

The internal capital market channel of monetary policy: Evidence from U.S. emergency facilities [★]

–Preliminary draft – please do not cite or circulate –

Thomas Kick ^a, Michael Koetter ^{b,c} and Manuela Storz ^b

^aDeutsche Bundesbank, Wilhelm-Eppstein-Straße 14, G-60431 Frankfurt am Main

^bFrankfurt School of Finance and Management, Sonnemannstraße 9-11, G-60314 Frankfurt am Main

^cHalle Institute for Economic Research (IWH), P.O. Box 110361,
06017 Halle (Saale), Germany

Abstract

We test in this paper if U.S. monetary policy in the form of emergency facilities established in response to the financial crisis transmitted via internal capital markets of internationally active bank holding companies (IBHCs) to banking markets outside the U.S. We manually collect the holding company structure of internationally active banks for which we observe proprietary interest rate data reported to the German central bank. The comparison of banks in Germany with access to U.S. facilities via internal capital markets to banks without such access shows that this access is associated with a significant decrease in short-term funding costs, while both credit pricing and lending volumes remain unchanged. Short-term deposit rates especially decline for IBHCs with low pre-crisis ABCP exposure, suggesting that the facilities were successful in alleviating crisis-hit banks' funding constraints, but simultaneously provided less constrained banks with a funding cost advantage.

Key words: Monetary policy transmission, central bank refinancing operations, internal capital markets

JEL: E52; E58; F23; F38; G01; G21

[★] We are grateful to Deutsche Bundesbank for the provision of data. Any views expressed are only those of the authors and do not necessarily represent the views of Deutsche Bundesbank. All errors are our own.

Email addresses: thomas.kick@bundesbank.de (Thomas Kick), m.koetter@fs.de (Michael Koetter), m.storz@fs.de (Manuela Storz).

September 22, 2015

1 Introduction

Did emergency liquidity support to foreign banks in the U.S. transmit to non-U.S. loan prices via the internal capital markets of multinational banks? In response to the 2007/2008 financial crisis, the Federal Reserve System provided many unconventional liquidity lines to mitigate funding pressure and to revive credit supply in the U.S.. These programs were very large, peaking at 1.2 trillion USD distributed at the end of 2008 and the evidence suggests indeed a success in terms of lifting liquidity constraints (McAndrews et al., 2008; Syrstad, 2014) and mitigating bank lending contraction in the U.S. (Berger et al., 2014).

To identify any possible cross-border policy transmission, we exploit in this paper the fact that all emergency facilities were also accessible to subsidiaries of non-U.S. banks. To them, emergency liquidity facilities were an important source of funding during the crisis in the absence of a strong local deposit base (Acharya et al., 2014). In fact, 59% of all funds distributed through the facilities and the Discount Window were obtained by entities with non-U.S. headquarters.

Conventionally, neither the identity of banks that tap emergency liquidity provided by the lender of last resort nor the actually used volumes are unobservable to avoid stigmatization and potentially self-fulfilling prophecies of bank distress. We take advantage of the public release of detailed data on the identity of all banks that used one of the six different U.S. emergency facilities and the Discount Window, which had to be released under the Freedom of Information Act (FOIA) filed by Bloomberg L.P. against the Federal Reserve System in 2011 (New York Southern District Court, 2008). The published data on emergency facilities and the Discount Window lists daily funds outstanding for all individual entities between December 2007 and April 2010.

These information allows a clear identification of banks outside the U.S. with and without access to an economically significant, additional source of liquidity. If liquidity shocks are transmitted to banking markets outside the U.S. through an internal capital markets channel by international bank holding companies (IBHC), we expect to see systematically different loan and deposit rates charged on markets outside the U.S. for any additional credit or funding business generated.

Such detailed lending and funding rates for new loans and deposits are rare. We can use proprietary data on interest rates on new business reported monthly by a representative sample of both German and foreign banks to the German central bank, the Bundesbank. We test if banks that are a member of an IBHC with internal global capital markets and access to these U.S. facilities charged significantly lower loan and/or higher deposit rates compared to banks without any access to the U.S. support liquidity through internal capital markets.

To establish which banks on German soil have access to liquidity provided by the U.S. Federal Reserve, we manually identify the IBHC with which the using banks released by Bloomberg are associated and whether these IBHC operate in Germany. We collect data from annual reports about all IBHC and match these as well with all 218 German banks that report detailed loan and funding prices on a monthly basis. This two-way matching procedure thereby identifies, which banks that report lending and funding rates for newly generated business to Bundesbank are exposed via internal capital markets to this positive liquidity shock.

Several German banks accessed the emergency facilities (Buch et al., 2011b) and the magnitude of funds channeled to German banks was substantial. They tapped up to 100 billion EUR in September 2008, which amounts to around 10% of the entire volume of the U.S. facilities at the time and

was four times the size of the contribution of Germany's financial system to German GDP. It is generally known that U.S. monetary policy transmitted via international banks, which manage liquidity at a global scale throughout their organizational network (Cetorelli and Goldberg, 2012a), disseminating funding shocks via internal capital markets (see De Haas and Van Lelyveld, 2010). Active liquidity management on a global scale by IBHC specifically gave rise to the phenomenon of core funding and core lending markets (Cetorelli and Goldberg, 2012b), which maintained important roles for some IBHC despite financial shocks abroad and in the U.S.. Thus, German banks with subsidiaries in the U.S. and foreign bank branches operating in Germany that were a part of (non-German) IBHC that also operated U.S. affiliates faced a positive funding shock. We use a difference-in-difference approach to test, whether liquidity shocks transmitted into lower funding cost and different credit pricing to non-financial corporations in the German market relative to other banks without access to Fed facilities.

Our results provide a clear indication that short-term funding costs of German corporate borrowers declined significantly in response to U.S. liquidity assistance. Short-term deposit rates offered by banks with access via internal capital markets of IBHC to corporates in Germany were lower compared to short term deposit rates offered by banks without access to the U.S. emergency facilities. For each percent of emergency funding per total IBHC assets, short-term deposit rates decline by 3.6 basis points. As such, the objective of U.S. monetary policy to reduce short-term funding pressure even extended beyond the boundaries of its own market.

In contrast, we find no significant change in short-term credit rates. Paired with lower funding cost this result suggests an increase net interest margins and thus economic rents. Long-run interest rates for either lending or funding do not exhibit any significant differential effects. Related, neither

lending nor deposit volumes respond significantly. These results confirm that liquidity emergency policies might have eased pressure on the short end of the yield curve, but could not reduce longer term risk premia.

We also find that banks with less exposure to the fallout due to the financial crisis, as gauged by levels pre-crisis ABCP holdings, exhibit also a decline in short-term funding rates. The magnitude of this effect declined for growing ABCP exposures, but remains significantly negative. Thus, access to additional emergency funds through internal capital markets did succeed in easing short-term financing conditions also for severely exposed banks.

The results are robust towards a plethora of alternative definitions of access to U.S. facilities via internal capital markets, matched sampling of banks in Germany to address potential concerns of self-selection of large banks into international activities, placebo tests regarding the timing of liquidity support facilities, and alternative lag structures regarding the transmission speed of U.S. monetary policy to interest rates in the German banking market via internal capital markets.

2 Related literature

The global financial crisis of 2007-2008 has provided a new case for investigation into the international transmission of financial shocks and has subsequently triggered numerous new literature contributions. Our paper examines the cross-border transmission of unconventional U.S. monetary policy through IBHCs to banks' funding cost and credit pricing in Germany. We thereby combine and contribute to three strains of literature: The role of global banks in the international transmission of financial shocks, the transmission of monetary policy through bank lending (i.e. the lending channel) and more recent works surrounding the impacts and mechanisms of the

U.S. emergency funding facilities.

The role of internationally active banks in the transmission of financial shocks was first emphasized by Peek and Rosengren (1997), as branches of Japanese banks in the US were strongly affected by the stock market crash in Japan. Several works show evidence for the transmission of financial crisis through either a balance sheet or a lending channel in internationally active banks. A domestic financial shock can force banks abroad to adjust their balance sheets when exposed to foreign assets affected by the shock, which in turn constraints their local lending (Peek and Rosengren, 1997, 2000), particularly when banks are highly leveraged (Devereux and Yetman, 2010). This also contributed to the spread of the recent financial crisis to both emerging (Cetorelli and Goldberg, 2012b; Popov and Udell, 2012) and developed economies (Acharya and Schnabl, 2010; Aiyar, 2012).

While the crisis reduced lending volumes and increased lending prices in the U.S. (Santos, 2010), financial shocks also spread through cross-border lending, as banks hit by a crisis in their home economies reduced their lending abroad (Giannetti and Laeven, 2012a; Schnabl, 2012). Asymmetries in the withdrawal of funding abroad thereby seem to give evidence of a home bias in international bank lending (Giannetti and Laeven, 2012b; De Haas and Van Horen, 2012) .

The impact of monetary policy on the mitigation of the global financial crisis has so far hardly been examined. In non-crisis times, bank lending has been shown to be highly sensitive to monetary policies, stimulating or restricting economic growth (Bernanke and Gertler, 1992, 1995; Stein, 1998). Empirically, monetary policy remains very potent in influencing credit supply through banks and seems to be further amplified when banks are constrained by their balance sheets. Kashyap and Stein (2000) find for the U.S. that it is especially illiquid banks which react sensitively to changes in mon-

etary policy. Disentangling credit supply and demand, Jiménez et al. (2012) analogously find that in Spain credit supply is strongly reduced by banks when facing restrictive monetary policy or adverse economic conditions. This is particularly the case for banks with weak balance sheets.

