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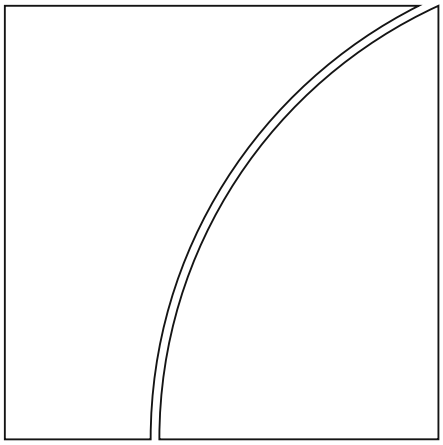

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Crises and rescues: liquidity transmission through international banks

by Claudia Buch, Cathérine Koch and Michael Koetter

Monetary and Economic Department

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JEL classification: G01, F34, G21

Keywords: Term Auction Facility, international banking, liquidity shock, bank funding structure, ABCP exposure

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Crises and rescues: liquidity transmission through international banks

Claudia Buch, Cathérine Koch and Michael Koetter[1]

Abstract

This paper studies how global banks transmit liquidity shocks via their internal capital markets. The unexpected access of German banks' affiliates located in the United States (US) to the Federal Reserve's Term Auction Facility (TAF) serves as our liquidity shock. Using microdata on all affiliates abroad, we test whether affiliates located *outside* the US adjusted their balance sheets during periods, when the US–located affiliate of the same parent received TAF loans. Our analysis has three main findings. First, during periods of active TAF borrowing, foreign affiliates of parent banks with high US dollar funding needs reduced their foreign assets by less. We identify those parents based on their pre–crisis exposure to the US asset–backed commercial paper (ABCP) market. Second, foreign affiliates in financial centers also shrank their assets less. Third, there is no evidence that the ABCP exposure per se is driving the reduction of activity outside the US. In sum, our results show that the TAF program spilled over into foreign markets, while highlighting the importance of actively managed internal capital markets and the increased centralization of global banks' liquidity management at the domestic parent during and after the financial crisis.

JEL classification: G01, F34, G21

Keywords: Term Auction Facility, international banking, liquidity shock, bank funding structure, ABCP exposure

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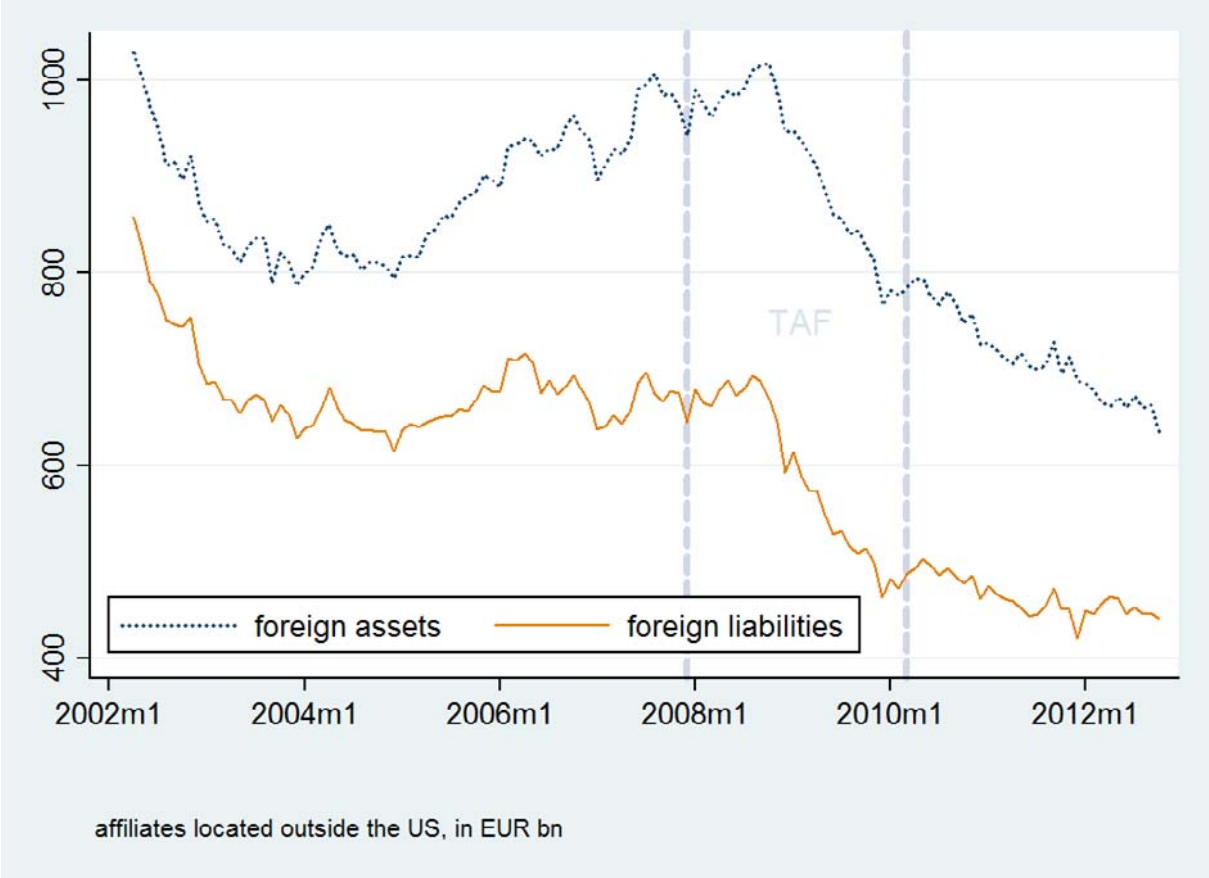
1. Introduction

After the global financial crisis, international banking activity changed substantially. Global banks withdrew from foreign markets or re–allocated their exposures (De Haas and van Horen, 2013; De Haas and van Lelyveld, 2014; McGuire and von Peter, 2009; Popov and Udell, 2012). Figure 1 confirms this pattern for the foreign affiliates of German parent banks. Their balance sheets contracted sharply after the failure of Lehman Brothers in September 2008, when international markets became increasingly fragmented (Giannetti and Laeven 2012; Hildebrand et al. 2012; Rose and Wieladek 2012) in response to US dollar funding shocks, the drying–up market liquidity, and adverse asset price developments (Acharya et al. 2013; BIS 2009).

Aggregate assets and liabilities of foreign affiliates of German banks — Figure 1



The figure shows foreign aggregate assets (dotted blue line) and liabilities (solid orange line) reported by all German banks' foreign affiliates outside the US over time. The gap between assets and liabilities is due to funding of affiliates' from German parent banks. The dashed vertical lines indicate the period from December 2007 to March 2010 when the Federal Reserve auctioned TAF loans. Any positions of US–located affiliates are excluded.

To prevent a further meltdown and disintegration of markets, central banks intervened massively by means of concerted actions or standby measures. In December 2007, the Federal Reserve (Fed) announced "measures designed to address elevated pressures in short–term funding markets".[2] One of these measures was the Fed's Term Auction Facility (TAF) program, which lasted from December 2007 to March 2010. The terms of borrowing under the TAF program were more favorable than those under standard programs. In comparison to conventional open market operations, the Fed's TAF program provided term funds to more counterparties and against a broader spectrum of collateral, while avoiding the stigma associated with the discount window.

Shin (2011, 2012) argues that foreign banks operating in the United States transferred TAF liquidity to their headquarters, but he admits that "the trail grows cold since we cannot peer into the internal global portfolio decision of these banks". Our paper picks up this trail. We identify the affiliates of German banks located in the US, obtain information on the volume of emergency lending obtained under the TAF program, and we match these affiliates to the global affiliate network of their German parents. This allows us to track changes in the activities of German banks' foreign affiliates outside the United States in response to the US–based affiliate's borrowing from the TAF program. We analyze how affiliates, *other* than those directly receiving TAF, adjusted their foreign assets and liabilities. As we can separate interoffice positions from interlinkages with non–affiliated entities, our paper complements evidence on the active management of internal capital markets by global banks (Cetorelli and Goldberg 2012; CGFS 2010a; Frey and Kerl 2015; Galema et al. 2015). Such a disaggregated structure is a key requirement to properly assess the internal capital market's role in the transmission of shocks across countries (Fender and McGuire 2010).

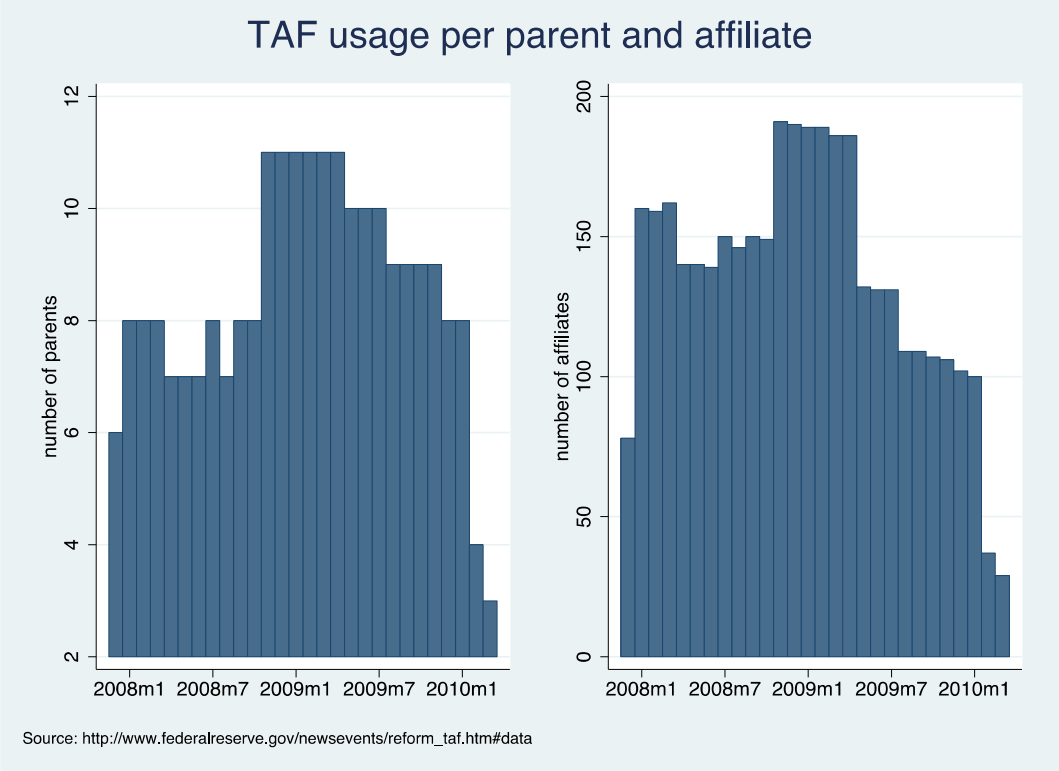
Our identification is based on the following assumptions and stylized facts. First, the Fed considered foreign, non–US chartered banks as eligible for refinancing operations like the TAF program through their US–located affiliates for the first time. All German banks with a US–located affiliate borrowed from the TAF program at some point in time during the provision period. Moreover, since 2003, there had been no local entry to or exit from the US market by a German bank. The set of 11 German parent banks whose US–located affiliate(s) turned out to be TAF–eligible was thus predetermined when the housing bubble burst in 2007. Any active sorting of banks into TAF eligibility can be ruled out. To capture the liquidity shock, we construct an indicator variable to track the bids of German banks for TAF liquidity that varies across parent bank and month. Figure 2 shows the staggered timing pattern that we exploit to identify the effect of TAF usage.

