net repo and fed funds are falling as well, and banks, particularly exposed banks, are reducing their cash balances.

We aggregate funding variables into the total *Private Funding* – the sum of the change in Fed Funds Net, Total US Deposits, Repo Net, Cash and Balances, AFS Securities, and Other Borrowed Money. ABCP-exposed banks increase funding by more than six times as much as non-exposed banks at this time.

Differences between exposed and non-exposed banks are not the only differences we see at this time. In Panel A of Table 2, we separate the sample between domestic and foreign banks and find dramatic differences between foreign and US banks' access to liquidity. For example, while on average banks exposed to ABCP grow deposits more than do non-ABCP-exposed banks, the difference is driven by the US banks. In fact, US banks with ABCP exposure grow deposits by over three times more than foreign banks with ABCP exposure, despite having experienced similarly sized liquidity shocks. This suggests that foreign exposed banks were not able to switch to more stable sources of funding as US banks did. Within types of deposits, exposed US banks grow their time deposits and other deposits, while foreign banks grow flightier large time deposits and other deposits only. US exposed banks also raise other debt financing, increasing other borrowed money, selling available-for-sale securities, and shrinking cash balances, while foreign exposed banks pay back other borrowed money and grow cash balances. Foreign banks with exposure to ABCP are growing funding by more than are their non-exposed peers, although

perhaps not by as much as we would have expected. Foreign banks with ABCP grow deposits by nearly two times as much as their non-exposed peers. They also increase repo and cash, but shrink other borrowed money.

Of course, this analysis is univariate in nature. In Table 3, we present the results of a number of specifications in which the change in funding (the difference between balances as of 2007Q3 and 2007Q2) normalized by lagged total assets (2006Q4) is the dependent variable. As explanatory variables, we include an indicator variable for whether the bank is foreign and for USD ABCP exposure, again normalized by 2006Q4 total assets. We normalize by assets to control for size differences, and because we cannot normalize by the amount of the US ABCP shock experienced by the bank nor by total US assets, since we would be dividing by 0 for some banks.

In the fall of 2007, we do not see ABCP-exposed foreign banks disproportionally increasing US deposits. In fact, while ABCP-exposed banks increase deposits on average, although not statistically significantly, the sign on the interaction of ABCP exposure and foreign bank is negative and statistically significant for both total deposits and non-core deposits. This effect suggests a funding risk in that the depositors of ABCP-exposed foreign banks likely withdrew their deposits, moving them to unexposed foreign banks, domestic banks, or to money market funds. Looking across the other seven regression specifications, each with a dependent variable measuring a source of short term funding, we do not find any other statistically significant relationship for this interaction. In short, foreign banks exposed to the ABCP funding shock cannot grow total US deposit funding and non-core deposits by as much as do similarly exposed US banks.

3.3. Weekly Funding

Since funding conditions may be affected in the shorter term, but may be resolved by quarter end, we confirm our results with intra-quarter changes in balances (between August 1 and August 15,

2007). We present summary statistics for the subset of 276 banks (28 ABCP-exposed banks) in our sample that file weekly reports in Panel B of Table 2. These filings have additional detail that allows us to look at transfers between foreign bank subsidiaries, which would approximate liquidity raised outside of the US and swapped into dollars.[14] We examine both the change in Net Due From (To) Related Institutions and the change in Borrowing from US Commercial Banks at this interval. The former is a measure of intrabank liquidity flowing to US-regulated entities from their non-US corporate parents and affiliates, while the latter measures interbank lending within the US.

While exposed foreign banks are raising money from their affiliates, they are losing liquidity from US banks over the quarter – foreign exposed banks return almost $660 million borrowed from US commercial banks in the two weeks around the shock (almost $220 million from quarter to quarter), while their exposed US peers borrow an additional $1.25 billion.

3.4. Government Funding

We next compare funding from government sources, specifically the Discount Window and advances from FHLBs. We calculate the change in funding from the Discount Window primary credit program by summing the borrowing amount of primary credit at the Discount Window for the months September, October, November, and December, and subtracting the amount for the months April, May, June, and July. These data come from the proprietary Federal Reserve database and exclude borrowing done through secondary credit and seasonal credit lending programs. While not all banks access the Discount Window, we have complete information for all banks that borrow. Although the aggregate borrowing level was low, US borrowers increase Discount Window borrowing by three times as much as their exposed foreign peers.

[14] While this information includes transfers among foreign commercial banks and their US offices, it represents a lower bound on access to dollars, since it measures only funds sent to US-regulated subsidiaries.

We also measure the quarterly change in Federal Home Loan Bank advances over all maturities reported on the Call Report. As shown in Panel A of Table 4, in aggregate, US ABCP-exposed banks borrow more than 10 times as much from the FHLB as do their exposed foreign peers. In fact, only 27 of the 128 foreign banks in the sample even had access to FHLB advances Adding up both sources of government funding, we obtain *Total pre-TAF Gov. Funding*, and again find that the US exposed banks expand funding much more than do foreign exposed banks (more than 40 times). Examining borrowing from the discount window and the FHLBs, and adding linear controls for bank size, we see corroborative results in Panel B of Table 4 – funding is significantly associated with US regulated assets, but not with total assets, and foreign banks access less liquidity than do their US peers.

The third item in Panel A of Table 4 sums up the total amount of funding that banks add in the third quarter of 2007, before the TAF is instituted. It is the sum of private and government funding in our previous analysis, *Total pre-TAF Funding*. By this measure, we see the funding gap clearly illuminated. In aggregate, US ABCP-exposed banks increase their funding from private and government sources by dramatically more than do their foreign exposed peers. However, foreign banks with ABCP exposure grow their funding dramatically less than US banks with ABCP exposure do (approximately $1/8^{th}$ as much). In fact, they only grow their funding by as much as do non-ABCP-exposed foreign banks, on average (approximately 1.5 times as much).

3.5. Residual Funding Demand

As a measure of the unmet demand for USD liquidity, we next examine borrowing from the Term Auction Facility (TAF), which was instituted in December 2007, and calculate the sum of the amount borrowed in the TAF auctions held on December 17^{th} and 20^{th} of 2007.[15] On average,

[15] On December 17, 2007, the Federal Reserve conducted a 28-day TAF auction of $20 billion at a stop-out rate of 4.65 percent. The awarded loans settled on December 20, 2007, and matured on January 17, 2008. On December 20,

foreign ABCP-exposed banks borrow more from the TAF than do any other category of bank, although not all exposed foreign banks bid at the TAF auctions. In Panel B of Table 4, we run simple OLS regressions to understand if our results are driven by bank scale. We control for the size of banks' total assets, as well as banks' US assets held through Federal Reserve regulated subsidiaries, because US assets may determine access to deposits. Exposed foreign banks appear to demand more from the TAF, although the estimated coefficient economically large, but not statistically significant. Adding together the TAF and FHLB funding, we see a dramatic difference in access to US government funding – foreign banks access much less government funding than do US banks, and foreign exposed banks access no more government funding than do their unexposed peers.

Our analysis has some limitations. We have no comprehensive information on USD or dollar-denominated assets of non-US entities, and we lack information on USD commercial paper issuance of foreign banks.[16] This lack of information itself is symptomatic of a mismatch between bank exposure to US assets and incomplete information on banks that are headquartered outside of the US. It is worth noting that while exposed US banks accessed dramatically more funding, in terms of amounts relative to Tier 1 Capital, foreign banks actually had 2.5% more US ABCP exposure than did US banks, on average.

4. Impact of Funding on Real Economy

4.1. Syndicated Loans

2007, the Federal Reserve held another TAF auction of $20 billion in 35-day credit at 4.67 percent stop-out rate. Loans settled on December 27, 2007, and matured on January 31, 2008. TAF transaction data is publicly available through http://www.federalreserve.gov/newsevents/reform_taf.htm

[16] Comprehensive data on CP issuance have been made available only since August 2008. While some of this information is on Bloomberg, the fields are not well populated. We do not believe that there was a significant increase in USD denominated CP issuance by foreign banks, but it is more difficult to prove the absence of such issuance.

Having documented differential access of domestic and foreign banks to USD funding sources, we turn to the syndicated loan market to understand if the ABCP funding shock had real effects on corporate credit; and if this effect differs between US and foreign banks, and for USD versus foreign currency denominated loans. In perfect markets with no frictions in access to US dollars, we would not find differences between lending in dollars and in other currencies within banks. However, if funding frictions exist (consistent with observed CIP violations), we hypothesize that lending in USD by ABCP-exposed foreign banks would be negatively affected.

We use the Loan Pricing Company's (LPC) DealScan database to analyze the terms of syndicated loans arranged in 2007. LPC data have been extensively described in previous literature (see, for example, Ivashina (2009)). We link (by hand) banks from our sample to LPC using bank names and RSSD information from the National Information Center hierarchy to assign a match when the LPC lender name matches to any of the bank's subsidiaries. These banks comprise 20% of unique LPC lender names, and matched banks participate in 92% of the loans made in 2007.[17] We are able to find matches for 312 of the 567 sample banks (117 of the matched banks are foreign). We limit the analysis to observations with borrower sales data from LPC to better control for borrower quality. Of the 312 banks, only 159 underwrote syndicated loan facilities with available data in our sample period of January 1, 2007 to December 12, 2007 (154 underwrote USD-denominated loans, 69 underwrote euro-denominated loans, 64 underwrote both USD- and euro- denominated loans, and 149 underwrote revolving credit lines). The remaining banks did not underwrite syndicated loans reported to LPC in this period. In addition to information on the

[17] LPC lender names and IDs are not unique by bank. Large banks such as JP Morgan may have as many as 22 lender IDs in LPC. In 2007, there were 9,489 syndicated loans made excluding Bond and Note loan types. The banks in our sample were lenders in the syndicate for 92% of the loans (98% of the total facility amount outstanding) and lead arrangers in 89% of the loans (95% of the total facility amount outstanding).

lending syndicate, we use this database for information on each loan facility, including all-in-drawn spread, maturity, amount, purpose, and the sales and industry of the borrower.

It is notable that just as we see a mismatch between foreign banks' US ABCP exposure and their US-regulated assets, we see a mismatch between foreign banks that underwrite USD denominated syndicated loans and their US regulated assets. Table 5 presents summary statistics on the underwriting of USD syndicated loans by foreign and US banks. Adding up all loans likely to be outstanding as of August 9, 2007, defined as facilities with a start date before and maturity after August 9, 2007 (162,555 facilities), and assuming that each member of the underwriting syndicate underwrites an equal amount of each facility, the numbers are striking – exposed US and foreign banks underwrite roughly the same amount of syndicated loans. These underwriting commitments are approximately 40% of US banks' total assets, but about 375% of foreign banks' US regulated assets.

Of course, many of these loans are underwritten but sold off. To be more conservative, we assume that banks keep only their portion of the revolver, and retain no exposure to the term loans. Even under this assumption, we find that foreign exposed banks' revolving credit line commitments are 1.8 times larger than their total regulated US assets. To be even more conservative, if we assume that banks keep only 25% of their underwritten share of the revolver and 5% of the term loans, ABCP-exposed foreign banks still have an exposure to USD-denominated loans that is greater than 50% of their regulated US assets (the comparable number for US banks is 8%). In part, this reflects the fact that large syndicated loan underwriters such as Deutsche Bank and Credit Suisse have relatively small amounts of regulated assets in the US relative to the scale of their operations in the US. While this small asset base relative to total assets would not be relevant if US dollars could be raised at will and in a frictionless manner, aggregate

dollar shortages as well as frictions in raising market funding (due to moral hazard and adverse selection concerns) render such a small asset base as a significant exposure to future dollar funding risk.

Do USD funding frictions affect foreign banks' US lending? We use information on 11,210 syndicated loan facilities in the pre-ABCP crisis period and 4,444 in the post period (August 9, 2007 to December 12, 2007), a total of 15,654 lender-facility observations. In the pre-period, 10,593 are denominated in US dollars, and 617 are denominated in euros or pounds; of the facilities in the post-period, 4,168 are denominated in USD, and 276 are denominated in euros or pounds.[18] We also use information about loans ratings from the DealScan database, using the Moody's rating if available. If the Moody's loan rating is not available, we use the first available of the following ratings: S&P Loan Rating equivalent, Moody's Senior Debt, S&P Senior Debt, Fitch Senior Debt, Fitch Long-term Borrower Rating, and S&P Long-Term Borrower Rating.

We begin by comparing loans arranged before and after August 9th, 2007 in USD and in euro or pounds (GBP). We tabulate the average terms of loans made before and after the shock in Panel A of Table 6. On average, after the ABCP shock, spreads fall by almost twice as much in the Euro/GBP market as they do in US dollar denominated loans. However, these results do not control for systematic differences in the types of banks, borrowers, and loans granted.

