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Abstract

We empirically assess the responses of banks in the United States to a regulatory change that influenced the distribution of funding in the banking system. Following the 2011 FDIC change in the assessment base, insured banks found wholesale funding more costly, while uninsured branches of foreign banks enjoyed cheaper access to wholesale liquidity. We use quarterly bank balance sheet data and a rich data set of syndicated loans with borrower and lender characteristics to show that uninsured foreign banks, which faced a relatively positive shock, engaged in liquidity hoarding. Hence, they accumulated more reserves but extended fewer total syndicated loans and became more passive in the syndicated loan deals in which they participated. These results contribute to the discussion on the role of foreign banks in credit creation, especially in a country like the United States where foreign banks also have a crucial role in managing USD money market operations at the group level.

JEL Classification: G21, G28, E44

Keywords: foreign banks, liquidity shocks, Wholesale funding, syndicated loans

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1 Introduction

The contribution of multinational banks to the business activity of host countries has seen growing interest over the past twenty years alongside a rise in global banking activity. It is often argued that multinational banks can buffer host economies from domestic (liquidity or capital) shocks, due to their ability to tap internal capital markets for liquidity and their access to more sophisticated lending technologies and securities holding. Foreign banks have indeed frequently been found to maintain credit amidst negative shocks to the host countries in which they operate (see, for instance, Cetorelli and Goldberg, 2012a, and references therein).[1] Yet, in the aftermath of the global financial crisis (GFC) that started in 2008, concerns have been growing about the capacity of foreign banks to perform such a stabilizing role (see, e.g., Goulding and Nolle, 2012). But disentangling the supply-side responses of foreign and domestic banks to domestic shocks runs into the difficulty of distinguishing such supply-side responses from changes in credit demand.

In this paper, we aim at contributing to this unsettled debate by exploiting a unique policy-driven domestic liquidity shock that hit the U.S. bank funding market. The shock, first investigated by Kreicher, McCauley and McGuire (2014), increased the cost of wholesale funding for insured domestic banks while reducing it for uninsured foreign banks. These sub-groups are affected in opposite ways in terms of their wholesale funding and the policy changes can be interpreted as a positive shock to the cost of funding for uninsured foreign branches.

The value-added of this paper is that we assess the impact of the policy change on the bank's business model, by using data from the syndicated loan market hand-matched with data on banks' balance sheets. We show that foreign banks that benefited from the favourable funding shock reacted by increasing their holdings of reserves (consistent with Kreicher, McCauley and McGuire, 2014), but did not participate more actively in syndicated loans. In fact, ceteris paribus, we find evidence of reduced syndicated lending by foreign banks on both the intensive and extensive margins.

[1] However, foreign banks have also been shown to propagate shocks originating abroad by recalling capital to their home offices, contracting the credit supply in host countries in which they operate (see, for instance, Peek and Rosengren, 2000).

In April 2011, the Federal Depository Insurance Corporation (FDIC) enacted a change in the insurance fee levied on banks in order to fund the FDIC's Deposit Insurance Fund. The legislation was passed as a part of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank) in response to the GFC. As such, the FDIC assessment base change sought to act as a corrective tax on large, complex institutions and decrease their exposure to the wholesale short-term funding.[2] Their ongoing reliance on wholesale funding could leave these banks more vulnerable to runs and contribute to systemic instability (Shin, 2010). Specifically, whereas banks were previously assessed on a percentage of domestic deposits, they would now be assessed based upon their total liabilities and wholesale funding became part of the assessment base. Wholesale funding refers to a variety of borrowings, like repurchase agreements, federal funds, and foreign deposits and is often on large quantities and on a short-term basis.[3] In Appendix A, we show the estimated magnitudes ($ trillions) and changes (%) in the assessment base for a sub-sample of insured banks.

Importantly, all U.S. depository institutions are required to have FDIC insurance, but a group of around two-hundred branches of foreign banks in the United States are exempt from the new insurance assessment base. These foreign bank branches may not accept retail deposits from U.S. citizens and residents, but take wholesale deposits and engage in a variety of other banking activities. These branches hold a high percentage of the total foreign banking assets in the United States, and a significant fraction of their lending takes the form of commercial and industrial (C&I) loans with representation in the syndicated loan market.[4]

[2]This change restricts the "arbitrage opportunity"in which large banks borrowed overnight at 10 basis points from non-banks unable to place at the Fed at its going rate of 25 basis points.

[3]Supplementary Table S1 shows the composition of the balance sheets of small and large banks in the United States.

[4]The Federal Reserve's Dodd-Frank Act enhanced prudential standards (EPS) final rule, requires a foreign banking organization with $50 billion or more in U.S. non-branch/agency assets to place all of its U.S. subsidiaries under a top-tier U.S. intermediate holding company (IHC) by 1^{st} July 2016. After the IHC establishment, a foreign bank consists of U.S. bank holding companies, broker-dealer, financial company, commercial company and funding vehicle. The IHC will be subject to capital planning, stress testing, liquidity, risk management and other prudential requirements on a consolidated basis instead of the bank holding company. Foreign banks changed sharply their operations and asset management closer to the end of 2014 because the actual rule will use the U.S. assets of 1^{st} July 2015. As a response, some banks squeezed their assets to avoid the $50 billion threshold while others shifted assets to U.S. branches (Kreicher and McCauley, 2018). As we note in the data section, our sample spans 2001Q1 through 2014Q2.

As a result, the policy change enacted from the FDIC is a heterogeneous shock to the cost of bank funding.[5] Insured banks that are assessed on the new fee, face higher costs associated with raising non-depository funds. The traditional bank lending channel of monetary policy works through an analogous mechanism: if following a contractionary shock, banks cannot substitute lost deposits with other external sources such as certificates of deposits (CDs) or money market funds, then the shock is transmitted to the asset side of their balance sheets. In addition, without a large volume of liquid assets to be used as a buffer, the original shock is decreasing the lending creation. Whalen (2011) estimates that the impact is nearly the same as if the Fed were to have raised interest rates about 15 basis points. Similarly, in the current setting insured (assessed) banks face a higher cost associated with wholesale funding, while uninsured (exempted) foreign banks experience easier access to wholesale liquidity.

We use a difference-in-differences exercise, where we take the difference in the reactions to the policy shock of uninsured banks compared to insured banks. Because we estimate our approach based on the FDIC change, we include time, firm, bank, and country*time fixed effects to alleviate any lingering concerns for common shocks, like absorbing other factors contained in Dodd-Frank act, and time-invariant demand and supply-side omitted factors. We examine banks' lending activity as recorded on their quarterly balance sheet statements, and through a hand-matched syndicated loan-level database based on DealScan data. In our sample, syndicated loans represent, on average, around 9% of U.S. foreign banks' total assets, and around 13% in terms of total loans. We find that uninsured branches of foreign banks reduced their participation in syndicated loans, despite benefiting from improved access to wholesale funding. That is, these banks faced with greater access to wholesale liquidity, reduced their lending in favor of liquidity hoarding (building up reserves). Our results are in line with the evidence in Kreicher, McCauley and McGuire (2014) that U.S. branches of non-U.S. banks went from being net lenders (in the volume of $400 billion on their own affiliates outside the U.S.) to net borrowers, by $200 billion. Overall, the results

[5] Anecdotal evidence suggests that before the FDIC published the proposed rules in November, market participants hoped that reserve holdings at the Federal Reserve might be excluded from the asset base (see Smedley, 2010).

from our analysis contribute to the discussion on the role of foreign banks in credit creation, especially in a country as the United States where foreign banks also have a crucial role in managing USD money market operations at the group level.

We consider testable hypotheses about the impact of the new FDIC assessment base on banks' funding mix and lending using mechanisms from the banking lending channel literature. The prediction about the impact on the liability side of the affected and unaffected banks is clear. Specifically, the banks should economise on the newly assessed wholesale funds (Kreicher, McCauley and McGuire, 2014). Domestic insured banks should favour deposit over non-deposit liabilities because the (relative) regulatory cost of deposits has gone down for foreign uninsured branches.[6] The predicted impact on loan creation is ambiguous a priori. The traditional bank lending channel posits that such a funding shock can cause the insured banks to cut lending relative to the unaffected branches (Kashyap and Stein, 1995, 2000). On the contrary, Stein (1998), Manone, Padilla and Pagano (2001), Gale and Yorulmazer (2013), among others, rationalize banks' incentives to hoard liquidity in the presence of uncertainty in loan returns and imperfect substitutability between retail and wholesale deposits.

An alternative possible explanation for liquidity hoarding is the presence of a "price effect" that creates an arbitrage opportunity when overnight rates are trading below the Fed's interest rate on excess reserves. For instance, depository institutions with accounts at the Fed (eg US chartered banks and US branches and agencies of foreign banks) could borrow cheap funds in the market from non-banks like government-sponsored enterprises and then deliver those funds at the Fed, earning a risk-free profit.

The new FDIC balance-sheet assessment raised the all-in cost of funds for US chartered banks performing this arbitrage, leaving them at a disadvantage relative to branches of foreign banks. The more competitive branches and agencies of foreign banks could have taken advantage of their lower cost of funding and increased their reserves with the Fed. In our empirical specification, to filter out this effect we use a rich set of bank-specific

[6]For example, say an assessed bank was paying a 10-basis point premium to the FDIC on its domestic deposits before, and afterwards has to pay 10 basis points on both deposit and non-deposit liabilities. Before the wider assessment base, the regulatory costs of the two funding sources differed by 10 basis points, and afterwards by zero basis points.

characteristics, including a liquidity ratio to control for different preferences among banks in liquidity hoarding. Ultimately, how the insured and uninsured banks respond in terms of lending vs liquidity hoarding remains an empirical question that we try to address in this paper.

The remainder of the paper unfolds as follows. Section 2 relates the analysis to prior literature. Section 3 describes in detail the FDIC assessment base change and how it may be interpreted as a bank funding shock. It also lays out testable hypotheses regarding the effects of the FDIC assessment base change. Section 4 describes the data we use, and Section 5 discusses our empirical methodology. Section 6 presents the main results while Section 7 contains robustness analysis and further tests. Section 8 concludes.[7]

2 Prior Literature

This paper relates to two strands of literature. The first investigates how foreign banks impact on credit provision and how they can stabilize their host economies by maintaining lending amidst negative capital or liquidity shocks. Kashyap and Stein (1995, 2000) investigate the effect of a liquidity shock via monetary policy on bank lending and find that smaller banks are less resilient to the bank lending channel than larger banks. Cetorelli and Goldberg (2012a) find that the presence of foreign banks during adverse liquidity shocks can be a stabilizing force in the host economy. In fact, they argue that the feature which makes large banks resilient in response to a contractionary monetary policy shock is not their access to external credit, as argued by Kashyap and Stein (1995, 2000), but rather the presence of foreign offices.

Large multinational banks can withstand liquidity shocks better than large domestic banks can, by allocating liquidity across borders using the internal capital market funding.[8] De Haas and Van Lelyveld (2006) find for emerging Europe that during local crises lending

[7]Details regarding the regulation of foreign banks in the United States are relegated to Appendix B.