Second, in order to identify the effect of TAF, we exploit systematic differences across the parent banks' US dollar funding needs at the end of 2006, i.e. before the crisis unfolded. As pointed out in CGFS (2010b) or McGuire and von Peter (2009), prior to the 2007/2008 crisis, the US–located branches of foreign banks had sent substantial amounts of net intragroup US dollar–denominated funding to their home offices overseas, mostly raised from wholesale sources like money market mutual funds and other institutional investors. The off–balance sheet activities of these foreign branches in the US were large and included backup liquidity support

[2] See http://www.federalreserve.gov/newsevents/press/monetary/20071212a.htm.

to securitization structures and Asset Backed Commercial Paper (ABCP) conduits[3]. Hence, we resort to the pre–TAF exposure of individual German parent banks to the US dollar–denominated ABCP market as a proxy for US dollar funding needs. Figure 3 provides information on these exposures for German banks as of end–2006, drawing on data from Acharya et al. (2013). It shows that US dollar (USD) funding needs varied considerably across German parents and were likely pivotal in co–determining the use of the TAF facility. In fact, Benmelech (2012) finds that around 58% of overall TAF amounts were used by non–US banks. Shin (2010), in turn, reports that the cumulative total borrowing under the Fed's TAF program was dominated by foreign banks, especially those headquartered in Europe or Japan. This motivates our study of balance sheet adjustments of foreign, non–US affiliates of German parents in response to TAF. We argue that the significant indirect effects of TAF borrowing on the balance sheets of foreign affiliates of German parents outside the United States can provide evidence of actively managed internal capital markets.

Usage of the Term Auction Facility by German parents and affiliates — Figure 2



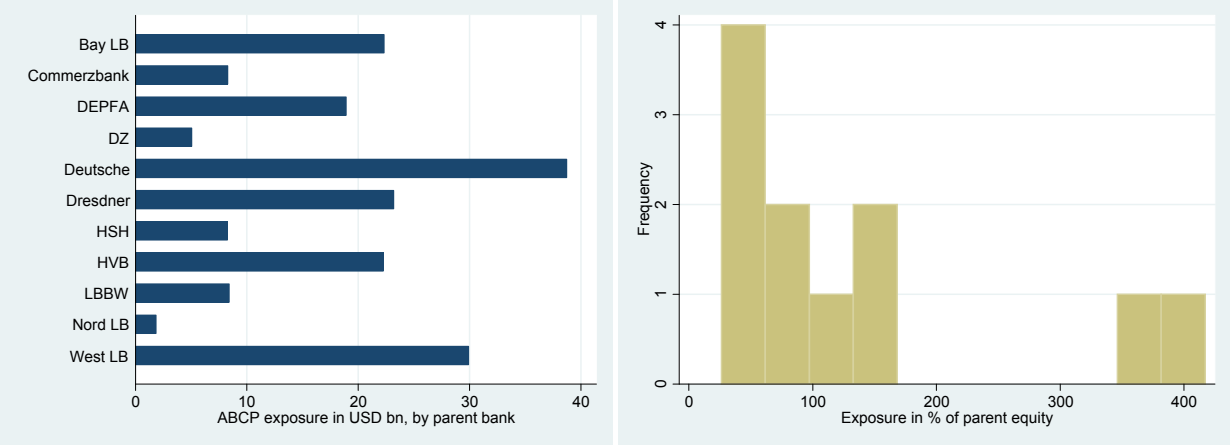
The left–hand panel indicates how many German parent banks used the Term Auction Facility (TAF) of the Federal Reserve via their US–located affiliate for each month during the program's period. The right–hand panel gives the total number of foreign affiliates outside the US summed across all recipient German parents that had indirect access to TAF based on the estimation sample. The data was obtained from the homepage of the Federal Reserve.

[3] Market reports suggest that net inter–office funding from US–located foreign branches surged when the crisis unfolded and exceeded $600 billion in mid–2008. At the end of September 2009, the off–balance sheet commitments of these branches amounted to about $700 billion (CGFS 2010b).

Third, we exclude the US–located affiliate(s)[4] of each German parent banks from the sample to avoid the mechanical effect that a positive funding shock in the US is associated with a balance sheet expansion of the TAF–borrowing entity. Instead, we focus on the assets and liabilities of foreign affiliates located *outside* the US. Thereby, we can test for international spillovers of crisis response (and unconventional monetary policy) measures via the internal capital markets of globally active parent banks.

ABCP exposures of German parents

Figure 3



The left–hand panel of the figure shows the aggregate Asset Backed Commercial Paper (ABCP) market exposures of German parent banks included in the sample as of December 2006. The right–hand panel plots the distribution of these exposures relative to the parent bank's equity in the same month based on the estimation sample at the affiliate–months level. The ABCP data is from Acharya et al (2013) and available at http://pages.stern.nyu.edu/~sternfin/pschnabl/.

Fourth, it is unlikely that the liquidity needs of a specific foreign affiliate located outside the US – which is our unit of analysis – *caused* the decision of parents to bid for TAF liquidity. While the health of US banks and foreign affiliates operating in US financial markets was likely decisive for various policy measures (see, e.g., Acharya et al. *forthcoming*), we argue that the use of the TAF facility represented an exogenous liquidity shock to the network of foreign affiliates of German parents located outside the US.

Our empirical analysis exploits the international banking activities of individual foreign affiliates worldwide as reported by globally–active German banks in the unconsolidated "External Position Report" of *Deutsche Bundesbank*.[5] Our sample contains monthly data and ranges from April 2002 to October 2012. We use information on country–by–country exposures of each subsidiary of a German bank located abroad or the sum of activities, as jointly reported by all branches of a given

[4] Besides the branch or subsidiary that actively bid for TAF liquidity (usually the one located in New York), some German banks operated more affiliates in other US cities. To avoid confounding patterns or common shocks, we drop those additional affiliates from our sample.

[5] Similar data have been used by Düwel et al. (2011), who find that declining risk appetite of a German parent bank has a negative impact on cross–border lending activities of the corporate banking group, even more so during the financial crisis. Using these data, it has also been shown that foreign activities of German banks are related to the size and productivity of banks (Buch et al., 2011) and that international banking activities have a relatively limited impact on banks' risk–return trade off (Buch et al. 2013).

parent in a given host country. The dataset allows us to identify the entire international network of affiliates per German parent bank apart from any US operations. As we can further separate interoffice positions from interlinkages with non–affiliated entities, we can overcome the analytical constraints highlighted in Fender and McGuire (2010).

Our results provide evidence on global banks' active management of internal capital markets, reflecting international spillover effects of the Fed's TAF liquidity shock. First, we find that non–US foreign affiliates contracted assets, but not liabilities, when the US–located affiliate of the same parent bank tapped into TAF liquidity. This contractionary effect, however, turns significant only when we condition on observed differences across parents' US dollar funding needs, as implied by ABCP exposures. We thus infer that liquidity provision through the Fed's TAF program mitigated the withdrawal from foreign markets other than the United States for those German parents that had a higher exposure to the US dollar–denominated ABCP market prior to the financial turmoil. At the level of the global banking group, this finding points to a *substitution effect* in that globally active parent banks tapped into TAF liquidity to substitute for liquidity that was previously sourced from wholesale markets. In general, our first result is also consistent with the more frequently described *flight home effect*, as German banks reduce their local foreign operations and centralize their international activity at the domestic parent.

Second, sample splits reveal that German banks retreat less from financial centers where affiliates presumably serve as a hub of core international financial market activities.

Third, when distinguishing by currency denomination, we find little indication of more pronounced effects for US dollar–denominated positions. In sum, our results suggest that the crisis might have induced international banks to increase the centralization of their liquidity management (CGFS 2010a; McGuire and von Peter 2009), while highlighting the importance of actively managed internal capital markets.

We are not the first to study the effects of emergency liquidity assistance of central banks' in general, and the Federal Reserve's in particular. Our results complement and partly contrast with earlier evidence. A series of papers studies the facilities that the Fed created in response to the near collapse of the US securitization markets in 2008. With respect to the mutual fund market, Duygan–Bump et al (2013) find that the "Asset–Backed Commercial Paper Money Market Mutual Fund Liquidity Facility" stabilized the outflows of assets and reduced ABCP yields. Campbell et al (2011) examine the effects of the "Term Asset–Backed Securities Loan Facility", suggesting that the program improved conditions in US securitization markets, with no differential effect among individual securities. As regards the TAF, McAndrews et al. (2008) find that the program effectively relaxed the liquidity constraints during the crisis in 2007–2008. Berger et al. (2014) use bank–level data from US Call reports to illustrate the degree of substitution between conventional bank funding sources and TAF liquidity. They examine differences across US banks and relate them to their respective TAF borrowing finding that smaller banks which tapped into TAF liquidity tended to be more capital constrained and riskier. Their results also point into the direction that TAF increased US lending, or at least moderated its decline, when banks were contracting their loan portfolio. Taylor and Williams (2009) argue that counterparty risk that should be reflected in the spread between term interbank lending rates and the overnight

rate – but not a scarcity of liquidity — was the major problem in financial markets during the crisis. Yet, they do not find that the TAF had an effect on interest rate spreads. Relatedly, Wu (2011) finds that the TAF program mitigated pressure in the money market, but exerted little effect on counterparty risk premia.

Benmelech (2012) stressed that the Fed allocated 58% of TAF loans to foreign banks, which provided a higher proportion of asset–backed securities as collateral than domestic banks. This motivates our study of German parent banks' role in the transmission of US liquidity shocks. Acharya et al. (2013) find that foreign banks in the US with substantial exposure to the asset–backed commercial paper market requested more liquidity from the Fed's TAF program. They also show that foreign banks significantly raised syndicated loan rates if credit was denominated in US dollars.