The presence of internal capital markets can lead both to transmission and isolation from the effects of monetary policy. Campello (2002) provides evidence that U.S. banks which are part of a network are less affected by changes in monetary policy than stand-alone banks, as they absorb shocks through their internal capital market. This is also supported by Cetorelli and Goldberg (2012a). They observe capital flows in the networks of internationally active U.S. banks and find that global liquidity management insulates from local liquidity shocks. In particular, during the global financial crisis, these banks reallocated funding through their networks, both in response to the negative shock of the crisis and to the positive shock of the Term Auction Facility (TAF) (Cetorelli and Goldberg, 2012b).

While the Troubled Asset Relief Program (TARP) has received widespread attention in the literature¹, less assessments of the emergency facilities of the Federal Reserve System have been presented so far. Evidence on TAF and the Term Securities Lending Facility (TSLF) shows that both were helpful in mitigating liquidity shortages (Fleming et al., 2010), but did not reduce the borrowing cost of banks relative to LIBOR (Kuo et al., 2012). Overall, liquidity pressure in the money market was reduced (Wu, 2011), and USD LIBOR was lower after the introduction of TAF (McAndrews et al., 2008).² find that it was especially foreign banks who raised liquidity through TAF, while charging higher rates on syndicate loans compared to U.S. banks when exposed to Asset-Backed Commercial Paper (ABCP) before the cri-

¹ Considering only some contributions on unintended negative consequences, among other effects, distortion of competition and market power (Berger and Roman, 2015; Koetter and Noth, 2015), decrease in operating efficiency of banks (Harris et al., 2013) and an increase in risk-taking (Duchin and Sosyura, 2014; Black and Hazelwood, 2013) have been documented.

sis. Duygan-Bump et al. (2013) find that the ABCP Money Market Mutual Funds Liquidity Facility (AMLF) significantly reduced ABCP yields and prevented outflows from funds.

Several working papers have employed the dataset on the facilities by Bloomberg, following the surprise release in 2011. Berger et al. (2014) find for U.S. banks that TAF was mainly distributed to large banks, which partly used the funds to replace other sources of funding. Their results also suggest that the facility increased overall bank lending, which is in line with previous findings of the lending channel being especially strong for illiquid banks. Puddu and Wälchli (2012) show that TAF funds were furthermore successful in decreasing the liquidity risk of banks in the U.S., but borrowing may also have led to a decrease in overall value for banks due to a stigma effect (Cyree et al., 2013).

Our paper is both the first to directly link the effects of U.S. unconventional monetary policy to a foreign banking sector and the first to show possible unintended consequences of this policy abroad. More importantly, we are the first to observe a possible change in corporate loan pricing abroad in response to the emergency facilities. Our analysis complements literature on international transmission of the global (negative) crisis shock by analyzing the positive liquidity shock in response. In contrast to Acharya et al. (2014), we examine the effect on individual banks' monthly deposit and loan conditions instead of international syndicated loans. This allows us to show the effect on everyday retail business, which directly affects a broad share of the economy. We further add to the findings of Cetorelli and Goldberg (2012b) by observing the actual magnitude of the positive liquidity shock for individual entities and their impact on loan pricing rather than volumes abroad.

Among all recent contributions employing the unique surprise release dataset

by Bloomberg, we are so far the first to show the impact of the significant liquidity provisions across all facilities and the Discount Window. In doing so, we document a cross-border effect on interest rates in banks' deposits and loans on a representative dataset of the German banking sector. Our analysis offers insight into the international transmission of large-scaled monetary policy interventions, providing implications for the boundaries of local policies in the presence of globalized banks.

3 Identification and institutional background

3.1 Identification of IBHC networks and access to funding

To determine whether a bank had access to the Federal Reserve emergency facilities via internal capital markets of IBHC, we first identify whether a bank operating in Germany is a member of an IBHC that also had a U.S. subsidiary. Banks, except for savings banks (*Sparkassen*), are considered members of a certain IBHC, whenever the respective IBHC has an equity interest or voting rights of more than 50% in the bank. The identification is primarily conducted manually on the basis of annual reports of IBHCs. In case there was a mid-year change of ownership during the time the facilities were in operation, the date of ownership change stated in the annual reports is used. Where no annual reports were available, the IBHC-association was confirmed by information from official company websites.

In Germany, savings banks have a unique network structure with Landesbanken, which serve as a central bank for all savings banks in a certain region. Landesbanken conduct their business only in certain states (*Bundesländer*) and are typically jointly owned by the regional savings banks and/or the states they are in. Taking this structure into account, we assign

each savings bank to the network of its respective Landesbank. We identify the network in this context geographically, following the approach of Puri et al. (2011), i.e. each savings bank is part of the Landesbank of the state it is located in. DekaBank, the investment bank of the German savings bank group, is closely linked to all Landesbanken. It is therefore considered to be a member of the network of every Landesbank.

– Figure 1 around here –

Following this identification, 107 out of the 218 banks in our sample are members of an IBHC with access to Federal Reserve funding facilities, while the remaining 111 had no access. The sample structure is illustrated in detail in Figure 1. Among the banks with access, some also belong to non-German IBHCs. These are either German subsidiaries of US-IBHCs (subgroup *c*), or subsidiaries of foreign, non-US IBHCs (subgroup *d*). The latter are banks of non-German BHCs, which accessed the facilities through their U.S. subsidiaries.

The subgroup of German banks with access can further be separated into heads of BHCs, and subsidiaries of BHCs (*e* and *f*). The form of access to the facilities is different for these subgroups, as heads have direct control over the U.S. subsidiaries (which accessed the facilities), while facility funds reach German subsidiaries only through the head companies, thus indirectly.

We use the different sample subgroups in Figure 1 later on as alternative treatment definitions, which allow us to examine additional differential effects.

Detailed information on the amounts received from the Federal Reserve System by individual IBHCs was made public by Bloomberg in 2011. The dataset provides a complete account of all funds granted for each of the

facilities and the Discount Window, as well as aggregated data. Balances vis-à-vis the Federal Reserve are stated on a daily basis during the entire lifetime of the facilities and are available on IBHC level.

The dataset was released after Bloomberg L.P. had successfully filed a lawsuit against the Board of the Federal Reserve on grounds of the Freedom of Information Act (FOIA) in November 2008. The FOIA gives U.S. citizens the right to access documents and related information on the actions of the government. The Federal Reserve System had refused to give out any information, claiming that the data was confidential financial information, which is generally protected from the FOIA. In August 2009, the court ruled in favor of Bloomberg; the Federal Reserve System, however, appealed several times and the data was only released in 2010, after the Supreme Court rejected the final appeal. Bloomberg subsequently made the information available through its information network.

3.2 Background to Federal Reserve funding facilities

As a response to the interbank market breakdown resulting from the subprime mortgage crisis in 2007, the Federal Reserve established six different funding facilities in addition to the Discount Window. Although the discount rate was already substantially lowered by December 2007, institutions hardly made use of the Discount Window, possibly to avoid a stigmatic effect. The Term Auction Facility (TAF), and later five other facilities, were thus created to address the severe liquidity shortages in the market. Unlike the Troubled Asset Relief Program (TARP), the facilities were established as new monetary policy instruments to alleviate liquidity shortages in the financial market in general, rather than supporting individual institutions in need.

Established in December 2007, TAF was the most universal lending facility. It provided short-term credit (for a maximum of 84 days) to deposit-taking financial institutions against collateral in the form of auctions with a pre-fixed total amount. At the first auction on December 17, 2007, 20 billion USD were allotted, at a rate of 4.65%, which was then 10 basis points below the discount rate. Further auctions took place on a bi-weekly basis, with amounts ranging between 20 and 150 billion USD. Although the facility remains formally active, no auctions have taken place since March 2010, with the remaining credit outstanding repaid until April 2010.

In March 2008, the Primary Dealer Credit Facility (PDCF) and Term Securities Lending Facility (TSLF) were established. The PDCF allowed primary dealers to receive overnight loans against collateral at the primary credit rate of the New York Federal Reserve through their clearing banks. The amount of funds that could be borrowed was only limited by the value of the collateral that could be provided. The TSLF was also aimed at the liquidity needs of primary dealers, providing 28-day Treasury general collateral against a wide range of collateral usually suitable for repurchase agreements, including asset-backed commercial paper (ABCP). Additionally, primary dealers were provided with liquidity through single-tranche open market operations (STOMO) between March and December 2008. These operations were not conducted through a formal facility, but were in character similar to the facilities. In auctions, primary dealers could enter short-term repurchase agreements with the Federal Reserve against collateral eligible for standard open market operations.

The Asset-Backed Commercial Paper Money Market Mutual Funds Liquidity Facility (AMLF) was an instrument created in September 2008 to help institutions to finance purchases of high-quality ABCP from mutual funds. It was especially targeted at relieving liquidity pressure from the money market as a result of the ABCP market becoming highly illiquid. Closely

linked to this facility was the Commercial Paper Funding Facility (CPFF), established only one month later, aiming at supporting the market for commercial paper in general. While the AMLF provided loans, the CPFF operated in the form of a special purpose vehicle (SPV), which would purchase sound short-term commercial paper (both secured and unsecured). All facilities, with the exception of TAF, were abolished on February 1, 2010.

For an institution to directly participate in the auctions or have access to the facilities, it had to be a registered US entity. Non-US BHCs with subsidiaries in the US thus also had access, while those without subsidiaries had no access. Total funds outstanding to the Federal Reserve across all facilities and the Discount Window peaked at 1.2 trillion USD in December 2008. Figure 2 illustrates the development of total funds outstanding in relation to the US economy and the US financial sector. By the end of 2008, the size of the facilities corresponded to up to around 7% of total annual US GDP, and 35% of annual US financial sector output. The Federal Reserve System's emergency facilities were thus significantly larger in size than the US government's assistance provided through TARP (around 430 billion USD).