In Panel B of Table 6, we split the sample between US and foreign banks. In the beginning of 2007, on average, foreign and US banks seem to be making similar USD-denominated loans, with mean loan spreads around 160 basis points. In Europe, relative to USD loans, both exposed US and foreign banks seem to be making riskier loans, with mean spreads around 200 basis points. US banks seem to be participating in riskier loan facilities in the European market. After the ABCP

[18] See Carey and Nini (2007) for a discussion of the US versus European syndicated loan data.

market shock, US and foreign banks still seem to be making riskier (higher spread) loans in the European market, US banks appear to participate in significantly larger loan facilities in Europe, and on average euro/pound-denominated loans seem to be of similar or slightly longer maturity than USD loans. These univariate differences point out the importance of controlling for bank and currency fixed effects.

4.2. Empirical Methodology

In order to control for important differences in the type of loans that banks make, and for differences in loan markets, we employ a differences-in-differences strategy, where we estimate the terms of loan facilities extended before and after the ABCP shock, in USD and other currencies, by foreign and domestic banks, and by ABCP- and non-ABCP-exposed banks. We begin by looking at the effect of the share of loans that is financed by ABCP-exposed or foreign banks, and then expand the dataset to one observation per loan facility-bank.

We can thus estimate how loan terms changed in the following segments: i) after the ABCP shock, ii) in USD loans vs. non- USD loans, iii) for foreign banks after the ABCP shock, and iv) for foreign banks with ABCP exposure after the ABCP shock, while controlling for bank fixed effects, borrower characteristics and loan characteristics. Specifically, we estimate the following equation:

$$LPC\ Term_{b,l,f} = \alpha + \gamma_0 * USD + \Lambda\Psi * Post + \Gamma\Psi * Post * USD + \tau X_b + \varphi Y_l + \omega Z_f$$

where b indexes banks, l indexes loan facilities and f indexes borrower firms; the dependent variable $LPC\ Term_{b,l,f}$ is a term from the loan package, either spread, amount, or maturity; $\Lambda = [\lambda_i]$ and $\Gamma = [\gamma_i]$, for $i=1,...,4$, are row vectors of coefficients; and Ψ is a column vector of variables of interest defined as:

$$\Psi = [1, ABCP\_DUM, For\_DUM, ABCP\_DUM * For\_DUM]^{\mathrm{T}}.$$

Our variables of interest are the following: *USD*, a dummy variable equal to 1 if the currency of the loan is USD; *Post*, a dummy variable equal to 1 on or after August 9, 2007; *For_DUM*, a dummy variable equal to 1 if the bank's ultimate parent is headquartered outside of the US, and *ABCP_DUM*, an indicator variable equal to 1 if a bank has USD ABCP exposure. In the analysis at the loan facility level, we calculate the *S_ABCP*, the percentage of banks in the syndicate with USD ABCP exposure; and *S_Foreign*, the percentage of syndicate banks with an ultimate parent headquartered outside of the US. Lacking detailed information on the share taken by each bank, we do not weight these percentages by loan share. Results are similar, but with reduced statistical significance if we include only lead banks.

We include fixed effect controls for each bank, X_b. In addition, we add Y_l a vector of controls for loan characteristics associated with terms of syndicated loans, including loan security, and fixed effects controls for the loan purpose. We also include Z_f controls for borrower characteristics including sales divided by package amount and fixed effects for the borrower industry, as well as the loan's credit rating when available. In our sample, approximately 29% of loans are rated. In some of the spread specifications, we include controls for other co-determined loan characteristics such as maturity and amount. Results are similar if those controls are omitted. Standard errors are clustered at the loan package level. Detailed variable definitions are available in Appendix A.

In summary, we estimate differences in loan terms after controlling for observable loan characteristics, borrower characteristics, and for any fixed differences among currencies and banks. Results emerge from differences in the differences in bank terms between currencies before and after the ABCP shock. Of course, there are limitations to any analysis of syndicated loan data. First, loans are priced in a syndicate, and therefore terms are determined by the syndicate. This

would bias us against finding any results, since a withdrawal of credit by foreign banks might be mitigated by additional credit provision by other syndicate members. Second, syndicated loans are underwritten by the syndicate banks, but they may originate the loan to sell off some of or the entire loan package. Third, we can only analyze the prices of the loans that are actually made after the liquidity shock (the intensive margin). In Section 4.4, we attempt to understand the extent to which the extensive margin changes, although we are limited by the lack of data on loan demand.

4.3. Loan Pricing after the ABCP Funding Shock

We hypothesize that banks exposed to the ABCP shock suffered more of a liquidity shock than banks without ABCP exposure. This liquidity shock is denominated in USD, and since we find evidence that US banks have differential access to USD liquidity in Section 3 (by raising deposits and accessing FHLB financing), we expect there to be differential impacts in the US lending market relative to other currencies, assuming that there are frictions in liquidity across currencies for foreign banks. Thus in order to estimate the impact of a negative liquidity shock to lending, we look to see if foreign exposed banks offer different terms than do US exposed banks, or than foreign or domestic non-exposed banks.

We begin in Table 7 by looking at the pricing of loans before and after the ABCP shock, and at the characteristics of the bank syndicate in each loan facility. In each specification in the table, we include controls for observable characteristics of the borrower and loan that are associated with loan pricing. For each loan term (spread, amount and maturity), we estimate two specifications. First, we estimate the effect on USD and non-USD loans of the percentage of the loan syndicate that is exposed to the ABCP shock, but without distinguishing between US and foreign banks (columns (1), (3) and (5)). Then we allow the estimated coefficient to differ for the share of the syndicate that is foreign and exposed to the ABCP shock. The size of the coefficient

on the interaction of *Post, USD, S_ABCP*, and *S_Foreign* and captures the marginal effect of the share of exposed foreign banks in the syndicate in the post-shock period on the terms of loans denominated in USD, relative to non-USD loans.

Before looking at the nationality of the lenders, we do not find differential effects in the share of ABCP-exposed banks on loan terms – if anything, it appears that non-USD loans are disproportionately affected (column (1)). However, once we allow coefficients to vary with the share of foreign exposed banks, we see that it is the share of foreign exposed banks that is associated with higher prices for USD loans. For a 10-percentage point increase in the syndicate share of foreign exposed banks, spreads increase by 132 basis points, amounts decrease by $2 million, and maturities increase by 24 months, all else equal. All estimated coefficients are statistically significant, although amounts are significant only at the 10% level. Estimated coefficients are larger when calculated using all banks in the syndicate, rather than just leads.

There may be unobservable differences in the types of borrowers that have foreign banks in their lending syndicate. Since many of the banks in our sample lend in both USD and non-USD, we can use bank fixed effects to control for unobservable differences in the types of borrowers that match with the foreign exposed lenders. In addition, while a given bank may change lending in response to solvency concerns after the ABCP shock, there is no a priori reason to think that the solvency effect on lending in USD should be different from the change in lending terms in other currencies. In this way, we can estimate cleanly the effects of USD liquidity shortages, while controlling for variation among banks' liquidity and solvency at this time through bank fixed effects. An advantage of this analysis, relative to studying a later time period, is that we believe the shock to US and non-US banks' solvency to be quite similar (driven by ABCP exposure) and that demand should be relatively unaffected. In order to add controls for bank fixed effects, we

expand the sample out to one observation per bank-facility and cluster standard errors at the loan package level to account for the correlation among loans to the same borrower. To the extent that loan terms are jointly determined across banks in the syndicate, this empirical approach will bias us against finding any relationship between loan terms and bank characteristics.

In Table 8, we begin by repeating the first two specifications of Table 7, where the lender variables are now binary variables (instead of percentages) indicating if the bank is foreign or exposed to US ABCP. We start with specifications that include loan level, rating, amount, and maturity controls, but not lender fixed effects. Prices on USD loans increase in the post shock period, as do prices for loans made by exposed banks. In the fourth specification, when we look only at the variation within banks, the statistical significance of the results actually strengthens. As in Table 7, significant differences emerge when we allow the effect of ABCP exposure to vary by loan currency. Foreign banks with exposure to ABCP raise interest rates on US dollar loans after the ABCP funding shock, particularly when compared to US exposed banks or to non-exposed foreign banks. The effect is statistically and economically significant, with a marginal difference in interest rate for foreign exposed banks lending in US dollars of 85 basis points, even after controlling for loan maturity, size, level, and loan rating (specification 4). Adding up the coefficients, exposed foreign banks are raising prices after the ABCP shock. The sum of the marginal effects is an additional 5 basis points on USD loans – at a time when they are dropping interest rates on their non-USD loans.

Since relationship banks may play a more important role in the syndicate, we identify banks that participated in a borrower's previous syndicated loan (*Relationship*) and repeat the analysis in specification (4) but splitting the sample between borrowers for which the lender has previously participated in the lending syndicate in the last five years (column (5)) and those with no previous

relationship (column (6)). We find similarly large effects for this subset of borrowers, but not differentially so from the standpoint of statistical significance.

We would also expect to see stronger effects for bank-dependent borrowers. We split the sample between banks with and without public equity (specifications (7) and (8)). We find the largest marginal effect for exposed foreign banks on borrowers that do not have public equity. We investigated this further to see if borrower characteristics mattered, but did not find many results of statistical significance, perhaps because we observe detailed borrower characteristics only for the sample of banks with public equity.

A liquidity shock might be expected to have the strongest effects on the terms of the liquidity that banks provide to their customers through revolving lines of credit. Looking at only US banks lending to US borrowers in the same period, Bord and Santos (2014) find that banks that accessed the liquidity facilities of the Federal Reserve raised prices on the undrawn fees for revolving credit lines to their customers. Surprisingly, in our analysis, the effect is relatively limited when we restrict the sample to revolvers (not shown). However, we are estimating our results on all-in-drawn spread, rather than on undrawn spread, because we have very few observations with information on undrawn spreads for non-USD revolvers.

Since loan facilities are typically part of a larger loan package, we want to make sure that the pricing differences we find are present in aggregate loan packages. Therefore, we aggregate facilities of a single borrower into a loan package and calculate a weighted average spread on all facilities. The results are of similar magnitude and economic significance.

We also look to see if borrowers with previous relationships with foreign banks are disproportionately affected. Ideally, we would have banks exogenously assigned to borrowers. In practice, since borrowers are likely to refinance with their existing bank syndicate, we examine

the subset of borrowers with previous syndicated loans that selected foreign banks prior to the ABCP funding shock. These pairings are thus unlikely to be correlated with the shock.[19] We are limited in the power of this analysis by the fact that the penetration of non-exposed US banks in non-USD loans and non-exposed foreign banks in USD loans is relatively lower in the sample of pre-2007 loans. Were-run the analysis on the subset of borrowers with pre-2007 loans that have been refinanced in the post-time period. The terms of the loans for this subset that we analyze are those of the post-2007 loans, but the bank syndicate is set to be the original syndicate, regardless of whether banks in the original syndicate participate in the refinancing. This therefore is an analysis that looks at the impact of having a previous relationship with foreign exposed banks on loans that are refinanced. We find that having foreign exposed banks in the original syndicate is associated with lower loan amounts (negative coefficient, significant at the 5% level, on *Post * USD * ABCP_DUM * For_DUM* in Table C3), but has no statistically significant effect on pricing. This is consistent with some borrowers choosing to borrow less (in USD) and dropping foreign exposed banks from their syndicate. However, we must be cautious in interpreting the results because of the low power of our analysis since we have fewer within-bank observations across different currencies when beginning with pre-2007 data. The full analysis can be found in Appendix C, Table C3.

Finally, since differential access to USD funding may also impact other loan terms, we analyze the effect of the ABCP funding shock on facility amount, maturity and rating. Table D1 in Appendix D presents these results. Overall, after the ABCP shock, foreign exposed banks seem to be reducing slightly the amount of their loans, and making riskier USD loans relative to their loans in other currencies (not statistically significant coefficient on *Post * USD * ABCP_DUM **

[19] We are grateful to Philip Strahan for this suggestion.

For_DUM, specifications (2) and (6)). These banks seem to be extending the maturities on their loans denominated in USD (positive coefficient on *Post * USD * ABCP_DUM * For_DUM*). However, when adding up all the marginal effects, both exposed US and foreign banks are shortening maturities on their US loans and extending maturities on their euro loans relative to the pre-shock period.

4.4. Extensive Margin

It is plausible that the real effect of a liquidity shock is in the loans that do not get made at all. While we cannot identify all borrowers that would have liked to borrow in the syndicated loan market (the full extensive margin), we can examine borrowers that previously accessed this market to see if they are able to refinance their existing loans. For this purpose, we use the set of syndicated loans outstanding at the time of the ABCP shock, and test if US dollar borrowers with foreign exposed banks in their syndicate are less likely to refinance their loans.