These papers suggest that the TAF program was successful in mitigating liquidity risk and, to a lesser extent, counterparty risk in the US. We complement these results by arguing that the program had effects also on non–US headquartered banks, which were active in markets outside the US. We explicitly test for the interaction effects between the use of the TAF program and pre–crisis ABCP exposures in order to control for differences in banks' US dollar funding needs. By studying the effect of the TAF program on foreign asset holdings of non–US affiliates of German banks, we identify a transmission channel of liquidity shocks through the internal capital markets of global banking networks.

More generally, our paper is related to literature on the transmission of shocks through global banks during financial crises. Peek and Rosengren (1997, 2000) documented the transmission of a shock that originates in Japan and spills over to the US economy via foreign affiliates. Cetorelli and Goldberg (2011) use data on bilateral country pairs and point to a negative impact of the US financial crisis on lending to emerging markets. They exploit the fact that banks have been hit differently by the drying up of the market for US dollar–denominated funding. The same authors (Cetorelli and Goldberg 2012) analyze the role of banks' internal capital markets, and find that smaller amounts of internal funds available for foreign banks' affiliates in the United States led to a decline in lending. Likewise, Giannetti and Laeven (2012) attribute the collapse of the global syndicated loan market to a "flight home effect", with lending banks attempting to rebalance their loan portfolios. While conducting a meta–analysis based on individual country–level papers of the international banking research network (IBRN), Buch and Goldberg (2015) show that the ex ante balance sheet composition of banks impacts their responses to liquidity risk. With respect to German banks, Kerl and Koch (2015) find that large and small German banks respond differently to liquidity shocks, mainly reflecting their distinct business models and geographical scope of foreign operations. Overall, the authors also provide evidence of a "flight–home effect" as German parent banks shifted from foreign to domestic lending in the wake of the US financial crisis. As distinct from the present paper, which takes the affiliate level point of view, their analysis is conducted at the level of German parent banks. Our paper hence complements these studies by analyzing the effects of liquidity provision under the TAF program on the global affiliate network of German banks.

Second, we also relate to studies that compare the lending behavior of foreign and domestic banks during the financial crisis. This literature shows that access to a stable funding base of (local) deposits and the strength of the capital buffer of the (foreign) parent bank affects the stability of local lending. According to De Haas and

van Horen (2013), foreign banks remained more committed to those countries hosting an affiliated subsidiary that were geographically close, and where they had built up relationships with local banks. More generally, domestic banks have been found to exhibit more stable lending patterns than multinational banks (Claessens and van Horen 2014; De Haas and van Lelyveld 2014), whereas financial distress at the parent bank level has been found to affect the local financing of SMEs in Central and Eastern European countries (Popov and Udell 2012). Our paper contributes to this literature by analyzing how the Fed's liquidity provision under the TAF program was transmitted through internal capital markets, affecting a broad range of foreign economies rather than individual host countries.

Our paper proceeds as follows. Section 2 discusses our empirical specification and Section 3 describes the core underlying datasets. Our regression results are presented in Section 4 and Section 5 concludes our analysis.

2. Hypotheses and empirical specification

2.1 Hypotheses

Our goal in this paper is to identify how liquidity shocks are transmitted through globally active banks and whether banks' internal capital markets play an important role in this transmission process. Cetorelli and Goldberg (2012) have documented the importance of banks' internal capital markets based on data for US banks. They use an explicit measure that reflects the net borrowing and lending of foreign banks' branches located in the US to the rest of the banking group. By contrast, we implicitly identify the internal capital market of German banks by studying changes in the international banking activities of foreign affiliates worldwide. We exploit how affiliate–level exposures on a country–by–country basis changed in response to funding shocks experienced by affiliates that belonged to the same parent, but were located in the US. We hence shed light on internal capital markets from a different perspective.

To understand how internal capital markets of global banks might distribute TAF liquidity, let's assume that the US–located affiliate of a German parent borrows from the Fed. We hypothesize that the response of German banks' affiliates outside the US to this US dollar liquidity shock depends on several factors and explore three scenarios.

In the first scenario, the additional US dollar–denominated funds would flow directly to those affiliates with the most profitable investment opportunities within the global network of a given German banking group. The liabilities of recipient foreign affiliates outside the US would increase, indicating a loan from the US–located affiliate of the same parent. This interoffice position would be well captured by the Bundesbank's "External Position Report". Recipient affiliates located outside the US could expand their foreign assets along with their US dollar–denominated liabilities. If they tried to avoid currency mismatches, their foreign asset holdings denominated in US dollars would grow and be recorded by the Bundesbank's "External Position Report".

The second scenario illustrates a response which is consistent with the *flight home* effect as described in previous papers on the global financial crisis. In general,

global banks would be cutting back their foreign operations, especially by reducing their foreign affiliates' activities. If these global banks used TAF liquidity as a relatively cheap source of US dollar funding, they would centralize funds at the German parent. Under these circumstances, the Bundesbank's "External Position Report" would indicate a stagnation or decline of the total assets and total liabilities of foreign affiliates.

The response in our third scenario takes an idiosyncratic US dollar funding shock into account. We follow Acharya et al. (2013) and use the exposure of the global German parent bank to the ABCP market as a proxy for its US dollar–denominated funding needs. The expected response on the non–US located affiliate level would be different, as the purpose of borrowing under the TAF program was to alleviate liquidity constraints. In that case, a *substitution effect* might arise, as there would be no *additional* liquidity, but rather a substitution of liquidity from different sources. In an attempt to support an ailing entity, the additional US–dollar liquidity would either stay with the US–located affiliate, or any other affected, group–affiliated entity, or it would be channeled to the German parent bank.[6] The behavior of any non–US located, unaffected affiliate would be ambiguous, depending on how much independence it would be granted by the German parent to pursue its individual profit maximizing operations.

2.2 Empirical model

Our analysis sheds light on how foreign affiliates of German banks outside the United States adjusted their balance sheets in response to the TAF liquidity provision by the US Federal Reserve. Equation (1) specifies the foreign activities of each foreign affiliate i as a function of TAF borrowing by the banking group (TAF_{jt}), the banking group's ex ante exposure to the US ABCP market, and the interaction of both terms. We use EXP_j to denote the ABCP exposure of each banking group j as the ratio of outstanding ABCP on the last trading day in 2006 relative to parent–level equity, in percent. This proxy of funding pressure *before* the TAF program started is time–invariant, whereas the interaction $EXP_j{*}TAF_{jt}$ captures the time–varying TAF borrowing of parent banks, given their time–invariant need for US dollar–denominated funding.

In addition, we control for parent bank[7] characteristics (j = 1, … , 11), affiliate characteristics (i = 1, …, 540), and host country characteristics ($k = 1, \ldots, 55$):

$$Y_{ijkt} = \alpha_0 + \alpha_1 TAF_{jt} + \alpha_2 EXP_j + \alpha_3 EXP_j \times TAF_{jt} + \beta_1 X_{jt-1} + \beta_2 Z_{ijt-1} + B_{ijt} + u_{kt} + \varepsilon_{ijkt} \quad (1)$$

Depending on the specification, our dependent variable Y_{ijkt} is either the logarithm of total foreign assets (*TFA)* or total foreign liabilities (*TFL)* of the affiliate i

[6] Owing to the architecture of the data set, we are unable to observe any change in the foreign affiliates' liabilities if the funds were channelled via the German parent bank. These liabilities are deemed "domestic liabilities" and are not covered by the Bundesbank's "External Position Report". If the parent would pass on the US–dollar funds to non–US affiliates in a second round, we would hence not be able to see any effect on the liability side, only the asset side.

[7] In our analysis, the parent bank identifies the respective banking group. For this reason, we use these terms interchangeably.

(either a branch or subsidiary), which is located in host country *k* and affiliated with parent *j* in month *t*.

The coefficient estimates of α_1 to α_3 help us to identify the more general *flight home effect* and the *substitution* effect. As suggested by the *flight home effect*, global banks would be centralizing their foreign operations at the parent banks, especially by scaling down the activities of their foreign affiliates. In that case we would expect α_1, α_2 and α_3 to be negative and statistically significant. However, if TAF liquidity was used to mitigate funding constraints, we would expect α_1 and α_3 to be either positive and statistically significant or insignificant at all. The US dollar funds borrowed from the TAF program would replace other sources at specific group–affiliated, ailing entities (most likely the US–located affiliate itself) that had been hit by the US dollar funding shock.

We estimate Equation (1) with panel OLS techniques and cluster standard errors at the affiliate level.[8] TAF_{jt} is an indicator variable that takes a value equal to one whenever the US–located affiliate of the same banking group related to parent bank *j* reports an outstanding loan from the TAF liquidity program in month *t*, and zero otherwise. Banks differ considerably with respect to the timing of TAF borrowing. For some banks, long spells of borrowing were interrupted by brief pauses of one or two months. Others tapped into TAF only occasionally; yet others used TAF solely at the beginning or the end of the provision period, which lasted from December 2007 until March 2010.

To mitigate concerns regarding confounding factors at the parent– or affiliate–level that determine affiliates' balance sheets, we specify X_{jt-1} and Z_{ijt-1}, which are vectors of monthly (t = 1, …, 127) parent–level and affiliate–level traits, lagged by one period. B_{ijt} is an indicator variable that is set equal to one if the affiliate is a branch, while being set to zero if it is a subsidiary.[9] To absorb monthly macroeconomic variation, specific to host countries where affiliates operate – such as differences in monetary policy, government rescue measures or demand effects related to periods of local economic up– and downturns – we use country–time fixed effects u_{kt} (Khwaja and Mian 2008). Thereby, our regressions attempt to explain only the remaining variation in total foreign assets and liabilities after controlling for possible aggregate differences across foreign markets.

The following four features of the data and of the TAF initiative help us to properly identify the transmission effects. First, one important econometric issue is whether German banks could self–select into the eligibility for TAF support. The answer is that they could not. The Fed extended TAF access also to non–US chartered banks, and only German parent banks with US–located affiliates at the time of program initiation could bid for TAF liquidity. Since 2003, there had been no local entry or exit from the US market by a German parent bank, and all German banks with US–located affiliate(s), without exceptions, tapped into TAF liquidity at some point in time. Because neither German parent banks, nor their foreign

[8] We exploit different forms of clustering for instance, twoway clustering at the affiliate–time level, clustering at the affiliate level (our unit of analysis) and at the parent level, which in turn nests both previous approaches.