[8]Cetorelli and Goldberg (2011) show that subsidiaries' distance from the parent bank plays an important role in their (de)stabilising role. Cetorelli and Goldberg (2012b) emphasize the heterogeneity of U.S. branches of foreign banks with respect to the role they play within their organizations. While some are "core investment markets" that receive funding from their home affiliates, others are "core funding markets" that send new flows to their parent banks in response to balance sheet disturbances.

by foreign banks has typically been more stable than lending by domestic banks. Haselmann (2006) provides evidence that foreign banks act as stabilizers in the financial markets of Central and Eastern European countries. Kamil and Rai (2010) show for Latin America that multinational bank subsidiaries were a relatively stable credit source during the recent crisis. By contrast, De Haas and Lelyveld (2014) conclude that during GFC the subsidiaries of multinational banks acted as destabilizers by curtailing credit growth more than domestic banks did.[9]

The second related strand of studies examines the response of the banking system to domestic liquidity shocks. The liquidity shock considered in this paper consists of an increase in the cost of wholesale funding for domestic banks and a corresponding decrease for foreign banks. It has long been established in the literature that retail and wholesale funding are imperfectly substitutable so that, for instance, a decline in the cost of one source drives down the overall cost of funding for banks. For example, the extensive literature on the bank lending channel has stressed that wholesale and retail funding feature a limited degree of substitutability. Romer and Romer (1990) and Kashyap and Stein (1995) stress that, since large-denomination CDs are not federally insured, investors purchasing them are especially concerned about the quality of issuing banks. In the presence of asymmetric information between banks and investors, adverse selection problems will make the marginal cost of wholesale liquidity an increasing function of the amount raised.

Stein (1998) discusses other financial frictions that cause imperfect substitutability between retail deposits and wholesale funding.[10] In our setting, the funding cost shock that hits banks can be thought of as akin to the shock that is generally studied in the bank lending channel, when the cost of retail deposits increases and, due to limited substitutability between retail and wholesale funds, banks' overall cost of funding rises. Here, due to the

[9]See also De Haas and Van Lelyveld (2010).

[10]There are imperfections in the market for non-deposit finance. As noted, asymmetric information and adverse selection problems can arise in the market for CDs (Stein, 1998). Adverse selection is not the only source of imperfections, however. Froot, Scharfstein and Stein (1993) demonstrate how a costly-state-verification model leads to a convex cost function for external funds. Further, in a search environment, potential investors in a bank's non-deposit liabilities may not be aware of the return opportunities offered by the bank. The bank may, therefore, have to spend in advertising or raise its rates relative to those on alternatives (e.g., T-bills).

FDIC regulatory shock, it is the cost of wholesale funding that rises and, due to imperfect substitutability, this generates an overall increase in the cost of funding for domestic banks.[11]

Finally, the paper is also loosely related to a strand of studies that investigate the role of foreign banks in transmitting shocks (see, e.g., Peek and Rosengren, 1997, 2000; and Claessens and Van Horen, 2014). Analyzing the syndicated lending market in the aftermath of the GFC, Giannetti and Laeven (2012) find that banks with relatively worsened capital positions shifted their lending proportionately more toward borrowers in their home countries ("flight home"), and that the banks most adversely affected by the crisis were the ones that cut their lending most severely. Correa, Sapriza and Zlate (2013) offer an example of foreign banks propagating a liquidity shock from abroad by looking at how U.S. branches of foreign banks responded to liquidity shocks stemming from the European debt crisis.

3 Institutional Background and Testable Hypotheses

In this section, we discuss the regulatory-driven domestic liquidity shock that hit the U.S. banking sector in April 2011.

3.1 FDIC Assessment Base Change

Dodd-Frank was signed into law in July 2010 with the intention of enhancing the FDIC's ability to manage its Deposit Insurance Fund (DIF). The law enabled the FDIC to use stronger tools to "maintain a positive fund balance even during a banking crisis and [maintain] moderate, steady assessment rates throughout economic credit cycles". Dodd-Frank raised the target reserve ratio (designated reserve ratio, DRR) and set a timetable by which the FDIC was to achieve specified increasing ratios through 2020. The act also required

[11] In the bank lending channel, a monetary contraction drains reserves from the banking system and this leaves banks with fewer funds to lend (Bernanke and Blinder, 1988). Banks may react by increasing nonreservable liabilities. However, since raising non-reservable liabilities is costly, tightening monetary policy is expected to still result in a net reduction in loanable funds (Stein, 1998; Kashyap and Stein, 1995).

that the effect of this increased fund ratio not raise the assessment for insured depository institutions with total consolidated assets of less than $10 billion.

The most important change - as it pertains to this study - came in the law's requirement that the FDIC redefine the assessment base used for calculating deposit insurance assessments. The FDIC previously assessed insured depository institutions based on domestic deposits. Beginning 1^{st} April 2011, the FDIC would assess insured depository institutions based on average consolidated total assets minus tangible equity (defined as Tier 1 Capital).[12] The amendment went into effect for the second quarter of 2011. The rule especially penalized large institutions, while the FDIC adjusted the rate of assessment for smaller institutions in such a way that they would not suffer from the regulatory change.

As before, the FDIC assigns insured banks a Risk Category ranging from I (lowest risk) through IV (highest risk) based on capital and supervisory evaluations. The rates of assessment depend on the category into which an insured bank falls, ranging from 5 basis points for Risk Category I to 35 basis points for Risk Category IV. Each quarter, institutions are assessed a certain percentage, based on their risk category, of average total consolidated assets less tangible equity. The most consequential change in the FDIC's assessment on insured banks came in their treatment of large and highly complex institutions. Large institutions are defined as those with at least $10 billion in total assets. The definition of a highly complex institution is less straightforward, but is generally a bank with total assets of $50 billion or more that is controlled by a U.S. holding company with $500 billion or more in total assets. Large and highly complex institutions use a scorecard to calculate their assessment rates in a more complicated manner than for the institutions discussed above. The calculation takes into account two measures, a performance score and a loss severity score, which are combined and converted into an assessment rate. [13]

[12]Insured banks are required to compute their total consolidated assets as a daily average over the quarter.

[13]The performance score, which ranges from 0 to 100, has three components: a weighted average CAMELS rating, the ability to withstand asset-related stress, and the ability to withstand funding-related stress. The CAMELS rating is constructed based on six confidential criteria (capital adequacy, assets, management capability, earnings, liquidity, and sensitivity). The measure of the ability to withstand asset-related stress is a function of a bank's Tier 1 leverage ratio, a concentration measure (which looks at the higher-risk assets), the ratio of core earnings to total assets, and a measure of credit quality. The ability to withstand funding-related stress takes into account the ratio of core deposits to total liabilities and balance

There are a few finer but relevant points in the final rule which warrant discussion here. Insured branches of foreign banks are given no special treatment. They are to compute their assets and equity based on the consolidated branch without including those of a foreign parent bank. In the case that a parent bank and its subsidiary are both FDIC-insured, the two entities are to compute their assessments separately, based only on the assets and equity of the individual institution. This implies that internal borrowing within a banking organization is assessed in the same way external borrowing would be.

The exact assessment rates are not publicly disclosed, but some general implications can be gleaned from the policy change enacted by the FDIC in April 2011. First, it should be viewed as a corrective tax on large depository institutions to limit leverage or dependence on short-term funding. FDIC Chairman Martin Gruenberg testified that "as Congress intended, the change in the assessment base will generally shift some of the overall assessment burden from community banks to the largest institutions".[14] So, the clear intention in the change of the assessment base was to shift the burden of FDIC assessments from small to big banks. In Appendix A, we show estimates from Whalen (2011) for the changes in the assessment base for the ten largest banks. Assuming that these banks remain at the same assessment rate, they will see their actual premiums rise by at least the rate of increase in the assessment base. To avoid paying more, they sought to align their funding model with that of smaller banks.

Second, it is evident that this policy change has an effect on the behavior of banks (Kreicher, McCauley and McGuire, 2014). McCauley and McGuire (2014) argue that the "seemingly small regulatory differences" between insured banks and uninsured branches of foreign banks have incentivized these branches to make big adjustments in their balance sheet and hold a disproportionate share of reserves. These consolidated non-U.S. banks raised dollars to finance their cash holdings through increased deposits and swapping of other currencies, the authors claim. Afonso, Entz and LeSueur (2013) reiterate the point

sheet liquidity. The loss severity score measures the relative magnitude of potential losses to the FDIC in the event of failure; it is constructed to fall between 0.8 and 1.2. The product of the performance score and the loss severity score yields an institution's total score, which maps to an assessment rate.

[14]Testimony at hearing on "Enhanced oversight after the financial crisis: Wall Street reform at one year", before the Committee on Banking, Housing and Urban Affairs, United States Senate, 21^{st} July 2011.

that the FDIC assessment change has had a material effect on U.S. bank funding costs. In particular, they note that foreign banks have increasingly borrowed in the federal funds market.

What is important for the purpose of this study is the effect of this policy shock on wholesale funding rates. Kreicher, McCauley and McGuire (2014) examine four overnight money market rates: the effective federal funds rate, Libor, Eurodollar, and repurchase agreements. They find that these rates all fell immediately on 1^{st} April 2011, due to lower bid for overnight funding from assessed banks. In fact, they note that trading was "especially turbulent" on the date of the policy change (Figure 1). They cite estimates from informed observers that the FDIC change cut overnight rates by 5-10 basis points. This fact yields two important implications of the policy change. First, the demand for borrowing in this market by insured institutions fell. Second, this policy change can also be viewed as a positive funding shock for the uninsured institutions, as their funding costs on the wholesale market decreased.

3.2 Testable Hypotheses

The policy change has severable testable implications. First, we expect that the assessed institutions (insured banks in the United States) will reduce their use of the wholesale funding and increase their financing of assets with deposits and/or reduce their assets.[15] After all, the assessment base change was implemented as a corrective policy measure; one of the main intentions of assessing wholesale funding was to achieve this. In spite of the possibility of substituting wholesale funding with retail funding, because of the imperfect substitutability between the two funding sources, we expect the overall cost of funding to increase for insured banks. By contrast, we expect the cost of accessing wholesale funding and, hence, the overall cost of funding to drop for exempted banks, that is, uninsured branches and agencies of foreign banks.

The most interesting empirical question regards the use made by the foreign unaffected banks of their easier access to liquidity. In particular, do foreign banks take the opportunity

[15]See also Kreicher, McCauley and McGuire (2014) for a discussion.

to compensate for any contraction in loans by domestic banks or do they instead disproportionately accumulate interest-bearing reserves at the Fed? The predictions of extant studies on this point are ambiguous. On one hand, the traditional bank lending channel posits that such a funding shock should cause the unaffected institutions (uninsured branches) to increase their lending relative to the affected group (insured banks). Kreicher, McCauley and McGuire, 2014 document - using information at the bank level - that this shock caused uninsured foreign branches to increase their lending (in the forms of reserves) relative to that of insured institutions. On the other hand, two alternative forces that are highlighted below can work in the opposite direction and decrease lending from uninsured banks.

First, a growing literature points to the tendency of banks to exploit available liquidity to hoard cash and liquid assets during turmoil, rather than extend loans to firms and households (see, e.g., Keister and McAndrews, 2009, and Gale and Yorulmazer, 2013). Stein (1998) develops a model that rationalizes banks' incentive to hoard liquidity in the presence of uncertainty about loan returns and of imperfect substitutability between retail and wholesale funding. In our setting, banks' incentive to hoard liquid assets was strongly motivated by the desire to exploit the payment of interest on excess reserves (IOER) offered by the Fed.[16] During the FDIC policy change, the Fed has paid interest on both required and excess reserves, at a rate of 25 basis points.[17] Martin, McAndrews and Skeie (2013) construct a general equilibrium model in which large reserve balances can crowd out bank lending in the presence of balance sheet costs and interest on reserves.[18] There are also anecdotal examples that banks' balance sheet costs have increased substantially in the wake of the financial crisis (see, for instance, Garratt, Martin, and McAndrews, 2015). Basel III

[16]In 2006, Congress passed the Financial Services Regulatory Relief Act, permitting the Federal Reserve to pay interest on reserves held by depository institutions at the Fed. The originally planned effective date was 1^{st} October 2011, but was advanced to 1^{st} October 2008 by the Emergency Economic Stabilization Act of 2008.

[17]Such interest may be paid on balances held by depository institutions, U.S. branches and agencies of foreign banks, Edge Act and agreement corporations, and trust companies. Pass-through correspondents may receive interest on balances held on behalf of an eligible institution even if the correspondents themselves are not eligible.