In Table 9, we present a Cox proportional hazard analysis of refinancing. We regress a dummy variable indicating if the borrower received a new syndicated loan package between August 9 and December 11, 2007, on our set of lender characteristics, controlling for features of the loan being refinanced that we expect to be associated with the probability of refinancing. As before, our main variables of interest are *ABCP_DUM, For_DUM,* and the interaction of the two variables. Since we only look at loan refinancing after August 9, we no longer need a dummy variable for the post-ABCP shock period.

While the previous analysis considered only loans issued in 2007, for this analysis, we want to begin with a sample of loans that were outstanding at the time of the ABCP shock. For this reason, we look backward for a period of five years and begin with the 10,109 loan packages

outstanding as of August 9, 2007 that were underwritten by sample banks (59,512 loan package-lender observations). In addition to looking at the facilities, in this analysis we focus on the loan package as our unit of observation, because we are interested in understanding how the crisis affects borrowers' access to loans, not the refinancing of any particular facility.

In order to isolate the effect of the loan underwriter on refinancing, we include controls for characteristics of the initial loan that might affect the probability of refinancing: the maturity of the original loan as of August 9, 2007, the price of risk at the time of the original loan, loan rating, loan purpose, and the industry of the borrower. Detailed definitions of the control variables are provided in Appendix A. The controls generally have the expected sign, with loans of longer maturity being less likely to be refinanced.

We find that foreign exposed banks are less likely to refinance USD loans in the months following the ABCP shock. The effect is economically large, although the estimated coefficient (0.043) in specification (3) is not statistically significant. However, when we turn to risky loans (when the loan being refinanced was issued originally at a spread greater than 150 basis points), we see a negative, statistically significant coefficient (-2.167). Exposed foreign banks are less likely to refinance USD risky loans after the funding shock. This also highlights the importance of controlling for risk in the spread regressions of the previous sections, since it is likely that the risk of loans extended by foreign exposed banks in USD is falling at this time relative to their other currency loans.

Another type of extensive margin are borrowers that switch away from foreign exposed banks, but still are able to borrow. We examine this dimension in two ways: First, we look at the share of foreign exposed banks after the ABCP shock. On a univariate basis, the share of foreign exposed banks underwriting USD loans falls at this time (see Table 6, Panel A). However, after

including controls for observable loan and borrower characteristics, the difference in the underwriting share of foreign exposed banks in USD is not statistically significant (not shown).

5. Concluding Remarks

Our primary finding in this paper is that foreign banks borrowing in the ABCP market and operating in the United States, in particular, had to scramble for liquidity when the ABCP market froze. Their limited access to deposit and government funding sources suggests that they relied mainly on the relatively more fragile wholesale markets for funding. In turn, they passed on the cost of this fragility to their USD borrowers in the form of higher costs for the provision of syndicated loan packages.

It is interesting to consider a few issues concerning other sources of funding for the foreign banks. Clearly, as the US banks relied on their own deposit markets and government funding, foreign banks may have also had access to such funding in their home countries. However, what these banks were scrambling for were primarily US dollars. Eventually, US dollars were made available through swap lines set up by the Federal Reserve with other central banks. However, this did not happen until December 11th 2007 (see McGuire and von Peter (2009), for example), giving us at least one quarter of data (starting with the ABCP funding shock in August 2007) from which we can identify the lending channel operating through foreign bank dollar shortages. That the TAF auctions conducted by the Federal Reserve starting in December 2007 had significant take-up by foreign banks, and that the dollar swap lines provided to foreign central banks were heavily used appear to suggest that foreign banks' US dollar needs were not fully met at least until December 2007.

Another source of US dollar funding for foreign banks, considered in the work of Cetorelli and Goldberg (2012), is that of management of liquidity across an entire banking organization, with funds flowing across international affiliates and within geographically diverse banks. They find that, faced with a shock to the parent in the ABCP market, global banks activated internal capital markets shuffling funds in and out of specific locations based on the relative importance of such locations as local funding pools. While we do not analyze how such management of liquidity contributes to – or affects – our results, if such liquidity management were relatively costless, then it should have only made it harder for us to find a differential effect between foreign and domestic banks operating in the US.

Finally, two policy issues are relevant for discussion in the context of our results. First, we find evidence that suggests that dollar-funding shortages can affect not only the stability of foreign banks, but also induce spillover into the US real economy, especially to corporations borrowing from foreign banks. A robust conclusion is that ensuring prudential regulation of domestic banks in a country may not be sufficient for guarding against financial fragility if the economy is a large center of global banking activities.

Second, while we can draw conclusions about the changes in loan pricing after August 2007 we cannot say whether spreads on syndicated loans made by foreign banks were too low prior to August 2007, or whether the spreads rose excessively so post-August 2007 (or both). Our empirical analysis, which is based on a difference in differences approach, cannot rule in favor of one thesis or the other. Acharya and Richardson (2009) argue that bank risk-taking in the pre-crisis period was driven by regulatory arbitrage motive. Acharya, Schnabl and Suarez (2013) show convincingly that the reliance on ABCP by commercial banks was primarily the result of advantageous capital treatment accorded to issuance of such paper (and guarantees to it) by most

national regulators. Shin (2012) calls the resulting provision of intermediation a “global banking glut”, arguing that it led to the underpricing of dollar-denominated maturity mismatch, and in particular to compressed loan premiums. Our results are supportive of these conclusions, but also potentially consistent with an ex-post credit crunch (excessively high spreads relative to efficient ones) due to transmission by foreign banks of their adverse funding conditions to corporations. Investigating this issue further presents a significant but worthy challenge.

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Appendix A: Variable Definitions

Variable	Definition
Changes in Funding (2007Q2 and 2007Q3)	
US Deposits	Total noninterest-bearing (including total demand deposits and noninterest-bearing time and savings deposits) and interest-bearing deposits (FR Y-9C: bhdm6631, bhdm6636, bhfn6631, bhfn6636; FFIEC 031: rcon6631, rcon6636, rcfn6631, rcfn6636; FFIEC 002: rcfd2205)
Repo Net	The amount of securities sold under agreements to repurchase less securities bought under agreements to repurchase (FR Y-9C: bhckb995, -bhckb989; FFIC 031: rcfdb995, -rcfdb989; FFIEC 002: rcfdc422, rcfdc423, -rcfdc414, -rcfdc415)
Fed Funds Net	Net fed funds from regulatory filings (FR Y-9C: bhdmb993, -bhdmb987; FFIEC 031: rconb993, -rconb987; FFIEC 002: rcfdc420, rcfdc421, -rcfdc412, -rcfdf856, -rcfdc413)
Fed Funds Sold	Amount of fed funds purchased (FR Y-9C: bhdmb987, FFIEC 031: rconb987, FFIEC 002: rcfdc412, rcfdf856, rcfdc413)
Other Borrowed Money (less FHLB Advances)	Borrowed money from nonrelated commercial banks and others less FHLB advances (*Other Borrowed Money* defined as FFIEC031: rcfdf055, rcfdf056, rcfdf057, rcfdf058)
Cash and Balances	Cash and balances due from depository institutions (FR Y-9C: bhck0081, bhck0395, bhck0397; FFIEC 031/FFIEC 002: rcfd0010)
Available for Sale Securities	Securities that are available for sale (FR Y-9C: bhck1773; FFIEC 031/ FFIEC 002: rcfd1773)
Demand Deposits	Demand deposits (FR Y-9C: bhcb2210; FFIEC 031/FFIEC 002: rcon2210)
Core Deposits	The sum of deposits under $100,000 plus all transaction deposits
Time Deposits (<$100K)	Total time deposits of less than $100,000 (FR Y-9C: bhcb6648, bhod6648; FFIEC 031/ FFIEC 002: rcon6648)
Time Deposits (>$100K)	Total time deposits of more than $100,000 (FR Y-9C: bhcb2604, bhod2604; FFIEC 031/ FFIEC 002: rcon2604)
Other Deposits	NOW, ATS, and other transaction accounts; money market deposit accounts and other savings accounts not classified as demand deposits or time deposits
Total Private Funding	Sum of changes in *Fed Funds Net*, *Total US Deposits*, *Repo Net*, *Cash and Balances*, *Available for Sale Securities*, and *Other Borrowed Money (less FHLB Advances)*
Discount Window	The sum of primary credit borrowing at the Discount Window; excludes borrowing done through secondary credit and seasonal credit lending (Proprietary FR Database).
FHLB Advance	Federal Home Loan Advances over all maturities (FFIEC 031; rcon2651, rconb565, rcfdb566)
Total pre-TAF Gov. Funding	Sum of changes in *Discount Window* and *FHLB Advance*
TAF	Sum of loans awarded through TAF auctions. (data are publicly available through: http://www.federalreserve.gov/newsevents/reform_taf.htm)
Total pre-TAF Funding	Sum of *Total pre-TAF Gov. Funding* and *Total Private Funding*.
Changes in Funding (Jun 27, Aug 1, Aug 15, and Sep 26 of 2007)	
Net Due From (To) Related Institutions	The amount that is sent to (received from) related institutions that are not US banks (FR 2644: walb2154, -walb2944; FR 2069: wrss2163, -wrss2941)
Borrowing from US Commercial Banks	The change in the amount borrowed in aggregate from other US banks (FR 2644: walba286; FR 2069: wrssa286)

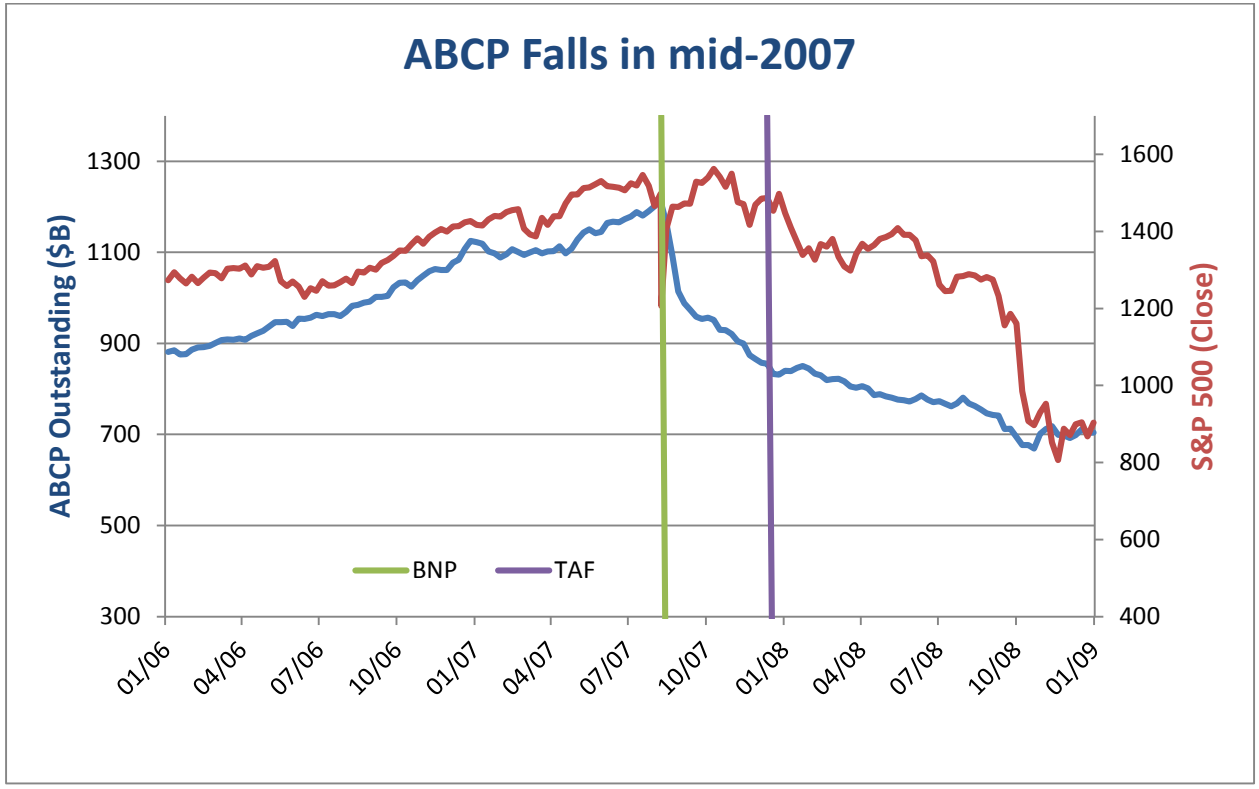
Appendix A: Variable Definitions (cont.)