[9] Occasionally, affiliates are sold to a new parent bank. The time *t* and parent *j* indices track these switches.

affiliates, could anticipate the unconventional support measures taken by the Fed in December 2007, there was no scope for self–selection into the eligibility for TAF support.

Second, we exploit systematic differences across the parent banks' US dollar funding needs as proxied by the exposure of German parent banks to the ABCP market at the end of 2006, that is, more than half year before the crisis started to unfold.

Third, we examine the activities of foreign affiliates *outside* the United States in response to time–varying borrowing from the TAF by the US–located affiliate of the same parent bank. We exploit variation over time across foreign affiliates of the same parent, while absorbing or controlling for any cross–sectional variation between parents. We drop the US–located foreign affiliate that receives TAF liquidity from our estimation sample to avoid mechanical effects of balance sheet expansions. A direct loan made by the US–located affiliate (potentially funded by TAF liquidity) to a non–US–located affiliate of the same parent bank would show up as an increase in the total foreign assets (TFA) of the affiliate located in the US and an increase in foreign liabilities of the affiliate located outside the US. By dropping the US–located affiliates and restricting our sample to affiliates outside the United States, we exclude interoffice positions on the asset side, but we allow for the internal capital markets to be reflected on the liability side. This helps identifying the effects of the TAF program on international lending outside the US, while tracking the TAF liquidity via internal capital markets of globally active parent banks.

Fourth, parent banks in our sample on average maintain a network of 21 foreign affiliates. Therefore, the liquidity needs of an individual foreign affiliate i of parent bank j is unlikely to cause the US–located affiliate to bid for TAF support.

3. Data

This section describes our dataset which consists of micro–level data from different sources. We combine the foreign affiliates' data, as recorded by the "External Position Report", with the corresponding parent– and affiliate–level controls, as specified in monthly balance–sheet statistics (both datasets are filed by *Deutsche Bundesbank*), the Fed's publicly available dataset on TAF lending[10] to individual banking groups, and ABCP exposures[11] by parent bank from Acharya et al. (2013). Table 1 shows the descriptive statistics of all variables, as defined in the Data Appendix.

The data provide a geographically disaggregated picture that reflects German banks' global operations in terms of assets and liabilities across all locations, while, at the same time, separating interoffice positions with the parent bank from interlinkages with non–affiliated entities. As documented by Fender and McGuire (2010), such a disaggregated structure is a necessary requirement to properly assess

[10] The data are published on the website of the Board of Governors of the Federal Reserve System (http://www.federalreserve.gov/newsevents/reform_taf.htm).

[11] The underlying data of Acharya et al. (2013b) are available on Philipp Schnabl's website (http://www.federalreserve.gov/newsevents/reform_taf.htm)

the banking group's role in the transmission of shocks across countries and a rare property in regulatory datasets.

Descriptive Statistics — Table 1

	Observations	Mean	Standard Deviation
Dependent variables			
Total foreign assets	24398	3,671,375	6,444,329
Total foreign assets (in ln)	24398	13.32	2.82
Total foreign assets in USD	24398	887,338	1,948,941
Total foreign assets in USD (in ln)	24398	9.72	5.27
Total foreign liabilities	24398	2,723,675	5,408,248
Total foreign liabilities (in ln)	24398	12.11	4.33
Total foreign liabilities in USD	24398	847,572	2,117,615
Total foreign liabilities in USD (in ln)	24398	9.20	5.53
Independent variables			
TAF indicator (0/1)	24398	0.16	0.36
Exposure (in % of Equity)	24398	113.30	93.78
Parent–level variables			
Capital (in%)	24398	4.42	1.55
Liquidity (in%)	24398	0.95	1.29
Latent liabilities (in%)	24398	12.16	9.59
Wholesale funding (in%)	24398	19.47	12.60
Size (total assets in ln)	24398	19.41	0.49
German support (0/1)	24398	0.13	0.34
Return on equity	18693	3.79	19.46
Non–performing loans	18951	1.11	1.27
Crisis (0/1)	24398	0.03	0.16
Affiliate–level variables			
Capital (in%)	24398	0.04	17.29
Liquidity (in%)	24398	1.82	5.57
Latent liabilities (in%)	24398	51.79	326.33
Wholesale funding (in%)	24398	5.74	15.14
Branch indicator (0/1)	24398	0.55	0.50

Details on data definitions are given in the Data Appendix. Dependent variables are expressed in thousands of euros. If variables are stated in percent, the numerator is given by total assets of the parent bank or the affiliate, respectively (unless stated differently).

3.1 Total foreign assets and liabilities of foreign affiliates of German parents

As our dependent variables, we use information on the foreign assets and liabilities of German banks' foreign affiliates located outside the United States from the "External Position Report", as collected by *Deutsche Bundesbank*. The *Bundesbank* receives detailed mandatory reports on cross–border and local positions of German banks' foreign affiliates abroad. In principle, the granularity of the data allows us to distinguish between different currency denominations, instruments, remaining maturities and counterparty countries with a split at the sectoral level and various crossings of these data dimensions. Inter alia, these reports serve as inputs into the international banking statistics which are compiled by the *Bank for International Settlements*.[12]

We retrieve data on German banks' foreign affiliates' (branches and subsidiaries) assets and liabilities vis–à–vis the rest of the world. The "External Position Report" excludes any positions vis–à–vis the German home market, independent of whether these positions involve the domestic parent bank or an unaffiliated counterparty. The first panel in Table 1 shows that the average foreign affiliate residing outside of the United States held, on average, total foreign assets worth EUR 3.7 billion during our sample period. On average, 24% of these total foreign assets were denominated in US dollars, with total foreign assets exceeding total foreign liabilities by about EUR 0.9 billion. This difference reflects lending and borrowing vis–à–vis German entities, particularly the internal funding that foreign affiliates receive from their domestic parent bank via internal capital markets (Frey and Kerl 2015). The share of US dollar–denominated liabilities of the average non–US–located foreign affiliates is even larger, amounting to 31%. Since Equation (1) specifies the dependent variables in logarithms, we also show the moments of the transformed data in Table 1.

3.2 Term auction facility

This section describes how we measure TAF usage by a given German banking group via its US–located foreign affiliate(s). In August 2007, strains on international funding markets sent an early warning of the global financial crisis. Central banks responded through concerted actions and the provision of short–term liquidity assistance (CGFS 2010b; McGuire and von Peter 2009). The US Fed's TAF was one of the largest such programs, auctioning short–term US dollar liquidity worth USD 3.81 trillion to 416 banks. The program was launched as a complement to conventional discount window and open market operations (OMOs) in order to provide emergency liquidity. Lending from the discount window suffered from stigma concerns among banks (Armantier et al 2015). Compared to OMOs, TAF allowed a broader range of (both domestic and foreign) financially sound depository institutions to borrow short–term funds from the Fed against a broader set of collateral. The TAF program provides a unique opportunity to study the international transmission of such emergency liquidity provision measures.

[12] See http://www.bis.org/statistics/about_banking_stats.htm.

Comprehensive information on the TAF program and on the participating banks is publicly available.[13]

The left–hand panel in Figure 2 shows the number of German parent banks that used TAF liquidity during the period December 2007 to March 2010. When the program was launched, six out of eleven eligible German parent banks immediately borrowed under the program. Until the last quarter of 2008, between six to eight German parents used TAF liquidity. However, after the interbank market dried up in September 2008, all eligible German parent banks bid for TAF loans. In the course of 2009, this number declined until eight German parents reported outstanding TAF loans at the end of 2009. The TAF program ended in March 2010, when only two German parents were still using TAF loans.

The number of foreign affiliates outside of the US linked to those 11 parents exhibits similar patterns over time. The right–hand panel of Figure 2 shows that more than 150 foreign affiliates were linked to the eight parents using TAF liquidity in January 2008. In June 2009, ten parent banks reported outstanding TAF loans, but only about 120 entities were affiliated with these parent banks. The composition of foreign affiliates that could indirectly be affected by TAF liquidity thus changed over time.

3.3 Exposure to the asset backed commercial paper market

In order to measure differences across parent banks' needs for US dollar funding, we exploit the dataset compiled by Acharya et al. (2013) on banks' exposures to the US dollar–denominated ABCP market. They document that foreign banks significantly shaped the pricing and other contractual terms for syndicated loans denominated in US dollars. By contrast, we exploit information on the entire spectrum of all existing foreign positions regarding the asset and liability side of foreign affiliates. Assets include loans to banks, the non–bank private sector, and the public sector; liabilities include local deposits and wholesale funding.

To gauge the exposure of German parents, and thus implicitly that of the associated banking group, to possible strains in US dollar funding, their dataset gives us the market value of aggregate ABCP exposures to parent equity per parent bank. The second panel of Table 1 shows that the average exposure in the affiliate–month analysis sample was 113% at year–end 2006, on the eve of the global financial crisis. Figure 2 illustrates the substantial variation across parents and thus the associated foreign affiliates outside the United States. The order of magnitude for the largest parent with the largest exposure was around $39 billion, which compared to total group equity of around $43 billion in December 2006 (Schnabel et al, 2013b). Hence, ABCP exposures were a major source of funding risk.

3.4 Parent– and affiliate–level controls

Bidding for TAF liquidity could have been triggered by both parent– and affiliate–level characteristics, such as worsening access to wholesale funding. We include control variables that capture structural characteristics of parents and non–US

[13] See http://www.federalreserve.gov/newsevents/reform_taf.htm.

located foreign affiliates (Table 1). The remaining two panels in Table 1 show descriptive statistics for both German parent banks and foreign affiliates outside the United States. The data are obtained from monthly balance sheets statistics (*Monatliche Bilanzstatistik*) filed by *Deutsche Bundesbank*.

Three variables control for the funding structure of German parents and affiliates outside the US. First, the *capital ratio* is defined as a bank's equity over total assets (non–risk–weighted assets). On average, parents are much better *capitalized* compared to affiliates (4.4% vs. 0.04%). This difference underpins the importance of considering also foreign branches, rather than just subsidiaries because the former are chartered in the home country (Germany) and do not have to hold capital. Second, the share of *wholesale funding* is the share of securitized debt in total debt at both levels. Foreign affiliates can have unique funding structures, while extending credit to and raising funds from affiliated and non–affiliated counterparties worldwide (Fender and McGuire 2010). The large parent banks considered in this study exhibit a large dependence on capital markets for funding purposes, while reporting almost 20% of their balance sheet as wholesale funding. The share of wholesale funding for affiliates is much smaller (5%). Third, *latent liabilities* capture irrevocable credit commitments and mezzanine finance relative to total assets. Off–balance sheet activities represent an important source of fee income that gained importance for banks in times of declining interest margins. Latent liabilities account for half the balance sheet's size of the average affiliate.