[18]A balance sheet cost is defined here only as a cost function increasing in the level of bank assets, but binding capital requirements could be interpreted as such a cost.

regulation has indeed incentivized some banks to keep liquid assets and/or to shrink their balance sheets.

A second force that can induce foreign banks to use the less costly access to wholesale funding to hoard liquidity, instead of extending loans, could be the limited ability of foreign banks to replace domestic banks in extending of loans. Several studies stress that foreign banks may serve only large and transparent customers ("cherry-picking" behavior). Mian (2006) finds that foreign banks may avoid lending to opaque firms, especially if the cultural and geographical distance between the CEO and the loan officer is large. Analogously, Berger, Klapper and Udell (2001) document that foreign banks may have difficulties lending to informationally opaque firms. Giannetti and Ongena (2012) investigate the lending patterns of multinational banks in Eastern European countries and obtain evidence that informationally opaque firms are penalized by multinational banks.

Also, Gormley (2010) uncovers further empirical evidence that foreign-owned banks are less likely to lend to informationally opaque businesses than are domestically owned banks. The tendency of foreign banks to take a cautious attitude towards expanding lending may also manifest itself in increased "laziness"in monitoring loans. Manove, Padilla and Pagano (2001) propose a model of "lazy banks"in which banks able to evaluate the quality of an investment project cease to do so if the collateral provided is abundant. In a related sense, in the presence of a positive liquidity shock, some banks might become "lazy": rather than make the effort required to participate in lending deals and monitor them, these banks could prefer to accumulate interest-bearing reserves.

4 Data and Measurement

4.1 Bank Call Report Data

We use several sources of data in this study. First, we obtain quarterly Call Reports from the Federal Reserve Bank of Chicago. These Call Reports are collected by the Federal Financial Institutions Examination Council (FFIEC) which is an interagency body responsible for examining financial institutions in conjunction with the Federal Reserve, FDIC,

National Credit Union Administration, Office of the Comptroller of the Currency (OCC), and the Consumer Financial Protection Bureau (CFPB). There are several specific reports we collect: the FFIEC 031 and the FFIEC 041 are reported at the level of the consolidated bank, filled out by banks located in the United States with and without foreign offices, respectively. We rely on a separate report, the FFIEC 002, for data on U.S. branches and agencies of foreign banks.

We supplement these Call Reports with a Federal Reserve release that contains data on the structure and shareholdings of foreign banks. This so-called structure and share data set contains more detailed qualitative information on the related foreign institutions of all foreign-owned banks. The data set consists of all U.S. offices of foreign banking organizations: U.S. branches and agencies, subsidiaries that are commercial banks and at least 25% owned by a foreign banking organization (FBO), foreign-owned Edge Act and agreement corporations, U.S. representative offices of foreign banks, and New York state investment companies owned by foreign banks. As discussed previously, we choose to look only at foreign-owned branches and agencies, foreign-owned subsidiaries, and domestic banks. This data set allows us to link the Call Reports to information regarding ownership structure.

Foreign banking organizations that control or own an institution in the United States are required to complete the FR Y-7Q report which contains limited information regarding total assets, risk-weighted assets, and regulatory capital levels of the FBO. FBOs with U.S. banking operations that have achieved status as financial holding companies complete this form quarterly; all other FBOs are required to complete the report once each year. As alluded to previously, these FBOs can either be banks or holding companies. The report is available through the Federal Reserve via a Freedom of Information Act Request.

We also obtain balance sheet data on domestic bank holding companies (BHCs), which report their financial statements with the Federal Reserve via the FR Y-9C form. Only BHCs with total consolidated assets of $1 billion or more file this report. If a holding company controls or owns another holding company, only the top-tier holding company must file the report. Currently, around 85% of U.S. chartered banks are controlled by a

holding company. Those that are not, and those whose top-tier holding company has less than $1 billion in total consolidated assets, are excluded from the portions of the study in which we consolidate all banks to the level of the holding company.

Our full data set spans 2001Q1 through 2014Q2, though in parts of the analysis we opt to use a shorter time frame in order to avoid various problems, particularly those arising from the presence of the financial crisis. We combine these data sets into two forms, which we use for analysis in the coming sections. First, we look at the individual banks and branches of foreign banks alone. This unconsolidated data set yields roughly 432 thousand observations over the nearly 15-year time span. Next, we consolidate the entities to the level of the top-tier holding company. The vast majority of small domestic banks have no affiliated depository institutions, so we retain about 273 thousand observations. With the unconsolidated data set, we can identify whether or not the observation is FDIC insured. However, it ignores the relationship between related branches and banks, and comparing consolidated banks to branches could pose certain problems. In the consolidated data set, we measure the degree to which a foreign bank family is not FDIC-insured by the ratio of its assets held by uninsured U.S. branches to total assets held in U.S. institutions. The differences are not qualitatively substantial, and so we present here only the results from the consolidated data set.

Care should be taken regarding the timing of the policy change in our analysis. The FDIC assessment base change went into effect 1^{st} April, 2011, but was finalized just less than six months prior. In our base case, we use the second quarter of 2011 as the policy change. We have tried other implementation dates as checks for robustness and find that the results are not substantially changed.

4.2 Syndicated Loan Data

We begin with a brief description of the syndicated loan market, as it has already been extensively analysed in the literature (e.g., Sufi, 2007; Giannetti and Laeven ,2012; Delis, Kokas and Ongena ,2017; for further details). Syndicated loans are granted by a group of banks to a single borrower. Loan syndication allows banks to compete with capital markets

in the generation of relatively large transactions that a sole lender would not otherwise be able (or willing) to undertake due to internal and regulatory restrictions. Syndicated loans do not necessarily capture the overall bank lending but account for a sizeable portion of total lending. This market is often used to assess bank lending policies and the interactions between lenders and borrowers (Ivashina and Scharfstein, 2010; Chodorow-Reich, 2014).[19]

We use Thompson Reuters' DealScan database to obtain data on U.S. syndicated loan deals enacted from U.S. banks to firms that operate in the U.S. or abroad (cross-border lending). This database provides detailed information on the loan deal's characteristics (amount, maturity, collateral, performance pricing, etc.), as well as more limited information for the members of the syndicate, the lead bank, the share of each bank in the syndicate and the firm that receives the loan. We categorize loans as credit line, term A, B, C, D, and E and exclude term loans B because banks hold none of these loans after the syndication. Term loans B are structured specifically for institutional investors and almost entirely sold off in the secondary market. Also, following Roberts (2015) we drop loans that are more likely to be amendments to existing loans, because these are misreported in Dealscan as new loans, but they do not necessarily involve new money. Finally, we exclude loans granted to utilities or to financial companies.

To obtain information for the financial statements of the banks we match these data with the Call Reports. We hand-match Dealscan's lender ID with the commercial bank ID (RSSD9001) from the Call Reports. This process yields a unique identity for each lender. In turn, we link the lenders at their top holding company level (RSSD9348) to avoid losing observations. Because these reports are available on a quarterly basis, we match the origination date of the loan deal with the relevant quarter. For example, we match all syndicated loans that were originated from 1^{st} April to 30^{th} June with the second quarter of that year of the Call Reports. Similarly, we obtain annual information for the financial statements of firms from Bureau Van Dijk's Osiris database. The final sample is a so-called 'multi-level' data set, which has observations on banks and firms (lower level)

[19]Syndicated loans are an important funding vehicle in the US. Ivashina and Scharfstein (2010) report that syndicated loan exposures represent about 26 per cent of total C&I loan exposures of US banks' balance sheet and about 36 per cent for large US and foreign banks. In addition, if we consider flows of new lending instead of stock balance sheet measure the overall fraction is higher.

and loan deals (higher level).

4.3 Measurement and Summary Statistics

Without loss of generality, we discuss summary statistics in this section from the unconsolidated bank balance sheet data, presented in Table 1, Panel A. Each of the variables refer to the total holdings in U.S. offices of a particular category. The capital ratio we use is Tier 1 capital divided by total risk-weighted assets. For branches and agencies of foreign banks, we use the capital ratio of their FBO. Liquid assets are given by interest-bearing balances, non interest-bearing balances, currency and coin, and securities available for sale and held-to-maturity, less asset-backed and mortgage-backed securities. Non-performing loans are loans that are reported as past due by 90 days or more and non-accruing loans. The measure of cash here closely tracks reserve balances held at the Fed, but reserves are only a component of all cash reported by banks, albeit the dominant one. In addition to reserve balances due from Federal Reserve banks, cash reported by banks includes cash items in the process of collection, unposted debits, currency and coin, balances due from unrelated depository institutions in the United States.

It is a well-known facet of the U.S. banking system that a small group of banks hold a large portion of assets. The mean asset size of a bank is nearly double that of the 90^{th} percentile; there is an extremely large number of banks with relatively few assets. Table 1, Panel A, shows that uninsured branches are significantly larger than the average insured bank. The group of banks without foreign offices (those filing the FFIEC 041) makes up roughly 95% of observations in this sample, but its median assets are a small fraction of that of the group of branches (FFIEC 002) and those with foreign offices (FFIEC 031).

U.S. chartered banks filing these Call Reports do so at the level of the consolidated bank for all U.S. offices. Thus, a consolidated bank without foreign offices cannot lend to affiliates from the level at which it is reporting, it has no affiliates. This means that the majority of observations in the sample do not report internal borrowing or lending. Those reporting this category are branches or agencies of foreign banks and U.S. chartered banks with affiliates in other countries. The sample of banks which report internal lending

and borrowing shrinks to about 20,000 observations, though most of the institutions which drop out are the smallest banks. Uninsured institutions were net lenders to their affiliates, while insured banks borrowed from their families, on average, in the years leading up to and immediately following the financial crisis. These positions reversed in 2011: insured foreign banks now rely more on deposits and have repaid their liabilities to their foreign affiliates and uninsured branches have stopped sending liquidity abroad.

In Figure 2 we show the shift between the holding of reserves and claims on own offices for uninsured foreign banks. When one breaks down the assets of foreign branches and agencies, it is evident that foreign banks – on aggregate - parked more liquidity in Fed reserves and reduced claims on their own offices. This is represented by the different behaviour of the red line (balances due from Federal Reserve banks) and the blue line (sum of the net due from (asset side) and net due to (liabilities side) related depository institutions).

Table 1, Panel A, also reveals that, while the U.S. chartered banks supply more loans than uninsured branches and agencies, uninsured branches and agencies are more focused on commercial and industrial (C&I) lending. They also have lower deposit to asset ratios than U.S. chartered banks primarily because of their restriction from taking retail deposits from U.S. residents. Finally, some foreign banks are specialised in managing liquidity in dollars at the group level.

The summary statistics from the DealScan data set are listed in Table 1, Panel B. The database is missing information on the share of the deal that lenders take for a nontrivial proportion of observations. The dummy for whether or not the loan is secured is also sometimes unavailable. Nonetheless, we retain a large number of observations that are matched to information on a bank and a borrowing firm. The set of borrower firm characteristics is similar to those used by Sufi (2007) and Minetti and Yun (2015) to investigate the syndicated loan market. 95 per cent of the borrowers in the sample are defined in the data set as corporations. All of the lenders are described by DealScan as a U.S. bank, foreign bank, or financial institution.

The dependent variables we use when analyzing syndicated loans are intended to capture

each lender's level of activity within a specific deal. First, we use a binary response variable corresponding to whether or not the bank is listed as the lead lender in this deal. This variable is denoted lead. We also look at the proportion of the total deal that the lender extends. This variable, share, ranges from 0 to 100. The interaction of these two variables we call lead share. The fourth dependent variable we use is a measure that incorporates the concentration of other lenders in the deal. The so-called share index gives a higher weight to a lender who takes a large share in a deal when there are many other lenders. The share index for bank i lending in a deal with n firms is

$$share\ index_i = (share_i - \frac{1}{n-1}\sum_{j \neq i} share_j). \tag{1}$$

We also look at the impact of the policy change on loan concentration. Several authors (for instance, Minetti and Yun, 2015) have used the Herfindahl index, which is generated as the sum of the squared shares by each lender in the deal. This measure is equal to 10,000 when there is one lender offering the full amount of the deal, and lower when there are more lenders involved. Finally, we look at the logarithm of the dollar amount offered by each lender, which is simply the product of the loan share and the total size of the facility. We denote this variable amount.