Variable	Definition
DealScan	
Spread	All-in-drawn spread (in basis points) corresponding to the total cost (interest rate and fees) paid over LIBOR for each dollar drawn down under the loan facility
Amount	Logarithm of the total loan facility
Maturity	Maturity of the facility in months
Unsecured	Dummy variable equal to 1 if the loan is either not secured
Number of Lenders	Number of lenders in the syndicate
Borrower Industry	Dummy variables for the 1-digit SIC industry code of the borrower
Deal Purpose	Dummy variables for the loan purpose, aggregated to business purposes, project financing, deal, or other (CP backup, IPO related finance, pre-export, securities purchase, undisclosed, guarantee, lease finance, or other)
Leverage	Sales divided by package amount
Rating	Dummy variables for Moody's Bank Loan Rating (20 dummies). If the Moody's Bank Loan Rating is not available, we use the first available of the following ratings: S&P Loan Rating equivalent, Moody's Senior Debt, S&P Senior Debt, Fitch Senior Debt, Fitch Long-term Borrower Rating, and S&P Long-term Borrower Rating
No Loan Rating	Dummy variable equal to 1 if the loan and borrower are not rated
Refinancing Variables	
Risk Price	Spread of Moody's seasoned Baa corporate bond yield less the Moody's seasoned Aaa corporate bond yield at the issuance date of the original loan

Appendix B: Availability of Information on Sources of Funding Liquidity

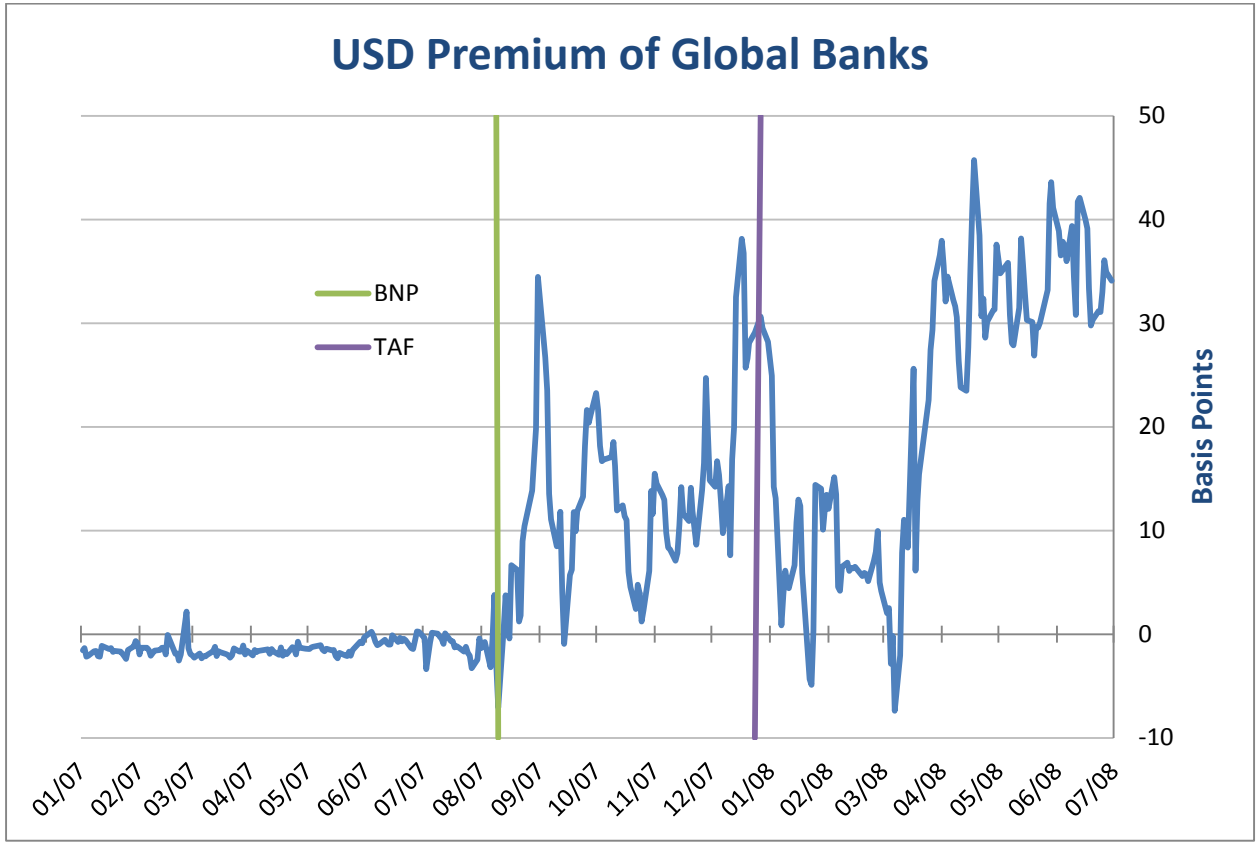
Source of ST liquidity	Data	Not Captured
Private		
Cash	Quarterly (includes non-dollar denominated currency and coin, and cash in interest-bearing balances offshore)	USD held outside of US (at FBO headquarters, etc.)
AFS Securities	Quarterly	AFS securities at FBO headquarters, disaggregated AFS holdings at the domestic branch and offices of foreign banks (002 filers)
Fed Funds Net / Eurodollar	Daily estimates (extracted from payments data), Quarterly at US regulated subsidiary only	May include correspondent banking, term fed funds, Eurodollar loans and tri-party repo. May miss activity not settled in Fedwire and loans with unusually high or low rates compared to the daily effective fed funds rate
Repo	Quarterly	Repo of assets at foreign headquarters
US Deposits (including Demand Deposits, Time Deposits, and Other Deposits)	Quarterly	USD deposits held at FBO level (the Y-7Q reports figures at the FBO level but does not detail deposit figures)
Local currency funding swapped into USD	Weekly information on transfers from headquarters for subset of banks	Banks which are not included in H.8 (voluntary) panel, USD funding not sent through regulated subsidiary
Commercial Paper	Quarterly for BHCs (Data tracked in Y-9C but not CALL or 002)	Commercial banks not part of a BHC and 002 filers (available CP data from DTCC begins August 29, 2008; CP facility data from Bloomberg not populated)
Government		
Discount Window	Daily (access only for US branches and agencies of foreign banks that hold reserves)	None
TAF	Daily (access for US depository institutions and US branches and agencies of foreign institutions in good standing and maintaining deposits subject to reserve requirements)	None
FHLB Advances	Quarterly (access only for member US commercial banks and BHCs)	None

Figure 1



Adapted from Acharya, Schnabl, and Suarez (2013). The red line is the level of the S&P 500 at close; the blue line is the total amount of ABCP outstanding in billions USD; the green line indicates August 9, 2007, when BNP Paribas suspended withdrawals from 3 subprime mortgage backed funds; the purple line indicates December 12, 2007, when the Federal Reserve announced the TAF to alleviate pressure in short-term funding markets.

Figure 2



Adapted from Hrung and Sarkar (2012). Data are daily from January 1, 2007 to June 30, 2008. The blue line measures CIP deviations for USD loans; the green line indicates August 9, 2007, when BNP Paribas suspended withdrawals from 3 subprime mortgage backed funds; the purple line indicates December 12, 2007, when the Federal Reserve announced the TAF to alleviate pressure in short-term funding markets.

Table 1: Summary Statistics

		ABCP-exposed				Foreign			
	Full Sample	All	Foreign	Domestic	Difference	All	ABCP	No ABCP	Difference
ABCP Outstanding ($M)	1237.30	13236.73	10919.26	20367.38	-9448.12	3439.14	10919.26		
	(6208.04)	(16050.01)	(10562.29)	(26090.54)		(7775.63)	(10562.29)		
ABCP (%)	0.60	6.41	7.37	3.45	3.92	2.32	7.37		
	(9.62)	(31.13)	(35.87)	(2.35)		(20.25)	(35.87)		
Total Assets ($B)	103.91	739.24	783.84	602.01	181.83	367.27	783.84	175.74	608.10
	(299.33)	(563.33)	(554.66)	(590.12)		(482.46)	(554.66)	(289.30)	
US Assets ($B)	22.92	166.80	72.49	457.01	-384.52	27.14	72.49	6.30	66.19
	(129.53)	(383.29)	(143.95)	(669.62)		(86.44)	(143.95)	(12.42)	
Tier 1 Capital Ratio (%)	9.44	7.63	7.79	6.96	0.83	7.36	7.79	7.13	0.66
	(9.54)	(24.82)	(27.67)	(1.40)		(17.76)	(27.67)	(8.46)	
N	567	53	40	13		127	40	87	

Table 1 displays summary statistics of bank characteristics. Summary statistics are reported separately for exposed banks and foreign banks. Characteristics are *ABCP Outstanding*, the amount of US ABCP outstanding in millions; *ABCP*, the highholder bank's US ABCP (from Moody's Investor Service and Bankscope as detailed in Acharya and Schnabl (2010)) normalized by its total 2006Q4 assets (from Bankscope); *Total Assets*, the total 2006Q4 assets of the consolidated bank in billions USD; *US Assets*, the 2006Q4 US assets of the bank in billions USD (from regulatory reports); and *Tier 1 Capital Ratio*, the bank's Tier 1 regulatory capital over risk-weighted assets for 2006Q4. Standard deviations are in parentheses.

Table 2, Panel A: Changes in Funding (2007Q3 - 2007Q2, $M)

		ABCP-exposed				Foreign			
	Full Sample	All	Foreign	Domestic	Difference	All	ABCP	No ABCP	Difference
US Assets	980.28	7611.41	3955.08	18861.66	-14906.58	1534.12	3955.08	421.03	3534.05
	(8050.97)	(24788.80)	(17279.25)	(38868.08)		(10112.66)	(17279.25)	(3233.07)	
Private Funding									
Cash and Balances	-17.10	-202.53	271.32	-1660.53	1931.85	63.78	271.32	-31.64	302.96
	(880.18)	(2825.46)	(1923.87)	(4417.40)		(1113.61)	(1923.87)	(330.46)	
AFS Securities	36.58	14.31	183.09	-505.01	688.10	274.95	183.09	317.19	-134.10
	(1374.43)	(3114.49)	(1850.47)	(5524.28)		(1755.90)	(1850.47)	(1720.08)	
Fed Funds Net	-40.39	-213.72	-356.80	226.55	-583.35	-225.18	-356.80	-164.67	-192.13
	(923.03)	(2556.41)	(2614.40)	(2413.96)		(1676.40)	(2614.40)	(1003.02)	
Fed Funds Sold	-8.79	-133.67	-31.81	-447.08	415.27	-13.08	-31.81	-4.48	-27.33
	(381.14)	(762.76)	(584.67)	(1126.59)		(594.64)	(584.67)	(602.33)	
Repo Net (Sold - Purchased)	-50.63	-500.46	520.80	-3642.78	4163.58	92.66	520.80	-104.19	624.99
	(2253.64)	(7282.16)	(4286.29)	(12486.49)		(2504.70)	(4286.29)	(857.52)	
Total US Deposits	434.77	2571.77	1649.79	5408.61	-3758.82	1087.29	1649.79	828.66	821.13
	(3370.40)	(9166.37)	(7260.06)	(13462.63)		(5140.99)	(7260.06)	(3821.66)	
Demand Deposits	-58.42	-231.84	-112.71	-598.39	485.68	-49.21	-112.71	-20.01	-92.70
	(326.65)	(619.88)	(387.00)	(992.72)		(233.21)	(387.00)	(95.00)	
Core Deposits	-25.42	-189.07	-141.16	-336.50	195.34	-59.31	-141.16	-21.68	-119.48
	(340.72)	(489.52)	(454.66)	(579.13)		(272.30)	(454.66)	(101.72)	
Time Deposits (<$100K)	36.11	97.13	-4.68	410.36	-415.04	-2.31	-4.68	-1.22	-3.46
	(324.52)	(497.30)	(59.39)	(958.83)		(34.21)	(59.39)	(10.57)	
Time Deposits (>$100K)	275.53	1850.07	1612.11	2582.23	-970.12	960.41	1612.11	660.78	951.33
	(2383.57)	(6715.04)	(7291.50)	(4673.22)		(4677.33)	(7291.50)	(2766.66)	
Other Deposits	184.65	910.77	178.84	3162.87	-2984.03	186.19	178.84	189.57	-10.73
	(2001.79)	(5649.31)	(1418.63)	(11156.89)		(1648.39)	(1418.63)	(1751.66)	
Other Borrowed Money	154.93	1646.27	-812.61	9212.07	-10024.68	-247.86	-812.61	11.79	-824.40
	(2874.80)	(9250.29)	(4367.51)	(15054.40)		(2502.57)	(4367.51)	(555.78)	

Table 2, Panel A: Changes in Funding (2007Q3 - 2007Q2, $M) (cont.)