– Figure 2 around here –

Through US subsidiaries, the facilities also provided a substantial amount of emergency credit to non-US bank holding companies (BHCs). German BHCs alone received around 10% of all funds distributed, corresponding to several times the size of the much smaller annual German financial sector output. Table 1 reports the average monthly balance of all BHCs in our data sample by individual facility between December 2007 and May 2010.

– Table 1 around here –

3.3 *Measuring the impact of emergency facilities*

Based on the identification above, we analyze the effects of provided support through US emergency facilities on banks in Germany by identifying their association with IBHCs, through which they may or may not have access to Federal Reserve funding. Among those banks who had access, all in fact used this access at some point in time during the lifetime of the emergency facilities. Furthermore, there is no bank which gained or lost access to the funding due to a change in the IBHC structure. All concerned U.S. subsidiaries were already in operation before the facilities and remained in operation throughout their entire lifetime.

We therefore examine the effect of emergency funding based on the different amounts in facility usage, rather than changes in the access structure. We define the variable *Usage* as the average monthly balance of total funds outstanding to all funding facilities and the Discount Window, divided by the total assets of the IBHC, multiplied by 100. *Usage* thus represents the funds obtained in percentages of the respective IBHC's size. This takes into account the different sizes of IBHCs with access to funding. In the special case of DekaBank, the outstanding balance is defined as the average balance of all Landesbanken.

Total assets of the IBHC are the consolidated balance sheet totals of the highest ranking bank of the network in the sample, i.e. the highest available consolidation level in our dataset. For German IBHCs, this is the total assets of the IBHC head company (as these are always included in the sample), for non-German IBHCs, this is the total assets of the largest subsidiary bank in the sample.

We calculate monthly balances outstanding as the average daily balance across all facilities and the Discount Window. The USD balances are con-

verted to EUR using the respective average monthly reference rate of the European Central Bank (ECB).

On a monthly basis, we estimate the impact on a German bank's offered interest rates in a fixed-effect regression framework, according to the following equation:

$$r_{i,m} = \beta_0 \times \text{Subsidiary}_i + \beta_1 \times \text{Subsidiary}_i \times \text{Usage}_{i,m} + \beta_2 \times X_{i,m-1} + \alpha_m + \gamma_{it} + \varepsilon_{i,m}, \quad (1)$$

where $r_{i,m}$ represents the dependent variable interest rate of bank i in month m , Subsidiary_i is a dummy variable equal to one if a bank has access to emergency funding through a U.S. subsidiary in its IBHC, and $\text{Usage}_{i,m}$ is the IBHC's outstanding balance across all emergency facilities and the Discount Window as a share of total assets.

$X_{i,m-1}$ represents a vector of control variables, which are lagged by one month and winsorized by 1% at both ends to control for outliers. Control variables are *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities*, as specified in Table 3.

Month-fixed effects α_m take into account variation in seasonality. As we use a monthly dataset, it also captures any effect that is merely due to the existence of the emergency facilities and not the actual usage of the funding. γ_{it} is a bank-year-fixed effect accounting for unobserved bank-specific characteristics, which may be varying over time. Employing this fixed effect, we cannot directly estimate the effect of operating a subsidiary (Subsidiary_i), in this framework due to perfect collinearity. We estimate this level effect in a separate regression, omitting the bank-year-fixed effect.

4 Data

4.1 *Dependent variables*

We obtain monthly interest rates and new business volumes from the interest rate report (*Zinsstatistik*) of Deutsche Bundesbank. The report is a mandatory survey of interest rates and business volumes of banks in Germany, and conducted on a monthly basis. Large banks are part of the survey every month, while the remaining sample is constructed from a varying pool of smaller banks. At least 200 banks have to report to Deutsche Bundesbank each month, which corresponds to around 10% of all banks in the German banking sector. In terms of total assets, the report covers over 75% of the total German banking sector.

The complete report differentiates between over 50 classes of deposit and credit products offered. To represent an important share of overall banking activity, we focus on the most frequently reported deposit and credit product for non-financial corporations each for short-term (< 1 year) and long-term (> 1 year) maturities. From the perspective of the bank, this corresponds to one asset side and on liability side product for each maturity category. Table 2 presents detailed descriptions of the variables.

Clients are incorporated non-financial businesses, such as publicly listed or limited companies. Interest rates are reported as averages for newly generated business during the reported month, and all rates are reported in percentages.

– Table 2 around here –

4.2 Control Variables

We use balance sheet information from the monthly balance sheet report of Deutsche Bundesbank (*Bilanzstatistik*) to construct control variables. Like the interest rate report, the balance sheet report is a mandatory monthly survey. It covers all banks in Germany and thus allows us to obtain characteristics for all banks in our sample. For an overview of the control variables and their calculation see Table 3.

Bank Size is defined as $\ln(\text{total assets})$ and captures the differences in institution size, *Leverage Ratio* (share of total equity) accounts for the differences in capitalization. Accounting for the differences in funding, *Wholesale Funding* represents the share of securitized debt on the balance sheet, while *Latent Liabilities* captures exposure to latent liabilities as a share of total assets.

– Table 3 around here –

To control for outliers, we winsorize all control variables by 1% at both ends of the distribution.

4.3 Descriptive statistics

Table 4 presents summary statistics on both dependent and control variables, separately for the treatment and the control group of our sample. The sample consists of monthly data on 218 individual banks in Germany, ranging from January 2004 to December 2013, i.e. a total of 120 months. Banks in the treatment group are those which at some time between December 2007 and April 2010 were part of an IBHC with access to the emergency facilities. The remaining banks form the control group (also see Figure 1).

The financial products, for which we analyze loan pricing, are the most fre-

quently reported products in the interest report for corporate clients. Variations in the number of observations arise because not all banks regularly report values for all categories, either because no new business was generated during a respective month or the respective product is not part of the bank's business model. The minimum number of observations is 6,087 (for long-term deposits), the maximum is 17,836 (for short-term credits).

The t-test for equality of means confirms significant differences between the reported rates and volumes of the treatment and the control group. Banks in the treatment group on average offer higher deposit rates, while simultaneously charging higher credit rates. We later on confirm our results on a matched sample to further address a potential sampling bias.

– Table 4 around here –

The basic difference-in-differences (DID) analysis in Table 5 suggests that during the time of the emergency facilities, banks with and without access had indeed significantly different interest rates (prices) for their offered products to corporate clients.

Results are obtained by splitting our entire sample period ranging from January 2004 to December 2013 (120 months) into the period in which the emergency facilities were active (December 2007 to April 2010; *treatment period*) and the surrounding period (January 2004 to November 2007 and May 2010 to December 2013; *control period*). We calculate observation means separately for banks with access (*treatment group*) and banks without access (*control group*) during both subperiods. The DID is given by the difference between the treatment and the control group during the treatment period, less the difference in the control period.

– Table 5 around here –

These first results indicate that banks with access to emergency funding fa-

cilities had lower short-term interest rates during the existence of the facilities, i.e. they offered lower deposit rates, but may have passed on this reduction in funding costs through lower prices on short-term credits. Moreover, there is also a significant difference in long-term deposit rates, long-term credits, however, do not change significantly. At first glance there is thus no indication of an impact on long-term credit pricing.

5 Results

5.1 *Baseline results*

Table 6 reports the baseline estimation results according to Equation (1). Consider first short-term rates, the primary target of unconventional monetary policy in the form of providing additional liquidity lines. Column (I) exhibits a significantly negative effect of emergency facility usage on short-term deposit rates. The differential impact on the short-term funding cost of banks in Germany with access to U.S. liquidity via the internal capital market of IBHC amounts to 3.6 basis points for each percent of emergency funding per total IBHC assets. Given average short-term interest rates of 1.92%, this effect corresponds to a 1.87% decline in short-term funding cost.

– Table 6 around here –

Therefore, German banks with access to Fed liquidity facilities benefited, but the economic magnitude of these benefits was relatively small. Yet, these statistically significant effects are remarkable since they provide clear evidence for the international transmission of unorthodox monetary policy on the cost of borrowing. Thereby, our micro evidence complements macroeconomic studies concerning the domestic transmission of monetary policy on the cost of borrowing (see, e.g., Gilchrist et al., 2015) as well as

bank-level studies documenting the effects of loan volume responses via international banks (as in Cetorelli and Goldberg, 2012a; Schnabl, 2012).

Note that the direct differential effect of U.S. liquidity line usage on banks with access relative to those without is absorbed by bank \times year fixed effects. Column (V) shows results where we do not specify these fixed effects to gauge the importance of operating a U.S. subsidiary. The coefficient is significantly negative at the 1%-level and large, indicating that the mere presence of internal capital markets that include U.S. banking markets by means of subsidiaries reduces deposit funding cost in Germany substantially relative to banks that have no access to this market.

Ideally, the reduction of funding costs of banks should also ease credit terms to corporate customers, an objective presumably even more important to central banks compared to easing funding pressure faced by banks per se. Column (II) shows a negative, but insignificantly negative differential effect for those banks with access to U.S. liquidity facilities. This result might indicate that improved funding conditions of banks with access to an additional source of refinancing through internal capital markets in the U.S. did not pursue a complete passthrough to customers in terms of lower credit rates, but improved their profitability. This explanation is in line with Cycon and Koetter (2015), who find that the reduction of internal funding cost of a large commercial bank in response to the ECB's Security Purchase Program (SMP) was passed on to customer rates only in part. Instead, they show that interest margins earned by the bank increase.

In fact, the results in column (VI), where we do not control for bank \times year fixed effects, exhibit a positive relationship of the interaction term. This result highlights the importance to control for unobservable bank characteristics to isolate the effect of access to U.S. liquidity due to internal capital markets. Large banks that are internationally active, for example, may

command local market power in Germany and charge relatively larger loan rates to corporate customers. Therefore, we prefer henceforth the most conservative specification including bank \times year fixed effects.