Measures of the participation of a lender in a syndicated deal and of the concentration of the deal can capture the incentives of the lender to monitor the loan. Holmstrom and Tirole (1997) show that a lender has more incentives to monitor a borrower when it invests more of its own money in the borrowing firm. Building on this argument, Sufi (2007) measures creditors' monitoring incentives in syndicated loans by looking at the loan share held by lead arrangers and the concentration of the loans.

5 Empirical Methodology

This section discusses the empirical methodology. Our baseline regression follows the approach often employed by the literature on the bank lending channel to examine the effect of a shock to banks' cost of funding (Kashyap and Stein, 1995). Indeed, as noted in the

previous section, there is a strong similarity between the cost-of-funding shock triggered by the FDIC regulatory reform and the monetary policy shock studied in the literature on the bank lending channel.

Kashyap and Stein (1995) separate banks into five classes based on size measured by total assets. They use the growth rate of nominal total loans as the dependent variable, and a monetary policy indicator, seasonal dummy variables, nominal GDP growth, inflation, and four lags of the dependent variables as regressors. More recent studies have augmented this model, commonly by adding a set of bank-specific characteristics and other macroeconomic controls. The baseline specification we use in this paper, builds on this approach, employing a rich set of control variables:

$$\Delta L_{it} = \alpha_i + \beta_1 unins_{it} + \beta_2 FDIC_t + \beta_3 (unins^* FDIC)_{it} + \sum_{j=1}^{4} \theta_i \Delta L_{it-j} + \sum_{j=1}^{4} \gamma_j X_{it-j} + \sum_{t=1}^{T} \mu_t T_t + \varepsilon_{it} \tag{2}$$

where ΔL_{it} is a measure of the loan change of bank i in period t, $unins_{it}$ measures the degree to which a foreign bank family is not FDIC-insured by the ratio of the assets held by uninsured U.S. branches to total assets held in U.S. institutions of bank i in period t; $FDIC_t$ is a dummy variable equal to one after the FDIC assessment base change in the second quarter of 2011, zero before; and $(unins^* FDIC)_{it}$ is the interaction of the two.[20] In the unconsolidated data set we are able to identify whether or not the bank is FDIC-insured or not (dummy variable). The differences are not qualitatively substantial, and so we present here only the results from the consolidated data set. β_3 is the key coefficient of interest, corresponding to the difference-in-differences result. β_3 can be interpreted as the difference in the reactions to the policy shock of uninsured banks (treated group) compared to insured banks (control group). A positive coefficient would suggest that uninsured foreign branches increased their lending following the funding shock relative to insured banks. X_{it} is a vector of bank-specific controls including the natural logarithm of total assets, the ratio of liquid assets to total assets, the ratio of Tier 1 capital to risk-weighted assets, and the ratio of

[20] A similar specification but at the simple cross-sectional level is also used in Kreicher, McCauley and McGuire (2014) to analyse how the change in FDCI regulation impacted on the in the growth of banks' reserve holding.

non-performing loans to loans for bank i in time t. T_t is a set of quarterly time dummy variables. The regression we run when analyzing cash holding is identical, except that we include four lags of the dependent variable instead of loans.[21]

Analysis of loan-level data allows for an additional dimension of control variables. Whereas in the above regressions we include bank-specific controls, with the DealScan lenders and borrowers matched to bank Call Reports and the firm Osiris database, we include borrower-specific, lender-specific, and deal-specific controls. We continue to employ the difference-in-differences identification strategy, and our preferred specification includes borrower, lender, and time (quarter) fixed effects. Due to the granularity of the loan-level data set, we opt to use only the first lag of each of our controls. As stated previously, we use four dependent variables which measure the activity of a given lender in a syndicated loan deal. The level of observation is a borrower-lender pair for a given deal, or facility. The preferred regression specification for a loan from bank i to firm j at time t is

$$y_{ijt} = \alpha_i + \beta_1 unins_{it} + \beta_2 FDIC_t + \beta_3 (unins^* FDIC)_{it} + \Theta X_{it} + \Phi S_{jt} + \Pi Z_{ijt} + \mu_i + \gamma_j + \nu_t + \varepsilon_{ijt}. \tag{3}$$

As before, β_3 is the primary coefficient of interest. X_{it}, S_{jt}, and Z_{ijt} are vectors of lender-specific, borrower-specific, and deal-specific characteristics. μ_i, γ_j, ν_t are vectors of lender, borrower, and time fixed effects. The following borrower-specific characteristics are included: the natural logarithm of total sales; liquid assets to total assets; the natural logarithm of earnings before interest, taxes, depreciation, and amortization (EBITDA); a leverage ratio (total debt to EBITDA); net profit to assets; cash to assets; working capital to assets; the natural logarithm of the number of employees; the ratio of tangible assets to total assets; the natural logarithm of revenue; the ratio of income to total assets; the natural logarithm of total debt; and a set of dummy variables corresponding to the borrower company's industry. The set of lender characteristics is the same as before: the natural logarithm of total assets, the ratio of liquid assets to total assets, the ratio of Tier 1 capital

[21] It is worth stressing that the presence of the liquidity ratio (including reserves) in the vector of (time-varying) bank-specific characteristics allows us to control – at least to some extent - for different preferences among banks in liquidity hoarding.

to risk-weighted assets, and the ratio of non-performing loans to loans. The set of deal-specific controls include: a set of dummies corresponding to the primary purpose of the deal, the maturity of the loan in months, a dummy variable corresponding to whether the loan is secured, and the natural logarithm of the deal amount.

The above specification restricts our sample to banks which participate in syndicated lending. Thus, we are examining lending on the intensive margin, that is, the quality of the lenders' participation in the deal conditional on the lender participating. Additionally, we alter this data set to examine the lenders' participation on the extensive margin. We aggregate the loans by bank and use bank-quarters as our level of observation. This allows us to analyze banks which altered the number of deals in which they participated following the assessment base change, rather than examining their roles in the deals in which they participated. Our dependent variables in this portion of the analysis count the number of deals in which a bank participates, the number of deals in which a bank is listed as the lead lender, and the total amount of credit extended in a quarter.

6 Main Results

6.1 Bank Call Reports

We separate banks into groups based on their asset size because the expected effect of the FDIC change in the assessment base varies between large and small institutions. Recall that we expect smaller insured institutions to be unaffected, while the largest insured institutions should face significantly higher funding costs. Following Kashyap and Stein (2000) and Cetorelli and Goldberg (2012a), we classify any bank that is in the smallest 90% of banks sorted by asset size as "small" and the largest 5% as "large".[22] These asset sizes are based on the size of the bank in the fourth quarter of 2010, just prior to the policy change taking effect. Using a difference-in-differences approach with uninsured banks as the treated group, we estimate the policy's effect on cash holding, total lending, and

[22] As pointed in Cetorelli and Goldberg (2012a), leaving out the intermediate group of banks between the 90^th and 95^th percentiles ensures a clean separation between small and large banks

commercial and industrial (C&I) lending. For each dependent variable, we use three forms: the change in the natural logarithm, the absolute change scaled by assets, and the change in the fraction of the dependent variable to assets.[23] Our main results show only the latter two forms. We use the system GMM estimator suggested by Arellano and Bond (1991) to account for the dynamic nature of the dependent. Each regression equation includes time fixed effects. Alternatively, we have used bank fixed effects and macroeconomic control variables instead of time dummies. Neither alternative specification yields substantially different results.

Tables 2 through 4 are based on the U.S. offices of the entire banking organization, consolidated to the top-tier holding company. Please note that the left and the right panel report to slightly different measures of the dependent variables. We also use three sets of time windows for each dependent variable: First, we use the entire 14.5 year series, and then four-year and two-year windows surrounding the policy change. For the sake of brevity we do not report the two-year windows because the findings are similar to the four-year timeframe. In Table 2, we find that the largest uninsured banks began to accumulate a disproportionately large amount of cash (mainly in the form of reserves) following the assessment base change, in line with Kreicher, McCauley and McGuire (2014). Interestingly, in the full timespan (Table 2, top panel), the smaller set of uninsured banks accumulates more cash according to the first measure (Column 1). Restricting our sample to the four-year window around the policy change, from 2009Q2 through 2013Q1, Table 2, bottom panel, shows that uninsured institutions increased their holdings of cash by about seven percentage points of their total assets (second column); as a share of assets, these branches increased their allocation of cash by about four percentage points (fifth column) relative to insured institutions. The policy seems to have had no positive impact on the lending of these banks, and a negative effect in some cases as reported on their balance sheet.

Tables 3 and 4 show, in some cases, a reduction in loans by these institutions which increased their cash holdings as a result of the positive balance sheet shock. Again, restricting our attention to the four-year window around the policy shock, balance sheet allocation of

[23] A similar choice is made in the cross-section used by Kreicher, McCauley and McGuire (2014). This will allow us to compare – to some extent- our results on lending to their results on banks' reserve holding.

total loans by uninsured branches fell by about two percentage points for both independent variables (bottom panel of Table 3, second column). Table 4 shows that the results are marginally significant at best when looking at commercial and industrial loans specifically. Overall, these results for the lending responses vary between insignificant and suggestive of a reduction in lending by uninsured branches. These results are consistent with the graphical analysis provided in Kreicher, McCauley and McGuire (2014).

6.2 Syndicated Loans

Our preferred specification for estimation of equation (3) includes both borrower and lender fixed effects. Using the same difference-in-differences approach, we find that uninsured banks reduced their roles within the syndicated deals in which they participated, as shown in Table 5 for nearly each of the six measures of loan activity. The uninsured banks became significantly less likely to be classified as the lead lender within the deals they made (first column), and took smaller portions of the total facilities (second column). As in the previous section, we estimate their roles over varying timespans. When restricting our sample to a four-year window surrounding the implementation of the policy change, we find that uninsured banks became about 10 percentage points less likely to be the lead lender following the policy change (bottom panel of Table 5, first column). The share of the total facility that these banks offered also fell by about 2.2 percentage points (second column). The results are qualitatively similar, though have a less straightforward interpretation when the dependent variable is the lead share or share index.

The fifth columns of the top and bottom panels of Table 5 show that the deals became marginally more concentrated in the sense that fewer lenders may have entered into the deals when the uninsured branches participated. The effect is significant at the 10% level when the relationship is estimated for the entire timespan and insignificant when restricting the sample to the four years surrounding the policy change. On the other hand, there appears to be a strong effect of the policy change on the total value of loans extended by uninsured foreign branches. The two estimates (sixth columns of the panels) imply that relative to their insured counterparts, these uninsured lenders cut their total offerings by

around 23% or 37%. These estimates are both statistically significant.

Correa, Sapriza, and Zlate (2013) find that uninsured branches of foreign banks decreased their lending in this period due to a fall in deposits during the Euro area debt crisis. However, they find no effect on the intensive margin, which we show U.S. branches of foreign banks generally exhibited here. The authors find that these banks cut the number of loans and borrowers to whom they lent—a reduction of lending on the extensive margin. We implement a similar specification (not shown here) including the change in deposits as an explanatory variable. Our results are virtually unchanged when controlling for this loss of deposits. In Section 7.1 we break down the uninsured branches into European and non-European groups in order to examine the extent to which our results are driven by a reduction in lending caused by the European sovereign debt crisis.