The asset side of banks' balance sheet is described by *liquidity* as the share of cash and central bank deposits. This share is relatively small for the parents (about 1% of assets) and a bit higher for foreign affiliates (about 2%).

For the parent bank, we specify four additional controls. We account for *size* using log total assets. As a robustness check, we also control for the share of *non–performing loans* in total loans as well as for *return on equity* to capture possible differences in the risk–return preferences of parent banks. We cannot calculate these variables for affiliates, because the "External Position Report" contains only balance sheet data and no information on profit and loss statements. On average, German parent banks are profitable and exhibit merely a 1% share of non–performing loans. However, as both variables are available only at a lower frequency for a subset of banks, we do not specify them as part of the baseline vector of control variables.

We add an indicator variable which equals one if the parent received capital support from the German authorities. Support by the domestic government might confound the effects that TAF had on foreign affiliate balance sheets (Kerl and Koch 2015). We obtained the information on the timing of capital injections and the issuance of government–guaranteed bonds from Stolz and Wedow (2010). About 10% of our affiliate–month observations pertain to German parent banks that have received support measures like capital injections, credit lines, or guarantees by the German government (federal and state–level) between August 2007 and August 2008. We use a combined indicator equal to one from the time the German parent has received any German support measure.

Finally, we take alternative liquidity shocks into account that might have affected affiliates' balance sheets due to other central bank measures that were initiated in the run–up to the US dollar funding crisis and prior to the launch of the TAF. Specifically, we specify an indicator equal to one as of August 2007. From then

on, central banks also offered US dollar swap lines in a concerted fashion (Goldberg et al. 2011; McGuire and von Peter 2009).

4. Regression results

Our main objective is to test whether the Fed's TAF program affected international banking activities outside the US, and how global banks distribute the TAF–injected US dollar liquidity via internal capital markets. Table 2 shows the baseline results drawing on Equation (1). Columns (1)–(4) show our results for the log of total foreign assets at the level of individual non–US affiliates as dependent variable, while columns (5)–(8) show the results for the log of their total foreign liabilities. We cluster standard errors at the affiliate level, equivalent to our unit of analysis. In order to control for local macroeconomic developments, we follow Khwaja and Mian (2008), adding host country–by–time fixed effects. Overall, our specification explains a considerable share of the total variation in total foreign assets (56%).

4.1 Response of foreign assets

If parent banks tapped into TAF liquidity in order to increase assets of foreign affiliates in non–US markets, the estimated coefficient of the *TAF* indicator α_1 should be positive. Column (1) shows that the effect of *TAF* on foreign assets is statistically insignificant when controlling for local financial market conditions (through country–by–time fixed effects) and for characteristics of parents and affiliates. The *TAF* indicator also remains insignificant after including additional controls such as return on equity and non–performing loans (Column 2). We infer that TAF liquidity was not simply channeled to the non–US located affiliates in order to be invested in their most profitable investment opportunities. This finding clearly contrasts with the behavior laid out in the first scenario.

The insignificant response of foreign affiliates' asset holdings to TAF borrowing might ensue from systematic differences in US dollar funding needs at the level of the banking group. If US dollar liquidity from the TAF program was needed to substitute for US dollar liquidity previously obtained from other sources like money market mutual funds and other institutional investors, we would expect no significant increase of assets. Therefore, we add the ABCP exposure of parents to our baseline specification to proxy for US dollar funding needs at the parent level and interact this variable with the *TAF* indicator, which varies across time and parent bank. Column (3) shows that foreign affiliates outside the United States significantly contracted their foreign assets when the US–located affiliate of the same parent bank received *TAF* liquidity.

While the pure *TAF* effect α_1 is negative and the direct *Exposure* coefficient α_2 is insignificant, the interaction coefficient α_3 of *TAF* borrowing with ABCP *Exposure* is positive and significant. Hence, our results lend empirical support to both the *flight home* and the *substitution effect*. In general, global banks tapping into TAF liquidity seem to scale down the operations of their foreign affiliates. However, for banking groups with a higher need of US dollar liquidity due to their ABCP exposure, TAF liquidity replaced other sources of US dollar funding and thereby slowed the withdrawal from foreign markets.

Effects of TAF on total foreign assets and liabilities

Table 2

	Foreign assets				Foreign liabilities			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TAF indicator (0/1)	–0.122	–0.103	–0.439**	–0.439**	0.373	0.095	–0.013	–0.006
	(0.202)	(0.198)	(0.217)	(0.218)	(0.343)	(0.278)	(0.305)	(0.307)
Exposure			–0.001	–0.001			0.002	0.002
			(0.001)	(0.001)			(0.002)	(0.002)
TAF*Exposure			0.003**	0.003**			0.003	0.003
			(0.001)	(0.001)			(0.002)	(0.002)
Crises*Exposure				–0.000				–0.002
				(0.001)				(0.002)
Parent–level variables								
Capital	0.157**	0.167**	0.163**	0.163**	0.239***	0.142	0.264***	0.264***
	(0.073)	(0.084)	(0.077)	(0.077)	(0.089)	(0.095)	(0.091)	(0.091)
Liquidity	0.029	0.042	0.033	0.033	–0.037	0.047	–0.076	–0.077
	(0.041)	(0.045)	(0.034)	(0.034)	(0.066)	(0.052)	(0.054)	(0.054)
Latent liabilities	–0.009	–0.010	–0.010	–0.010	–0.020	–0.025**	–0.011	–0.011
	(0.011)	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.013)
Wholesale funding	0.022**	0.030	0.021*	0.021*	–0.047***	–0.018	–0.043**	–0.043**
	(0.011)	(0.019)	(0.011)	(0.011)	(0.016)	(0.027)	(0.017)	(0.017)
Size	0.283	0.511	0.186	0.186	0.140	0.264	0.429	0.432
	(0.241)	(0.347)	(0.311)	(0.311)	(0.387)	(0.426)	(0.411)	(0.412)
German support (0/1)	–0.165	–0.124	–0.216	–0.216	–0.719	–0.681	–1.023**	–1.026**
	(0.342)	(0.376)	(0.362)	(0.362)	(0.456)	(0.510)	(0.483)	(0.484)
Return on equity		–0.002				0.002		
		(0.006)				(0.008)		
Non–performing		0.024				–0.049		
Loans (ratio)		(0.115)				(0.156)		
Affiliate–level variables								
Capital	–0.069***	–0.069***	–0.069***	–0.069***	–0.136***	–0.138***	–0.136***	–0.136***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.010)	(0.009)	(0.009)
Liquidity	–0.017	–0.024	–0.017	–0.017	–0.011	–0.019	–0.011	–0.011
	(0.043)	(0.054)	(0.043)	(0.043)	(0.035)	(0.040)	(0.035)	(0.035)
Latent liabilities	0.008***	0.008***	0.008***	0.008***	0.011***	0.010***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wholesale funding	0.001	–0.002	0.001	0.001	–0.045**	–0.037	–0.046**	–0.046**
	(0.013)	(0.020)	(0.013)	(0.013)	(0.020)	(0.028)	(0.020)	(0.020)
Branch indicator (0/1)	–0.674*	–0.923**	–0.671*	–0.671*	–1.398***	–1.657***	–1.375***	–1.374***
	(0.362)	(0.418)	(0.364)	(0.364)	(0.459)	(0.528)	(0.459)	(0.459)
Constant	7.527	3.168	9.525	9.524	11.423	9.304	5.373	5.309
	(4.870)	(7.149)	(6.439)	(6.446)	(7.668)	(8.670)	(8.290)	(8.301)
Observations	24398	18657	24398	24398	24398	18657	24398	24398
R^2	0.558	0.577	0.559	0.559	0.626	0.647	0.627	0.627

The dependent variable in columns (1)–(3) [(4)–(6)] is the log of total foreign assets [liabilities] reported by individual foreign affiliates of German banks and aggregated at their respective host–country level. US–located affiliates are excluded. "Exposure" derives from Acharya et al (2013b) and denotes the ratio of the German parent banks' asset–backed commercial paper holdings to equity expressed in percent. "Crisis" indicates the period of beginning financial market turmoil from August to November 2007 before the TAF program was initiated. Parent– and affiliate–level variables are lagged by one month. Size refers to the log of the German parent banks' total assets. The Data Appendix defines all variables more precisely. Host country–by–time (monthly) fixed effects are included but not reported. We report standard errors in parentheses and cluster them at the affiliate–level to account for serial correlation. ***, **, * denote significance at the 1%, 5%, 10%–level

These results are consistent with previous findings on how global, non–US chartered banks behaved during the financial crisis. From the parent bank

perspective, Kerl and Koch (2015) find that German parent banks with higher credit commitments reduced their net borrowing from affiliated entities relatively more when receiving support from the German government. We extend this finding to the affiliate level, while tracking the effect of *TAF* liquidity. From the perspective of foreign affiliates outside the US, those affiliates that were part of a banking group that had overall a larger need for US dollar funding (higher *Exposure*) contracted their foreign assets less in response to *TAF* borrowing. Instead of reducing their foreign assets, these non–US affiliates might have needed to channel fewer funds to Germany to support of their parent banks. Note that the "External Position Report" does not capture positions vis–à–vis Germany from the foreign affiliates' perspective. This finding would be consistent with Frey and Kerl (2015), Kerl and Koch (2015) and Galema et al. (2015) with the interaction effect providing evidence that global banks actively manage liquidity through internal capital markets on a global scale.

As regards the economic magnitudes of these effects, recall that we estimate a semi–log model. The total marginal effect of using TAF evaluated at the mean of the ABCP *Exposure* measure (113% of ABCP relative to equity, Table 1) thus indicates a contraction of only around 10% (=0.003*113.3 – 0.439) of total foreign assets in response to using TAF liquidity. Compared to the direct contractionary effect of 44%, *TAF* borrowing thus mitigated the retreat from foreign markets other than the United States for those German banking groups that had a higher *Exposure* to the US dollar–denominated ABCP market prior to the financial turmoil (Figure 3).

Column (4) reveals that our result can indeed be attributed to the use of *TAF* and not to other unconventional emergency interventions taken by central banks or governments prior to the launch of TAF. We include the interaction of a *Crises* indicator variable denoting the start of financial market frictions in August 2007 with the ABCP *Exposure* of parent banks[14]. This interaction term is insignificant, while the coefficients for both *TAF* and *TAF*Exposure* variable remain statistically significant and identical in magnitude. Thus, our specification seems to identify the differential impact of TAF, given cross–sectional heterogeneity in parents' US dollar–denominated funding needs following from their pre–crisis exposures to the ABCP market.