		ABCP-exposed				Foreign			
	Full Sample	All	Foreign	Domestic	Difference	All	ABCP	No ABCP	Difference
Government Funding									
Discount Window	22.65	124.31	51.41	348.62	-297.21	25.71	51.41	13.89	37.52
	(246.07)	(467.09)	(341.94)	(702.28)		(210.72)	(341.94)	(107.63)	
FHLB Advances	137.39	750.82	27.89	2975.23	-2947.34	42.28	27.89	48.90	-21.01
	(1037.29)	(2859.43)	(255.27)	(5302.50)		(269.47)	(255.27)	(276.94)	
Term Auction Facility (TAF)	39.82	181.93	240.18	2.69	237.49	166.80	240.18	133.06	107.12
	(236.60)	(466.73)	(525.60)	(7.25)		(471.34)	(525.60)	(443.36)	
Totals									
Total Funding	678.20	4190.77	1534.88	12362.76	-10827.88	1113.62	1534.88	919.94	614.94
	(5600.09)	(16454.35)	(11425.55)	(25555.94)		(7532.45)	(11425.55)	(4879.24)	
Total Government Funding	160.03	875.13	79.30	3323.85	-3244.55	67.99	79.30	62.79	16.51
	(1156.07)	(3097.13)	(402.57)	(5694.95)		(372.20)	(402.57)	(359.70)	
Total Private Funding	518.17	3315.64	1455.58	9038.91	-7583.33	1045.63	1455.58	857.14	598.44
	(5076.71)	(14824.43)	(11355.05)	(22050.98)		(7494.50)	(11355.05)	(4868.91)	
N	567	53	40	13		127	40	87	

Table 2, Panel B: Changes in Funding, H.8 FR 2644 Subsample ($M)

		ABCP-exposed				Foreign			
	Full Sample	All	Foreign	Domestic	Difference	All	ABCP	No ABCP	Difference
Change from Jun 27, 2007 to Sep 26, 2007									
Net Due From Related Institutions	49.51	-2027.21	-2605.56	93.42	-2698.98	264.84	-2605.56	2790.79	-5396.35
	(3584.07)	(7149.79)	(8005.09)	(187.07)		(8759.22)	(8005.09)	(8762.66)	
Net Due To Related Institutions	95.62	914.61	1465.80	-1106.42	2572.22	744.32	1465.80	109.42	1356.38
	(1280.73)	(3622.87)	(3794.93)	(2037.48)		(2908.28)	(3794.93)	(1647.09)	
Net Due To Less From	46.11	2941.82	4071.36	-1199.83	5271.19	479.48	4071.36	-2681.37	6752.73
	(3685.72)	(7949.95)	(8606.31)	(2000.82)		(8951.71)	(8606.31)	(8157.50)	
Borrowing from US Commercial Banks	105.22	595.26	-218.79	3580.08	-3798.87	-31.51	-218.79	133.29	-352.08
	(1709.30)	(4478.43)	(1624.79)	(9143.84)		(1189.21)	(1624.79)	(583.28)	
N	276	28	22	6		47	22	25	
Change from Aug 1, 2007 to Aug 15, 2007									
Net Due From Related Institutions	72.19	500.57	622.92	11.17	611.75	393.75	622.92	190.05	432.87
	(842.02)	(1390.24)	(1535.84)	(14.96)		(1959.91)	(1535.84)	(2282.27)	
Net Due To Related Institutions	-36.99	-205.25	-255.36	-4.79	-250.57	-208.54	-255.36	-166.93	-88.43
	(590.07)	(1658.57)	(1858.85)	(11.73)		(1382.66)	(1858.85)	(784.85)	
Net Due To Less From	-109.18	-705.82	-878.28	-15.96	-862.32	-602.29	-878.28	-356.97	-521.31
	(1022.11)	(2103.17)	(2328.50)	(25.40)		(2354.91)	(2328.50)	(2394.88)	
Borrowing from US Commercial Banks	108.34	777.73	659.06	1252.41	-593.35	388.20	659.06	147.44	511.62
	(622.80)	(1625.74)	(1217.24)	(2859.33)		(980.41)	(1217.24)	(640.19)	
N	281	30	24	6		51	24	27	

Table 2, Panel A displays summary statistics of levels of bank characteristics (top part) and changes in funding (bottom part) for the entire sample (567 banks, 53 ABCP-exposed banks). Table 2, Panel B displays summary statistics of changes in funding for the H.8 FR 2644 subsamples (276 and 281 banks with 28 and 30 ABCP-exposed banks, respectively). Summary statistics are reported separately for exposed banks and foreign banks. Detailed definitions of variables are in Appendix A. All values are in millions USD. Standard deviations are in parentheses.

Table 3: Determinants of Changes in Funding

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Deposits Detail							
	Total US Deposits	Time (<$100K)	Core Deposits	Total Deposits - Core Deposits	FF/Euro Net (Borrow-Lend)	FF/Euro Lending	Repo Net (Sold-Purchased)	Cash and Balances	AFS Securities
ABCP (%)	252.6	-88.7	94.7	157.9	-194.9*	138.6	-167.5*	-24.8	-14.5
	(212.6)	(85.2)	(102.7)	(169.9)	(105.1)	(93.8)	(87.3)	(56.8)	(85.8)
For_DUM	1078.5	-520.6	369.9	708.6	-1014.0**	772.6*	-256.2	-4.5	-134.7
	(803.3)	(352.5)	(419.6)	(678.0)	(456.8)	(445.6)	(241.7)	(233.9)	(318.5)
ABCP (%) * For_DUM	-471.0**	88.1	-96.0	-374.9**	146.2	-130.8	7.8	18.7	11.4
	(214.3)	(85.5)	(103.2)	(171.4)	(106.3)	(95.1)	(87.6)	(57.4)	(86.4)
Log US Assets ($B)	9.6	-10.7	-18.5	28.1	-42.7	33.4	-7.8	-0.0	18.9
	(58.8)	(18.6)	(23.5)	(48.9)	(33.4)	(31.5)	(23.1)	(18.9)	(23.9)
Log Assets ($B)	-392.2**	-80.2	-150.7	-241.5*	142.0	-115.2	50.9	7.2	-29.1
	(173.0)	(77.8)	(92.7)	(130.7)	(99.7)	(97.3)	(37.6)	(62.4)	(65.2)
Constant	3933.5**	1526.2*	1541.4	2392.1**	-541.5	498.8	-174.8	-75.5	438.8
	(1555.2)	(883.0)	(1008.0)	(1132.5)	(874.2)	(840.5)	(253.8)	(627.3)	(576.9)
N	567	567	567	567	567	567	567	567	567
Adjusted R^2	0.114	-0.004	-0.006	0.110	0.020	-0.003	0.523	-0.008	-0.006

Table 3 displays univariate regression results on changes in private funding. Each dependent variable is normalized by the highholder bank's total 2006Q4 assets; they are quarterly changes from 2007Q2 to 2007Q3 in millions USD of (1) *Total US Deposits*, total US Deposits; (2) *Time (<$100K)*, the total time deposits of less than $100,000; (3) *Core Deposits*, the amount of transaction deposits and insured time deposits; (4) *Total Deposits - Core Deposits*, the amount of total deposits less core deposits (5) *FF/Euro Net (Borrow-Lend)*, the amount of fed funds borrowed less the amount lent; (6) *FF/Euro Lending*, the amount of fed funds lent; (7) *Repo Net (Sold-Purchased)*, the amount of securities sold under agreements to repurchase less the securities bought under agreements to repurchase; (8) *Cash and Balances*, the cash and balances due from depository institutions; and (9) *AFS Securities*, the amount of available-for-sale securities. The independent variables are *ABCP (%)*, the highholder bank's US ABCP normalized by its total 2006Q4 assets; *For_DUM*, a dummy variable equal to 1 if the highholder bank is foreign; *ABCP (%) * For_DUM*, the interaction between *ABCP* and *For_DUM*; *Log US Assets*, the natural logarithm of the 2006Q4 US assets of the bank in billions USD (from regulatory reports); and *Log Assets*, the natural logarithm of the total 2006Q4 assets of the consolidated bank in billions USD (from Bankscope). Detailed definitions of variables are in Appendix A. Robust standard errors are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table 4, Panel A: Changes in Government Funding ($M)

	ABCP-exposed			Foreign		
	Foreign	Domestic	Difference	ABCP	No ABCP	Difference
Discount Window	51.41	348.62	-297.20	51.41	13.89	37.52
	(341.94)	(702.28)		(341.94)	(107.63)	
FHLB Advance	27.89	2975.23	-2947.34	27.89	48.90	-21.01
	(255.27)	(5302.50)		(255.27)	(276.94)	
Total pre-TAF Gov. Funding	79.30	3323.85	-3244.55	79.30	62.79	16.51
	402.57	5694.95		402.57	359.70	
TAF	240.18	2.69	237.48	240.18	133.06	107.11
	(525.60)	(7.25)		(525.60)	(443.36)	
Total pre-TAF Funding	1534.88	12362.76	-10827.88	1534.88	919.94	614.94
	(11425.55)	(25555.94)		(11425.55)	(4879.24)	

Table 4, Panel A displays summary statistics of changes in government funding for the entire sample (567 banks, 53 ABCP-exposed banks). Summary statistics are reported separately for exposed banks and foreign banks. Detailed definitions of variables are in Appendix A. All values are in millions USD. Standard deviations are in parentheses.

Table 4, Panel B: Change in Government Funding

	(1)	(2)	(3)	(4)
	FHLB Advances	Discount Window	TAF	TAF + FHLB Advances
ABCP (%)	22.9	0.8	-12.8	10.1
	(89.3)	(8.6)	(8.4)	(89.1)
For_DUM	-557.5***	-33.5	-21.9	-579.4***
	(144.6)	(25.4)	(30.8)	(155.9)
ABCP (%) * For_DUM	-23.1	-0.8	12.7	-10.4
	(89.5)	(8.7)	(8.4)	(89.3)
Log US Assets ($B)	40.0***	4.2**	4.6***	44.6***
	(13.6)	(1.7)	(1.6)	(13.9)
Log Assets ($B)	34.2	5.3	7.8*	42.0
	(32.1)	(5.1)	(4.3)	(33.2)
Constant	-91.6	-52.8	-68.9**	-160.5
	(320.4)	(43.6)	(31.3)	(326.5)
N	567	567	567	567
Adjusted R^2	0.009	0.009	-0.002	0.009

Table 4, Panel B displays univariate regression results on changes in government funding. Each dependent variable is normalized by the bank's total 2006Q4 assets; they are (1) *FHLB Advances*, the sum of all FHLB advances; (2) *Discount Window*, the borrowing amount of primary credit at the discount window excluding all borrowing done through secondary credit and seasonal credit lending programs; (3) *TAF*, the amount borrowed from the Term Auction Facility auctions held on December 17th and 20th of 2007; and (4) *TAF + FHLB Advances*, the sum of *TAF* borrowing and the change in *FHLB Advances*. The independent variables are *ABCP*, the highholder bank's US ABCP normalized by its total 2006Q4 assets; *For_DUM*, a dummy variable equal to 1 if the highholder bank is foreign; *ABCP (%) * For_DUM*, the interaction between *ABCP* and *For_DUM*; *Log US Assets*, the natural logarithm of the 2006Q4 US assets of the bank in billions USD (from regulatory reports); and *Log Assets*, the natural logarithm of the total 2006Q4 assets of the consolidated bank in billions USD (from Bankscope). Detailed definitions of variables are in Appendix A. Robust standard errors are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table 5: Mismatch between USD Underwriting and US Assets

	Sum	Means	
	Amount/N	% of Total Assets	% of US Assets
Domestic, ABCP	2479.30	39.19	40.81
Domestic, No ABCP	833.89	40.90	40.90
Foreign, ABCP	2928.77	25.65	376.96
Foreign, No ABCP	573.08	7.14	194.07
Revolvers			
Domestic, ABCP	1528.89	25.63	27.72
Domestic, No ABCP	481.96	23.48	23.48
Foreign, ABCP	1553.56	13.13	175.75
Foreign, No ABCP	308.07	2.74	91.40
*25% * Revolvers + 5% * Term Loans*			
Domestic, ABCP	420.24	6.97	7.48
Domestic, No ABCP	135.93	6.65	6.65
Foreign, ABCP	445.25	3.83	52.58
Foreign, No ABCP	88.29	0.89	27.39

Table 5 displays summary statistics on the mismatch between USD underwriting and US regulated assets. The sample includes all outstanding USD currency denominated loans in DealScan made by the 567 banks in our panel, defined as any facility with a start date before August 9, 2007 and an end date after August 9, 2007 (N=162,555 facility-lenders). The columns display sums of outstanding amounts, as well as mean outstanding amounts as a percentage of total bank assets and US bank assets. *Domestic, ABCP* are domestic headquartered banks with exposure to US ABCP; *Domestic, No ABCP* are domestic headquartered banks with no exposure to US ABCP; *Foreign, ABCP* are foreign headquartered banks with exposure to US ABCP; *Foreign, No ABCP* are foreign-headquartered banks with no exposure to US ABCP.