Having established that these lenders took on a more passive role in the deals in which they participated, we next look at whether these banks adjusted the number of borrowers to whom they lent, the number of loans they gave, or the size of loans. Specifically, we use three dependent variables: (1) the number of loans into which a lender entered in a given quarter, (2) the number of loans in which a lender was the lead arranger in a quarter, and (3) the total amount of credit extended by a lender in a quarter. We find that after the policy change, uninsured banks extended fewer loans each quarter, and acted as the lead arranger of credit less frequently (Table 6). To look at the extensive margin in this manner requires us to use observation at the bank-quarter level as an observation, although we may continue to use borrower and lender fixed effects. However, we discard any observations for which a lender does not participate in any deals in a given quarter. The results are consistent with those from the previous section. The uninsured foreign lenders, despite facing a relatively positive funding shock, reduced the number of deals in which they participate and the gross amount of credit they extended, relative to insured lenders.

7 Robustness and Further Tests

In this section, we have checked the robustness of our results in a number of ways.

7.1 The European Debt Crisis

Our primary concern is the concurrence of the European sovereign debt crisis. Indeed, Correa, Sapriza, and Zlate (2013) show that U.S. branches of European banks cut their lending, specifically in the market for syndicated loans, as a result of this crisis. To test the extent to which our results reflect the FDIC assessment base change rather than the European debt crisis, we separate our treatment group of uninsured banks into uninsured branches of European banks and uninsured branches of non-European banks:

$$\begin{aligned} y_{ijt} &= \alpha_i + \beta_1 Eur.\ unins_i + \beta_2 FDIC_t + \beta_3 (Eur.\ unins^* FDIC)_{it} + \beta_4 NonEur.\ unins._i + \\ &\quad \beta_5 (NonEur.\ unins^* FDIC)_{it} + \Theta X_{it} + \Phi S_{jt} + \Pi Z_{ijt} + \mu_i + \gamma_j + \nu_t + \varepsilon_{ijt}. \end{aligned}$$

In this manner, we are effectively comparing the effect of the shock on three different groups of institutions: branches of European banks, branches of non-European banks (for instance, branches of Asian or South American banks), and insured domestic banks.

Table 7 presents our results for the intensive margin of loan-level data. All columns employ lender fixed effects and borrower fixed effects. Panel A of the table shows similar results as before for the intensive margin of syndicated loans: all uninsured banks took on more passive roles in the deals in which they participated. The results lose some power, as expected, but neither the European nor non-European group of uninsured bank branches appear to dominate the effect observed when treated as one group like in the main results. Panel B of Table 7 presents the results for the extensive margin using loan-level data. The results appear robust to the separation between European and non-European banks. In particular, neither group of bank appears to dominate the reduction in lending; the panel shows that the effect of both groups as significant at the 99% confidence level for the number of deals and the total amounts offered. We have also produced (but not presented

here) robustness checks for the bank balance sheet data dividing uninsured banks into European and non-European subgroups and found that both groups report an increase in cash holding and a mild reduction in lending.

7.2 More on the Identification of the Shock

In the second main robustness check, we distinguish between foreign insured banks and foreign uninsured branches to ensure that our results are indeed driven by the domestic liquidity shock triggered by the FDIC policy change. To this end, we estimate the following:

$$\begin{aligned} y_{ijt} &= \alpha_i + \beta_1 for.\ unins_i + \beta_2 FDIC_t + \beta_3 (for.\ unins^* FDIC)_{it} + \beta_4 for.\ ins_i + \\ &\quad \beta_5 (for.\ ins^* FDIC)_{it} + \Theta X_{it} + \Phi S_{jt} + \Pi Z_{ijt} + \mu_i + \gamma_j + \nu_t + \varepsilon_{ijt}. \end{aligned}$$

Here, we are testing whether foreign insured banks followed the behavior of foreign uninsured banks. If so, this would weaken our results. However, there is no evidence to support this notion. These results are displayed in Table 8. The main results are driven entirely by uninsured foreign banks. In fact, foreign insured banks tend to exhibit opposite behavior in this table when there is a significant coefficient. These results confirm that it is the uninsured nature of these banks which drives their relative reduction in lending, and hence confirm that our results are indeed capturing the effect of the FDIC assessment base change. This robustness check appears to strengthen our main findings.

7.3 Other Foreign Shocks (Country-Year Fixed Effects)

The final and most strict robustness check results we show employ the use of home country*year fixed effects. This should effectively control for home country-specific shocks. Here, we are comparing foreign insured banks to foreign uninsured banks from the same country. This robustness test, therefore, is substantially stricter than the previous two. Any uninsured branches from a country that does not also have unrelated insured banks will drop out of the estimation. Further, all banks whose ultimate parent is based in the United States (that is, all domestic banks) also drop out of the control group. That is, the

variation in these results now comes from within-home country between uninsured branch and insured subsidiary bank.

Table 9 displays these results for the change in lending along the intensive margin. The results hold up remarkably well. When comparing variation within home-country, the results carry through: uninsured branches of foreign banks became more passive as lenders following the positive funding shock.

7.4 Further Tests

We have experimented with a number of other specifications and other modifications of our baseline regression and found no significant deviations from our baseline results. Some of these modifications that are not presented here for the sake of brevity, include the following. In addition to the two-time windows of fourteen years and four years, we also examine a time window of two years–from 2010q2 through 2012q1–for each of the regressions presented in this paper. The results are qualitatively similar to those obtained from the four-year windows. In addition to aggregating the Call Reports to the level of the bank holding company, we run the same regressions using disaggregated bank-level data and find similar results. It is our view that aggregating to the level of the BHC is the more conservative approach as we avoid comparing branches of banks to consolidated banks. Finally, as mentioned previously, we have used macroeconomic controls instead of a set of time dummy variables. None of these alternative approaches produce qualitatively different results.

8 Conclusion

This paper empirically explores the behavior of foreign banks following a domestic liquidity shock that increases the cost of wholesale funding for domestic banks, while reducing it for foreign banks. We show in two complementary ways that foreign, uninsured banks reduced their lending at the same time that they used their improved access to wholesale funding to increase their holdings of reserves. We find that banks which acquired more

reserves allocated a smaller proportion of their balance sheets to general loans and C&I loans. These banks also became more passive lenders in the syndicated loan deals in which they participated, and entered into fewer of these deals.

The paper's contribution to the literature deals with the reaction of foreign banks to a domestic liquidity shock. Much earlier literature has found that foreign banks are resilient in the presence of domestic shocks, such as monetary policy shocks, and continue to extend credit when domestic banks in a host country contract their lending. Our paper suggests that this transmission mechanism may not hold true under an environment of large excess reserves in the banking system and steep balance sheet costs, as suggested by Martin, McAndrews, and Skeie (2013). Further work might more explicitly attempt to quantify these balance sheet costs, for instance, by measuring the U.S. banks' leverage ratios, which were strengthened by Basel III and further by the Fed's enhanced supplementary leverage ratios. The Basel III capital requirements use risk-weighted assets in the denominator, and because reserves carry zero risk weight, cash accumulation does not impose a balance sheet cost through this ratio. The leverage ratio, on the other hand, uses total consolidated assets in the denominator, so that an increase in a bank's holding of cash requires it to raise more capital, a potentially costly activity.

A second area for possible future work lies as an extension of the Manove, Padilla, and Pagano (2001) model of "lazy" banks. In our paper, the banks which receive a positive funding shock acquire disproportionately large amounts of excess reserves. These interest-bearing reserves appear to crowd out lending and discourage these banks from actively extending credit. The banks described in the Manove, Padilla, and Pagano (2001) paper enjoy a positive collateral shock: their prospective borrowers can provide higher quality collateral in exchange for credit. While one effect of such a shock is cheaper credit for entrepreneurs, the overall result as hypothesized by the authors is less desirable. Namely, banks, the institutions best equipped to judge creditworthiness, become "lazy", content with the collateral provided by the borrowers, and opt not to screen lenders. In a similar sense, in our setting uninsured branches of foreign banks become less eager to lend when faced with a positive liquidity shock.

Appendix A: Estimated change in FDIC assessment base for top 10 US banks (Whalen, 2011)

	Assessment Base		Changes ($ billions)	Changes (%)
	2010 ($ billions)	2011 ($ billions)		
Bank of America	943	1,311	368	84%
Bank of New York Mellon	76	196	120	156%
Capital One Financial	121	199	77	64%
Citigroup	336	1,155	819	291%
JPMorgan Chase	670	1,785	1,115	166%
PNC Financial	182	272	90	50%
State Street Corp	23	155	132	576%
SunTrust Banks	122	162	40	33%
US Bancorp	177	308	130	74%
Wells Fargo & Co.	786	1,155	369	47%

Appendix B: U.S. Regulation of Foreign Banks

Foreign banking in the United States takes on several different forms, each with unique regulatory characteristics. Foreign banks in the U.S. most commonly appear in the forms of representative offices, agencies, branches, banks, and Edge Act and Agreement international banking corporations. A representative office generally engages in non-transactional business such as marketing, and so is not considered in this study. By mandate, Edge and Agreement corporations may engage only in banking activities outside of the U.S., and so are not of interest here as well. In this section we discuss the important characteristics distinguishing branches, agencies, and subsidiaries of foreign banks in the United States.

Federal Reserve Regulation K defines an agency as a place of business of a foreign bank "at which credit balances are maintained, checks are paid, money is lent, or... deposits are accepted from a person or entity that is not a citizen or resident of the United States." A foreign branch is defined as a place of business of a foreign bank "at which deposits are received, and that is not an agency." The major distinction between branches is that agencies are generally more restricted in their ability to accept deposits. Agencies may keep credit balances, which are deposit-like liabilities, but less general than a deposit. Credit balances must serve a specific purpose, cannot be used to pay routine operating expenses, and must be withdrawn reasonably soon after the specified purpose has been accomplished. Aside from their differing abilities to accept deposits, branches and agencies are practically indistinguishable, and for the remainder of this paper, we choose not to distinguish between the two, as is common in the literature (see, for instance, Cetorelli and Goldberg 2012c).[24]

A branch is merely an extension of its parent bank—not a separate legal entity—and is less costly to establish because it does not require its own capital investment. U.S. branches of foreign banks file quarterly reports (FFIEC 002) based on the assets and liabilities held by the branch itself, but do not have a freestanding capital structure. Though these reports are less detailed than those filed by standalone banks, they contain the major balance sheet and income categories. The Foreign Bank Supervision Enhancement Act of 1991 (FBSEA) prohibited the FDIC from insuring U.S. branches and agencies of foreign banks. For this reason, they may not accept retail deposits (any deposit of less than $100,000) from U.S. citizens or residents. There are a small number of branches established before the FBSEA which were allowed to keep their insured status with the FDIC. Aside from this restriction, branches can engage in a full range of activities. Branches are not subject to U.S. bank capital adequacy requirements, but it is U.S. law that federal branches and agencies maintain a Capital Equivalency Deposit (CED) equal to 5% of their liabilities.

Unlike a branch, a subsidiary bank maintains its own capital and is a separate legal entity from its controlling bank or holding company, but its shares are owned by a parent company. Subsidiaries of foreign banks are subject to all the same regulations and may engage in the same activities as domestically owned banks, including FDIC insurance. From a regulatory standpoint, there are no significant differences between bank subsidiaries of foreign holding companies and U.S. banks. For instance, a U.S. subsidiary bank owned by a foreign bank must comply with United States bank capital requirements—not those of

[24]Cetorelli, Nicola, and Linda S. Goldberg (2012c) "Follow the Money: Quantifying Domestic Effects of Foreign Bank Shocks in the Great Recession." American Economic Review 102, 3, 213−18.

the country in which its controlling office is located. These banks may organize as national banks or state banks.

Branches have more flexibility than subsidiaries in the ability to reallocate liquidity to and from affiliates. Federal Reserve Regulation W adopted Section 23 of the Federal Reserve Act which places limitations on the size and type of transactions allowable between a bank and its subsidiary. Specifically, a bank's covered transactions with any affiliate cannot be greater than 10% of the bank's capital and surplus, and the total amount of covered transactions between the bank and all of its affiliates cannot be greater than 20%. The restrictions apply to both foreign- and domestically-owned banks, but are more limiting to a subsidiary of a foreign bank, as we expect to see capital flow more regularly between international affiliates. A U.S. branch or agency is only subject to these restrictions if the affiliate is a U.S. institution engaged in securities underwriting and dealing, merchant banking, insurance underwriting, and insurance investment activities.