4.2 Response of foreign liabilities

Columns (5) to (8) describe our results for the effect of the TAF program on the total foreign liabilities reported by foreign affiliates outside the United States. The explanatory power of these specifications is even larger, amounting to 63%. A positive coefficient estimate α_1 would lend empirical support to the first scenario described in Section 2.1. TAF funds might be a relatively cheaper source of US–dollar denominated funding compared to local deposits that affiliates outside the US can collect and then swap into US dollar–denominated funds. In this case, the TAF indicator would hint at higher interoffice liabilities vis–à–vis the US–located affiliated of the same banking group during periods of active TAF borrowing. Conversely, negative estimates of α_1, α_2 and α_3 would be consistent with the *flight–home* effect. If banks borrowed under the TAF program to buffer liquidity

[14] The crisis indicator per se is subsumed by "Khwaja–Mian" type host country–time fixed effects.

shocks experienced by any group–affiliated entity (most likely the US–located affiliate) or the parent bank itself, we would expect insignificant or maybe even positive estimates depending on how independent non–US located affiliates could operate from their parent bank. Insignificant or positive estimates of α_1 and α_3 would speak to the substitution effect of the third scenario.

Columns (5) through (8) show that, contrary to assets, the effect of TAF liquidity on foreign liabilities of non–US affiliates is insignificant. Neither ABCP *Exposure* nor the interaction term *TAF*Exposure* is statistically significant. This insignificant effect could be explained by the inability of banks to swap local (deposit) funding outside the United States into US dollar–denominated funding. We cannot test this explanation directly, but indirect evidence supports this line of reasoning. During the financial crisis, the spreads in cross–currency swap transactions widened significantly as a USD premium emerged. This widening was mainly attributed to a systemic US dollar shortage, coupled with concerns about counterparty risk (Baba and Packer 2008; McGuire and von Peter 2009). Hence, in addition to TAF borrowing having been a cheaper source of financing, the Fed may have been the only lender willing to provide US dollar liquidity at that point in time.

Overall, our results are consistent with a general *flight home* and a *substitution effect* through global banks' internal capital market: TAF liquidity relieved funding pressure and induced parent banks to demand less net funding from their foreign affiliates outside the US. The insignificant effect on foreign liabilities hints at banks' inability to swap local deposit funding obtained by foreign affiliates into US dollar denominated funds (McGuire and von Peter 2009).

4.3 Effects of parent– and affiliate–level controls

The lower panels in Table 2 show our estimates of parent– and affiliate–level control variables for the log of total foreign assets in columns (1)–(4) and the log of total foreign liabilities in columns (5)–(8). Regarding the former, we find generally that affiliates that are associated with better capitalized parents hold more total foreign assets. An increase of the capital ratio by 1 percentage point is associated with higher foreign asset holdings of about 16%. The link between parent capitalization and total foreign liabilities at the affiliate level is even stronger. We find no significant effects of parent liquidity, off–balance latent liabilities, and size. Larger shares of wholesale funding at the parent level have a positive correlation with larger foreign asset holdings, but a negative correlation with foreign liabilities at the affiliate level. This result might hint at the existence of internal capital markets, as wholesale funding raised by the parent bank is channeled abroad and invested by the foreign affiliates, while replacing their own funding abroad. Having received support from the German state reduces only the liabilities of foreign affiliates significantly, but not their assets.

In terms of affiliate–level control variables, capital, latent liabilities, and the branch indicator exhibit consistently significant estimates. A one percentage point higher capital ratio is associated with lower foreign asset holdings of about 69%, and lower levels of foreign liabilities of about 13%. Hence, better capitalized affiliates report, in contrast to their parents, a lower level of foreign operations. A higher share of latent liabilities has a small, albeit positive, correlation with foreign assets and foreign liabilities. The negative branch indicator, finally, implies that the

balance sheets of foreign subsidiaries are significantly larger. We focus henceforth on the specifications in Columns (3) and (7).

4.4 Regional sample splits

We have so far argued that foreign affiliates outside the United States are most unlikely to have induced the US–located affiliates to bid for TAF liquidity. However, certain foreign affiliates, for instance in Dublin or London, perform a hub function in internal capital markets, which may affect our results.[15]

Therefore, we estimate the model for subsets of affiliates in different host countries that might specialize in specific business models or functions within the setup of a globally–operating bank. We focus on total foreign assets as the dependent variable. For the sake of comparison, Column (1) of Table 3 replicates our benchmark results.

Column (2) considers foreign affiliates located in financial centers in isolation, whereas Column (3) drops them from our benchmark estimation sample.[16] Results for financial centers confirm our previous finding that banks with a one percentage point higher *Exposure* to the ABCP market slightly increase their foreign assets (by 0.3%) in response to TAF borrowing by their parents. However, the direct TAF effect can no longer be estimated with sufficient precision and turns insignificant due to the reduced sample size. By contrast, the sample of affiliates that are not located in financial centers yields a negative and significant *TAF* effect comparable to the benchmark results, but an insignificant interaction effect. Hence, foreign affiliates that are located in financial centers differ considerably from foreign affiliates located elsewhere. This indicates that affiliates perform hub functions for parent banks and were shielded from the global retreat from foreign markets. The results for our control variables mostly do not differ from the main findings.

Next, we consider the possibility of systematic differences across affiliates' access opportunities to other sources of liquidity than TAF, in this case liquidity provisions from the ECB or other national authorities within the euro area. Column (4) replicates our estimation for those affiliates hosted by EMU member countries, while Column (5) drops them from our estimation sample. Results for EMU–located affiliates confirm our benchmark results, but the coefficient estimates are slightly higher in absolute magnitude, albeit with somewhat weaker statistical significance. Affiliates residing in EMU countries contracted their foreign asset holdings in response to TAF liquidity, although less strongly when being a member of a banking group with larger ABCP exposures. The total marginal effect of TAF usage evaluated at the mean ABCP exposure level indicates a contraction on the order of 19% compared to the 10% effect reported for the baseline. For foreign affiliates located outside EMU countries, Column (5) exhibits a direct negative coefficient, indicating that TAF borrowing is associated with a relatively higher reduction of foreign assets

[15] Since some *Landesbanken* were hit hardest by the mortgage subprime market collapse and the unfolding of the US dollar liquidity crisis (e.g. the case of *SachsenLB*), we also estimated the effect of both ABCP exposure and TAF for different types of banking groups: private, cooperative, and savings banks. However, some of these subsamples had too few observations of freedom to yield statistically reasonable results. See Tables 5 and 6.

[16] The Data Appendix provides details on the different country sets that form our estimation samples.

of about 40%, while the interaction term turns insignificant. Thus, our main results do not dependent on systematic differences across affiliates' access to ECB liquidity facilities.

Subsamples by region

Table 3

	Baseline	Financial centres		EMU		UK	Ireland	GIIPS
		Only	Excluded	Only	Excluded	Excluded	Excluded	Excluded
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TAF indicator (0/1)	–0.439**	–0.423	–0.527**	–0.643*	–0.396*	–0.501**	–0.481**	–0.612***
	(0.217)	(0.304)	(0.266)	(0.369)	(0.229)	(0.232)	(0.215)	(0.234)
Exposure	–0.001	–0.002	–0.000	–0.001	0.000	–0.001	–0.000	–0.000
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
TAF*Exposure	0.003**	0.003*	0.002	0.004*	0.002	0.003**	0.003**	0.003**
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Parent–level variables								
Capital	0.163**	0.189*	0.209**	0.241*	0.140*	0.160*	0.177**	0.163**
	(0.077)	(0.104)	(0.097)	(0.144)	(0.072)	(0.084)	(0.078)	(0.080)
Liquidity	0.033	0.041	0.023	0.019	0.033	0.035	0.041	0.044
	(0.034)	(0.060)	(0.038)	(0.061)	(0.034)	(0.037)	(0.034)	(0.036)
Latent liabilities	–0.010	–0.051**	0.009	–0.015	–0.008	–0.014	–0.010	–0.013
	(0.012)	(0.026)	(0.012)	(0.021)	(0.010)	(0.012)	(0.012)	(0.013)
Wholesale funding	0.021*	–0.016	0.037***	0.024	0.014	0.018	0.025**	0.024*
	(0.011)	(0.019)	(0.012)	(0.015)	(0.013)	(0.012)	(0.011)	(0.013)
Size	0.186	0.230	0.310	–0.122	0.562	0.130	0.275	0.445
	(0.311)	(0.489)	(0.337)	(0.516)	(0.347)	(0.344)	(0.320)	(0.341)
German support (0/1)	–0.216	–0.104	–0.185	0.018	–0.523	–0.203	–0.368	–0.502
	(0.362)	(0.519)	(0.448)	(0.583)	(0.406)	(0.402)	(0.341)	(0.345)
Affiliate–level variables								
Capital	–0.069***	–0.101***	–0.052***	–0.064***	–0.063***	–0.071***	–0.065***	–0.056***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.010)	(0.008)	(0.008)	(0.009)
Liquidity	–0.017	–0.118	0.032	–0.252***	0.021	–0.014	0.029	0.026
	(0.043)	(0.095)	(0.029)	(0.094)	(0.029)	(0.042)	(0.026)	(0.026)
Latent liabilities	0.008***	0.009**	0.008***	0.007***	0.010***	0.008***	0.008***	0.010***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Wholesale funding	0.001	–0.004	0.006	0.012*	–0.021	0.005	0.001	0.003
	(0.013)	(0.023)	(0.010)	(0.007)	(0.023)	(0.012)	(0.013)	(0.013)
Branch indicator (0/1)	–0.671*	–1.121*	–0.591	–1.553***	0.523	–0.910**	–0.530	–0.149
	(0.364)	(0.661)	(0.409)	(0.568)	(0.434)	(0.401)	(0.355)	(0.374)
Constant	9.525	11.022	5.813	15.346	1.784	10.707	7.411	3.913
	(6.439)	(9.761)	(6.981)	(10.593)	(7.118)	(7.102)	(6.643)	(7.090)
Observations	24,398	7,023	17,375	9,437	14,961	22,696	23,751	21,131
R^2	0.559	0.468	0.640	0.494	0.679	0.549	0.558	0.582

The dependent variable in all columns is the log of total foreign assets reported by individual foreign affiliates of German banks and aggregated at their respective host–country level. US–located affiliates are excluded. "Exposure" derives from Acharya et al (2013b) and denotes the ratio of the German parent banks' asset–backed commercial paper holdings to equity expressed in percent. Parent– and affiliate–level variables are lagged by one month. "Size" refers to the log of the German parent banks' total assets. The Data Appendix defines all variables and the country sets more precisely. Host country–by–time (monthly) fixed effects are included but not reported. "only" means that the regression exclusively draws on the referenced set of countries, whereas "exempt" means that we use our baseline sample of 63 host countries while dropping the referenced set of countries. EMU abbreviates European Monetary Union. GIIPS abbreviates Greece, Ireland, Italy, Portugal, Spain. We report standard errors in parentheses and cluster them at the affiliate–level to account for serial correlation. ***, **, * denote significance at the 1%, 5%, 10%–level.