Table 6, Panel A: Summary Statistics of Syndicate Lending Terms by Currency

	USD Loans				Euro Loans			
	N	Mean	Std. Dev.	Change in Mean	N	Mean	Std. Dev.	Change in Mean
Pre-Paribas								
Amount ($M)	2021	400.86	999.38		118	538.54	1170.62	
Spread (bps)	2021	222.53	148.54		118	237.29	129.90	
Maturity (yrs.)	2021	5.11	1.58		118	6.80	1.95	
Lender Underwriting								
S_Foreign	2021	34.23	31.09		118	78.15	29.79	
S_ABCP * S_Foreign	2021	26.73	27.84		118	53.59	28.39	
S_ABCP	2021	69.71	29.96		118	67.17	27.68	
Post-Paribas								
Amount ($M)	664	536.68	1183.20	135.82	34	1099.66	1539.41	561.12
Spread (bps)	664	196.24	154.83	-26.29	34	218.16	187.93	-19.13
Maturity (yrs.)	664	4.70	1.61	-0.41	34	6.70	1.96	-0.10
Lender Underwriting								
S_Foreign	664	32.26	30.78	-1.97	34	83.16	19.05	5.01
S_ABCP * S_Foreign	664	25.26	25.94	-1.48	34	44.45	28.18	-9.14
S_ABCP	664	69.03	28.47	-0.68	34	56.43	27.68	-10.74

Table 6, Panel B: Summary Statistics of Syndicate Lending Terms by Currency-Headquarters

	Foreign				Domestic			
	N	Mean	Std. Dev.	Change in Mean	N	Mean	Std. Dev.	Change in Mean
USD Loans								
Pre-Paribas								
Amount ($M)	4387	862.2	1297.1		6206	605.6	1094	
Spread (bps)	4387	155.7	125.4		6206	169.9	125	
Maturity (yrs.)	4387	5.12	1.45		6206	5.10	1.41	
Post-Paribas								
Amount ($M)	1820	832.4	1157.8	-29.8	2348	718.8	1231.1	113.2
Spread (bps)	1820	132.4	114.2	-23.3	2348	155.1	131.9	-14.8
Maturity (yrs.)	1820	4.81	1.507	-0.31	2348	4.75	1.43	-0.35
Euro Loans								
Pre-Paribas								
Amount ($M)	499	971.5	1365.4		118	915.6	1789.2	
Spread (bps)	499	183.3	138.0		118	224.3	125.9	
Maturity (yrs.)	499	5.88	2.59		118	5.80	2.16	
Post-Paribas								
Amount ($M)	234	954.6	979.2	-16.90	42	1623.7	1658.6	708.10
Spread (bps)	234	150.8	121.0	-32.50	42	170.7	185.4	-53.60
Maturity (yrs.)	234	6.15	1.53	0.27	42	5.637	2.082	-0.16

Table 6, Panel A shows lending summary statistics by currency and Table 6, Panel B shows similar statistics further split by bank headquarters. The sample is the 15,654 facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007, and denominated in USD, Euros, or British pounds. Statistics are presented for loans made by foreign and domestic banks. *Amount* is the amount of the loan facility in millions USD. Euro/GBP loans are converted by LPC using the currency conversion rate at the facility start date. *Spread* is the all-in-drawn spread from DealScan in basis points. *Maturity* is the maturity of the loan in years. *S_Foreign* is the percentage of banks in the syndicate that are foreign. *S_ABCP* is the percentage of banks in the syndicate in the syndicate that have any US ABCP exposure. *S_ABCP * S_Foreign* is the interaction of these two variables.

Table 7: Loan Terms Pre and Post ABCP Shock (Facility Level)

	(1)	(2)	(3)	(4)	(5)	(6)
	Spread		Amount		Maturity	
Post	-48.40	-617.5***	0.456	7.257***	-2.994	-197.3***
	(29.98)	(156.4)	(0.840)	(2.204)	(14.07)	(26.88)
Post * USD	51.47	620.5***	-0.488	-7.297***	-0.758	191.9***
	(32.66)	(156.9)	(0.853)	(2.206)	(14.26)	(26.93)
Post * S_ABCP	118.6**	1288.2***	0.206	-6.779**	1.232	234.3***
	(60.40)	(232.6)	(1.167)	(2.979)	(20.57)	(43.05)
Post * USD * S_ABCP	-108.0*	-1271.8***	0.172	7.219**	1.407	-232.2***
	(63.41)	(233.3)	(1.180)	(2.983)	(20.74)	(43.13)
Post * S_Foreign		615.2***		-6.776***		202.8***
		(165.5)		(2.305)		(28.84)
Post * S_ABCP * S_Foreign		-1338.6***		6.520*		-241.4***
		(264.7)		(3.390)		(47.26)
Post * USD * S_Foreign		-620.0***		6.745***		-194.0***
		(173.5)		(2.325)		(28.87)
Post * USD * S_ABCP * S_Foreign		1329.1***		-6.608*		238.2***
		(273.2)		(3.421)		(47.52)
USD * S_Foreign		97.66**		0.631		-9.054
		(40.71)		(0.693)		(11.96)
USD * S_ABCP		67.02*		0.237		8.988
		(36.74)		(0.792)		(18.36)
USD * S_Foreign * S_ABCP		-126.3**		-1.339		2.088
		(55.59)		(1.093)		(19.91)
USD	54.8***	5.3	-0.6***	-0.5	-15.7***	-17.1
	(13.0)	(27.9)	(0.2)	(0.6)	(3.2)	(10.5)
S_ABCP	-21.5*	-89.4***	0.3***	0.1	-1.1	-10.1
	(11.9)	(34.6)	(0.1)	(0.8)	(1.9)	(18.3)
S_Foreign	-14.7	-103.6***	-0.3	-0.8	6.5***	11.7
	(18.3)	(33.4)	(0.2)	(0.7)	(2.4)	(11.7)
S_ABCP * S_Foreign	37.9*	159.2***	0.6***	1.8*	-5.0	-4.8
	(22.8)	(49.8)	(0.2)	(1.1)	(3.2)	(19.7)
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	2837	2837	2837	2837	2837	2837
Adjusted R^2	0.473	0.475	0.489	0.490	0.322	0.330

Table 7 shows the results of regressions for 2,837 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. The dependent variables are *Spread*, the all-in-drawn spread in basis points; *Amount*, the natural logarithm of facility amount; and *Maturity*, the maturity of the facility in months. Each specification includes the following loan level controls: a dummy variable equal to 1 if the loan is denominated in USD, the spread (if the dependent variable is not *Spread*), the natural logarithm of loan amount (if not *Amount*), maturity (if not *Maturity*), sales divided by package amount, an unsecured dummy, the number of lenders in the facility, the number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose and loan type. In addition, controls for *loan rating* (categorical variable) are included in all specifications. Detailed definitions of variables are provided in Appendix A. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *S_Foreign* is the percentage of banks in the syndicate that are foreign. *S_ABCP* is the percentage of banks in the syndicate that have any US ABCP exposure. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table 8: Spread Pre and Post ABCP Shock

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Relationship	No Relationship	Public	Private
Post	-22.50	-40.43	-18.04	-38.48	-66.57*	-24.06	-43.48	-45.10
	(30.24)	(32.14)	(19.91)	(27.39)	(36.46)	(37.24)	(39.77)	(49.11)
Post * USD	25.31	46.44	26.41	47.80*	67.71*	36.33	48.21	71.24
	(30.43)	(32.04)	(20.25)	(27.70)	(36.83)	(37.97)	(39.58)	(50.20)
Post * ABCP_DUM	15.34	91.54**	14.29	82.47**	68.28**	117.8**	65.53***	100.3*
	(10.70)	(43.54)	(13.26)	(33.47)	(32.99)	(48.40)	(24.59)	(57.82)
Post * USD * ABCP_DUM	-10.37	-85.74**	-13.65	-79.08**	-57.28*	-117.9**	-56.06**	-111.8*
	(11.34)	(43.63)	(13.26)	(33.77)	(33.31)	(49.42)	(24.94)	(58.98)
Post * For_DUM		18.13		23.69	88.58*	12.61	80.60**	33.65
		(31.82)		(33.87)	(52.91)	(43.28)	(34.76)	(53.30)
Post * ABCP_DUM * For_DUM		-84.10*		-79.05**	-105.0**	-110.5**	-29.42	-129.8**
		(49.67)		(36.99)	(44.87)	(54.95)	(32.92)	(61.22)
Post * USD * For_DUM		-27.76		-26.67	-76.53	-22.65	-76.09**	-30.15
		(33.85)		(35.13)	(53.51)	(45.66)	(35.55)	(56.48)
Post * USD * ABCP_DUM * For_DUM		85.03*		74.09**	84.58*	113.9**	20.79	122.3**
		(50.47)		(37.32)	(45.35)	(55.60)	(33.67)	(62.17)
USD * For_DUM		30.72		15.50	66.41	12.23	40.69	5.842
		(24.85)		(23.75)	(41.64)	(26.82)	(31.63)	(34.92)
USD * ABCP_DUM		19.51		8.289	41.89	0.959	19.65	-8.571
		(14.24)		(14.97)	(27.07)	(22.44)	(21.31)	(19.19)
USD * ABCP_DUM * For_DUM		-18.34		-8.263	-50.39*	-12.25	-7.802	-14.03
		(16.44)		(16.40)	(29.30)	(24.11)	(21.27)	(23.83)
USD	20.06	-6.200	20.98*	8.700	-28.40	31.43	-8.678	37.68
	(12.96)	(23.64)	(12.36)	(22.47)	(32.95)	(24.71)	(31.48)	(30.76)
ABCP_DUM	-3.771	-23.48*						
	(2.674)	(13.72)						
For_DUM	-7.460*	-34.65						
	(4.343)	(24.71)						
ABCP_DUM * For_DUM	5.034	23.26						
	(3.474)	(16.15)						
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Fixed Effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	15654	15654	15654	15654	8946	6708	10314	5340
Adjusted R^2	0.529	0.530	0.547	0.547	0.570	0.513	0.589	0.437

Table 8: Spread Pre and Post ABCP Shock (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
					Relationship	No Relationship	Public	Private
Marginal Effects								
ABCP-exposed								
Domestic Lender, USD Loan	7.78	11.81	9.01	12.71	12.14	12.17	14.20	14.64
Domestic Lender, Euro Loan	-7.16	51.11	-3.75	43.99	1.71	93.74	22.05	55.20
Foreign Lender, USD Loan	7.78	3.11	9.01	4.77	3.77	5.53	10.08	10.64
Foreign Lender, Euro Loan	-7.16	-14.86	-3.75	-11.37	-14.71	-4.15	73.23	-40.95
Not ABCP-exposed								
Domestic Lender, USD Loan	2.81	6.01	8.37	9.32	1.14	12.27	4.73	26.14
Domestic Lender, Euro Loan	-22.50	-40.43	-18.04	-38.48	-66.57	-24.06	-43.48	-45.10
Foreign Lender, USD Loan	2.81	-3.62	8.37	6.34	13.19	2.23	9.24	29.64
Foreign Lender, Euro Loan	-22.5	-22.30	-18.04	-14.79	22.01	-11.45	37.12	-11.45

Table 8 shows the results of regressions for 15,654 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. The dependent variable is *Spread*, the all-in-drawn spread in basis points. Each specification includes the following loan level controls: the natural logarithm of loan amount, maturity, sales divided by package amount, an unsecured dummy, the number of lenders in the facility, the number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose and loan type. In addition, controls for *loan rating* (categorical variable) are included in all specifications. Controls for lender fixed effects are included in specifications (3) through (8). Specifications (5) and (6) split the sample between borrowers for which the lender has previously participated in the lending syndicate in the last five years and those with no previous relationship. Specifications (7) and (8) split the sample between borrowers with and without publicly traded equity. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *For_DUM* is equal to 1 if the highholder bank is foreign. *ABCP_DUM* is a dummy variable equal to 1 if the highholder bank has US ABCP. Detailed definitions of variables are provided in Appendix A. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table 9: Extensive Margin