Federal Reserve Regulation D imposes reserve requirements on transaction accounts, nonpersonal time deposits, and Eurocurrency liabilities, but the latter two have had a requirement of zero since the early 1990s. Depository institutions may hold these reserves as vault cash, directly with the Fed (in the case of a depository institution that is a member bank), or in a pass-through account with a correspondent bank. U.S. branches and agencies choosing to hold reserves at the Fed may do so either directly with the bank in their district, or may aggregate reserves with a pass-through correspondent holding reserves for the consolidated bank. For a small quantity (currently below $14.5 million) of reservable deposits, the reserve requirement is zero. The marginal reserve ratio for banks with up to the next threshold (currently below $103.6 million) is 3%, and rises to 10% above that level. These apply to branches and agencies of foreign banks in the U.S. as long as their parent bank has or is controlled by a company with worldwide consolidated bank assets of at least $1 billion. There are several additional exemptions to the regulation of reserve requirements. Bankers' banks, which primarily do business with other financial institutions, are owned by other financial institutions, and do not do business with the general public, are exempt from reserve requirements. An International Banking Facility (IBF) is a set of accounts through which a depository institution may more effectively transact with foreign customers. IBF deposits held by a depository institution do not count toward required reserves.

U.S. subsidiaries, branches, and agencies of foreign banks required to maintain reserve requirements may use the Fed's discount window. Borrowing at the discount rate is generally done at primary or secondary credit. United States based banks can borrow from the discount window at a rate depending on their CAMELS ratings and their capitalization adequacy. Similarly, foreign banks face a rate based on their SOSA and their ROCA rating.

Commercial banks in the United States can decide whether to organize as a state or national bank. National banks operate with a charter issued by the Office of the Comptroller of Currency (OCC), while state banks receive a charter from a state government. The choice of charter also determines the principal regulator of the bank: a national bank's primary supervisor, regulator, and examiner is the OCC, while that duty falls jointly to either the Fed (if the state bank is a member of the Federal Reserve System) or the FDIC (if it is a nonmember) and the state chartering authority for state banks. National banks

are required by law to be members of the Federal Reserve System, and all state banks are eligible to apply for membership. Member banks must hold 3% of their capital as stock in their regional Federal Reserve Bank; this stock pays out a 6% annual dividend each year. State banks generally tend not to pursue membership with the Federal Reserve System. Beyond this, the differences between choosing a national and state charter have lessened over the past century, and the charters differ mainly in who regulates the bank. Like U.S. chartered depository institutions, branches of foreign banks may obtain either a federal or state charter, and are then characterized as federal or state branches. Unlike a national bank, federally-chartered branches are not required to become member banks, but otherwise, uninsured federal branches face similar regulations to those faced by a national bank.

A foreign banking organization (FBO) is defined as a foreign bank that operates or controls a branch, agency, or subsidiary bank. A bank holding company (BHC) is a company that owns and controls one or more banks. The Fed is the primary regulator of all BHCs in the U.S. Bank holding companies in the United States generally cannot engage in nonbanking activities per the BHC Act of 1956. Most commercial banks in the United States have an associated holding company. A foreign bank controlling a U.S. chartered subsidiary, branch, or agency is likewise restricted in its nonbanking activities. Financial holding companies, on the other hand, have more flexibility with respect to the companies they own. The Gramm-Leach-Bliley Act of 1999 defined financial holding companies which are allowed to engage in nonbanking activities such as insurance underwriting as long as the activities are financial and/or deemed closely related to banking. If a foreign bank and its ultimate parent achieve characterization as a Qualifying Foreign Banking Organization (QFBO), the Fed has limited jurisdiction over nonbanking and nonfinancial activities of a foreign bank's affiliates in the U.S. and abroad. A QFBO may engage in any activity in the U.S. that is deemed incidental to its business outside of the United States, and may engage in any activity outside of the United States. To qualify as a QFBO, a foreign bank and its parent must show that more than half of its global business is banking, and that more than half of its global banking business is outside of the United States. In order for a foreign bank to obtain a charter for a U.S. branch, agency, or subsidiary, the Fed requires that the foreign bank's capital ratio be "equivalent, but not identical to" the requirement of a U.S. bank. A foreign bank operating a branch or agency in the U.S. is treated like a holding company.

The FBSEA placed foreign branches and agencies under the regulatory supervision of the Federal Reserve, rather than the Office of the Comptroller of the Currency (OCC). Many domestic banking entities also operate under the supervision of the Fed: state-chartered member banks, bank holding companies, and foreign branches of U.S. national and state member banks. Though all national banks must be members of the Federal Reserve System, they are supervised by the OCC. Examiners quantify their assessment of branches and agencies using a ROCA score, which has four components: Risk management, Operational controls, Compliance, and Asset quality. Regulators are also interested in the degree of support a U.S. operation of a foreign bank will receive from its FBO if necessary. The strength-of-support assessment (SOSA) is a confidential rating made up of two components. The first measures the FBO's ability to support its subsidiary or branch,

which takes into account the overall health of the FBO as well as supervision from its home country supervisor. The second component assesses whether there are any general concerns regarding the ability of the FBO to maintain controls and compliance at its U.S. office.

All banks in the U.S. are restricted from lending in excess of 15% of their capital to a single borrower. These limits have some exceptions, but also hold for branches and agencies of foreign banks. Because the limits refer to the capital of the parent of the branch or agency, these limitations are likely to be somewhat more relaxed than for a subsidiary of the holding company.

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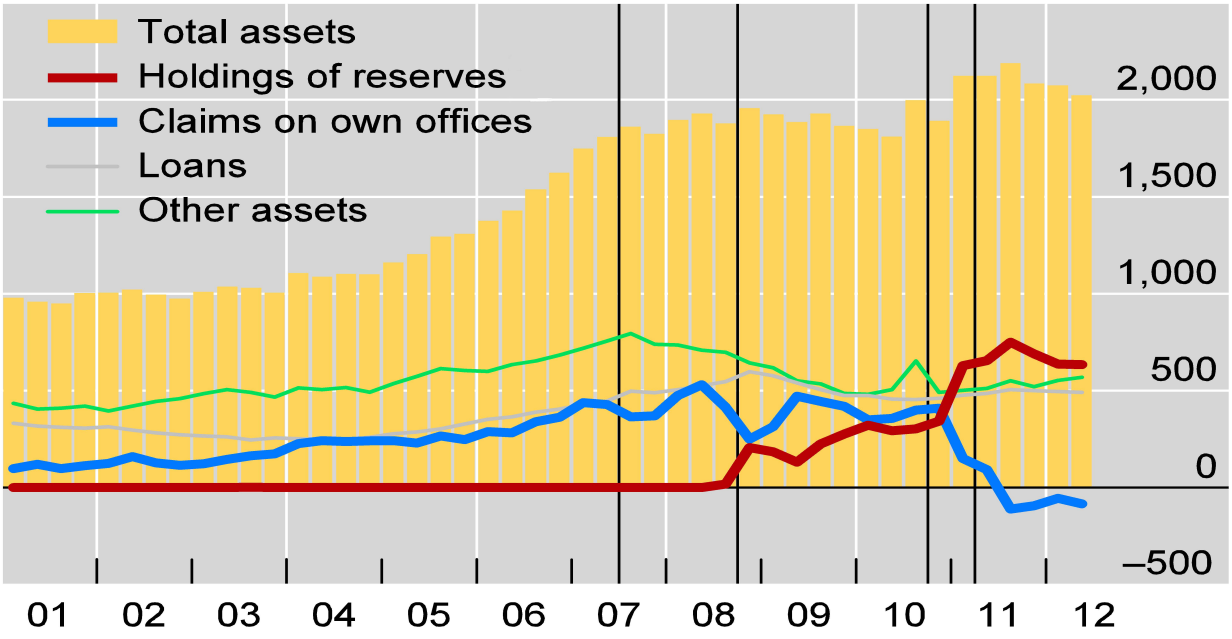
Figure 1. Overnight borrowing rates

Source: Kriecher, McCauley and McGuire (2014)

Figure 2. Foreign banks' uninsured branches and agencies in the United States($ billions)



The vertical lines indicate the start of the financial crisis (end-Q2 2007), the collapse of Lehman Brothers (end-Q3 2008), the announcement of the change to the FDIC assessment base (end-Q3 2010) and the implementation of the change (1 April 2011). Source: Kriecher, McCauley and McGuire (2014)

Table 1. Summary Statistics

Panel A. Bank Call Report Data

	Uninsured				Insured			
Bank Characteristics	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.
Total Assets ($ Billions)	222	9.504	0.633	21.4	6,935	1.575	0.152	26.5
Cash ($ Billions)	222	3.066	0.067	9.798	6,935	0.125	0.011	1.992
Cash (% of Assets)	210	0.270	0.147	0.303	6,935	0.098	0.070	0.101
Deposits ($ Billions)	221	4.982	0.220	12.4	6,935	1.056	0.128	17.2
Deposits (% of Liabilities)	209	0.404	0.331	0.345	6,934	0.930	0.964	0.129
Loans ($ Billions)	221	2.141	0.304	5.483	6,935	0.903	0.093	14.3
Loans (% of Assets)	209	0.434	0.388	0.348	6,935	0.602	0.630	0.168
C&I Loans ($ Billions)	221	1.058	0.161	2.589	6,935	0.145	0.010	2.380
C&I Loans (% of Assets)	209	0.246	0.181	0.256	6,935	0.083	0.069	0.067
Net Internal Lending ($ Billions)	222	0.691	-0.055	10.9	121	-2.710	-0.114	15.70
Liquid Assets to Assets (%)	207	0.488	0.457	0.338	7,010	25.413	21.923	15.804
Tier 1 Capital Ratio (%)	164	12.468	11.745	3.849	7,004	23.468	13.860	213.291
Nonperforming Loans to Loans (%)	77	4.058	1.554	7.367	6,500	3.270	1.996	4.113

Panel B. Syndicated Loan Data

	Uninsured				Insured			
Outcome Variables	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.
Lead	4,202	0.168	0	0.374	70,283	0.272	0	0.445
Share	1,617	6.644	5	7.678	26,107	10.137	7	11.487
Lead Share	1,616	1.467	0	7.398	26,103	4.278	0	11.774
Share Index	1,617	0.804	0.150	6.848	26,107	2.302	0.489	9.891
Herfindahl	1,617	857.853	652.656	807.721	26,107	1191.606	837.5	1139.257
Amount Offered	1,617	55	30	96.700	26,107	48	25	145
Deal Characteristics								
Maturity (Months)	4,146	47.005	60	23.083	69,552	46.700	60	20.674
Facility Amount ($ Millions)	4,201	993	500	1580	70,280	681	330	1200
Secured Loan	2,905	0.526	1	0.499	46,793	0.563	1	0.496
Lender Characteristics								
Total Assets	4,203	37.6	33	36.4	70,289	323.0	125	388.0
Liquid Assets to Assets	4,069	0.580	0.565	0.278	70,289	0.244	0.137	0.217
Tier 1 Capital Ratio	1,726	0.109	0.111	0.021	70,083	0.114	0.091	0.176
Nonperforming Loans to Loans	4,027	0.027	0.014	0.039	69,927	0.022	0.013	0.028
Borrower Characteristics								
Age	3,296	29.729	16	37.080	53,517	27.437	16	31.198
Total Assets	4,076	14.876	15.263	2.353	68,156	14.476	14.630	2.075
Total Sales	4,091	14.233	14.564	2.349	68,495	14.043	14.181	2.093
Liquid Assets to Assets	4,075	1.546	1.247	2.098	68,087	1.750	1.393	2.625
Leverage Ratio	4,074	7.311	6.211	73.792	68,139	5.342	5.355	111.424
Profits	4,076	0.272	0.136	2.158	68,135	0.341	0.139	5.080
Cash	4,074	0.226	0.172	0.197	67,950	0.227	0.167	0.209
Working Capital to Assets	4,076	0.076	0.043	0.153	68,146	0.018	0.072	15.768
EBITDA	4,026	12.584	12.994	2.409	67,492	12.278	12.480	2.090
Number of Employees	3,882	9.228	9.367	1.812	64,491	8.762	8.814	1.845
Tangible Assets to Total Assets	4,065	0.655	0.689	0.219	67,792	0.681	0.720	0.232
Revenue	4,107	14.240	14.573	2.349	68,698	14.049	14.195	2.093
Income	4,076	0.073	0.066	0.077	68,152	0.073	0.073	0.505
Debt	3,099	13.590	14.018	2.479	51,616	13.107	13.416	2.357
Misc.								
Number of Deals (per lender)	72	58.375	10.5	201.772	441	159.386	7	605.895

Notes: This table reports summary statistics for the variables used in the analysis.