Columns (6) through (8) exclude the United Kingdom, Ireland, and EMU periphery countries, respectively, from our estimation sample. The UK and Ireland played a central role as locations for the securitization business, in particular the one related to US real estate–backed securities. As such, affiliates in these markets might have had fundamentally different needs for US dollar–denominated funding. The periphery countries of the euro area, in turn, were exposed to various alternative central bank facilities in response to the sovereign debt crisis, which peaked with the first rescue package for the Greek government in 2010. As it turns out, the exclusion of any of these groups does not affect our findings and yields very similar effects compared to the benchmark results reported in Table 1.

4.5 US dollar–denominated positions

When responding to liquidity shocks, the currency composition of banks' assets and liabilities matter as banks might aim at limiting open foreign exchange positions and/or minimizing the costs of hedging foreign currency risk. Ivashina et al. (2015) show that the wholesale funding structure of European banks matters for US dollar–denominated lending once frictions in the foreign exchange swap market occur. Analyzing the share of syndicated loans denominated in US dollars, they find that banks headquartered in the euro area significantly contracted their US dollar–denominated lending relative to euro–denominated lending in Europe and the US. McGuire and von Peter (2009) provide similar evidence at the aggregate level and point to European banks' large–scale reliance on wholesale funds.

Our data provide information on a currency breakdown of foreign assets and liabilities.[17] We can test whether foreign affiliates associated with banking groups that report larger exposures to the ABCP market adjusted their US dollar–denominated assets differently, when compared to euro–denominated assets. The Fed's TAF program would be expected to have a stronger effect on US dollar–denominated assets and liabilities, as banks were able to immediately invoke the internal capital market, without the need to swap non–US dollar funds into the US currency.

Table 4 distinguishes US dollar–denominated assets (Column 2) and US dollar–denominated liabilities (Column 4) for all non–US located foreign affiliates of German parents. Columns (1) and (3) again replicate our benchmark results. The estimates for foreign assets denominated in US dollars show that only the interaction of the ABCP exposure and TAF indicators retains its significantly positive nature, exhibiting a slightly larger magnitude compared to the baseline. Foreign affiliates with larger ABCP exposures thus responded by expanding assets denominated in USD when their parent tapped into TAF liquidity. The direct effects of ABCP exposure and the TAF indicator are insignificant, while our host of control variables yield comparable results to the baseline specification. Hence, foreign affiliates of German parents did not shrink assets denominated in USD – contrary to the retreat effects documented by, for example, Ivashina et al. (2015). An important feature of our study is our focus on the assets of foreign affiliates located outside the United States. Thereby, we complement the important previous evidence

[17] In their reports to the *Bundesbank*, banks have to convert all assets denominated in any currency into euro at the time of reporting. For this reason, the aggregates might mask significant variations across assets which are originally denominated in different currencies.

Subsamples by currency

Table 4

	Foreign assets		Foreign liabilities	
	All currencies	USD	All currencies	USD
	(1)	(2)	(3)	(4)
TAF indicator (0/1)	–0.439**	–0.357	–0.013	–0.034
	(0.217)	(0.417)	(0.305)	(0.421)
Exposure	–0.001	0.005	0.002	0.006**
	(0.001)	(0.003)	(0.002)	(0.003)
TAF*Exposure	0.003**	0.005**	0.003	0.002
	(0.001)	(0.002)	(0.002)	(0.003)
Parent–level variables				
Capital	0.163**	0.408***	0.264***	0.524***
	(0.077)	(0.138)	(0.091)	(0.140)
Liquidity	0.033	–0.122*	–0.076	–0.139**
	(0.034)	(0.065)	(0.054)	(0.061)
Latent liabilities	–0.010	0.043*	–0.011	0.034
	(0.012)	(0.023)	(0.013)	(0.023)
Wholesale funding	0.021*	–0.063**	–0.043**	–0.056**
	(0.011)	(0.025)	(0.017)	(0.026)
Size	0.186	0.311	0.429	0.751
	(0.311)	(0.636)	(0.411)	(0.613)
German support (0/1)	–0.216	0.812	–1.023**	–0.537
	(0.362)	(0.530)	(0.483)	(0.523)
Affiliate–level variables				
Capital	–0.069***	–0.102***	–0.136***	–0.125***
	(0.008)	(0.012)	(0.009)	(0.012)
Liquidity	–0.017	0.002	–0.011	0.027
	(0.043)	(0.046)	(0.035)	(0.044)
Latent liabilities	0.008***	0.019***	0.011***	0.016***
	(0.002)	(0.004)	(0.002)	(0.003)
Wholesale funding	0.001	–0.012	–0.046**	–0.029
	(0.013)	(0.027)	(0.020)	(0.026)
Branch indicator (0/1)	–0.671*	–0.028	–1.375***	–0.589
	(0.364)	(0.739)	(0.459)	(0.695)
Constant	9.525	2.248	5.373	–6.570
	(6.439)	(13.166)	(8.290)	(12.537)
Observations	24,398	24,398	24,398	24,398
R^2	0.559	0.567	0.627	0.601

The dependent variable in columns (1) [(3)] is the log of total foreign assets [liabilities] denominated in any currency but converted into Euro. The dependent variable in columns (2) [(4)] is the log of total foreign assets [liabilities] denominated in US dollar but converted into euros. All dependent variables are reported by individual foreign affiliates of German banks and aggregated at their respective host–country level. US–located affiliates are excluded. "Exposure" derives from Acharya et al (2013b) and denotes the ratio of the German parent banks' asset–backed commercial paper holdings to equity expressed in percent. Parent– and affiliate–level variables are lagged by one month. Size refers to the log of the German parent banks' total assets. The Data Appendix defines all variables more precisely. Country–by–time (monthly) fixed effects are included but not reported. We report standard errors in parentheses and cluster them at the affiliate–level to account for serial correlation. ***, **, * denote significance at the 1%, 5%, 10%–level.

pertaining to syndicated loan market data, which includes loans originated by foreign affiliates located in the United States, which we deliberately drop from our analysis. The results for foreign liabilities reveal a significant, yet very small, and positive effect of the ABCP exposure measure on US dollar–denominated liabilities. An additional percentage point of ABCP exposure, given the use of TAF by non–US–located foreign affiliates, corresponds to an increase of foreign US dollar–denominated liabilities of about 0.6%. As our analysis does not provide parallel evidence on US dollar–denominated assets, the difference must have been channelled indirectly via the German parent bank, because the sample construction rules out an immediate exchange of US dollar liquidity among US and non–US based foreign affiliates.

5. Conclusions

Did the Fed's TAF program spill over into other countries and impact the international activities of global banks' foreign affiliates located *outside* the United States? Based on unique microdata, we track how the TAF liquidity shock was transmitted through internal capital markets of global banks, while taking the individual banking group's need for US dollar–denominated liquidity into account.

We use data from *Deutsche Bundesbank* that reflect the structure of German banks' global operations across all locations of their foreign affiliates. This data allows us to separate interoffice positions from interlinkages with non–affiliated counterparties. By restricting our sample to those German parent banks with US affiliates (that were already active in the US market since 2003), we mitigate concerns of self–selection and consider the TAF liquidity shock to be exogenous to the network of non–US foreign affiliates. Following Acharya et al. (2013), we exploit the pre–crisis ABCP exposure of German parent banks to proxy their need of US dollar denominated liquidity.

Our results show that the TAF program had significant international spillover effects, while stressing the importance of actively managed internal capital markets of global banks, especially during crisis periods. First, we find that for German banks with higher US dollar funding needs, foreign affiliates reduce their assets by less during periods of active TAF borrowing. The use of TAF by German parent banks alone yields no significant adjustment effect of their foreign affiliates' balance sheets outside the home market and the US. The Fed's *TAF* program thus mitigated the withdrawal from foreign markets other than the United States for those German parents that had a higher *Exposure* to the US dollar–denominated ABCP market prior to the crisis. These effects are economically significant. For the mean of US dollar–denominated funding needs arising from ABCP market exposure, using TAF in a given month leads to a contraction of foreign assets of about 10%, much less than in periods without active TAF borrowing. Foreign liabilities, in turn, do not respond significantly to the use of additional liquidity provided by the TAF. Since we deliberately exclude US–located affiliates from our sample to ensure that no direct channel exists between foreign US– and non–US located affiliates, these results corroborate earlier evidence on actively managed internal capital markets. Specifically, our findings suggest a *substitution effect* in that globally active parent banks used the TAF program as a substitute for liquidity previously obtained from other wholesale funding sources like money market mutual funds and other

institutional investors. This result is also consistent with the frequently described *flight home effect* in that global parent banks shrink their local foreign operations during our period under and refocus on their domestic market.

Second, we find significant differences across different subsamples of host countries where foreign affiliates reside. Most crucially, foreign affiliates located in financial centers perform key functions for parent banks and were apparently shielded from the global retreat from foreign markets, as we find no significant response of foreign assets for this group. This finding relates to our result that banks withdrew relatively more from EMU countries than from non–EMU countries, because only two financial centers are also included in the subsample of EMU countries. The retreat from EMU periphery countries was likewise most pronounced for affiliates connected to parents that used TAF liquidity.

Third, we isolate the effects of assets and liabilities denominated in US dollars, since these balance sheet positions are likely to have been particularly affected by the USD funding squeeze of 2007. We do not find evidence that foreign affiliates of German parents contracted their foreign US dollar business, even in cases where they had been particularly exposed to the turmoil in the ABCP market. This result complements earlier evidence on the effects of liquidity assistance from the syndicated loan market, indicating how liquidity shocks in the US are transmitted internationally via banks' affiliate networks *outside* the US.

As such, our analysis informs the debate on emergency liquidity provision, unconventional monetary policy measures, and shock propagation via globally operating banking groups. The evidence strongly hints at the existence of actively managed internal capital markets that allocate funding and liquidity in different currency denominations. The resulting international policy linkages are relevant for both policymakers and market practitioners.

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7. Data appendix

External position report

Data on foreign assets of the affiliates of German banks are taken from the "External Position Report" (*Auslandsstatus*) of the *Deutsche Bundesbank*. They are confidential and can be used on the premises of the *Bundesbank* only.