	(1)	(2)	(3)	(4)
	Package-Lender		Facility-Lender	
	All	Risky	All	Risky
USD * ABCP_DUM	-0.149	2.290**	-0.074	0.963***
	(0.843)	(0.980)	(0.516)	(0.337)
USD * For_DUM	0.341	5.535**	0.276	3.262***
	(1.014)	(2.223)	(0.857)	(1.127)
USD * ABCP_DUM * For_DUM	0.288	-4.630**	0.043	-2.167**
	(0.835)	(2.234)	(0.577)	(0.881)
ABCP_DUM	0.176	-2.299**	0.089	-0.937***
	(0.840)	(0.973)	(0.516)	(0.332)
For_DUM	-0.317	-5.582**	-0.223	-3.300***
	(1.013)	(2.220)	(0.861)	(1.129)
ABCP_DUM * For_DUM	-0.258	4.714**	-0.056	2.177**
	(0.834)	(2.224)	(0.579)	(0.872)
Maturity	-0.003	-0.003	-0.004	-0.002
	(0.003)	(0.004)	(0.003)	(0.004)
Risk Price	-0.082	-0.347	0.069	-0.167
	(0.237)	(0.372)	(0.257)	(0.437)
USD	0.111	-1.115	0.119	-0.390
	(0.902)	(0.928)	(0.511)	(0.550)
Loan Level Controls	Yes	Yes	Yes	Yes
Lender Fixed Effects	No	No	No	No
N	59512	22611	90888	40373

Table 9 shows results from estimating a Cox proportional hazard regression on a binary dependent variable, *Refinancing*, equal to 1 if a loan is refinanced between August 9 and December 11, 2007. The sample is 90,888 loan facility-lender observations and 59,512 package-lender observations underwritten in the five years preceding the ABCP shock that were outstanding as of August 9, 2007. Specifications (2) and (4) subset on only risky loans, defined as loans with all-in-drawn spreads greater than 150 basis points. All specifications include fixed effects for 1-digit SIC code of borrower, deal purpose, loan type, and facility rating. *USD* is equal to 1 if the facility (package) is denominated in USD. *For_DUM* is equal to 1 if the bank is foreign. *ABCP_DUM* is a dummy variable equal to 1 if the lender has any US ABCP exposure. *Maturity* is the maturity of the facility in months. *Risk Price* is the difference between Moody's seasoned Baa corporate bond yield and Aaa corporate bond yield. Robust standard errors clustered by borrower are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Appendix C: Internet Appendix (I)

I. Alternative Intensive Margin Analysis

In Appendix C, we present an intensive margin analysis on the subset of borrowers with pre-2007 loans that have been refinanced in the post-time period. We analyze loan terms for the post-2007 loans, but the bank syndicate is set to be the original (pre-2007) syndicate. For example, if borrower A borrowed in 2005 from BNP Paribas, BNP Paribas will be in the controls regardless of whether BNP Paribas is in the 2007 syndicate. Less than a third of non-USD borrowers had a previous syndicated loan in the LPC dataset (as compared to slightly more than half of the USD borrowers.) Therefore, we have only a small sample of borrowers' pre-2007 syndicates to analyze. This may reflect either of the following: the amount of non-USD syndicated borrowers is increasing (fewer non-USD refinancings), or LPC coverage of this market is increasing.

Tables C2 and C3 present this analysis, replicating that presented in Tables 7 and 8. Results are qualitatively similar to those presented in the paper. Looking at the facility level analysis (comparable to Table 7 in the main text), we find that USD loans with foreign exposed banks in the original syndicate are associated with higher spreads (positive coefficient, significant at the 1% level, on *Post * USD * S_ABCP * S_Foreign* in specification (2)), a positive effect on amounts (specification (4)) and a negative effect on loan maturity (specification (6)). Looking at the within bank effect (in Table C3 below, comparable to Table 8), we find a negative effect on amounts, and no statistically significant effect on spreads and maturity. This is consistent with some borrowers choosing to borrow less and dropping foreign banks from their syndicate. However, we must be cautious in interpreting the results due to the low power of our analysis, as illustrated in Table C1 below in the small sample sizes in some of the pairs of loan underwriting date (post vs. pre) and loan type (denominated in USD vs. non-USD).

Table C1: Observations Table

Full Sample				**Previous Syndicate**			
	Pre	Post	Total		Pre	Post	Total
non-USD	617	276	893	non-USD	320	143	463
USD	10,593	4,168	14,761	USD	8,223	2,293	10,516
Total	11,210	4,444	15,654	Total	8,543	2,436	10,979
Facility-Level				**Previous Syndicate, Facility-Level**			
	Pre	Post	Total		Pre	Post	Total
non-USD	118	34	152	non-USD	50	10	60
USD	2,021	664	2,685	USD	1,377	365	1,742
Total	2,139	698	2,837	Total	1,427	375	1,802

Table C1 shows the number of facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. *Post* (*Pre*) denotes loans with start date after (before) August 9, 2007. *USD* indicates loans denominated in USD. *Non-USD* indicates loans denominated in euros or pounds. *Previous Syndicate* matches the borrower's 2007 loan terms with the lender characteristics of its most recent loan underwritten from 2002-2007.

Table C2: Loan Terms Pre and Post ABCP Shock (Previous Lenders, Facility Level)

	(1)	(2)	(3)	(4)	(5)	(6)
	Spread		Amount		Maturity	
Post	155.6*	-2.218	5.186***	1.858*	7.394	81.01***
	(91.47)	(94.61)	(1.271)	(1.088)	(19.42)	(16.63)
Post * USD	-112.4	45.92	-4.892***	-1.592	-16.43	-91.72***
	(93.23)	(99.11)	(1.312)	(1.105)	(19.50)	(16.90)
Post * S_ABCP	-205.2	264.1**	-5.072***	-1.111	-31.50	-121.9***
	(136.4)	(126.9)	(1.415)	(1.707)	(20.83)	(25.98)
Post * USD * S_ABCP	160.8	-291.0**	4.929***	1.184	43.43**	134.4***
	(138.2)	(131.5)	(1.461)	(1.694)	(20.96)	(26.38)
Post * S_Foreign		916.1**		10.23**		-204.2***
		(356.5)		(4.428)		(75.75)
Post * S_ABCP * S_Foreign		-1519.5***		-12.64**		254.9***
		(463.3)		(5.850)		(89.88)
Post * USD * S_Foreign		-899.7**		-9.911**		216.6***
		(362.9)		(4.413)		(76.23)
Post * USD * S_ABCP * S_Foreign		1449.5***		11.78**		-265.2***
		(465.8)		(5.800)		(90.30)
USD * S_Foreign		84.64		-3.252*		58.17
		(132.6)		(1.676)		(52.58)
USD * S_ABCP		55.12*		-0.785*		2.019
		(33.04)		(0.476)		(12.47)
USD * S_Foreign * S_ABCP		-40.60		4.261**		-79.01
		(145.2)		(1.789)		(51.51)
USD	30.31*	-40.69	0.0542	0.420	-10.08*	-5.388
	(17.70)	(42.41)	(0.213)	(0.331)	(5.471)	(6.483)
S_ABCP	-1.217	-58.30*	0.396***	1.124**	-7.579***	-9.763
	(13.75)	(31.64)	(0.141)	(0.469)	(2.376)	(12.53)
S_Foreign	-8.826	-90.55	0.0837	3.240*	0.696	-58.33
	(22.27)	(131.7)	(0.208)	(1.669)	(3.967)	(52.35)
S_ABCP * S_Foreign	25.72	78.55	0.348	-3.673**	0.261	78.43
	(26.14)	(142.4)	(0.251)	(1.770)	(4.563)	(51.25)
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	1802	1802	1802	1802	1802	1802
Adjusted R^2	0.497	0.498	0.472	0.474	0.302	0.308

Table C2 shows the results of regressions for 1,802 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. The dependent variables are *Spread*, the all-in-drawn spread in basis points; *Amount*, the natural logarithm of facility amount; and *Maturity*, the maturity of the facility in months. Each specification includes the following loan level controls: a dummy variable equal to 1 if the loan is denominated in USD, the spread (if the dependent variable is not *Spread*), the natural logarithm of loan amount (if not *Amount*), maturity (if not *Maturity*), sales divided by package amount, an unsecured dummy, the number of lenders in the facility, the number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose and loan type. In addition, controls for *loan rating* (categorical variable) and previous syndicate composition are included in all specifications. Detailed definitions of variables are provided in Appendix A. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *S_Foreign* is the percentage of banks in the syndicate that are foreign. *S_ABCP* is the percentage of banks in the syndicate that have any US ABCP exposure. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table C3: Loan Terms Pre and Post ABCP Shock (Previous Lenders)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Spread				Amount				Maturity			
			Public	Private			Public	Private			Public	Private
Post	-0.757	-23.35	-13.69	-24.14	1.009***	1.442***	1.376***	0.151	0.164	-1.601	4.711	-6.750
	(27.07)	(54.11)	(51.01)	(92.63)	(0.332)	(0.472)	(0.508)	(0.760)	(8.629)	(8.275)	(9.123)	(7.882)
Post * USD	20.55	39.08	29.68	45.69	-0.887**	-1.277***	-1.375***	0.303	-2.566	-1.291	-7.678	4.228
	(27.52)	(53.99)	(50.80)	(90.64)	(0.345)	(0.483)	(0.508)	(0.771)	(8.670)	(8.213)	(9.060)	(8.230)
Post * ABCP_DUM	-6.577	11.50	5.049	-0.676	-0.235	-0.938**	-0.651	-0.115	-3.926	0.804	-6.695	2.174
	(15.50)	(42.22)	(30.19)	(59.23)	(0.163)	(0.380)	(0.510)	(0.419)	(2.620)	(6.410)	(7.721)	(6.888)
Post * USD * ABCP_DUM	0.630	-10.72	-8.266	3.787	0.181	0.902**	0.705	-0.0999	5.819**	1.113	7.846	0.731
	(15.57)	(42.43)	(30.47)	(60.17)	(0.167)	(0.387)	(0.515)	(0.444)	(2.628)	(6.429)	(7.786)	(7.130)
Post * For_DUM		12.65	-5.975	12.87		-0.672	-0.673	0.233		5.314	8.574	-25.32**
		(56.75)	(52.00)	(105.1)		(0.527)	(0.531)	(1.004)		(10.48)	(10.03)	(11.65)
Post * ABCP_DUM * For_DUM		-1.888	18.16	-5.856		1.018***	0.666	0.232		-9.847	-2.525	4.903
		(44.79)	(33.48)	(82.81)		(0.380)	(0.507)	(0.779)		(6.754)	(7.654)	(9.460)
Post * USD * For_DUM		3.239	22.30	2.790		0.517	0.540	-0.582		-3.813	-8.647	28.27**
		(57.10)	(52.23)	(103.5)		(0.535)	(0.529)	(0.997)		(10.56)	(10.09)	(11.90)
Post * USD * ABCP_DUM * For_DUM		-20.07	-34.18	-30.14		-0.997**	-0.711	0.109		9.399	3.637	-7.737
		(45.44)	(34.60)	(83.01)		(0.395)	(0.515)	(0.789)		(6.965)	(7.809)	(9.711)
USD * For_DUM		34.85	19.44	42.41		-0.460	-0.607	0.790		7.867	5.535	-20.81**
		(47.18)	(40.90)	(87.80)		(0.458)	(0.492)	(0.898)		(8.866)	(7.847)	(10.43)
USD * ABCP_DUM		27.35	17.52	20.66		-0.386	-0.445	-0.0448		4.098	-1.239	7.077
		(29.21)	(21.83)	(40.26)		(0.265)	(0.280)	(0.346)		(4.274)	(4.848)	(5.527)
USD * ABCP_DUM * For_DUM		-14.82	8.986	-25.52		0.583*	0.430	-0.177		-10.42*	-0.998	0.267
		(36.28)	(27.05)	(60.90)		(0.313)	(0.284)	(0.673)		(5.311)	(5.876)	(8.031)
USD	3.227	-34.36	-18.93	-32.61	-0.306	-0.00298	-0.0852	0.0714	1.813	-1.011	5.845	-9.796
	(19.17)	(42.93)	(31.70)	(83.00)	(0.231)	(0.429)	(0.465)	(0.681)	(6.512)	(5.082)	(5.747)	(6.666)
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	10979	10979	7716	3263	10979	10979	7716	3263	10979	10979	7716	3263
Adjusted R^2	0.580	0.580	0.636	0.438	0.455	0.456	0.430	0.499	0.366	0.366	0.393	0.405

Table C3 shows the results of regressions for 10,979 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. The dependent variables are *Spread*, the all-in-drawn spread in basis points; *Amount*, the natural logarithm of facility amount; and *Maturity*, the maturity of the facility in months. Each specification includes the following loan level controls: a dummy variable equal to 1 if the loan was denominated in USD, the spread (if the dependent variable is not *Spread*), natural logarithm of loan amount (if not *Amount*), maturity (if not *Maturity*), sales divided by package amount, an unsecured dummy, the number of lenders in the facility, the number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose and loan type. In addition, controls for loan rating (categorical variable) and previous lender fixed effects are included in all specifications. Specifications (3), (4), (7), (8), (11) and (12) split the sample between borrowers with (*Public*) and without (*Private*) publicly traded equity. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *For_DUM* is equal to 1 if the previous highholder bank was foreign. *ABCP_DUM* is a dummy variable equal to 1 if the previous highholder bank had US ABCP. Detailed definitions of variables are provided in Appendix A. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Appendix D: Internet Appendix (II)

I. Other Loan Terms

In Appendix D we analyze the effect of the ABCP funding shock on other important loan terms such as facility amount, maturity, and rating. Since loan terms may be jointly determined, we include controls for other loan terms such as spread, amount, or maturity. Beginning with loan amounts, we do not find statistically significant differences in the post-shock period. USD-denominated loan amounts decline slightly relative to other loans, but the effect is not statically significant.