Table 2. Response of Foreign and Domestic Banks' Cash Holdings

	Time Period: 2001Q1-2014Q2					
	$\Delta(Cash_t)/Assets_{t-1}$			$\Delta(Cash/Assets)_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	-0.00284	-0.00559	-0.0119**	0.00306***	0.0142*	-0.00803***
	(0.00575)	(0.0200)	(0.00540)	(0.000877)	(0.00855)	(0.00165)
Uninsured Ratio	-0.0161	-0.0185	-0.0118	0.00609**	0.00114	-0.000833
	(0.0178)	(0.0305)	(0.0139)	(0.00310)	(0.00586)	(0.00761)
Uninsured*FDIC	0.119**	0.0780**	0.0889***	-0.00299	0.0221***	0.00888**
	(0.0586)	(0.0361)	(0.0275)	(0.00561)	(0.00681)	(0.00405)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	213,680	11,925	237,345	213,680	11,925	237,345
Number of Holding Companies	5,888	358	6,561	5,888	358	6,561

	Time Period: 2009Q2-2013Q1					
	$\Delta(Cash_t)/Assets_{t-1}$			$\Delta(Cash/Assets)_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	-0.0161***	0.0296	0.00704***	-0.00578***	0.00884	0.00683***
	(0.00573)	(0.0191)	(0.00137)	(0.00108)	(0.00667)	(0.000855)
Uninsured Ratio	-0.0175	-0.0363	-0.0418	0.0151*	-0.0140	0.0112
	(0.0279)	(0.0380)	(0.0372)	(0.00834)	(0.0122)	(0.0112)
Uninsured*FDIC	0.101	0.0701*	0.0857**	-0.0103	0.0387***	0.00804
	(0.0782)	(0.0361)	(0.0425)	(0.0110)	(0.0123)	(0.00735)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	68,763	3,662	76,240	68,763	3,662	76,240
Number of Holding Companies	4,708	266	5,240	4,708	266	5,240

This table reports the effects of the FDIC shock on banks' reserve holdings. Robust standard errors in parentheses. Equations are estimated using Arellano-Bond GMM estimator. Each regression equation also includes four lagged values of the following as controls: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans. Unit of observation is a bank holding company in a given quarter. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). Uninsured ratio is the ratio of uninsured assets to total assets under control of the bank holding company. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 3. Response of Foreign and Domestic Banks' Lending

	Time Period: 2001Q1-2014Q2					
	$\Delta(Loans_t)/Assets_{t-1}$			$\Delta(Loans/Assets)_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	-0.0176***	0.0242***	-0.0208	-0.0169***	-0.00712	0.00124
	(0.00225)	(0.00617)	(0.0181)	(0.00102)	(0.00462)	(0.00124)
Uninsured Ratio	0.0180**	-0.0351	0.0330***	4.56e-06	-0.0116**	0.00209
	(0.00742)	(0.0414)	(0.0113)	(0.00255)	(0.00562)	(0.00416)
Uninsured*FDIC	-0.00927	-0.0152**	-0.00983	-0.00147	-0.00649*	-0.000900
	(0.0122)	(0.00615)	(0.00701)	(0.00457)	(0.00390)	(0.00270)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	213,680	11,925	237,345	213,680	11,925	237,345
Number of Holding Companies	5,888	358	6,561	5,888	358	6,561

	Time Period: 2009Q2-2013Q1					
	$\Delta(Loans_t)/Assets_{t-1}$			$\Delta(Loans/Assets)_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	-0.00294	0.00233	-0.00158	0.00128	0.000390	-0.00720***
	(0.00270)	(0.00717)	(0.00146)	(0.000795)	(0.00406)	(0.000717)
Uninsured Ratio	0.0313*	0.00492	0.00799	-0.00329	-0.00243	-0.00487
	(0.0177)	(0.0141)	(0.0114)	(0.00569)	(0.00851)	(0.00555)
Uninsured*FDIC	-0.0208	-0.0205**	-0.00999	-0.00281	-0.0164***	-0.00140
	(0.0299)	(0.00837)	(0.0137)	(0.00757)	(0.00556)	(0.00446)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	68,763	3,662	76,240	68,763	3,662	76,240
Number of Holding Companies	4,708	266	5,240	4,708	266	5,240

This table reports the effects of the FDIC shock on banks' loans. Robust standard errors in parentheses. Equations are estimated using Arellano-Bond GMM estimator. Each regression equation also includes four lagged values of the following as controls: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans. Unit of observation is a bank holding company in a given quarter. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). Uninsured ratio is the ratio of uninsured assets to total assets under control of the bank holding company. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 4. Response of Loan Categories

	Time Period: 2001Q1-2014Q2					
	Δ(C&I Loans$_t$)/Assets$_{t-1}$			Δ(C&I Loans/Assets)$_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	-0.000674	0.00510***	-0.000392	-0.00150***	-0.00296	-0.000104
	(0.000662)	(0.00149)	(0.00122)	(0.000528)	(0.00339)	(0.000636)
Uninsured Ratio	0.00942***	0.000526	0.0120***	0.00325*	-0.00545*	0.00499**
	(0.00237)	(0.00386)	(0.00317)	(0.00181)	(0.00290)	(0.00224)
Uninsured*FDIC	-0.00124	-0.00727***	-0.00347	-0.00244	-0.00138	-0.000587
	(0.00394)	(0.00170)	(0.00232)	(0.00287)	(0.00258)	(0.00185)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	213,680	11,925	237,345	213,680	11,925	237,345
Number of Holding Companies	5,888	358	6,561	5,888	358	6,561

	Time Period: 2009Q2-2013Q1					
	Δ(C&I Loans$_t$)/Assets$_{t-1}$			Δ(C&I Loans/Assets)$_t$		
VARIABLES	Smallest 90%	Largest 5%	All Banks	Smallest 90%	Largest 5%	All Banks
FDIC	0.00220***	-0.00135	0.000480	0.00343***	0.000632	7.41e-05
	(0.000606)	(0.00239)	(0.000372)	(0.000511)	(0.00292)	(0.000378)
Uninsured Ratio	0.00926	-0.00812*	0.00390	0.00280	-0.0108*	0.00177
	(0.00840)	(0.00427)	(0.00823)	(0.00388)	(0.00555)	(0.00389)
Uninsured*FDIC	0.00137	-0.00599*	0.00111	-0.000982	-0.00335	0.00346
	(0.00747)	(0.00323)	(0.00396)	(0.00525)	(0.00340)	(0.00334)
Bank controls	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
Observations	68,763	3,662	76,240	68,763	3,662	76,240
Number of Holding Companies	4,708	266	5,240	4,708	266	5,240

This table reports the effects of the FDIC shock on banks' C&I loans. Robust standard errors in parentheses. Equations are estimated using Arellano-Bond GMM estimator. Each regression equation also includes four lagged values of the following as controls: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans. Unit of observation is a bank holding company in a given quarter. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). Uninsured ratio is the ratio of uninsured assets to total assets under control of the bank holding company. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 5. Participation in Syndicated Loans. Intensive Margin

	Time Period: 2001Q1-2014Q2					
VARIABLES	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Uninsured	0.110***	4.508***	0.236	6.331***	-661.3***	0.584***
	(0.0288)	(1.019)		(0.794)	(130.3)	(0.219)
FDIC	0.289	117.5	145.6	150.2	8,772	4.427**
	(0.556)	(136.8)	(160.3)	(151.8)	(9,588)	(1.743)
Uninsured*FDIC	-0.125***	-0.915	-1.412**	-1.818***	132.0**	-0.226**
	(0.0391)	(0.599)	(0.711)	(0.673)	(60.60)	(0.0908)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y
Lender & Borrower Fixed Effects	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
R-squared	0.328	0.230	0.176	0.181	0.132	0.362
Observations	27,358	11,798	11,795	11,798	11,798	11,786
Number of Lenders	335	263	263	263	263	263
Number of Borrowers	1,296	820	820	820	820	820

	Time Period: 2009Q2-2013Q1					
VARIABLES	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Uninsured	0.738***	-6.643***	-4.272	-13.56	1,075**	0.565
	(0.185)	(2.240)	(3.935)		(443.7)	(0.481)
FDIC	-0.0138	16.10*	16.63	16.16**	1,415**	-0.387
	(0.100)	(8.886)	(11.34)	(7.890)	(636.8)	(0.483)
Uninsured*FDIC	-0.0971***	-2.212**	-2.588**	-2.244**	-68.19	-0.369***
	(0.0345)	(0.996)	(1.254)	(1.067)	(90.18)	(0.0988)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y
Lender & Borrower Fixed Effects	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y
R-squared	0.421	0.342	0.288	0.319	0.184	0.412
Observations	6,946	3,605	3,603	3,605	3,605	3,599
Number of Lenders	163	137	137	137	137	137
Number of Borrowers	707	381	381	381	381	381

This table reports the effects of the FDIC shock on intensive margin measures of banks' participation in syndicated loans. Clustered robust standard errors at the level of the borrower and the lender in parentheses. Equations are estimated using ordinary least squares. All equations contain lagged values of the following bank-specific characteristics: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans; lagged values of the following borrower-specific characteristics: the logarithm of total sales, liquid assets to assets; the logarithm of EBITDA, a leverage ratio, net profit to assets, cash to assets, working capital to assets, the logarithm of the number of employees, tangible assets to assets, the logarithm of revenue, income to assets, the logarithm of total debt, and a set of dummy variables corresponding to the borrower company's industry; and the following deal-specific characteristics: primary purpose dummies, maturity of the loan, secured loan, and the logarithm of the deal amount. Unit of observation is a borrower-lender pair for a given facility. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 6. Syndicated Loans Response. Extensive Margin

	Time Period: 2001Q1-2014Q2		
VARIABLES	ln(Number of Deals)	ln(Number of Leads)	ln(Total Amount Offered)
	(1)	(2)	(3)
Uninsured	-0.367**	-0.940**	1.962***
	(0.179)	(0.388)	(0.168)
FDIC	-0.596	2.318	-3.809
	(1.913)	(4.608)	(2.893)
Uninsured*FDIC	-0.832***	-1.052***	-0.921***
	(0.151)	(0.257)	(0.194)
Borrower, Lender, & Deal Controls	Y	Y	Y
Lender & Borrower Fixed Effects	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y
R-squared	0.882	0.847	0.866
Observations	27,361	23,366	26,699
Number of Lenders	335	335	335
Number of Borrowers	1,296	1,286	1,295
	Time Period: 2009Q2-2013Q1		
VARIABLES	ln(Number of Deals)	ln(Number of Leads)	ln(Total Amount Offered)
	(1)	(2)	(3)
Uninsured	1.214**	-1.249	-1.367***
	(0.482)	(1.077)	(0.362)
FDIC	1.440***	1.718**	1.835***
	(0.391)	(0.671)	(0.575)
Uninsured*FDIC	-0.583***	-0.743**	-0.462**
	(0.150)	(0.319)	(0.215)
Borrower, Lender, & Deal Controls	Y	Y	Y
Lender and Borrower Fixed Effects	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y
R-squared	0.941	0.891	0.922
Observations	6,948	5,848	6,861
Number of Lenders	163	163	163
Number of Borrowers	707	688	704