Foreign assets: capturing loans and advances to banks, companies, governments, bonds and notes, foreign shares and other equity, participation abroad, denominated or converted into euros. Irrevocable credit commitments are included but no other off–balance sheet items.

Branches and subsidiaries: Foreign affiliates of German parent banks. Branches operate without independent legal status, are not subject to foreign bank regulation and are fully incorporated by the German parent. The Bundesbank receives a joint report of all branches of a German bank per host country. Subsidiaries have an independent legal status and are majority owned (50% plus one share) by the German parent. They submit individual reports which allow identifying several subsidiaries in each host country. We aggregate across all destination countries per report while dropping the US as host country. For this reason, one observational unit is either a subsidiary of bank *X* located in country *Y*, or the composite report of all branches of bank *X* hosted by country *Y*.

Time: Monthly data from April 2002 to October 2012 (t =127)

Host Countries of all German banks' affiliates (55): Austria, Australia, Belgium, Bulgaria, Brazil, Canada, Chile, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hong Kong, Hungary, Ireland, India, Indonesia, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mauritius, Mexico, Netherlands, New Zealand, Norway, Peru, Pakistan, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Singapore, Slovenia, Slovakia, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, United Arab Emirates, Uruguay, United Kingdom, Vietnam.

Subsamples of countries:

- European Monetary Union EMU (as composed during the sample period): Austria, Belgium, Cyprus, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Slovenia, Slovakia
- European Crisis Countries (Periphery): Greece, Italy, Ireland, Portugal, Spain
- Financial Centers: Hong Kong, Ireland, Luxembourg, Singapore, Switzerland, United Kingdom

Term auction facility

Detailed data on the Federal Reserve's Term Auction Facility (TAF) can be downloaded from the Fed's webpage at http://www.federalreserve.gov/newsevents/reform _taf.htm#data (as of February 12, 2013).

From this database, we extract the following information:

Borrowers: The dataset lists the following affiliates of German parent banks: Bayerische Landesbank, Commerzbank, Deutsche Bank, Dresdner Bank, DZ Bank, Euro Hypo, Helaba, HSH Nordbank, LBBW, Nord LB and West LB.

Crisis spans the period from the beginning financial market turmoil in August 2007 to November 2007 before the TAF program was initiated.

Loan amount: Amount of TAF loan, in millions of US Dollars

Loan date: Date on which the TAF was loan originated.

Loan number: Number of outstanding TAF loans in parallel.

Maturity date: Date on which the TAF loan was scheduled to mature.

Term: Number of days for which the loan was extended.

Asset–backed commercial paper market

We retrieved data on the exposure of German banks to the asset–backed commercial paper market from Philip Schnabl's website (http://pages.stern.nyu.edu/~pschnabl/).

From this database, we extract the following information:

ABCP tot: Total of all asset backed commercial papers (ABCP) outstanding at end–2006 (in USD bn)

Equity: Bank Equity (converted to USD bn)

Exposure: ABCP_tot divided by Equity (%)

Bank– and affiliate–level variables

Banking groups: *Private* (big and small commercial banks, cooperative banks and their head institutions, mortgage banks); *Government* (savings banks and Landesbanks as their head institutions), *Large* (big commercial banks, head institutions of cooperative banks and Landesbanks), *Regional* (small commercial banks, savings banks and small cooperative banks).

Capital: Capital / total assets * 100

Latent liabilities: Latent liabilities / total assets * 100 where latent liabilities consist of irrevocable credit commitments and mezzanine finance

Liquidity: Cash and central bank deposits / total assets * 100

Non–performing loans: Impaired interbank and non–bank loans relative to non–bank loans of the parent bank in percent.

ROE: Return on equity of the parent bank of the parent bank in percent.

German support: Indicator equal to one after (first) German intervention targeted at the German parent bank

Size: Log total assets of the parent bank.

Wholesale funding: Share of securitized funding of the parent or the affiliate in total liabilities in percent of total assets.

Branch: dummy for foreign branches (0/1)

Total foreign assets by banking group

Table 5

	All	Private	State–owned	Large	Regional
	(1)	(2)	(3)	(4)	(5)
TAF indicator (0/1)	–0.439**	–0.714	0.147	–0.390	–0.048
	(0.217)	(0.550)	(0.413)	(0.239)	(0.458)
Exposure	–0.001	–0.002	–0.001	–0.000	0.004**
	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)
TAF*Exposure	0.003**	0.003	0.000	0.002**	
	(0.001)	(0.007)	(0.002)	(0.001)	
Parent–level variables					
Capital	0.163**	0.200**	–0.186	0.166**	0.864*
	(0.077)	(0.083)	(0.159)	(0.079)	(0.458)
Liquidity	0.033	0.037	–0.101	0.042	0.495
	(0.034)	(0.035)	(0.155)	(0.031)	(0.603)
Latent liabilities	–0.010	–0.005	–0.095	–0.008	–0.044
	(0.012)	(0.012)	(0.088)	(0.012)	(0.029)
Wholesale funding	0.021*	0.024**	0.042	0.019	–0.027
	(0.011)	(0.012)	(0.082)	(0.014)	(0.034)
Size	0.186	0.472	–0.162	0.329	0.724**
	(0.311)	(0.458)	(1.115)	(0.346)	(0.272)
German support (0/1)	–0.216	–0.238	–0.273	–0.126	
	(0.362)	(0.545)	(0.758)	(0.379)	
Affiliate–level variables					
Capital	–0.069***	–0.066***	–0.066***	–0.069***	–0.139
	(0.008)	(0.009)	(0.017)	(0.008)	(0.086)
Liquidity	–0.017	–0.000	–0.061	–0.020	–2.523***
	(0.043)	(0.050)	(0.054)	(0.044)	(0.529)
Latent liabilities	0.008***	0.007***	0.019***	0.009***	–0.006
	(0.002)	(0.002)	(0.006)	(0.002)	(0.010)
Wholesale funding	0.001	0.015**	–0.027	0.000	–0.039***
	(0.013)	(0.007)	(0.035)	(0.014)	(0.009)
Branch indicator (0/1)	–0.671*	–0.722*	–0.124	–0.703*	–1.649***
	(0.364)	(0.414)	(1.537)	(0.390)	(0.269)
Constant	9.525	3.588	17.768	6.652	1.493
	(6.439)	(9.351)	(20.865)	(7.137)	(7.677)
Observations	24,398	18,340	6,058	23,156	1,242
R^2	0.559	0.600	0.664	0.572	0.998

The dependent variable in columns (1)–(5) is the log of total foreign assets reported by individual foreign affiliates of German banks and aggregated at their respective host–country level. US–located affiliates are excluded. "Exposure" derives from Acharya et al (2013b) and denotes the ratio of the German parent banks' asset–backed commercial paper holdings to equity expressed in percent. Parent– and affiliate–level variables are lagged by one month. "Size" refers to the log of the German parent banks' total assets. The Data Appendix defines all variables and the banking groups more precisely. Host country–by–time (monthly) fixed effects are included but not reported. "only" means that the regression exclusively draws on the referenced set of countries, whereas "exempt" means that we use our baseline sample of 63 host countries while dropping the referenced set of countries. We report standard errors in parentheses and cluster them at the affiliate–level to account for serial correlation. ***, **, * denote significance at the 1%, 5%, 10%–level.

Total foreign liabilities by banking group

Table 6

	All	Private	State–owned	Large	Regional
	(6)	(7)	(8)	(9)	(10)
TAF indicator (0/1)	–0.013	–1.244*	0.723	–0.049	0.226
	(0.305)	(0.667)	(0.686)	(0.321)	(1.049)
Exposure	0.002	–0.001	0.002	0.001	–0.006
	(0.002)	(0.009)	(0.004)	(0.001)	(0.019)
TAF*Exposure	0.003	0.015*	–0.001	0.002	
	(0.002)	(0.009)	(0.003)	(0.002)	
Parent–level variables					
Capital	0.264***	0.309***	–0.546*	0.151*	–1.125
	(0.091)	(0.090)	(0.322)	(0.084)	(2.940)
Liquidity	–0.076	–0.061	–0.326	–0.015	0.470
	(0.054)	(0.047)	(0.247)	(0.036)	(1.291)
Latent liabilities	–0.011	–0.008	–0.052	–0.016	–0.071
	(0.013)	(0.016)	(0.142)	(0.012)	(0.088)
Wholesale funding	–0.043**	–0.044**	0.056	–0.006	–0.132
	(0.017)	(0.019)	(0.138)	(0.018)	(0.164)
Size	0.429	1.111	–0.440	0.554	–3.123
	(0.411)	(0.703)	(1.712)	(0.405)	(2.741)
German support (0/1)	–1.023**	–0.927	–0.834	–1.053**	
	(0.483)	(0.721)	(0.950)	(0.493)	
Affiliate–level variables					
Capital	–0.136***	–0.137***	–0.130***	–0.138***	–0.117
	(0.009)	(0.010)	(0.025)	(0.009)	(0.225)
Liquidity	–0.011	–0.009	–0.034	–0.010	–5.675***
	(0.035)	(0.043)	(0.067)	(0.035)	(1.322)
Latent liabilities	0.011***	0.010***	0.019**	0.011***	0.011
	(0.002)	(0.002)	(0.009)	(0.002)	(0.047)
Wholesale funding	–0.046**	–0.043*	–0.078	–0.049**	–0.019
	(0.020)	(0.022)	(0.053)	(0.022)	(0.051)
Branch indicator (0/1)	–1.375***	–1.475***	–1.386	–1.416***	10.116***
	(0.459)	(0.487)	(1.979)	(0.468)	(2.045)
Constant	5.373	–8.140	23.394	3.131	70.668
	(8.290)	(13.456)	(30.644)	(8.169)	(70.925)
Observations	24,398	18,340	6,058	23,156	1,242
R^2	0.627	0.673	0.720	0.650	0.992

The dependent variable in columns (6)–(10) is the log of total foreign liabilities reported by individual foreign affiliates of German banks and aggregated at their respective host–country level. US–located affiliates are excluded. "Exposure" derives from Acharya et al (2013b) and denotes the ratio of the German parent banks' asset–backed commercial paper holdings to equity expressed in percent. Parent– and affiliate–level variables are lagged by one month. "Size" refers to the log of the German parent banks' total assets. The Data Appendix defines all variables and the banking groups more precisely. Host country–by–time (monthly) fixed effects are included but not reported. "only" means that the regression exclusively draws on the referenced set of countries, whereas "exempt" means that we use our baseline sample of 63 host countries while dropping the referenced set of countries. We report standard errors in parentheses and cluster them at the affiliate–level to account for serial correlation. ***, **, * denote significance at the 1%, 5%, 10%–level.

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