Columns (III) and (IV) in Table 6 show next that banks with access to U.S. subsidiaries through the IBHC network do neither exhibit significantly different long-term loan nor deposit rates. This result suggests that the emergency facilities in the U.S. were able to relieve short-term pressure in credit and funding markets as intended. But they had no differential effect on the long end of the yield curve faced by banks operating in Germany. As such, internal capital markets of IBHC appear to be of relevance to transmit monetary policy internationally, but possibly unintended consequences abroad for long term financing decisions appears to be limited, at least in other developed economies such as the German one.

5.2 *Lagged passthrough*

The effect of access to U.S. liquidity facilities on funding and lending rates discussed above assumes that any potential pass-through via internal capital markets of IBHC occurs instantaneously since we specify the usage by bank i contemporaneously. However, recent studies investigating the effects of other unorthodox monetary policy on interest rates in variants of a Vector Autoregression setting, such as Boeckx et al. (2015) for the Eurozone, document lagged response in interest rates in response to quantitative easing of up to four quarters.

– Figure 3 around here –

Therefore, Figure 3 shows estimated interaction terms according to (1) when we specify the scaled amount of used liquidity facilities by each banks IBHC by up to 12 lags, i.e. one year. The negative effect on banks' fund-

ing cost in terms of contracted corporate deposit rates by banks in Germany with access to U.S. liquidity remains significant at the 5%-level up to 5 months. Importantly, we also find that short-term customer credit rates exhibit a economically significant reduction due to access to U.S. liquidity that is significantly different from zero for lags of one up and until five months.

This result highlights that unorthodox liquidity provision in the U.S. not only represented a funding advantage to internationally active banks, but also eased credit terms to German corporates. The magnitude of these effects is not statistically different from each other. Any refunding advantages enjoyed by banks that are a member of IBHC with internal capital market access to the U.S. did not result in a competitive advantage in terms of larger markups earned. As such, our results contradict indications in, for example, Berger and Roman (2015) who find that U.S. banks subject to unconventional support schemes, the Troubled Asset Relief Program in this case, provided recipient banks with more market market power. One important explanation why we find little indication of why differential liquidity assistance induces competitive distortions is that we consider only one portion of a banks business, namely short-term corporate lending. Another reasons might be that both quantitative easing considered in Cycon and Koetter (2015) and Boeckx et al. (2015) and outright equity support of banks as in Berger and Roman (2015) affect banks pricing policies differently compared to liquidity assistance, which we investigate here.

The two graphs in the bottom panel of Figure 3 confirm, in turn, the absence of any significant responses in long-run deposit and credit rates contracted with corporate customers in Germany. Any impetus from liquidity assistance on the funding constraints of banks and credit terms to the real sector therefore remains absent in our sample.

5.3 *Treatment validity*

5.3.1 *Matched control group*

An important requirement for valid inference in our empirical set-up is to ensure that the comparison of rates on new deposits and loans by banks in Germany with and without access to U.S. liquidity is not subject to confounding factors, such as the size of the bank determining whether it operates a branch in the U.S. or not. Studies for the German banking sector have shown that foreign markets are not entered randomly, but that only few, fairly larger, productive, and profitable banks set-up subsidiaries abroad (Buch et al., 2011a,b, 2014).

And indeed, the descriptive statistics for the present sample of banks that report interest rates to Bundesbank, Table 4 indicates significant differences with respect to dependent and control variables between the treatment and control group.

To address rightfully resulting concerns about sample selection bias, we create a matched sample based on propensity score matching following Caliendo and Kopeinig (2008). We match each bank in the treatment group with its nearest neighbor in the control group and subsequently drop all banks in the sample which cannot be matched or do not fulfil the common support assumption. Subsequently, we re-estimate (1) for the matched sample and report according results in Table 7.

– Table 7 around here –

To conserve on space, we only depict the coefficient of interest, namely the interaction term between a bank in Germany having access via U.S. subsidiaries and the aggregate usage of these facilities. The main result of a decrease in short-term deposit rates remains significant at the 5% level and

even increases in magnitude. The result suggests a 10.6 basis point decrease per one percent in facility usage, corresponding to an economically significant change of 5.9% in short-term deposit funding cost for the average bank.

5.3.2 *Random usage assignment*

We conduct three tests to challenge our test design to define banks as treated depending on their usage of U.S. liquidity facilities while these were in place. To that end, we conduct two placebo treatment tests. First, instead of the observed usage of facilities ranging between December 2007 and May 2010, we pre-date the timing of liquidity facilities by three years in Table 8.

– Table 8 around here –

The results are not significantly different from zero, thereby confirming that the estimated negative relationship of short-term interest rates and the usage of bank i of a U.S. facility in month m is not spurious. But as Figure 2 illustrates the intensity of usage changed over time. Since it also exhibits considerable variation across banks at any given moment in time, we assign as a second placebo test the observed volumes of used facilities randomly across banks during the time of treatment.

– Table 9 around here –

The according results are shown in Table 9 and confirm as well the absence of differential effects on either short- or long-term interest rates between banks in Germany with versus banks without access to U.S. liquidity facilities.

In sum, these results strongly support the validity of our approach to use a difference-in-difference method.

5.4 Facility support and pre-crisis ABCP exposure

The previous results indicate that the Federal Reserve emergency facilities were successful in lowering short-term funding costs, and thus alleviated funding constraints in times of financial turmoil. But did the significant amount of emergency funds reduce funding constraints for those banks which were particularly affected by the crisis? Or was access to the facilities used similarly by all banks, irrespective of crisis exposure?

To analyze if liquidity assistance access was larger for those banks with large pre-crisis ABCP exposure, we specify an interaction model and show according results in Table 10. Shedding light on the role of large pre-crisis ABCP exposures is particularly relevant in our sample, because several banks based in Germany held very large amounts of ABCP. Since this market was one of the first and most severely affected during the crisis, pre-crisis ABCP approximate well how affected an IBHC was by the financial crisis.

– Table 10 around here –

Data on end-of-2006 exposure to ABCP is obtained from Acharya et al. (2014). The dataset contains both the ABCP balance in billion USD, as well as the bank's corresponding end-of-2006 total equity in billion USD. For the variable *ABCP*, the total ABCP balance is divided by the total equity. We divide this ratio by 1000 for better scaling as the ABCP balance is relatively large compared to the total equity. The resulting variable thus measures the group's exposure in 1000 USD of ABCP per 1 USD of group equity. In case of banks that later on belong to one IBHC, but are listed separately in the dataset, the sum of outstanding ABCP is scaled with the sum of total equity.

The results for short-term rate confirm and corroborate our earlier findings

that funding cost of banks in Germany, which were able to use U.S. liquidity facilities exhibit significantly lower deposit rates. Contrary to the baseline reports above, we now also find a contemporaneous negative effect on short-term loans of corporates. The finding the long-term rates charged to German corporations are not responding significantly to U.S. liquidity provision is confirmed.

But both the direct pre-crisis exposure to the ABCP market as well as the interaction terms are mostly insignificant, the exception being a small positive coefficient estimated for the effect on short-term deposit rates. To assess the effect of economic magnitude, however, we need to assess the total marginal effect. Figure 4 shows accordingly conditional marginal effects of *Usage* with respect to the four interest rates conditional on the distribution of ABCP exposures across banks in Germany prior to the crisis.

– Figure 4 around here –

Note, that the distribution of the ABCP variable is very skewed. The vast majority of IBHC members in Germany had less than 1000 USD of ABCP exposure as a group per 1 USD of group equity. Only a handful of banks were engaged more heavily in this market, which highlights the importance to draw inference not only based on coefficients estimated at the mean of the data.

The upper two panels of Figure 4 confirm that short-term deposit and loan rates are significantly reduced. This effect is different from zero for the funding cost across the entire ABCP distribution, but declines for those banks with the largest pre-crisis exposures. Similarly, the reduction in short-term credit rates are significantly negative up to around 1,500 USD of ABCP exposure per dollar of group equity, but not for those IBHC members with very large exposures. As such, the U.S. facilities certainly aided dampening of short term rates, but at least customers of the most crisis-affected banks

did not benefit from this policy.

The bottom panels corroborate as well that long-term rates did not respond to liquidity assistance across any degree of ABCP-exposure.

5.5 *Alternative treatment definitions*

Figure 1 highlights the numerous possible alternatives how to define IBHC and thus access to U.S. liquidity via internal capital markets. We consider four alternative differential effects, for which we represent results in the Appendix in Tables A.1 through A.4.

5.5.1 *Effect on German IBHC banks*

Our previous results were obtained under the assumption that both subsidiaries of German IBHCs and subsidiaries of non-German IBHCs were equally affected by transfers of supporting funds through internal capital markets. De Haas and Van Horen (2012) however provide evidence that internal capital markets during crisis may favor home country banks. Therefore foreign subsidiaries with access to funding may not be affected in the same way and distort our results. In the following analysis we exclude these banks (all banks in subsamples *c*) and *d*) in Figure 1) from our data sample. Table A.1, *Panel A* reports the results.

We further show the difference in impact between German and non-German IBHC banks among the subsample of all banks with access to the US emergency funding support (subsamples *b*), *c*) and *d*) in Figure 1) in Table A.1, *Panel B*. Using the original baseline regression approach, we redefine our treatment variable *Usage* to represent the scale of funding received for German IBHC banks only, and zero for all other banks.

5.5.2 *Effect on German IBHC heads*

US funding support possibly had an even stronger effect on head companies of German BHCs with a subsidiary in the US. Unlike the other banks in the IBHC, they have direct control over the US subsidiary, and therefore a more direct access to the provided liquid. We therefore restrict our banks with access to the heads of German IBHCs (subsample *e*) in Figure 1) and analyze the effect compared to the original control group in Table A.2, *Panel A*.