This table reports the effects of the FDIC shock on extensive margin measures of banks' participation in syndicated loans. Clustered robust standard errors at the level of the borrower and the lender in parentheses. Equations estimated using ordinary least squares. All equations contain lagged values of the following bank-specific characteristics: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans; lagged values of the following borrower-specific characteristics: the logarithm of total sales, liquid assets to assets; the logarithm of EBITDA, a leverage ratio, net profit to assets, cash to assets, working capital to assets, the logarithm of the number of employees, tangible assets to assets, the logarithm of revenue, income to assets, the logarithm of total debt, and a set of dummy variables corresponding to the borrower company's industry; and the following deal-specific characteristics: primary purpose dummies, maturity of the loan, secured loan, and the logarithm of the deal amount. Unit of observation is a borrower-lender pair for a given facility. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 7. Robustness. Participation in Syndicated Loans, European and Non-European Banks

VARIABLES	*Panel A: Intensive Margin*						*Panel B: Extensive Margin*		
	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)	ln(Number of Deals)	ln(Number of Leads)	ln(Total Amount Offered)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
European Uninsured	-0.169	6.409*	6.351**	9.071***	-63.37	-0.332	0.122	-1.326**	4.243***
	(0.168)	(3.273)	(2.531)	(3.485)	(231.9)	(0.718)	(0.378)	(0.613)	(0.575)
Not European Uninsured	0.106	5.373***	0.239	6.963***	-661.1***	0.588***	-0.366**	-1.017**	1.957***
	(0.0729)	(1.791)	(1.883)	(1.878)	(130.3)	(0.220)	(0.178)	(0.404)	(0.165)
FDIC	0.259	112.8	151.4	148.3	8,766	4.315**	-0.615	2.681	-3.760
	(0.804)	(94.73)	(106.9)	(105.6)	(9,599)	(1.747)	(1.868)	(4.558)	(2.882)
European Uninsured*FDIC	-0.117***	-1.489	-1.516	-2.763**	136.1	-0.150	-0.803***	-1.193***	-0.983***
	(0.0437)	(0.966)	(1.039)	(1.088)	(89.72)	(0.121)	(0.245)	(0.273)	(0.163)
Not European Uninsured*FDIC	-0.136***	-0.325	-1.761**	-0.847	127.5	-0.309**	-0.843***	-0.540	-0.897***
	(0.0378)	(0.863)	(0.882)	(0.846)	(81.29)	(0.134)	(0.178)	(0.460)	(0.260)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Borrower & and Lender Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
R-squared	0.328	0.223	0.174	0.179	0.132	0.362	0.882	0.847	0.866
Observations	27,358	11,798	11,795	11,798	11,798	11,786	27,361	23,366	26,699
Number of Lenders	335	263	263	263	263	263	335	335	335
Number of Borrowers	1,296	820	820	820	820	820	1,296	1,286	1,295

This table reports robustness tests for the effects of the FDIC shock on intensive margin measures of banks' participation in syndicated loans, differentiating between European and non-European banks. Clustered robust standard errors at the level of the borrower and the lender in parentheses. Equations estimated using ordinary least squares. All equations contain lagged values of the following bank-specific characteristics: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans; lagged values of the following borrower-specific characteristics: the logarithm of total sales, liquid assets to assets; the logarithm of EBITDA, a leverage ratio, net profit to assets, cash to assets, working capital to assets, the logarithm of the number of employees, tangible assets to assets, the logarithm of revenue, income to assets, the logarithm of total debt, and a set of dummy variables corresponding to the borrower company's industry; and the following deal-specific characteristics: primary purpose dummies, maturity of the loan, secured loan, and the logarithm of the deal amount. Unit of observation is a borrower-lender pair for a given facility. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). The time period of estimation is 2001Q1-2014Q2. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 8. Robustness. Participation in Syndicated Loans, Insured and Uninsured Foreign Banks

	Panel A: Intensive Margin						*Panel B: Extensive Margin*		
VARIABLES	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)	ln(Number of Deals)	ln(Number of Leads)	ln(Total Amount Offered)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Foreign-Owned Uninsured	-0.00897	-1.438	-1.461	-1.762*	6.337	-0.145*	0.260	0.618	-0.179
	(0.0519)	(1.090)	(0.895)	(0.919)	(91.99)	(0.0877)	(0.253)	(0.561)	(0.387)
Foreign-Owned Insured	0.00109	-0.0694	0.260	-0.0463	-12.26	-0.00742	0.142	-0.0278	0.0961
	(0.0245)	(0.686)	(1.051)	(0.796)	(49.28)	(0.0529)	(0.102)	(0.147)	(0.122)
FDIC	0.214	105.8	145.0	139.3	8,827	3.789**	-0.163	4.903	-3.956
	(0.634)	(141.5)	(162.5)	(154.2)	(13,539)	(1.538)	(1.853)	(5.080)	(2.904)
Foreign-Owned Uninsured*FDIC	-0.123***	-0.765	-1.432**	-1.667**	137.2**	-0.216**	-0.896***	-1.037***	-0.916***
	(0.0401)	(0.640)	(0.723)	(0.695)	(61.59)	(0.103)	(0.152)	(0.268)	(0.196)
Foreign-Owned Insured*FDIC	0.0195	1.119**	1.394*	1.127**	49.13	0.0544	-0.268	0.0181	-0.0325
	(0.0434)	(0.469)	(0.745)	(0.532)	(43.09)	(0.0599)	(0.165)	(0.307)	(0.175)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lender and Borrower Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y	Y
Observations	27,358	11,798	11,795	11,798	11,798	11,786	27,361	23,366	26,699
R-squared	0.328	0.223	0.174	0.180	0.132	0.363	0.883	0.848	0.866
Number of Lenders	335	263	263	263	263	263	335	335	335
Number of Borrowers	1,296	820	820	820	820	820	1,296	1,286	1,295

This table reports robustness tests for the effects of the FDIC shock on intensive margin measures of banks' participation in syndicated loans, differentiating between European and non-European banks. Clustered robust standard errors at the level of the borrower and the lender in parentheses. Equations estimated using ordinary least squares. All equations contain lagged values of the following bank-specific characteristics: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans; lagged values of the following borrower-specific characteristics: the logarithm of total sales, liquid assets to assets; the logarithm of EBITDA, a leverage ratio, net profit to assets, cash to assets, working capital to assets, the logarithm of the number of employees, tangible assets to assets, the logarithm of revenue, income to assets, the logarithm of total debt, and a set of dummy variables corresponding to the borrower company's industry; and the following deal-specific characteristics: primary purpose dummies, maturity of the loan, secured loan, and the logarithm of the deal amount. Unit of observation is a borrower-lender pair for a given facility. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). The time period of estimation is 2001Q1-2014Q2. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table 9. Robustness. Foreign Shocks (Country-Year Fixed Effects)

	Time Period: 2001Q1-2014Q2					
VARIABLES	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Uninsured	0.380*	11.34***	7.030**	12.13***	69.19	0.736**
	(0.201)	(3.253)	(2.920)	(4.116)	(104.5)	(0.363)
FDIC	0.0349*	-2.116	-2.250*	-2.484*	-130.4	-0.0245
	(0.0208)	(1.367)	(1.257)	(1.279)	(121.9)	(0.146)
Uninsured*FDIC	-0.0315	-2.026**	-2.602**	-2.992**	124.0	-0.239*
	(0.0549)	(1.033)	(1.297)	(1.233)	(98.93)	(0.143)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y
Lender and Borrower Fixed Effects	Y	Y	Y	Y	Y	Y
Country-Year Fixed Effects	Y	Y	Y	Y	Y	Y
R-squared	0.331	0.221	0.177	0.181	0.121	0.363
Observations	27,358	11,798	11,795	11,798	11,798	11,786
Number of Lenders	335	263	263	263	263	263
Number of Borrowers	1,296	820	820	820	820	820
Number of Country-Years	226	226	226	226	226	226

	Time Period: 2009Q2-2013Q1					
VARIABLES	Lead	Share	Lead Share	Share Index	Herfindahl	ln(Amount)
	(1)	(2)	(3)	(4)	(5)	(6)
Uninsured	-0.181	3.382	5.297	5.704	-469.3	-0.613
	(0.345)	(4.900)	(5.760)	(9.083)	(455.3)	(0.636)
FDIC	-0.00443	-2.073	-1.864	-1.921	-46.25	-0.506**
	(0.0387)	(2.462)	(2.379)	(2.841)	(257.8)	(0.233)
Uninsured*FDIC	-0.0760	-3.641***	-3.893***	-4.247***	-212.2**	-0.143
	(0.0499)	(1.111)	(1.263)	(1.351)	(83.77)	(0.134)
Borrower, Lender, & Deal Controls	Y	Y	Y	Y	Y	Y
Lender and Borrower Fixed Effects	Y	Y	Y	Y	Y	Y
Country-Year Fixed Effects	Y	Y	Y	Y	Y	Y
R-squared	0.423	0.332	0.312	0.290	0.161	0.414
Observations	6,946	3,605	3,605	3,603	3,605	3,599
Number of Lenders	163	137	137	137	137	137
Number of Borrowers	707	381	381	381	381	381
Number of Country-Years	81	81	81	81	81	81

This table reports robustness checks for the effects of the FDIC shock after including country-year fixed effects in the regressions. Clustered robust standard errors at the level of the borrower and the lender in parentheses. Equations are estimated using ordinary least squares. All equations contain lagged values of the following bank-specific characteristics: the dependent variable, the logarithm of total assets, the ratio of liquid assets to total assets, the tier one capital ratio, and the ratio of nonperforming loans to total loans; lagged values of the following borrower-specific characteristics: the logarithm of total sales, liquid assets to assets; the logarithm of EBITDA, a leverage ratio, net profit to assets, cash to assets, working capital to assets, the logarithm of the number of employees, tangible assets to assets, the logarithm of revenue, income to assets, the logarithm of total debt, and a set of dummy variables corresponding to the borrower company's industry; and the following deal-specific characteristics: primary purpose dummies, maturity of the loan, secured loan, and the logarithm of the deal amount. Unit of observation is a borrower-lender pair for a given facility. FDIC is a dummy variable equal to unity following the implementation of the FDIC assessment base change (2011Q2). ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Supplementary Table S.1: Banks' Balance Sheet Composition

Small U.S. Banks

Assets	Liabilities
Reserves and Cash Balances (10.3%)	Domestic Deposits (76.4%)
Securities (16.2%)	Foreign Deposits (0.2%)
Loans (59.8%)	Fed Funds purchased (0.2%)
Other Assets (13.7%)	Repos (0.7%)
	Other Liabilities (6.7%)
	Capital (15.8%)

A small bank is defined as in the rest of this paper, as belonging to the smallest 90% of U.S. banks. Balance sheet composition are averages as of the fourth quarter of 2010, just prior to the implementation of the FDIC assessment base change.

Large U.S. Banks

Assets	Liabilities
Reserves and Cash Balances (8.7%)	Domestic Deposits (69.3%)
Securities (20.5%)	Foreign Deposits (3.1%)
Loans (61.9%)	Fed Funds purchased (1.3%)
Other Assets (8.9%)	Repos (3.4%)
	Other Liabilities (10.0%)
	Capital (12.9%)

A large bank is defined as in the rest of this paper, as belonging to the largest 5% of U.S. banks. Balance sheet composition are averages as of the fourth quarter of 2010, just prior to the implementation of the FDIC assessment base change.