Turning to facility maturity (specifications (3) and (4)), we find that foreign exposed banks seem to be shortening maturities on loans after the shock: we estimate a negative coefficient on *Post * ABCP_DUM * For_DUM* after including controls for bank fixed effects and loan ratings. In contrast to our expectations, foreign exposed banks actually seem to be extending maturities on their USD loans relative to their loans in other currencies (positive coefficient on *Post * USD * ABCP_DUM * For_DUM)*. However, when adding up all the marginal effects, we see that, relative to the pre-shock period, both exposed US and foreign banks are shortening maturities on their US loans and extending maturities on their euro loans (Foreign banks: -1.0 USD vs. 4.0 Euro). This result is different from that presented in Table 7, suggesting that the extension of the maturities found in the cross section (without controlling for bank fixed effects) is consistent with unobservable differences in the types of borrowers that have foreign banks in their lending syndicate.

Finally, we look at the riskiness of loans as measured by loan ratings. In specifications (5) and (6) in Panel A of Table D1, we are simply trying to understand if the average rating of loans done in the post-shock period has changed. Therefore, we do not include controls for other loan terms

(amount, maturity, and spread). Generally, all banks seem to be making less risky loans in the post-shock period. Overall, after the ABCP shock, foreign banks are making less risky USD loans (negative, but not statistically significant, coefficient on *Post * USD * For_DUM* in specification (6)). Similarly, exposed banks are also making less risky USD loans (negative, but not statistically significant, coefficient on *Post * USD * ABCP_DUM*), although exposed foreign banks seem to be increasing slightly the riskiness of their loans (insignificant positive coefficient on *Post * USD * ABCP_DUM * For_DUM*).

As in Table 8, we split the sample in two alternative ways. First, we split the borrowers between those for which the lender has previously participated in the lending syndicate in the last five years (columns (1) and (5) in Panel B of Table D1) and those with no previous relationship (columns (2) and (6)). Second, we split the sample between banks with public equity (specifications (3) and (7)) and those without public equity (specifications (4) and (8)). Consistent with the results in Panel A, foreign exposed banks seem to be extending maturities on their USD loans relative to their loans in other currencies (positive significant coefficient on *Post * USD * ABCP_DUM * For_DUM* for borrowers with previous relationship). When adding up all the marginal effects, we see that foreign exposed banks are shortening maturities on their US loans, and extending maturities on their euro loans for borrowers with previous relationship but shortening the maturities of all loans for banks with no previous relationship.

In summary, the impact of differential funding access of domestic and foreign banks to USD funding seems predominantly on the cost (spreads) of syndicated loans, rather than on their maturity, size, or risk.

Table D1, Panel A: Amount, Maturity, and Rating

	(1)	(2)	(3)	(4)	(5)	(6)
	Amount		Maturity		Rating	
Post	0.248	0.745*	1.308	-13.84*	-1.726	-5.441
	(0.27)	(0.39)	(8.95)	(7.26)	(2.49)	(3.63)
Post * USD	-0.134	-0.591	-3.647	11.1	1.197	4.823
	(0.27)	(0.39)	(9.00)	(7.27)	(2.53)	(3.65)
Post * ABCP_DUM	-0.117	-0.36	1.832	16.57*	1.368	1.177
	(0.18)	(0.28)	(4.35)	(8.62)	(1.68)	(2.80)
Post * USD * ABCP_DUM	0.144	0.412	-1.108	-16.08*	-0.987	-0.701
	(0.18)	(0.28)	(4.36)	(8.65)	(1.69)	(2.82)
Post * For_DUM		-0.606		15.83		5.261*
		(0.40)		(10.43)		(3.01)
Post * ABCP_DUM * For_DUM		0.287		-14.61*		-1.275
		(0.28)		(8.28)		(2.87)
Post * USD * For_DUM		0.468		-14.03		-5.111
		(0.41)		(10.35)		(3.14)
Post * USD * ABCP_DUM * For_DUM		-0.285		14.04*		1.164
		(0.30)		(8.32)		(2.94)
USD * For_DUM		-0.551**		-0.754		-2.843*
		(0.28)		(7.54)		(1.73)
USD * ABCP_DUM		-0.341		6.7		-1.193
		(0.21)		(6.08)		(1.71)
USD * ABCP_DUM * For_DUM		0.434*		-3.2		-0.178
		(0.24)		(5.82)		(1.77)
USD	-0.653***	-0.217	-4.625	-7.481*	-4.641***	-1.512
	(0.22)	(0.23)	(6.28)	(4.48)	(1.14)	(1.55)
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Lender Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	15654	15654	15654	15654	15654	15654
Adjusted R^2	0.474	0.474	0.339	0.34	0.248	0.253

Table D1, Panel A: Amount, Maturity, and Rating (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)
	Amount		Maturity		Rating	
Marginal Effects						
ABCP-exposed						
Domestic Lender, USD Loan	0.14	0.21	-1.62	-2.25	-0.15	-0.14
Domestic Lender, Euro Loan	0.13	0.39	3.14	2.73	-0.36	-4.26
Foreign Lender, USD Loan	0.14	0.07	-1.62	-1.02	-0.15	-0.10
Foreign Lender, Euro Loan	0.13	0.07	3.14	3.95	-0.36	-0.28
Not ABCP-exposed						
Domestic Lender, USD Loan	0.11	0.15	-2.34	-2.74	-0.53	-0.62
Domestic Lender, Euro Loan	0.25	0.75	1.31	-13.84	-1.73	-5.44
Foreign Lender, USD Loan	0.11	0.02	-2.34	-0.94	-0.53	-0.47
Foreign Lender, Euro Loan	0.25	0.14	1.31	1.99	-1.73	-0.18

Table D1, Panel A shows the results of regressions for 15,654 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. The dependent variables are *Amount*, the natural logarithm of facility amount, *Maturity*, the maturity of the facility in months, and *Rating*, the loan rating. Each specification includes the following loan level controls: sales divided by package amount, an unsecured dummy, number of lenders in the facility, number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose, and loan type. In addition, controls for loan rating (categorical variable) and spread are included in specifications (1) through (4), natural logarithm of loan amount in (3) and (4), and maturity in (1) and (2). Lender fixed effects are included in all specifications. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *For_DUM* is equal to 1 if the bank is foreign. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *ABCP_DUM* is a dummy variable equal to 1 if the lender has any US ABCP exposure. Detailed definitions of variables are provided in Appendix A. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.

Table D1, Panel B: Amount and Maturity Subsamples

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Amount				Maturity			
	Relationship	No Relationship	Public	Private	Relationship	No Relationship	Public	Private
Post	1.457***	0.166	0.568	0.631	-29.07***	-0.421	-11.11	-5.668
	(0.419)	(0.314)	(0.489)	(0.469)	(8.512)	(6.467)	(8.014)	(4.569)
Post * USD	-1.389***	0.0861	-0.585	-0.264	25.07***	-0.621	7.564	4.474
	(0.420)	(0.324)	(0.488)	(0.497)	(8.581)	(6.439)	(8.032)	(5.026)
Post * ABCP_DUM	-1.383***	0.314	-0.436	-0.122	21.45*	11.23	11.22	7.199
	(0.510)	(0.290)	(0.331)	(0.369)	(12.12)	(9.424)	(8.658)	(8.309)
Post * USD * ABCP_DUM	1.437***	-0.188	0.514	0.141	-19.94	-12.34	-10.38	-6.897
	(0.516)	(0.307)	(0.333)	(0.372)	(12.22)	(9.449)	(8.716)	(8.502)
Post * For_DUM	-1.883***	0.0794	-0.221	-0.00785	37.94***	1.276	18.31**	-3.274
	(0.643)	(0.371)	(0.430)	(0.485)	(13.88)	(7.991)	(8.234)	(6.153)
Post * ABCP_DUM * For_DUM	1.040	-0.177	-0.584	0.218	-28.05**	-15.20	-11.03	-9.677
	(0.725)	(0.379)	(0.429)	(0.443)	(13.16)	(9.953)	(8.660)	(8.295)
Post * USD * For_DUM	1.819***	-0.300	0.185	-0.190	-36.64***	0.211	-18.99**	11.03*
	(0.645)	(0.392)	(0.439)	(0.551)	(14.00)	(8.005)	(8.250)	(6.618)
Post * USD * ABCP_DUM * For_DUM	-1.104	0.207	0.516	-0.165	27.50**	15.37	11.87	4.794
	(0.725)	(0.396)	(0.434)	(0.514)	(13.26)	(9.986)	(8.765)	(8.696)
USD * For_DUM	-1.596***	-0.0489	-1.019***	0.354	24.30*	-7.404	15.84*	-13.60***
	(0.453)	(0.288)	(0.275)	(0.337)	(12.85)	(5.441)	(8.279)	(4.978)
USD * ABCP_DUM	-0.720*	-0.203	-0.380	0.0317	12.52	-0.975	8.584	0.403
	(0.372)	(0.230)	(0.267)	(0.243)	(10.95)	(5.920)	(7.775)	(4.886)
USD * ABCP_DUM * For_DUM	1.277***	0.165	0.641**	-0.149	-15.06	0.501	-10.88	2.574
	(0.359)	(0.326)	(0.256)	(0.293)	(11.17)	(6.341)	(6.642)	(4.967)
USD	0.133	-0.367	-0.382	-0.250	-10.33	-4.851	-3.091	-13.26***
	(0.366)	(0.248)	(0.287)	(0.293)	(7.715)	(4.785)	(6.179)	(3.918)
Loan Level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table D1, Panel B: Amount and Maturity Subsamples (cont.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Amount				Maturity			
	Relationship	No Relationship	Public	Private	Relationship	No Relationship	Public	Private
Marginal Effects								
ABCP-exposed								
Domestic Lender, USD Loan	0.12	0.38	0.06	0.39	-2.49	-2.15	-2.71	-0.89
Domestic Lender, Euro Loan	0.07	0.48	0.13	0.51	-7.62	10.81	0.11	1.53
Foreign Lender, USD Loan	-0.01	0.19	-0.04	0.24	-1.74	-0.49	-2.55	1.98
Foreign Lender, Euro Loan	-0.77	0.38	-0.67	0.72	2.27	-3.12	7.39	-11.42
Not ABCP-exposed								
Domestic Lender, USD Loan	0.07	0.25	-0.02	0.37	-4.00	-1.04	-3.55	-1.19
Domestic Lender, Euro Loan	1.46	0.17	0.57	0.63	-29.07	-0.42	-11.11	-5.67
Foreign Lender, USD Loan	0.00	0.03	-0.05	0.17	-2.70	0.45	-4.23	6.56
Foreign Lender, Euro Loan	-0.43	0.25	0.35	0.62	8.87	0.86	7.20	-8.94
N	8946	6708	10314	5340	8946	6708	10314	5340
Adjusted R^2	0.452	0.509	0.465	0.473	0.363	0.401	0.330	0.484

Table D1, Panel B shows the results of regressions for 15,654 syndicated loan facilities underwritten by the 567 banks in our panel between January 1 and December 12, 2007. Specifications (1), (2), (5), and (6) split the sample between borrowers for which the lender has previously participated in the lending syndicate in the last five years (*Relationship*) and those with no previous relationship (*No Relationship*). Specifications (3), (4), (7), and (8) split the sample between borrowers with (*Public*) and without (*Private*) publicly traded equity. The dependent variables are *Amount*, the natural logarithm of facility amount, and *Maturity*, the maturity of the facility in months. Each specification includes the following loan level controls: sales divided by package amount, an unsecured dummy, number of lenders in the facility, number of facilities in the loan package, and fixed effects for the 1-digit SIC code of the borrower, deal purpose, and loan type. In addition, controls for loan rating (categorical variable) and lender fixed effects are included in all specifications. *Post* is equal to 1 if the loan start date occurs after August 9, 2007. *For_DUM* is equal to 1 if the bank is foreign. *USD* is a dummy variable equal to 1 if the loan is denominated in USD. *ABCP_DUM* is a dummy variable equal to 1 if the highholder bank has US ABCP. Detailed definitions of variables are provided in Appendix A. Robust standard errors clustered on package are in parentheses; *, **, and *** indicate significance at the 10%, 5%, and 1% level.