Following the previous results for German IBHC head companies, we restrict our sample in *Panel B* to all banks of German IBHCs with subsidiaries in the US to analyze the difference in impact between direct funding access (heads) and indirect access (subsidiaries). The new sample consists of subsamples *e*) and *f*) in Figure 1. The variable *Usage* in this context remains the share of funds obtained for head companies, and is zero for subsidiaries.

5.5.3 *The impact of savings banks*

The special type of savings banks is both a unique and important feature of the German banking landscape. We here employ an alternative treatment definition to determine in how far the network between savings banks and Landesbanken accounts for our previously reported results. In deviation from our baseline identification, we therefore treat all savings banks in our sample as independent from their Landesbank's IBHC. In this specification, savings banks have no longer access to US funding facilities and are part of the control group.

5.5.4 *The impact of large banks*

Several banks in our sample are especially large commercial banks or serve as central institutions with special tasks for savings and cooperative banks. As such, they play a prominent role in the market and may strongly affect our results. The following results exclude these types of banks to report the effects of emergency facility support independent of these institutions.

6 Conclusions

We test if the usage of U.S. emergency facilities provided between December 2007 until April 2010 by subsidiaries of foreign banks were transmitted via internal capital markets of International Bank Holding Companies (IBHC), thereby affecting interest rate setting outside the U.S. banking market. To test for this international interest rate transmission, we combine the detailed data on which banks used which type of U.S. liquidity assistance to what extent for how long that had to be released by the Federal Reserve System in 2011, following a Freedom of Information Act ruling in favour of the press network Bloomberg L.P.. We collect manually for all foreign banks using the Fed liquidity support lines their connection to IBHC that also operated banks in Germany. For this market, detailed information on the pricing of new lending and deposit taking is reported by a representative sample of banks to the German central banks since January 2004.

The resulting difference-in-difference set-up compares whether banks with access to U.S. liquidity through the internal capital markets of their IBHC passed more favourable funding conditions at the group level on to their German operations. We find that short-term deposit rates exhibit a significant, contemporaneous decline in response to the usage of U.S. liquidity facilities compared to German banks without access to these funding sources.

For term credit rates do not decline contemporaneously, but with a lag of 1 up to 5 months. Thus, unorthodox U.S. monetary policy did not only succeed in reducing funding pressure in the U.S., but also helped to alleviate such constraints abroad in a large, developed banking system like Germany.

We do not find, however, any evidence of a response in long-term rates, either on deposits or loans demand by German corporate customers. This result indicates that liquidity assistance cannot successfully reduce long-term risk premiums.

These results are also confirmed, when considering banks with particularly large US funding pressure due to large pre-crisis ABCP market exposures, matched samples of banks without access to U.S. liquidity assistance via internal capital markets, alternative random treatment allocation schemes, as well as four variants how to defined membership in IBHC.

In sum, our results support the view that unorthodox monetary policy in the form of emergency liquidity assistance in the U.S. transmitted via internal capital markets of international bank holding companies also to other developed markets, and helped to alleviate funding pressure.

References

- Acharya, V., I. Drechsler, and P. Schnabl (2014). A pyrrhic victory? bank bailouts and sovereign credit risk. *The Journal of Finance* 69(6), 2689–2739.
- Acharya, V. V. and P. Schnabl (2010). Do global banks spread global imbalances? asset-backed commercial paper during the financial crisis of 2007–09. *IMF Economic Review* 58(1), 37–73.
- Aiyar, S. (2012). From financial crisis to great recession: The role of globalized banks. *The American Economic Review* 102(3), 225–230.
- Berger, A. N., L. K. Black, C. H. Bouwman, and J. Dlugosz (2014). The Federal Reserve’s Discount Window and TAF Programs: ‘Pushing on a String?’. Available at SSRN 2429710.
- Berger, A. N. and R. A. Roman (2015). Did TARP banks get competitive advantages? *Journal of Financial and Quantitative Analysis*, forthcoming.
- Bernanke, B. S. and M. Gertler (1992). The federal funds rate and the channels of monetary transmission. *The American Economic Review* 82(4), 901–921.
- Bernanke, B. S. and M. Gertler (1995). Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives* 9(4), 27–48.
- Black, L. K. and L. N. Hazelwood (2013). The effect of TARP on bank risk-taking. *Journal of Financial Stability* 9, 790–803.
- Boeckx, J., M. Dossche, and G. Peersman (2015). Effectiveness and transmission of the ECB’s balance sheet policies. *mimeo*.
- Buch, C., C. Koch, and Koetter (2014). Should i stay or should i go? bank productivity and internationalization decisions. *Journal of Banking and Finance* 42, 266–282.
- Buch, C., C. Koch, and M. Koetter (2011a). Size, productivity, and international banking. *Journal of International Economics* 85, 329–334.
- Buch, C., C. T. Koch, and M. Koetter (2011b). Crises, rescues, and policy

- transmission through international banks. *Discussion Paper of Deutsche Bundesbank* 15.
- Caliendo, M. and S. Kopeinig (2008). Some practical guidance for the implementation of propensity score matching. *Journal of Economic Surveys* 22, 31 – 72.
- Campello, M. (2002). Internal capital markets in financial conglomerates: Evidence from small bank response to monetary policy. *Journal of Finance* 57(6), 2773–2805.
- Cetorelli, N. and L. Goldberg (2012a). Banking globalization and monetary transmission. *Journal of Finance* 67, 1811–1843.
- Cetorelli, N. and L. Goldberg (2012b). Liquidity management of U.S. global banks: Internal capital markets in the great recession. *Journal of International Economics* 88(2), 299–311.
- Cycon, L. and M. Koetter (2015). Monetary policy under the microscope: Intra-bank transmission of asset purchase programs of the ECB. *IWH Discussion Paper* 9.
- Cyree, K. B., M. D. Griffiths, and D. B. Winters (2013). Federal Reserve financial crisis lending programs and bank stock returns. *Journal of Banking & Finance* 37(10), 3819–3829.
- De Haas, R. and N. Van Horen (2012). Running for the exit: International bank lending during a financial crisis. *Review of Financial Studies*.
- De Haas, R. T. and I. P. Van Lelyveld (2010). Internal capital markets and lending by multinational bank subsidiaries. *Journal of Financial Intermediation* 19(1), 1–25.
- Devereux, M. B. and J. Yetman (2010). Leverage constraints and the international transmission of shocks. *Journal of Money, Credit and Banking* 42(s1), 71–105.
- Duchin, R. and D. Sosyura (2014). Safer ratios, riskier portfolios: Banks' response to government aid. *Journal of Financial Economics* 113, 1–28. *Journal of Financial Economics*.

- Duygan-Bump, B., P. Parkinson, E. Rosengren, G. A. Suarez, and P. Willen (2013). How effective were the Federal Reserve emergency liquidity facilities? evidence from the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility. *The Journal of Finance* 68(2), 715–737.
- Fleming, M. J., W. B. Hrungr, and F. M. Keane (2010). Repo market effects of the Term Securities Lending Facility. *American Economic Review* 100(2), 591–96.
- Giannetti, M. and L. Laeven (2012a). The flight home effect: Evidence from the syndicated loan market during financial crises. *Journal of Financial Economics* 104(1), 23–43.
- Giannetti, M. and L. Laeven (2012b). Flight home, flight abroad, and international credit cycles. *The American Economic Review*, 219–224.
- Gilchrist, S., D. López-Salido, and E. Zakrajšek (2015). Monetary policy and real borrowing costs at the zero lower bound. *American Economic Journal: Macroeconomics* 7, 77–109.
- Harris, O., D. Huerta, and T. Ngo (2013). The impact of TARP on bank efficiency. *Journal of International Financial Markets, Institutions and Money* 24, 85–104.
- Jiménez, G., S. Ongena, J. Saurina, and J.-L. Peydró (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. *American Economic Review* 102(5), 2301–2326.
- Kashyap, A. K. and J. C. Stein (2000). What do a million observations on banks say about the transmission of monetary policy? *American Economic Review*, 407–428.
- Koetter, M. and F. Noth (2015). Did TARP distort competition among sound banks. *Economic Inquiry*, forthcoming.
- Kuo, D., D. Skeie, and J. Vickery (2012). A comparison of libor to other measures of bank borrowing costs. *FRBNY Working Paper*.
- McAndrews, J., A. Sarkar, and Z. Wang (2008). The effect of the Term Auction Facility on the London inter-bank offered rate. *FRB of New York Staff*

- Report No. 335 (335).*
- New York Southern District Court (2008). *Bloomberg L.P. v. Board of Governors of the Federal Reserve System. Case no. 1:2008cv09595.*
- Peek, J. and E. S. Rosengren (1997). The international transmission of financial shocks: The case of Japan. *The American Economic Review* 87(4), pp. 495–505.
- Peek, J. and E. S. Rosengren (2000). Collateral damage: Effects of the Japanese bank crisis on real activity in the United States. *American Economic Review*, 30–45.
- Popov, A. and G. F. Udell (2012). Cross-border banking, credit access, and the financial crisis. *Journal of International Economics* 87(1), 147–161.
- Puddu, S. and A. Wälchli (2012). Taf effect on liquidity risk exposure.
- Puri, M., J. Rocholl, and S. Steffen (2011). Global retail lending in the aftermath of the us financial crisis: Distinguishing between supply and demand effects. *Journal of Financial Economics* 100(3), 556–578.
- Santos, J. A. (2010). Bank corporate loan pricing following the subprime crisis. *Review of Financial Studies*, hhq115.
- Schnabl, P. (2012). The international transmission of bank liquidity shocks: Evidence from an emerging market. *Journal of Finance* 67(3), 897–932.
- Stein, J. C. (1998). An adverse-selection model of bank asset and liability management with implications for the transmission of monetary policy. *RAND Journal of Economics* 29(3), 466–486.
- Syrstad, O. (2014). The impact of the Term Auction Facility on the liquidity risk premium and unsecured interbank spreads.
- Wu, T. (2011). The US money market and the Term Auction Facility in the financial crisis of 2007-2009. *Review of Economics and Statistics* 93(2), 617–631.

Figures

Figure 1. Illustration of data sample.

Overview of sample structure by types of banks with and without access to Federal Reserve funding facilities. The analyzed data sample is constructed of German banks included in the interest rate report of Deutsche Bundesbank (*Zinsstatistik*). (a) includes all banks which are part of a BHC network that during the treatment period accessed one or more of the facilities. (b)–(d) distinguishes the banks according to the country of origin of the BHC, while (e) and (f) further separate between the head of the BHC and the subsidiaries, which only gained indirect access through the head company.

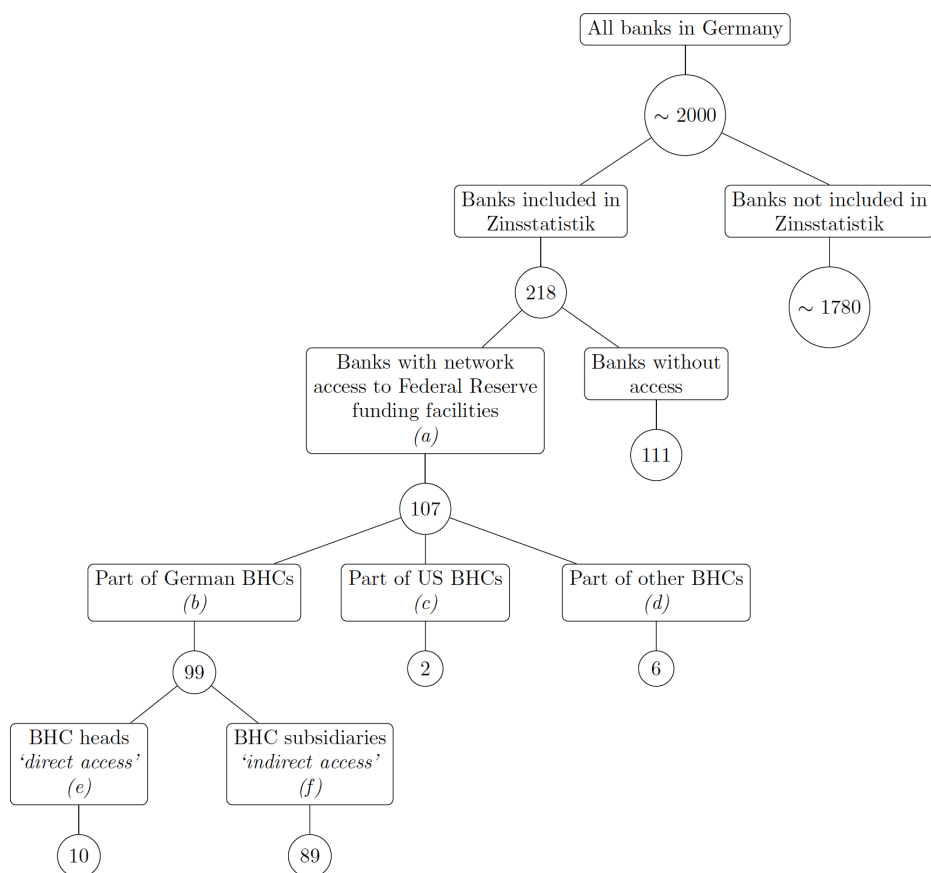


Figure 2. Total size of funding facilities.

Bars show the total balance outstanding of all six Federal Reserve funding facilities (TAF, PDCF, TSLF, AMLF, CPFF, STOMO) and the Discount Window in billion EUR (left scale) from December 2007 to April 2010. On the right scale the balance is depicted in % of total US GDP and US financial sector GDP, respectively. Financial sector GDP includes financial, insurance, and real estate economic activities.

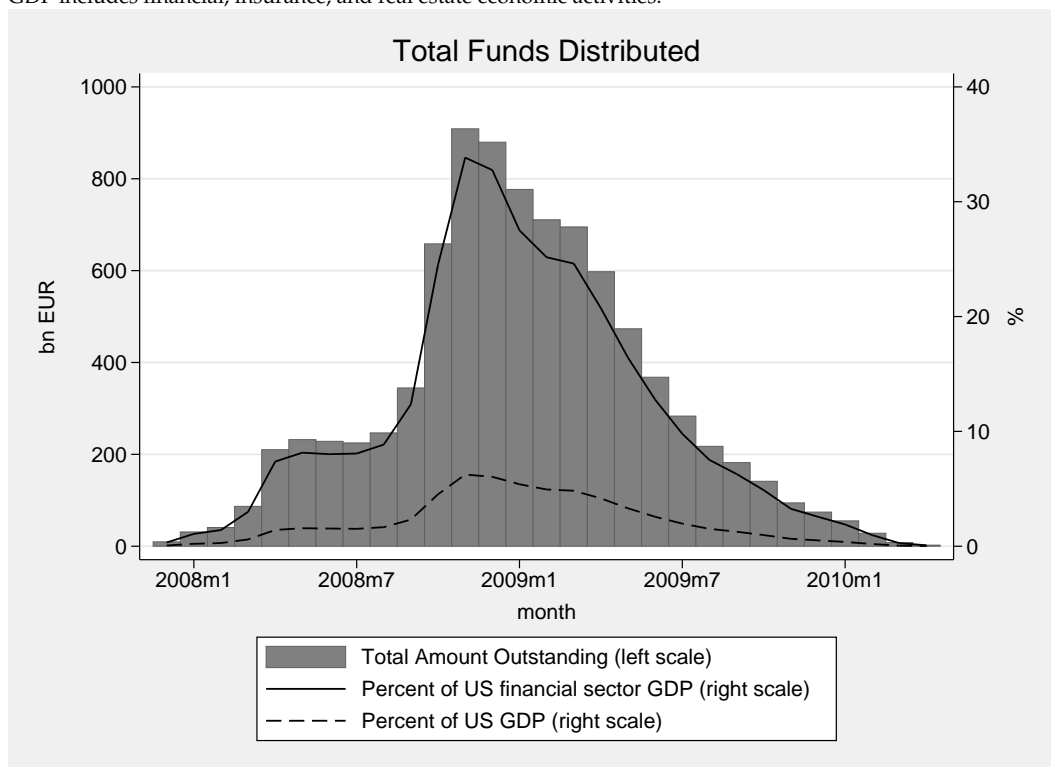


Figure 3. Lagged effects of access to funding facilities on corporate products.

Graphs illustrate the regression coefficient and the 95% confidence interval for different time lags of *Usage*. Coefficients are obtained from OLS regressions on the complete sample of 218 banks, with the treatment variable *Usage* lagged between 1 and 12 months. All regressions include control variables lagged by one additional month and winsorized at 1% on both ends, as well as bank- and month-fixed effects. Confidence intervals are based on two-way clustered standard errors by bank and month. Rates are reported in %.

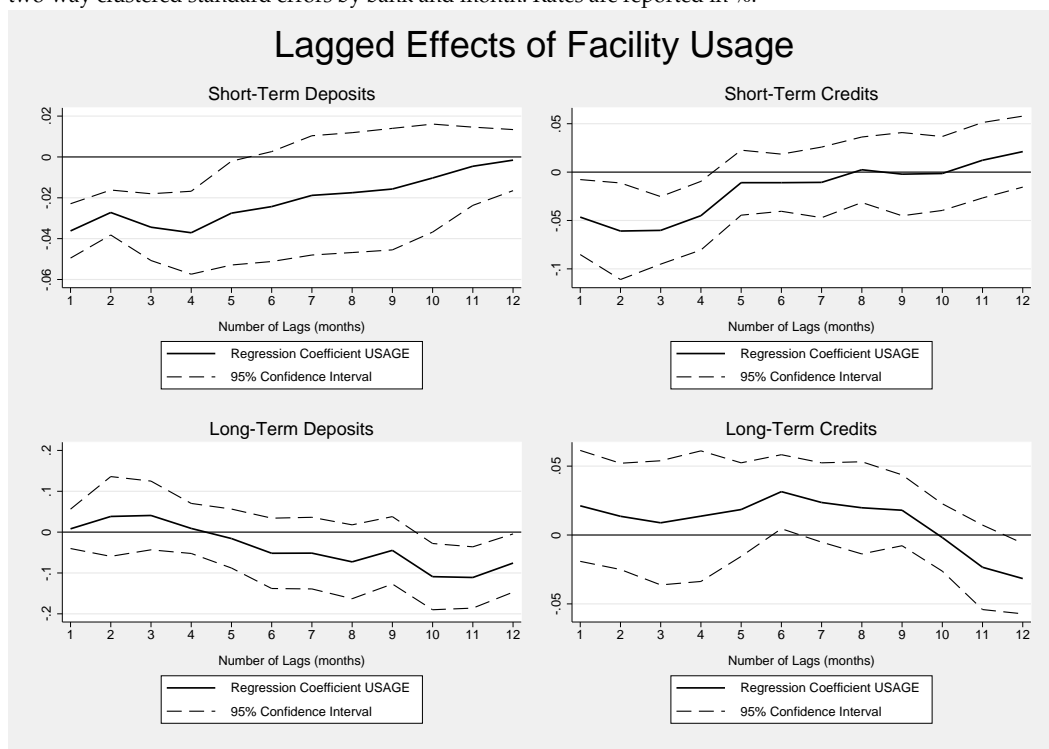
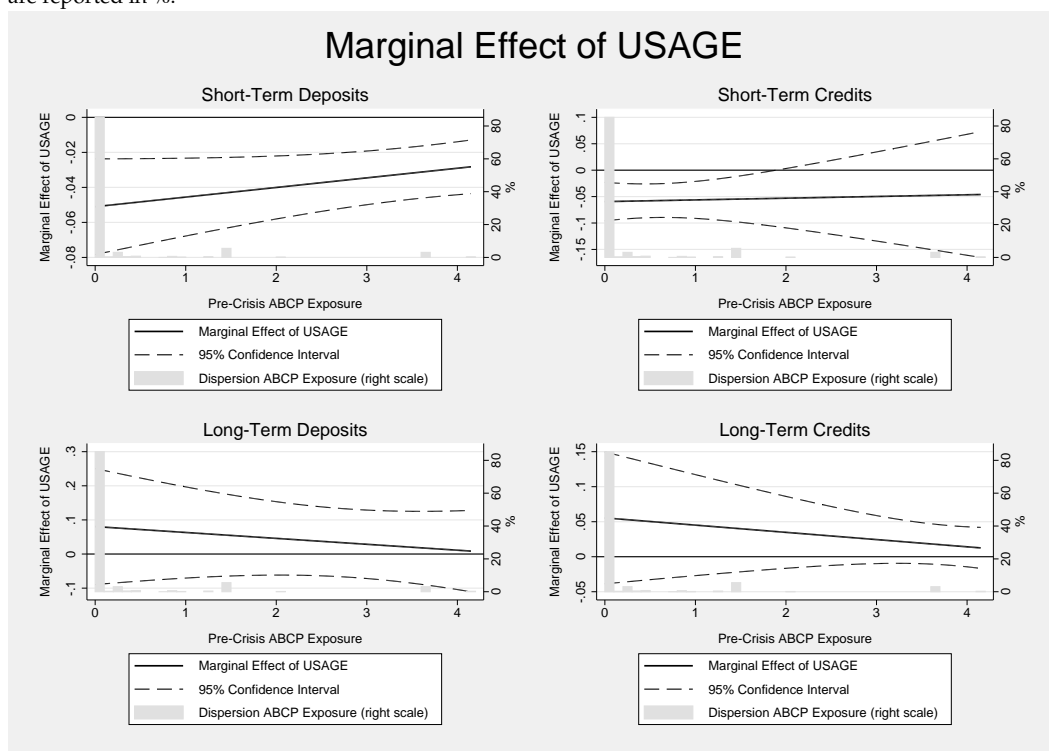


Figure 4. Effects of facility funds on corporate products conditional on pre-crisis ABCP exposure.

Graphs illustrate the marginal effect of the treatment variable *Usage* for different levels of pre-crisis ABCP exposure. Marginal effects are calculated based on the OLS regression results presented in Table 10. The regression includes control variables lagged by one month and winsorized at 1% on both ends, as well as bank- and month-fixed effects. Confidence intervals are based on two-way clustered standard errors by bank and month. Rates are reported in %.



Tables

Table 1**Funds received from individual facilities.**

Overview of the average monthly balance outstanding to the different Federal Reserve funding facilities and the Discount Window between December 2007 and April 2010 (29 months). The sample includes only IBHCs with headquarters and/or subsidiaries in Germany, i.e. funds having a link to banks in Germany. In million EUR.

Facility	N	Mean	SD	p5	p95
Term Auction Facility (TAF)	667	1,537	2,680	0	7,394
Commercial Paper Funding Facility (CPFF)	667	348	1,399	0	1,853
Single Tranche Open Market Operations (STOMO)	667	108	936	0	0
Term Securities Lending Facility (TSLF)	667	519	2,758	0	192
Primary Dealer Credit Facility (PDCF)	667	112	1,051	0	0
ABCP Money Market Mutual Fund Liquidity Facility (AMLF)	667	4	38	0	0
Discount Window	667	415	2,276	0	1,374
Total Balance	667	3,043	6,956	0	13,262

Table 2

Dependent variables.

Dependent variables are monthly interest rates reported by individual banks to Deutsche Bundesbank's *Zinsstatistik* (interest rate report). All rates are in % and calculated as averages of the total respective month's newly generated business.

Variable	Description
<i>Short-Term Products</i>	
Corporate Deposits	Short-term deposits from non-financial corporations, with maturities < 1 year
Corporate Credits	Short-term credit to non-financial corporations of up to one million EUR with maturities < 1 year
<i>Long-Term Products</i>	
Corporate Deposits	Long-term deposits from non-financial corporations with maturities > 2 years
Corporate Credits	Long-term credit to non-financial corporations up to one million EUR with maturities > 5 years

Table 3

Definitions of control variables.

Control variables are calculated from Deutsche Bundesbank's monthly *Bilanzstatistik* (balance sheet report).

Variable	Definition
Bank Size	$\ln(\text{Total Assets})$
Leverage Ratio	$(\text{Total Equity})/(\text{Total Assets}) \times 100$
Wholesale Funding	$(\text{Securitized Liabilities})/(\text{Total Assets}) \times 100$
Latent Liabilities	$(\text{Latent Liabilities})/(\text{Total Assets}) \times 100$

Table 4

Summary statistics.

The table presents summary statistics of dependent variables and control variables for banks with access to Federal Reserve funding facilities ('treatment group') and without access ('control group'), as well as the respective differences in means. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 218 individual banks. Rates are average monthly interest rates on newly generated business in %. Clients are non-financial corporations only, with reported credit data for all credits of up to one million EUR in size. Short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Control variables are *Bank Size*, given by $\ln(\text{Total Assets})$, *Leverage Ratio* (Total Equity in % of Total Assets), *Wholesale Funding* (Securitized Liabilities in % of Total Assets), and *Latent Liabilities* (Latent Liabilities in % of Total Assets), winsorized by 1% on both sides. SE reports the standard error of the t-test for equality of means, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Treatment Group					Control Group				
	N	Mean	SD	p5	p95	N	Mean	SD	p5	p95
<i>Dependent Variables</i>										
Short-Term Deposits	11,098	1.916	1.372	0.165	4.407	6,522	1.843	1.302	0.217	4.390
Short-Term Credits	11,615	4.137	1.529	2.061	6.616	6,221	3.915	1.542	1.789	6.510
Long-Term Deposits	3,907	2.985	1.216	1.000	4.969	2,180	2.822	1.137	1.000	4.600
Long-Term Credits	11,076	4.498	1.068	2.661	6.031	5,841	4.319	1.156	2.489	6.035
<i>Control Variables</i>										
Bank Size	11,944	23.251	1.434	21.820	26.268	7,612	22.310	1.079	20.948	24.466
Wholesale Funding	11,257	10.333	14.249	0.167	43.200	6,476	10.329	14.215	0.055	48.872
Leverage Ratio	11,944	4.618	1.609	1.969	6.922	7,612	5.010	2.289	1.908	10.081
Latent Liabilities	11,944	2.904	2.998	0.137	9.340	7,574	2.546	3.231	0.034	8.180
<i>Differences between Treatment and Control Group</i>										
	Short-Term Deposits	Short-Term Credits	Long-Term Deposits	Long-Term Credits	Bank Size	Wholesale Funding	Leverage Ratio	Latent Liabilities		
Difference	0.073***	0.222***	0.163***	0.179***	0.941***	0.004	-0.391***	0.358***		
SE	(0.021)	(0.024)	(0.032)	(0.018)	(0.019)	(0.222)	(0.028)	(0.045)		

Table 5

Results for difference-in-differences estimates.

The table reports difference-in-differences estimates for the dependent variables, given by subtracting the average differences between treatment and control group during the pre- and post-treatment period (January 2004 to November 2007 and May 2010 to December 2013) from the differences during the treatment period (December 2007 to April 2010). Rates are average monthly interest rates on newly generated business in %. Clients are non-financial corporations only, with reported credit data for all credits of up to one million EUR in size. Short-term includes maturities of up to one year, long-term deposits refers to maturities over two years, long-term credits to maturities over five years. Control variables are *Bank Size*, given by $\ln(\text{Total Assets})$, *Leverage Ratio* (Total Equity in % of Total Assets), *Wholesale Funding* (Securitized Liabilities in % of Total Assets), and *Latent Liabilities* (Latent Liabilities in % of Total Assets), winsorized by 1% on both sides. SE in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Dependent Variables	DID	Control Variables	DID
Short-Term Deposits	-0.235*** (0.049)	Bank Size	-0.087* (0.047)
Short-Term Credits	-0.250*** (0.059)	Wholesale funding	-0.344 (0.538)
Long-Term Deposits	-0.156** (0.070)	Leverage Ratio	0.207*** (0.069)
Long-Term Credits	-0.007 (0.042)	Latent Liabilities	0.448*** (0.112)

Table 6

Impact of Federal Reserve emergency funding on deposit and credit rates.

Regression results for deposits and credits to non-financial corporations. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 218 individual banks. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S. and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets. Rates are average monthly interest rates on newly generated business in %. Short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits of up to one million EUR in size. Control variables are *Bank Size*, given by $\ln(\text{Total Assets})$, *Leverage Ratio* (Total Equity in % of Total Assets), *Wholesale Funding* (Securitized Liabilities in % of Total Assets), and *Latent Liabilities* (Latent Liabilities in % of Total Assets). All regressions include month fixed effects and control variables winsorized by 1% on both sides and lagged by one month. Regressions (I) to (IV) additionally include bank \times year fixed effects (thus omitting *Subsidiary*). SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term		Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits	Deposits	Credits	Deposits	Credits
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
Subsidiary					-0.108*** (0.032)	-0.039 (0.079)	-0.006 (0.056)	0.016 (0.073)
Subsidiary \times Usage	-0.036*** (0.007)	-0.051 (0.034)	0.032 (0.052)	0.021 (0.016)	-0.037*** (0.011)	0.046** (0.023)	0.032 (0.030)	0.041** (0.017)
Bank Size	0.016 (0.042)	-0.132 (0.153)	0.060 (0.250)	-0.020 (0.106)	-0.017 (0.015)	-0.025 (0.035)	0.042 (0.028)	0.030 (0.045)
Wholesale Funding	0.004 (0.002)	-0.009 (0.009)	0.021 (0.016)	0.009 (0.007)	-0.001 (0.002)	-0.003 (0.002)	0.019*** (0.003)	-0.004* (0.002)
Leverage Ratio	0.002 (0.014)	-0.029 (0.035)	-0.111 (0.072)	-0.023 (0.042)	-0.007 (0.009)	0.007 (0.038)	-0.010 (0.021)	0.067 (0.048)
Latent Liabilities	-0.008* (0.004)	0.001 (0.012)	0.007 (0.026)	0.009 (0.011)	-0.002 (0.005)	-0.018 (0.011)	-0.005 (0.011)	-0.014 (0.011)
R^2	0.98	0.82	0.76	0.76	0.94	0.66	0.61	0.60
N	16,003	16,190	5,399	15,509	16,039	16,219	5,605	15,555
Sample Mean	1.924	4.055	2.950	4.410	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043	1.355	1.490	1.169	1.043
Usage Mean	0.141	0.149	0.154	0.139	0.141	0.149	0.154	0.139
Usage SD	0.598	1.013	0.549	0.580	0.598	1.013	0.549	0.580
bank \times year fixed effects	Yes	Yes	Yes	Yes	No	No	No	No
Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7

Matched control group.

Regression results for deposits and credits to non-financial corporations on a sample matched by propensity score matching. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months). Banks in the treatment group are matched with their nearest neighbor in the control group. Banks without a match or common support are dropped from the original sample. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank×year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Subsidiary×Usage	-0.106** (0.047)	0.010 (0.060)	0.006 (0.091)	0.059 (0.048)
R^2	0.98	0.87	0.81	0.87
N	5,432	5,432	5,432	5,432
Sample Mean	1.809	4.020	2.934	4.459
Sample SD	1.273	1.364	1.155	0.981
Usage Mean	0.189	0.189	0.189	0.189
Usage SD	0.593	0.593	0.593	0.593
Bank×year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes

Table 8

Placebo-test: Pre-treatment usage of facilities.

Regression results for deposits and credits to non-financial corporations, with facility usage three years prior to the actual usage. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months). *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in three years, as percent of group total assets. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Subsidiary \times Usage	0.013 (0.011)	0.020 (0.054)	0.030 (0.147)	-0.025 (0.041)
R^2	0.98	0.82	0.76	0.76
N	16,003	16,190	5,399	15,509
Sample Mean	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043
Usage Mean	0.039	0.038	0.049	0.039
Usage SD	0.176	0.176	0.228	0.180
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes

Table 9

Placebo-test: Random usage of facilities.

Regression results for deposits and credits to non-financial corporations, with amounts of facility usage randomly assigned to banks during the lifetime of the facilities. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months). *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as randomly assigned Federal Reserve funds outstanding, as percent of group total assets. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank×year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Subsidiary×Usage	-0.001 (0.001)	-0.001 (0.002)	0.000 (0.002)	-0.002 (0.002)
R^2	0.98	0.82	0.76	0.76
N	16,003	16,190	5,399	15,509
Sample Mean	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043
Usage Mean	0.458	0.420	0.507	0.388
Usage SD	4.067	3.908	4.677	3.523
Bank×year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes	Yes

Table 10

Access to funding facilities and pre-crisis ABCP exposure.

Regression results for deposits and credits to non-financial corporations. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 218 individual banks. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets. *ABCP* refers to the end-of-2006 balance of ABCPs in thousands of EUR per total group equity. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Usage	-0.051*** (0.013)	-0.059*** (0.017)	0.081 (0.072)	0.055 (0.046)
ABCP	-0.003 (0.013)	-0.011 (0.033)	-0.042 (0.038)	0.012 (0.023)
Usage \times ABCP	0.005** (0.003)	0.003 (0.012)	-0.017 (0.020)	-0.010 (0.011)
R^2	0.98	0.82	0.76	0.76
N	16,003	16,190	5,399	15,509
Sample Mean	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043
Usage Mean	0.141	0.143	0.156	0.140
Usage SD	0.599	0.620	0.554	0.580
ABCP Mean	0.267	0.261	0.304	0.268
ABCP SD	0.795	0.779	0.843	0.786
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

A Appendix Tables

Table A.1

Effect on German banks.

Panel A shows regression results for deposits and credits to non-financial corporations, without subsidiaries of foreign IBHCs having access to Federal Reserve funds. Panel B presents regression results for deposits and credits to non-financial corporations, including only banks with access to Federal Reserve Funds. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 211 (Panel A) and 106 (Panel B) individual banks, respectively. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
<i>Panel A: Subsample b) vs Control Group</i>				
Subsidiary \times Usage	-0.034*** (0.007)	-0.053 (0.040)	0.050 (0.051)	0.021 (0.016)
R^2	0.98	0.82	0.76	0.76
N	15,904	16,094	5,349	15,449
Sample Mean	1.920	4.054	2.942	4.408
Sample SD	1.350	1.488	1.167	1.044
Usage Mean	0.136	0.137	0.151	0.138
Usage SD	0.571	0.593	0.547	0.578
<i>Panel B: Subsample b) vs Subsample c)+d)</i>				
Subsidiary \times Usage	-0.026*** (0.008)	-0.052 (0.047)	0.059 (0.055)	0.010 (0.016)
R^2	0.98	0.83	0.73	0.76
N	10,516	10,829	3,563	10,419
Sample Mean	1.917	4.086	3.004	4.460
Sample SD	1.375	1.468	1.188	1.020
Usage Mean	0.206	0.204	0.227	0.204
Usage SD	0.692	0.714	0.658	0.694
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

Table A.2

Effect on German IBHC heads.

Panel A presents regression results for deposits and credits to non-financial corporations, including only German IBHC heads and banks without access to Federal Reserve Funds. Panel B presents regression results for deposits and credits to non-financial corporations, including only banks belonging to German IBHCs with access to Federal Reserve funds. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 122 (Panel A) and 99 (Panel B) individual banks, respectively. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets, and is zero for subsidiaries in Panel B. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
<i>Panel A: Subsample e) vs Control Group</i>				
Subsidiary \times Usage	-0.043** (0.018)	-0.023 (0.024)	0.072 (0.073)	0.033 (0.024)
R^2	0.97	0.80	0.76	0.76
N	13,690	13,812	4,586	13,154
Sample Mean	1.823	3.973	2.887	4.309
Sample SD	1.258	1.427	1.192	1.056
Usage Mean	0.024	0.024	0.046	0.020
Usage SD	0.313	0.312	0.355	0.305
<i>Panel B: Subsample e) vs Subsample f)</i>				
Subsidiary \times Usage	-0.041** (0.016)	-0.026 (0.027)	0.120 (0.082)	0.022 (0.020)
R^2	0.98	0.83	0.73	0.76
N	10,429	10,742	3,513	10,363
Sample Mean	1.914	4.085	2.992	4.458
Sample SD	1.371	1.467	1.185	1.022
Usage Mean	0.031	0.030	0.060	0.025
Usage SD	0.359	0.353	0.405	0.343
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

Table A.3

Without treatment of savings banks.

The table presents regression results for deposits and credits to non-financial corporations, with Sparkassen (savings banks) considered as being independent from Landesbanken. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 218 individual banks. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets, with Sparkassen being not treated, i.e. always having a balance of zero. Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Subsidiary \times Usage	-0.040*** (0.007)	-0.052 (0.037)	0.074 (0.053)	0.005 (0.011)
R^2	0.98	0.82	0.76	0.76
N	16,003	16,190	5,399	15,509
Sample Mean	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043
Usage Mean	0.055	0.055	0.072	0.048
Usage SD	0.493	0.517	0.431	0.463
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes

Table A.4

Excluding large banks.

The table presents OLS regression results for deposits and credits to non-financial corporations, without large commercial banks, Landesbanken and cooperative banks' central institutions. The sample is composed of monthly data ranging from January 2004 to December 2013 (120 months) and contains 203 individual banks. *Subsidiary* is a dummy variable equal to one if a bank's IBHC operates a subsidiary in the U.S., and zero otherwise. *Usage* is measured as Federal Reserve funds outstanding in percent of group total assets Rates are average monthly interest rates on newly generated business in %, short-term includes maturities of up to one year, long-term deposits refer to maturities over two years, long-term credits to maturities over five years. Corporate credits are all credits up to one million EUR in size. All regressions include bank \times year and month fixed effects, with control variables *Bank Size*, *Wholesale Funding*, *Leverage Ratio*, and *Latent Liabilities* winsorized by 1% on both sides and lagged by one month. SE two-way clustered by bank and month in (); * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

	Short-Term		Long-Term	
	Deposits	Credits	Deposits	Credits
Subsidiary \times Usage	-0.036*** (0.007)	-0.051 (0.034)	0.032 (0.052)	0.021 (0.016)
R^2	0.98	0.82	0.76	0.76
N	16,003	16,190	5,399	15,509
Sample Mean	1.924	4.055	2.950	4.410
Sample SD	1.355	1.490	1.169	1.043
Usage Mean	0.141	0.143	0.156	0.140
Usage SD	0.599	0.620	0.554	0.580
Bank \times year fixed effects	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes