Regulatory arbitrage and cross-border syndicated loans[1]

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Abstract: This paper investigates how international regulatory and institutional differences affect lending in the cross-border syndicated loan market. Lending provided through a foreign subsidiary is subject to subsidiary-country regulation and institutional arrangements. Multinational banks' choices between loan origination through the parent bank or through a foreign subsidiary provide information about these banks' preferences to operate in countries with varying regulations and institutions. Our results indicate that international banks originated larger loan volumes in countries with less stringent capital regulations consistent with regulatory arbitrage before the financial crisis. The results from estimating a conditional logit model of banks' choices of the country of loan origination also confirm that there was regulatory arbitrage before the financial crisis. Further, higher-quality institutions related to creditor rights and the rule of law promote loan origination volumes as well as location.

Keywords: Regulatory arbitrage, creditor rights

JEL classification: G21, G38

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1. Introduction

Banks have become increasingly international through the ownership of foreign subsidiary networks and the provision of cross-border loans. The Bank for International Settlements (BIS) reports that international banks' foreign claims, which include claims through foreign subsidiaries as well as cross-border loans, stood at 15.9 trillion dollars in 2012.[2] While banks have become more international, bank regulation and supervision remain mostly national. This implies that international bank flows to some extent could be driven by international regulatory differences as banks seek to avoid burdensome regulation in their home countries.[3]

Using aggregate data on international bank flows from the BIS, Houston, Lin, and Ma (2012) find that banks tend to have more claims on countries with fewer regulations, which they interpret as evidence of regulatory arbitrage by international banks. The provision of loans to countries with less stringent regulations is indeed consistent with regulatory arbitrage, if these loans are originated by subsidiaries located in these countries, as then the more lenient regulatory regime applies. However, the greater claims on countries with fewer regulations could reflect more lending by international banks' establishments located in other countries with relatively stringent regulation, in which case there is no regulatory arbitrage. The aggregate BIS data do not give details on where international loans have been originated, and hence cannot provide conclusive evidence of whether international banks engage in regulatory arbitrage.

[2] Based on BIS Locational Banking Statistics data.

[3] Countries stand to benefit from additional banking activity by way of increased local banking employment and profitability. For this reason, regulatory arbitrage by banks could trigger international regulatory competition by countries, tending to a 'race-to-the-bottom' in regulatory standards that could possibly threaten financial stability.

In this paper, we examine regulatory arbitrage using micro data on cross-border syndicated loans.[4] For each loan, we know where a bank has originated the loan. In particular, an international bank can provide a loan through an entity located in its parent country, or alternatively through a foreign subsidiary located either in the borrower's country or in a third country. In our sample for the years 1995-2016, we find that the shares of the loan volume provided through foreign subsidiaries located in the borrower's country and in a third country were 8.9% and 3.1%, respectively. For 12.7% of loans provided through borrower-country subsidiaries, the subsidiary country had less stringent capital regulation than the parent country, while this was the case for 30.6% of loans provided through a third-country subsidiary. These data are consistent with some regulatory arbitrage by international banks via loan origination through subsidiaries located in countries with relatively lenient capital regulations.

Analogously to Houston, Lin and Ma (2012), we estimate the impact of bank regulation and institutional quality on the aggregate volume of syndicated loans to borrower countries, and also on syndicated loan volumes bilaterally at the borrower country, lender country level. In addition, we examine how regulation and institutions affect the share of loans provided through foreign subsidiaries.

We find that loan inflows into borrower countries are positively related to private monitoring incentives related to financial institutions in these countries, consistent with a positive impact of institutional quality on loan inflows. Furthermore, the foreign subsidiary share of loans to a borrower country is positively related to the strength of creditor rights and the speed of contract enforcement in borrower countries, reflecting a role for institutional quality to affect the location of loan origination. However, the foreign subsidiary share of

[4] Cross-border syndicated loans are an important component of international banking flows with total new commitments of 1.8 trillion dollars in 2012 (BIS Quarterly Review, September 2013, Table 10). 2012 is the last full year for which the BIS reports aggregate cross-border syndicated loan volumes.

loans at the borrower country level is negatively related to borrower country capital regulation stringency consistent with regulatory arbitrage.

When considering syndicated loan data at the bilateral level, we find that loan volumes negatively reflect capital regulation stringency in lender countries again consistent with regulatory arbitrage. In addition, the subsidiary loan share at the bilateral level is positively related to capital stringency, especially during the pre-crisis years 1995-2005, and to official supervisory power in lender countries.

The estimation using bilateral loan data also suggests that the quality of institutions affects the location of loan origination. In particular, we find that stronger creditor rights and speedier contract enforcement in borrower countries, and weaker monitoring incentives and slower contract enforcement in lender countries, lead to a higher foreign subsidiary share in syndicated loan origination.

Going beyond loan volumes, we estimate a conditional logit model of a multinational bank's choice of the country of loan origination, from among the countries where the multinational bank is present. We find that the propensity of loan origination in a country is negatively related to the stringency of its capital regulations especially during the pre-crisis years, consistent with the evidence from the loan volume regressions. Specifically, when we estimate the impact of capital regulation stringency on loan origination location by year, we find evidence of regulatory arbitrage in each of the years 1999-2007, and none of the years 2008-2014. The disappearance of regulatory arbitrage at the time of the financial crisis could reflect that bank establishments located in countries subject to lax capital regulations were unable to continue lending as before, or alternatively that bank regulators strengthened enforcement of their regulations on banks' international operations as indicated by surveys of bank regulators (IMF, 2015, and World Bank, 2019).

International regulatory and institutional differences potentially also affect the determination of the lead bank of the loan syndicate among the participating banks. The lead bank performs the main tasks of borrower selection and monitoring on behalf of the entire syndicate, and regulation and institutions could affect a bank's comparative advantage and incentives to perform these tasks well. We find that stricter capital regulation and greater supervisory power discourage a lead bank role consistent with regulatory arbitrage, while such a role is facilitated by a greater rule of law.

Several papers have considered how regulatory arbitrage affects the structure of international banks. Considering international bank M&As, Karolyi and Taboada (2015) find evidence of regulatory arbitrage whereby acquisition flows involve acquirers from countries with stronger regulations than their targets, while abnormal returns are larger when acquirers come from more restrictive banking environments. This suggests that stringent regulations provide banks with a comparative advantage to expand abroad. Consistent with this, Frame, Mihov, and Sanz (2016) show that U.S. Bank Holding Companies (BHCs) are more likely to operate subsidiaries in countries with weak regulation and supervision, and that financial institutions' decisions to operate in environments with lax environments are associated with an increase in BHC risk and BHCs' contribution to systemic risk. Carbo-Valverde, Kane, and Rodriguez-Fernandez (2012) find evidence that differences in the size and benefits of safety-net benefits available to banks in individual EU countries help to account for cross-border merger activity.[5]

Some papers have examined how regulatory arbitrage affects a multinational bank's operations in foreign banking markets. Examining the riskiness of bank lending, Ongena, Popov, and Udell (2013) find that lower barriers to entry, tighter restrictions on bank

[5] Buchak, Matvos, Piskorvksi and Seru (2018) provide evidence of regulatory arbitrage between banking and shadow banking sectors in the US.

activities and to some degree higher minimum capital requirements at home are associated with lower banking standards abroad. Considering international banks operating in the UK, Reinhardt and Sowerbutts (2018) find that a tightening of capital requirements at home reduces UK branches' interbank lending growth relative to their UK subsidiaries.

A few papers address regulatory competition regarding capital standards from a theoretical perspective. Dell'Ariccia and Marquez (2006) analyze a two-country model where higher standards in one country create a positive externality for the other country, as it restricts overall loan supply and banking market competition, thereby rendering the other country's financial system more stable. In this setting, noncooperative capital standards are too low. Acharya (2003) considers the welfare implications of introducing common capital standards in a world where countries also compete in the area of regulatory forbearance policies. Regulatory forbearance in one country creates a negative spillover for the other country as it increases risk-taking by domestic banks, which reduces the profitability of foreign banks. This leads to noncooperative levels of forbearance that are too high in equilibrium. However, incomplete coordination only in the area of capital standards can be worse than no coordination at all, as it causes countries to compete more fiercely in the area of forbearance policies. Morrison and White (2009) also find that introducing common capital standards can be welfare reducing if there are international differences in the quality of regulation that can induce banks managed by better-skilled managers to relocate towards the better-regulated economy.

Several empirical papers address how information asymmetries affect loan syndicate structure. Sufi (2007) finds that the lead bank retains a larger loan share and forms a more concentrated syndicate when it is necessary to undertake more intense monitoring and due diligence. Lin, Ma, Malatesta and Xuan (2012) show that when the control-ownership divergence of a borrower is large, lead arrangers form more concentrated syndicates. Amiran,

Beaver, Landsman, and Zhao (2017) find that the introduction of credit default swap (CDS) trading for a borrower's debt decreases the share of loans retained by loan syndicate arrangers. Ball, Bushman, and Vasvari (2008) document that when a borrower's accounting information possesses higher debt-contracting value, lead arrangers retain a smaller proportion of new loans. Bosch and Steffen (2011) report that syndicates are smaller if firms are privately held or unrated. Esty and Megginson (2003) find evidence that lenders that cannot rely on legal enforcement mechanisms to protect their claims create larger and more diffuse syndicates as a way to deter strategic default given that larger syndicates make it more costly to restructure loans. Extending the literature on syndicate structure, this paper addresses how international regulatory and institutional differences affect a bank's propensity to originate syndicated loans through a foreign subsidiary, and how these differences influence which participating bank is the lead bank.

Section 2 describes the data. Section 3 presents empirical results on how international regulatory and institutional differences affect cross-border syndicate loan volumes and banks' choices of the country of loan origination. Section 4 presents empirical results on how these differences affect the determination of the lead bank in a loan syndicate. Section 5 concludes.

2. Data

To study regulatory arbitrage in the cross-border syndicated loan market we obtain data on syndicated loans from Loan Pricing Corporation's Dealscan database for the period 1995-2016. This database contains loan level information including the identities and residencies of borrowers and lenders as well as lenders' contributions to each loan. We use these data to construct aggregate loan volumes that are dependent variables in the regressions. In addition, we investigate credit ratios that reflect international banks' credit provision through foreign subsidiaries relative to their total cross-border syndicated loan provision.

The Dealscan database provides only recent information on lenders and their ultimate parents. In practice, ownership links vary over time due to mergers and acquisitions. To address this issue, we rely on the Dealscan-Compustat link provided by Schwert (2018) that connects the most active lenders in Dealscan to their respective banking groups on a quarterly basis, reflecting mergers and acquisitions over time. We then define a lender as a foreign subsidiary if the banking group that it belongs to according Compustat is headquartered in another country than the lender itself as reported by Dealscan.[6]

As we are interested in international bank regulatory arbitrage, we drop all loans provided by non-bank lenders and purely domestic loans where the ultimate parent bank and the borrower reside in the same country. Figure 1 plots the development of cross-border syndicated loan provision by banks over the 1995-2016 period, showing a generally upward trend that was temporarily reversed during the financial crisis of 2008-2009.

We match the loan data with borrower and lender country variables from various sources as detailed below. After these steps, we obtain a sample of 149,416 individual bank loans to borrowers in 119 countries by lenders with ultimate parents in 10 countries.[7] This sample is used in the regressions explaining lead bank selection. For about 70% of the individual loan contributions, Dealscan does not report the loan volume, which limits the number of borrower countries in our sample to 82 and the number of lender countries to 10 in the loan volume regressions.[8]

[6] After merging with the Dealscan-Compustat link our database covers about 31% of the entire volume of cross-border syndicated loans in Dealscan, and about 18% of the number of cross-border syndicated loans.
[7] By a loan we refer to the individual contribution of a lender in a facility. Facilities are credit agreements between a borrower and one or more lenders.
[8] For the top 5 lender countries, Table A2 in the Appendix provides information on the top 3 borrower countries and the top 3 subsidiary countries. For lenders in Germany, Japan, and the UK, the US is the top borrower as well as subsidiary country. For lenders in the US, the UK is the top borrower country as well as the top subsidiary country. For lenders in France the top borrower country is the USA and the Netherlands is the top subsidiary country.

We consider loan volume regressions where loan volumes are aggregated alternatively at the borrower country-year level and the borrower country-lender country-year level. Panel A of Table 1 provides summary statistics for variables at the borrower-country level. In particular, Volume is the sum of the US dollar value of all loans with a mean of $ 2.6 billion. To be able to use observations with a zero loan volume, we consider two alternative transformations of the loan volume. First, Log(Volume + 1) is the natural logarithm of 1 plus the sum of the US dollar value of loans with a mean of 11.99. Second, Arsinh(Volume) is the transformed loan volume using the inverse hyperbolic sine function, with a mean of 12.41.[9]

We construct three credit ratios that inform on potential regulatory arbitrage through the usage of a foreign subsidiary located in the borrower country or in a third country. First, Foreign subsidiary/total volume is computed as the share of loans provided by any foreign subsidiary with a mean of 0.095. Figure 2 plots the development of the share of cross-border loan volume provided by a foreign subsidiary over the period 1995-2015. Foreign subsidiary/total volume is apparently procyclical, increasing from about 7% in 2001 to about 16% in 2008. Furthermore, Borrower-country subsidiary/total volume is the share of loans provided by a subsidiary located in the borrower country, while Third-country subsidiary/total volume is the share of loans provided by a subsidiary located in a third country. These two variables have means of 0.018 and 0.077, respectively; implying that loan provision through third-country subsidiaries is relatively common.

Going beyond loan volume regressions, we also test the effect of regulatory variables on the choice of the country where the loan originating entity is located conditional on loan origination taking place. To examine this choice, we use information on multinational banks' ownership of foreign subsidiaries in OECD countries from Silva (2019). After matching our

[9] The inverse hyperbolic sine transformation transforms loan volumes according to the function $\text{arsinh}(x) = \ln\left(x + \sqrt{x^2 + 1}\right)$.

loan data with the foreign subsidiary ownership data, we know for each loan in which countries, including the parent country, a multinational bank could possibly have originated the loan. Then we create a loan origination dummy variable that equals one for the country where the loan was originated and zero for the other countries. We investigate the loan origination location choice by estimating a conditional logit model. Our loan location sample includes data for 42 banking groups headquartered in 10 countries and owning subsidiaries in 28 OECD countries. On average, a banking group has subsidiaries in 5.1 foreign countries. The sample period for this estimation is from 1999 to 2014, covering the years for which subsidiary ownership data are available.

Our main independent variables are indices of the quality of bank regulation taken from the World Bank's Bank Regulation and Supervision Surveys (Barth et al., 2004 and 2006). The available information are from five consecutive surveys. Following Houston, Lin and Ma (2012), we take values of the regulatory variables for the years 1995 to 1999 from the first survey (measuring regulation in 1999); for the years 2000 to 2003, we use the second survey reflecting the quality of regulation as of the end of 2002; for the years 2004 to 2007, the third survey's results are used (reflecting regulation at the end of 2005); for the years 2008 to 2012, we take the results of the fourth survey documenting regulation at the end of 2012; finally, for the years 2013 to 2016 we use the results of the fifth survey measuring regulation at the end of 2016.[10]

Among the regulatory variables, Capital regulation (borrower) is an index of the stringency of capital adequacy standards in the borrower country, with higher values indicating greater stringency. Capital regulation (borrower) ranges between 1 and 10 and has a mean of 6.333. Overall activity restrictions (borrower) is an index of the extent to which

[10] One of the subcomponents of Capital regulation (Overall capital stringency) cannot be calculated using data from the fifth wave of the survey because of missing information. Hence, for this wave we take the values of Capital regulation in the fourth wave and adjust it using changes in the other subcomponent, Initial capital regulation, that is available.

banks can engage in securities, insurance and real estate activities in the borrower country, with higher values indicating more restrictions. This variable ranges between 3 and 12 and has a mean of 7.121. Official supervisory power (borrower) is an index of the power of the supervisory authorities in the borrower country to take specific actions to prevent and correct problems in banks, with higher values indicating greater power. The range of this variable is 4-16, and it has a mean of 11.00.

Following Houston, Lin and Ma (2012), we control for several country institutional variables that may affect international bank flows. Among these, Monitoring (borrower) is an index of the strength of private monitoring of banks through, for instance, certified audits and ratings by international credit rating agencies, with higher values indicating stronger monitoring. This variable ranges between 3 and 11 and is 7.717 on average. Creditor rights (borrower) taken from Djankov et al. (2007) measures the strength of creditors' rights in case of a bankruptcy in the borrower country, with higher values indicating stronger creditor rights.[11] Creditor rights ranges between 0 and 4, and has a sample mean of 1.913 for borrower countries. Information sharing (borrower) measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries in the borrower country, with higher values indicating a greater availability of credit information. This variable ranges from 0 to 6 and has a mean of 3.496.[12] Time to enforce contracts (borrower) is the time required to resolve a commercial dispute in the borrower country, calculated as the average number of calendar days from the filing of the lawsuit in court until the final determination and, in appropriate cases, payment in a country. Higher values indicate weaker contract enforcement. On average, it takes 629 days to resolve disputes in

[11] Since the last available data are for 2007, for subsequent years we take the values of this year.
[12] This variable is from the World Bank's Doing Business database. The World Bank changed the methodology of measuring the Information sharing index in 2015. Until then, the index ranged between 0 and 6. Since the revised index ranges between 0 and 8 we multiply the post-2014 values of the index by 6/8. The first available year is 2004, and for prior years we take the values for this year.

borrower countries.[13] As a final institutional variable, Rule of law (borrower) captures perceptions of the extent to which agents in the borrower country have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence in a country, with higher values indicating higher confidence in the rule of law. This variable is measured in units of a standard normal distribution and ranges approximately from -1.69 to 2.1 with a sample mean of 0.406.

We also control for the development and the size of the borrower country, as loan capital may flow to economically less developed countries and larger countries because of economies of scale effects. We include the natural logarithm of GDP per capita measured at constant 2010 US dollar prices, Log real GDP/capita (borrower), and the natural logarithm of the total population, Log population (borrower), in the borrower country. These two variables have means of 9.137 and 16.78, respectively.

Panel B provides summary statistics for the data used in bilateral borrower-country, lender country loan volume regressions. In particular, this panel provides summary statistics for the same regulatory and institutional variables as Panel A, but now defined separately for borrower and lender countries.[14] Comparing these data for borrower and lender countries, we see that on average capital regulations and monitoring institutions are relatively stronger in lender countries than in borrower countries, while the opposite is true for overall activity restrictions and official supervisory power.

In the bilateral regressions, two additional explanatory variables are meant to control for the structure of the banking market in a borrower country, reflecting that higher margins in less competitive markets and markets with less significant government ownership of banks

[13] This variable is from the World Bank's Doing Business database. The first available year is 2004, and for prior years we take the values for this year.
[14] Creditor rights and Information sharing in lender countries are excluded because of a lack of sufficient variation in these variables.

may attract more foreign bank lending. First, Concentration (borrower) is the assets of the five largest banks as a share of total commercial banking assets in the borrower's country. Second, Government bank ownership (borrower) is the proportion of banking assets in government owned banks in the borrower country, where a bank is considered government owned if 50 percent or more of the shares are controlled by the government. These two variables have means of 73.31% and 16.75%, respectively. In the bilateral regressions, we also control for geographic distance and common language between lenders and borrowers. Specifically, Log distance is calculated as the natural logarithm of the physical distance between the capital cities of the respective borrower and lender countries with a mean of 8.417, and Common spoken language is the probability that a pair of people chosen at random from the borrower and lender countries understand one another in some language with a mean of 0.305. The latter variable is taken from Melitz and Toubal (2014).

As a further issue, we also consider how regulations and institutions affect the choice of the lead bank in an international loan syndicate. For this purpose, we define Lead to be a dummy variable indicating a lead arranger role for a bank in a loan syndicate. Following Bharath et al. (2011) and Berg et al. (2016), we set Lead equal to one if 1) the reported lender role in Dealscan is either "Admin agent", "Agent", "Arranger", or "Lead bank"; or 2) the lead arranger credit field equals "Yes"; or 3) if the loan has a sole lender. Lead has a mean of 42.7%.

The lead bank regressions include regulatory and institutional variables for the lender country and several additional control variables for the parent lender bank. Log assets is the natural logarithm of the bank's total assets lagged by one year, and Log syndicated lending is the log of 1 plus the sum of the dollar value of all loans provided by a lender in a given year minus the pertinent loan amount with means of 13.63 and 22.52, respectively.[15] Larger banks

[15] Bank accounting data are taken from Compustat.

by assets may be in a better position to assume the lead bank role in a loan syndicate, as this tends to require a bank to retain a relatively large share of the overall facility on its own books (Sufi, 2007). Loans/deposits is the ratio of all loans to deposits lagged by one year with a mean of 0.902. Banks that retain more loans on their balance sheets may be more traditional, and less inclined to assume lead roles in loan syndicates. Equity/assets is the bank's total common equity to total assets ratio lagged by one year with a mean of 0.05. Less capitalized banks may be less aggressively entrepreneurial, and hence less inclined to take on lead roles in loan syndicates. Finally, Past relationship is a dummy variable that indicates whether a bank has already provided at least one syndicated loan to the borrower in a previous year with a mean of 43.6%. A past relationship with a borrower makes it less necessary to provide a loan through a foreign subsidiary to facilitate monitoring, and it makes it easier for a bank to take on a lead role in new loan syndicate as the bank has an information advantage regarding the borrower.

A multinational bank with foreign subsidiaries can engage in regulatory arbitrage in the area of capital regulation by originating syndicated loans through foreign subsidiaries located in countries with less stringent capital regulation. Figure 3 provides information on the extent to which loans have been 'arbitraged' over the 1995-2016 period time in the sense that they have been originated through foreign subsidiaries located in countries with less stringent capital regulation than in the parent country. The share of 'arbitraged' loans reached a peak of about 8% in 2000, and generally was relatively high in the period 2000-2007 preceding the financial crisis, but has been more modest at less than 1% since then. The much lower share of arbitraged loans in recent years could conceivably reflect international convergence in capital regulatory standards, which would reduce the scope for such arbitrage. To see whether such convergence has occurred, Figure 4 displays the mean value and 10^{th} percentile and 90^{th} percentile values of the capital regulatory variable across countries for each of the World

Bank regulation and supervision survey waves. The figure fails to provide evidence of international capital regulatory convergence over time.

Arbitraged loans can be provided by subsidiaries located in either borrower countries or in third countries. As seen in Figure 5, the share of loans provided through subsidiaries in borrower countries that was arbitraged stood at a very high level of around 80% during 2000-2004, while it has declined to much lower levels in recent years. In contrast, the fraction of loans provided through third countries that was arbitraged has remained relatively high in recent years and stood at 26.7% in 2016.

Alternatively, Figure 6 plots the share of loans provided to borrowers located in countries with less stringent capital regulation than the country where the lender's parent bank is headquartered. As discussed, Houston et al. (2012) interpret the provision of loans to borrowers located in countries with less stringent regulation than the parent bank's country as potential evidence of regulatory arbitrage. The share of loans provided to borrowers in countries with relatively lax capital regulation reached a peak of 53.8% in 2000, and it stood at 11.6% in 2016. Generally, the share of 'arbitraged' loans in Figure 3 and the share of loans to borrowers in countries with relatively lax capital regulation in Figure 6 are seen to move similarly over time.[16]

To conclude this section, we compare the mean values of the regulatory variables for loans originated through foreign subsidiaries and through parent banks to see how on average loan origination through foreign subsidiaries has affected the stringency of the regulatory regime facing international banks that are active in the cross-border syndicated loan market. To start, Panel A of Table 2 provides the mean values of Capital regulation for loans provided though foreign subsidiaries in borrower countries (column 2), foreign subsidiaries in

[16] The similar shapes of the two figures could reflect that other things equal a relaxation of capital regulation in the borrower's country makes it more likely that this capital regulation drops below the capital regulation of a foreign subsidiary country if applicable and also of the lender's parent bank country.

third countries (column 4), and establishments in parent countries (column 6). Separate mean values are provided for the overall sample period of 1996-2016, and for the subperiods 1996-2005 and 2006-2016. For the overall period, we see that the mean Capital regulation for loans provided through subsidiaries in borrower countries exceeded the mean value for parent-country loans, while it was lower (higher) in the first (second) subperiod (column 8). These results suggest that foreign subsidiaries located in borrower countries were used relatively heavily to avoid burdensome parent-country capital regulation in the first half of the sample period, in line with figure 5. On average, subsidiaries located in third countries were subject to more stringent capital regulation than banking establishments in parent countries throughout the sample period (column 9), which suggests that on average subsidiaries in third countries were not used to evade parent-country capital regulations. However, subsidiaries located in third countries were subject to less stringent capital regulation than subsidiaries located in borrower countries during the overall sample period, and also during 2006-2016 (column 10).

Panel B provides analogous mean values of the activities restrictions variable for loans provided through foreign subsidiaries and parent banks. Subsidiaries located in borrower countries have been subject to more stringent activities restrictions than banks located in parent countries throughout (column 8), while subsidiaries located in third countries had fewer restricted activities relative to establishments in parent countries (column 9) and subsidiary banks in borrower countries (column 10). From Panel C, we see that on average subsidiaries in both borrower and third countries were subject to greater official supervisory power than banks in parent countries (columns 8 and 9), but that subsidiaries in third countries were subject to less powerful official supervision compared to subsidiaries in borrower countries for the overall period and during 1996-2005 (column 10). Finally, Panel D shows that subsidiaries in both borrower and third countries were subject to greater

financial market monitoring incentives than establishments in parent countries during the overall sample period (columns 8 and 9), pointing at the possibility that international banks prefer to originate loans through subsidiaries located in countries with stronger monitoring incentives.

3. Regulatory arbitrage, loan volumes and loan origination location

This section provides evidence on how bank regulation and other institutional variables affect cross-border syndicated loan flows and the loan origination location choice. Section 3.1 examines the determinants of aggregate loan volumes and the shares of loans originated in subsidiary countries at the level of the borrower country, while in section 3.2 the loan data are at the bilateral borrower country-lender country level.[17] Section 3.3 considers the choice of multinational banks as to the country of loan origination.

3.1 Inflows of loans into borrower countries

We estimate the following relation between the inflow of syndicated loans into a borrower country and bank regulatory and other variables:

$$I\,(\text{borrower})_{i,t} = \alpha + \beta_0\,\text{Regulation}\,(\text{borrower})_{i,t} + \beta_1\,X\,(\text{borrower})_{i,t} + \eta_i + \delta_t + \varepsilon_{i,t} \qquad (1)$$

in which $I\,(\text{borrower})_{i,t}$ is a variable characterizing the inflow of loans into borrower country i at time t. $\text{Regulation}\,(\text{borrower})_{i,t}$ is a set of regulatory variables in country i at time t (Capital regulation, Overall activity restrictions, Official supervisory power), with higher values indicating tighter regulation. $X\,(\text{borrower})_{i,t}$ is a set of institutional and control variables for country i at time t (Monitoring, Creditor rights, Information sharing, Time to

[17] We have too few lender countries in our data set to analyse loan volume variation at the lender country level.

enforce contracts, Log real GDP/capita and Log population), and η_i and δ_t are sets of borrower country and year fixed effects, respectively. We report standard errors that allow for clustering at the borrower country level. Similarly to Houston, Lin and Ma (2012, Table III), we expect to find that loan inflows into borrower countries, as measured by Log(Volume + 1) and Arsinh(Volume), are negatively related to the stringency of bank regulation in these countries, consistent with $\beta_0 < 0$. In addition, we hypothesize that the usage of borrower-country subsidiaries, as reflected in the Foreign subsidiary/total volume and Borrower country subsidiary/total volume variables, is negatively related to borrower-country regulatory stringency consistent with regulatory arbitrage, giving rise to $\beta_0 < 0$ in the pertinent regressions.

Columns 1 and 2 of Table 3 provide the results of regressions of Log(Volume + 1) and Arsinh(Volume) along the lines of (1). Furthermore, column 3 reports a Tobit regression of Arsinh (Volume) as an alternative way to deal with truncation of the sample in case of zero credit flows.[18] Capital regulation (borrower), Overall activity restrictions (borrower) and Official supervisory power (borrower) obtain insignificant coefficients in the three regressions. Monitoring (borrower) is estimated with positive and significant coefficients, suggesting that better private monitoring incentives encourage syndicated loan inflow into borrower countries. Information sharing (borrower) enters the three regressions with negative and significant coefficients, perhaps because information sharing on borrowers reduces the profitability of credit relationships to international banks. Credit inflows into borrower countries are further positively and significantly related to the rule of law, the log of GDP per capita and the log of the population in these countries.

[18] Santos and Tenreyro (2006) propose a pseudo-maximum likelihood (PML) estimation technique to deal with zero observations in an international trade application. Application of this technique failed to reach convergence in our case.

Next, regressions of Foreign subsidiary/total volume, Borrower country subsidiary/total volume and Third country subsidiary/total volume are provided in columns 4-6. The foreign subsidiary share variable is negatively and significantly related to Official supervisory power (borrower) in column 4, indicating that international banks avoid foreign subsidiary usage in case of greater official supervisory power in borrower countries. The foreign subsidiary and borrower country subsidiary shares vary positively with Monitoring (borrower) in regressions 4 and 5, as better financial market monitoring institutions in borrower countries appear to make borrower country subsidiary usage more attractive. In addition, the foreign subsidiary share is positively and significantly related to Creditor rights (borrower), and negatively and significantly to Time to enforce contracts (borrower). Overall, regression 4 provides evidence that foreign subsidiary usage is positively related to the quality of institutions in borrower countries as related to financial market monitoring, creditor rights, and the time to enforce contracts, while foreign subsidiary usage is negatively related to borrower country supervisory, power consistent with regulatory arbitrage.

Bank regulation potentially is endogenous to absolute and relative loan volumes. Borrowing countries experiencing large syndicated loan provision by local subsidiaries of international banks, could, for instance, increase the quality of regulation to discourage such credit provision. To mitigate potential endogeneity, we next re-estimate regressions 4-6 of Table 4 using instrumental variables (IVs), taking Capital regulation (borrower), Overall activity restrictions (borrower), Official supervisory power (borrower), and Monitoring (borrower) to be potentially endogenous. Following Houston et al. (2012, p. 1879), we employ instrumental variables that have been advanced in the literature as possible determinants of regulation. First, we use the time-varying means of the regulatory variables (excluding the pertinent country) to reflect possible 'regulatory contagion' (see Demirguc-

Kunt and Detragiache, 2002).[19] Second, we use a dummy variable indicating that the central bank supervises banks for prudential purposes (from the World Bank regulation and supervision survey) to reflect that central bankers are more likely to choose bank regulation that promotes systemic stability (see Goodhart, 2002). A final instrument is the five-year moving average of the Gini index measuring income inequality (from the WDI), as regulation is in part shaped by its distributional consequences (see Beck, Levine, and Levkov, 2010).[20] The resulting IV regressions are reported in columns 7-9 of Table 4. In the foreign subsidiary share and third country subsidiary share regressions 7 and 9, the instrumented capital regulation variable is estimated with negative significant coefficients, suggesting less foreign subsidiary usage in case of more stringent borrower-country capital regulation. In the IV regression 7, foreign subsidiary usage is positively related to Creditor rights (borrower) and negatively to Time to enforce contracts (borrower). Thus, in the IV regressions the picture remains one of subsidiary usage being negatively related to borrower country regulatory stringency, but positively to borrower-country institutional quality.

As a specification test, for regressions 7-9 we conducted an overidentification test based on Hansen's J statistic with as the null hypothesis that the instruments are valid, i.e. uncorrelated with the error term and correctly excluded from the estimating equation. As indicated in the table, this null hypothesis is not rejected for the three regressions. In addition, we conducted an underidentification test based on the Kleibergen-Paap rk Wald statistic with as the null hypothesis that the model is not identified, as the excluded instruments are not sufficiently correlated with the endogenous regressors. As seen in the table, in this instance

[19] Specifically, in case of a borrower-country regulatory variable, we instrument it by the mean of this variable for all borrower countries excluding the pertinent borrower country. In the regressions with bilateral data, in analogous fashion we construct the instruments for lender-country regulatory variables.
[20] Other instrumental variables used by Houston et al. (2012) are subsumed by included fixed effects in our setting.

the null hypothesis is rejected for the three regressions. Thus, the IV regressions 7-9 appear to be correctly specified.

3.2 Bilateral loan flows between borrower and lender countries

In this subsection we consider how syndicated loan flows aggregated at the bilateral borrower country, lender country level are related to bank regulatory stringency in both borrower and lender countries. We estimate equations as follows:

$$\begin{aligned} I\,(\text{bilateral})_{i,j,t} = \alpha + \beta_0\,\text{Regulation}\,(\text{borrower})_{i,t} + \beta_1\,X\,(\text{borrower})_{i,t} + \\ \gamma_0\,\text{Regulation}\,(\text{lender})_{j,t} + \gamma_1\,X\,(\text{lender})_{j,t} + \theta_1\,\text{Log distance}_{i,j} + \theta_2\,\text{Common language}_{i,j} \\ + \eta_i + \varphi_j + \delta_t + \varepsilon_{i,j,t} \end{aligned} \quad (2)$$

in which $I\,(\text{bilateral})_{i,j,t}$ is a variable characterizing the flow of loans to borrowers in country i from banks headquartered in country j at time t, and η_i, φ_j and δ_t are fixed effects for borrower and lender countries and time, respectively. Specification (2) includes regulatory variables and other institutional variables for both borrower and lender countries. We report standard errors that allow for clustering at the borrower country level.[21] The potential effects of regulatory variables in borrower and lender countries on absolute and relative credit variables are analogous to the discussion in Section 3.1.

Columns 1-2 of Table 4 report OLS regressions of Log(Volume + 1) and Arsinh(Volume), and a Tobit regression of Arsinh(Volume) with bilateral syndicated loan data, respectively. Capital regulation (Lender) enters the three regression with negative significant coefficients, suggesting that the total loan volume at the bilateral level declines

[21] Two way-clustering at the borrower and lender country levels yields qualitatively similar results to the reported results.

with lender-country capital stringency consistent with regulatory arbitrage. Overall activity restrictions in the borrower country impact negatively and significantly on bilateral loan volumes in regressions 1-2, while overall activity restrictions in the lender country are positively and significantly related to loan volumes in regressions 1-3. This could reflect that restricted non-banking activities are complements to syndicated loan provision for borrower-country banks but substitutes for lender-country banks. The strength of monitoring incentives in both borrower and lender countries vary positively and significantly with bilateral loan volumes in regressions 1-3, as stronger monitoring incentives may facilitate funding for borrower-country and lender-country banks alike. In the Tobit regression 3, bilateral loan volume positively reflects borrower-country creditor rights and banking market concentration, and negatively the time to enforce contracts and government bank ownership in borrower countries. Bilateral loan volume is positively related to the rule of law in borrower countries in regressions 1-3, but unexpectedly it varies negatively with the rule of law in lender countries in regressions 1-2. As expected, bilateral loan volume varies negatively with bilateral distance, and positively with a common spoken language of borrower and lender countries.

Columns 4-6 report the results of regressions of the overall foreign subsidiary loan ratio, and the borrower-country and third-country subsidiary loan ratios. Capital regulation (lender) enters regressions 4 and 6 with positive significant coefficients, which suggests that foreign subsidiaries generally and third-country subsidiaries specifically avoid burdensome parent-country capital regulation consistent with regulatory arbitrage. Official supervisory power in the lender country impacts positively and significantly on the overall foreign subsidiary ratio in regression 4, consistent with regulatory arbitrage so as to avoid stringent parent-country supervision. Furthermore, the supervisory power variable is estimated with a negative (positive) coefficient in the borrower-country (third-country) subsidiary loan ratio

regression 5 (6). These results suggest that more powerful supervisors in parent-countries cause banks to provide fewer syndicated loans through borrower-country subsidiaries, but instead to channel more syndicated loans through subsidiaries in third countries. The negative and significant coefficients for Monitoring (lender) in regressions 4 and 6 indicate that stronger monitoring incentives in lender countries reduce foreign subsidiary usage. Stronger creditor rights in borrower countries provide for greater relative use of foreign subsidiaries especially in third countries (regressions 4 and 6). More time to enforce contracts in borrower (lender) countries discourages (encourages) foreign subsidiary usage (regressions 4 and 6).

The results of IV estimation applied to the loan ratio regressions 4-6 are reported in columns 7-9. A positive and significant coefficient for Capital regulation (lender) in the IV regressions 7 and 9 points at greater foreign subsidiary usage by international banks in case of more stringent capital regulation in parent-bank countries, consistent with regulatory arbitrage. This regulatory arbitrage apparently takes the form of greater usage of especially third-country subsidiaries. Similarly, the positive significant coefficient for Official supervisory power (lender) in regression 9 is evidence that international banks increase their usage of third-country subsidiaries if subject to greater supervisory power in their home countries. Better monitoring institutions in lender countries, in contrast, reduce third-country subsidiary usage (regression 9). In the IV regressions 7-9, estimated coefficients for creditor rights in borrower countries, and the time to enforce contracts in borrower and lender countries are very similar to regressions 4-6. The IV regressions appear to be well specified according to reported overidentification and underidentification tests.

Overall, the results of Table 4 indicate that international banks are more likely to originate loan through foreign subsidiaries located in especially third countries if subject to stricter capital regulation and greater supervisory power in their home countries, consistent with regulatory arbitrage. In contrast, better institutions in lender countries relative to

borrower countries lead to a lower subsidiary usage in the provision of cross-border syndicated loans. In particular, the foreign subsidiary share is negatively related to the quality of monitoring institutions and the speed of contract enforcement in lender countries, while it is positively related to creditor rights and the speed of contract enforcement in borrower countries.

As discussed, Figure 3 suggests that arbitrage with respect to capital regulations was relatively prevalent in the first half of our sample period. To test this formally, we re-estimate the subsidiary ratio regressions 4-9 from Table 4 separately with data for the years 1995-2005 and 2007-2016. The results using data for the years 1995-2005 are displayed as columns 1-6 in Table 5. These results provide consistent evidence of higher subsidiary usage in case of more stringency in lender countries as related to capital regulation (columns 1, 3, 4 and 6), overall activity restrictions (columns 4 and 6), and overall supervisory power (columns 1 and 3). There is some evidence that stronger monitoring incentives in lender countries reduce subsidiary usage (column 3).

Estimation results for the years 2006-2016 are shown in columns 7-12. Overall, these results suggest that regulatory arbitrage was more limited in the later period. In particular, the capital regulatory index for the lender country is insignificant in all of these regressions. The overall activity restrictions variable for the lender country is negative and significant regressions 7, 9, 10 and 12, which suggests that these restrictions reduced subsidiary usage in the later period, inconsistent with regulatory arbitrage so as to avoid burdensome restrictions. This could reflect that syndicated lending functioned as a substitute rather than a complement to restricted non-bank activities in the later period. Regulatory arbitrage so as to avoid burdensome lender-country supervisory power appears to have continued in the later period (columns 7, 9, 10 and 12). The impact of monitoring institutions in lender countries on subsidiary usage in the later period is ambiguous given a positive impact on borrower country

subsidiary usage in column 8, and a negative impact on third-country subsidiary usage in column 12. The IV regressions 4-6 and 1-12 appear to be well specified as they pass the reported overidentification and underidentification tests.

3.3 The choice of the location of loan origination

In this section we present the results of estimating conditional logit regressions following McFadden (1974) that explain the choice of multinational banks as to the country of loan origination. We estimate this choice conditional on the characteristics of the possible countries where a banking group has establishments including the parent country for a given loan. The model specification is as follows:

$$P_{lc} = \exp(\beta\, x_{lc}) \,/\, \Sigma^{C} \exp(\beta\, x_{lc}) \qquad (3)$$

where P_{lc} is the probability that a multinational bank provides a loan l through an entity located in country c. For simplicity, we use compressed notation where subindex l refers to a loan provided by some bank i to borrower j as part of loan facility k at time t, while c = 1, 2, 3, …, C indicates the set of possible location choices. The set C is loan specific, reflecting that multinational banks have varying parent locations and foreign subsidiary networks. The location choice characteristics, x_{lc}, for location c are country characteristics as included in the loan volume regressions, except that the two bilateral variables, Log distance and Common spoken language, are each replaced by two alternative variables to acknowledge that each location choice involves three possibly distinct countries: the parent country, the borrower country, and the loan origination country. Specifically, Log distance is replaced by Log distance from parent country, which reflects the distance between the loan origination and parent countries, and Log distance from borrower, which reflects the distance between the

loan origination and borrower countries. Analogously, Common spoken language is replaced by Common spoken language in parent country and Common spoken language in borrower country. Equation (3) exploits variation within loan-banking group observations, and hence all time-varying banking group and borrower-specific characteristics, as well as loan characteristics, are implicitly controlled for. We estimate equation (3) using maximum likelihood, and we report standard errors that allow for clustering at the banking group level.

The results are reported in Table 6. In regression 1, the estimated coefficient for Capital regulation is negative and significant, indicating that more stringent capital regulations reduce the probability of loan origination in a country. Other regulatory variables are estimated to be insignificant. Information sharing obtains a negative and significant coefficient, perhaps because information sharing in a country reduces the value of investing in information collection regarding loan customers. Rule of law is positively and significantly related to loan origination location. The two distance variables enter with negative and significant coefficients, while the coefficient for Common spoken language in parent country is estimated to be positive and significant.

The three categories of bank establishments, i.e. parent banks, subsidiaries in the borrower country, and subsidiaries in third countries, could differ in their propensities to originate a loan on account of, for instance, varying general expertise in loan origination or specific knowledge of certain international borrowers. These differences could give rise to varying sensitivities of the propensity to originate a loan to bank regulatory variables across the three categories of banks. To allow for this, regression 2 replaces each regulatory variable by a set of three interactions of the regulatory variable with dummies that flag a parent country bank, a borrower country bank, and a third country bank, respectively. In this regression, borrower country and third country dummies are included as well. Parent country * Capital regulation obtains a negative and significant coefficient, while Borrower country *

Capital regulation and Third country * Capital regulation are positive but insignificance. Thus, only the propensity of the parent bank to be chosen to originate the loan is negatively and significantly related to pertinent capital regulation stringency. Similarly, the estimated coefficients for the three interactions involving Overall activity restrictions suggest that activity restrictions only in the parent country have a discernible negative effect on local loan origination. In this regression, Credit rights is positive and significant, while unexpectedly Time to enforce contracts is positive and significant at 10%. The Borrower country and Third country dummies are estimated to be negative and significant, consistent with most loans being originated by parent banks.

Next, we estimate two conditional logit models as in column 1 separately for the time periods 1995-2005 and 2006-2014 analogously to Table 5, with the results provided in columns 3 and 4. The coefficient for Capital regulation is negative in both regressions, but only significant in regression 3. These results suggest that banks chose to originate loans in countries with less stringent capital regulation only in the first half of the sample period, which is consistent with the results from Table 5 that foreign subsidiary usage in loan provision at the bilateral level is positively related to parent country capital regulation only in the earlier period. In regression 3, Monitoring is estimated with a positive and significant coefficient, while Overall activity restrictions is negative and significant in regression 4.

To gain further insight into the time variation of the impact of capital regulation stringency on origination location, we also estimated a regression where we replaced the capital regulation variable as in regression 1 by a set of interaction terms of the capital regulation variable with year dummies (similarly, we replaced the other regulatory variables with sets of interactions with year dummies). The point estimates of the coefficients for the various interactions of Capital regulation with year dummies and the corresponding 95% confidence intervals are displayed in Figure 7. These point estimates are negative for the

years 1999-2007 (and significant at 5% for the years 2002, 2003, and 2005), consistent with capital regulatory arbitrage affecting loan origination decisions during the pre-crisis period. In contrast, from 2008 the estimated coefficients are positive (and significant at 5% for the years 2008-2010), consistent with banks preferring locations with more stringent capital regulations to originate their loans during and after the crisis. From a peak in 2008, the estimated coefficients are further shown to follow a downward trend towards values closer to zero in the years 2013-2014.

There are two main possible complementary explanations for the findings from Tables 5 and 6 of capital regulatory arbitrage only in the earlier part of the overall sample period. First, Figure 7 clearly suggests that the end of capital regulatory arbitrage was precipitated by the severity of the financial crisis in 2008. The financial crisis could have triggered losses to banks that hampered their capacity to extend new loans especially in the case of banking establishments located in countries with lax capital regulations, giving rise to a positive association between new loan origination and capital regulation stringency starting in 2008. Thus, the experience of the crisis could have disciplined bank managers to limit international regulatory arbitrage. Alternatively, the crisis could have led regulators to step up their efforts to prevent regulatory arbitrage. Consistent with this explanation, survey evidence suggests that enforcement of home-country regulations regarding banks' international operations were tightened after the global financial crisis.[22]

4. The determination of the lead bank

A lead bank performs key selection and monitoring functions within a loan syndicate. Specifically, the lead bank initially selects the potential borrower and negotiates key elements

[22] Regulations were tightened, for instance, in the areas of supervisory discretion and international information exchange with foreign supervisors. See IMF (2015) and World Bank (2019).

of a prospective loan agreement. Subsequently it recruits other participating banks to provide their share of the loan funding. After a loan agreement has entered into force, the lead bank monitors the borrower in the interests of the entire loan syndicate, and it administers the loan. In this section, we examine the impact of bank regulation on the choice of a lead bank among the banks that participate in a loan syndicate.

We estimate a relation as follows:

$$Lead_{i,j,k,t} = \alpha + \beta_0 \text{ Regulation (lender)}_{i,t} + \beta_1 \text{ X (lender)}_{i,t} + \theta_1 B_{i,t} + \Theta_2 \text{ Past relationship}_{i,j,t} + \eta_{k,t} + \varphi_{i,,t} + \varepsilon_{i,j,k,t} \quad (4)$$

in which $Lead_{i,j,k,t}$ is a dummy variable signalling that bank i is a lead bank in a loan to borrower j as part of loan facility k at time t. $B_{i,t}$ is a set of bank variables (Log assets, Log syndicated lending, Loans/deposits, and Equity/deposits).[23] $\text{Past relationship}_{i,j,t}$ is a dummy variable indicating whether the lender has provided a loan to the borrower before the pertinent loan. The basic regressions include facility fixed effects $\eta_{k,t,}$ and lender country fixed effects $\varphi_{i,,t}$. We report standard errors that are clustered at the banking group level. A negatively estimated β_0 suggests that stricter regulation makes it more difficult for a bank to assume a lead bank role. Stricter capital regulation could, for instance, discourage such a role, as the lead bank generally retains a relatively large share of the overall syndicated loan on the bank's own books

Table 7 reports the results of estimating (4). Regression 1 includes facility and lender country fixed effects. In regressions 2-4, we replace the lender country fixed effects by bank fixed effects, bank * borrower country fixed effects and bank * borrower company fixed effects, respectively. Columns 5-8 report the results of applying IV estimation to regressions

[23] The creditor rights variable is not included because of insufficient variation in this variable.

1-4. Capital regulation in the lender country enters negatively and significantly in the OLS regressions 2-3 and in the IV regressions 6-8. Stricter capital regulation thus discourages a lead bank role, consistent with regulatory arbitrage. Overall activity restrictions in the lender country are estimated with positive significant coefficients in the OLS regressions 1-3 and in the IV regressions 5 and 7, perhaps as a lead bank role can serve as a substitute for restricted non-bank activities. Greater supervisory power is estimated to make a lead bank role less likely given the negative significant coefficients in the OLS regression 3 and the corresponding IV regression 7, consistent with regulatory arbitrage. The rule of law variable obtains positive significant coefficients, as greater rule of law apparently facilitates a lead bank role. Among the bank level variables, larger size as measured by total assets or total syndicated lending, and lower loans-to-deposits and equity-to-assets ratios tend to be associated with a greater propensity to become the lead bank. The IV regression 5 fails the overidentification test, but IV regressions 6-8 pass the reported specification tests. Overall, Table 7 suggests that stricter capital regulation and greater supervisory power discourage a lead bank role consistent with regulatory arbitrage, while such a role is facilitated by a greater rule of law.

6. Conclusions

In this paper, we investigate how international regulatory and institutional differences affect lending in the cross-border syndicated loan market. The syndicated loan data enable us to see whether a multinational bank provides a cross-border loan directly from the parent bank or indirectly through a foreign subsidiary. Lending provided through a foreign subsidiary is subject to subsidiary-country regulation and institutional arrangements. International banks thus can engage in regulatory arbitrage by originating loans through

foreign subsidiaries located in countries with relatively lax regulation rather than through their parent banks.

We find evidence that international banks' usage of foreign subsidiaries is in part driven by international regulatory differences. In the case of loans aggregated at the borrower-country level, we find that stricter capital regulation in the borrower country negatively affects the share of loans provided through foreign subsidiaries. When considering syndicated loan data at the bilateral level, we find that the subsidiary loan share is positively related to capital regulatory stringency and the strength of official supervisory power in lender countries. In addition, we find that stricter capital regulation and greater supervisory power discourage a lead bank role in an international loan syndicate. These results suggest that international banks prefer to operate in locations with relatively lax bank regulation and supervision, consistent with regulatory arbitrage. In the case of loan provision, arbitrage of capital regulations is significant primarily during the pre-crisis years 1995-2005.

Consistent with these results, when examining a multinational bank's choice of the country of loan origination, we find that the propensity of loan origination in a country is negatively related to the stringency of its capital regulation, especially during the pre-crisis years. Specifically, when we estimate the impact of capital regulation stringency on loan origination location by year, we find evidence of regulatory arbitrage in each of the years 1999-2007, and none of the years 2008-2014. The disappearance of regulatory arbitrage after the onset of the financial crisis could reflect that bank establishments located in countries subject to lax capital regulations were unable to continue lending as before, or alternatively the tightening of regulatory enforcement after the crisis period.

In addition to regulation, we find that institutional quality strongly influences the location of bank activity. The foreign subsidiary share of loans at the borrower country level is positively associated with the strength of creditor rights and the speed of contract

enforcement in borrower countries. Using bilateral data, we also find that stronger creditor rights and speedier contract enforcement in borrower countries, and weaker monitoring incentives and slower contract enforcement in lender countries, lead to a higher foreign subsidiary share in syndicated loan origination. Furthermore, a bank's lead bank role in a loan syndicate is encouraged by a greater adherence to the rule of law. These results suggest that banks prefer to operate in countries with greater institutional quality and that countries that improve institutional quality could be rewarded by being able to attract additional international bank activity.

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Figure 1: Total volume of cross-border syndicated loans provided by banks

This graph shows the total US dollar value of syndicated loans of which the borrower and the parent bank of the lender are located in different countries in billions of US dollars. The graph excludes loans for which the exact loan allocation between lenders is not available.

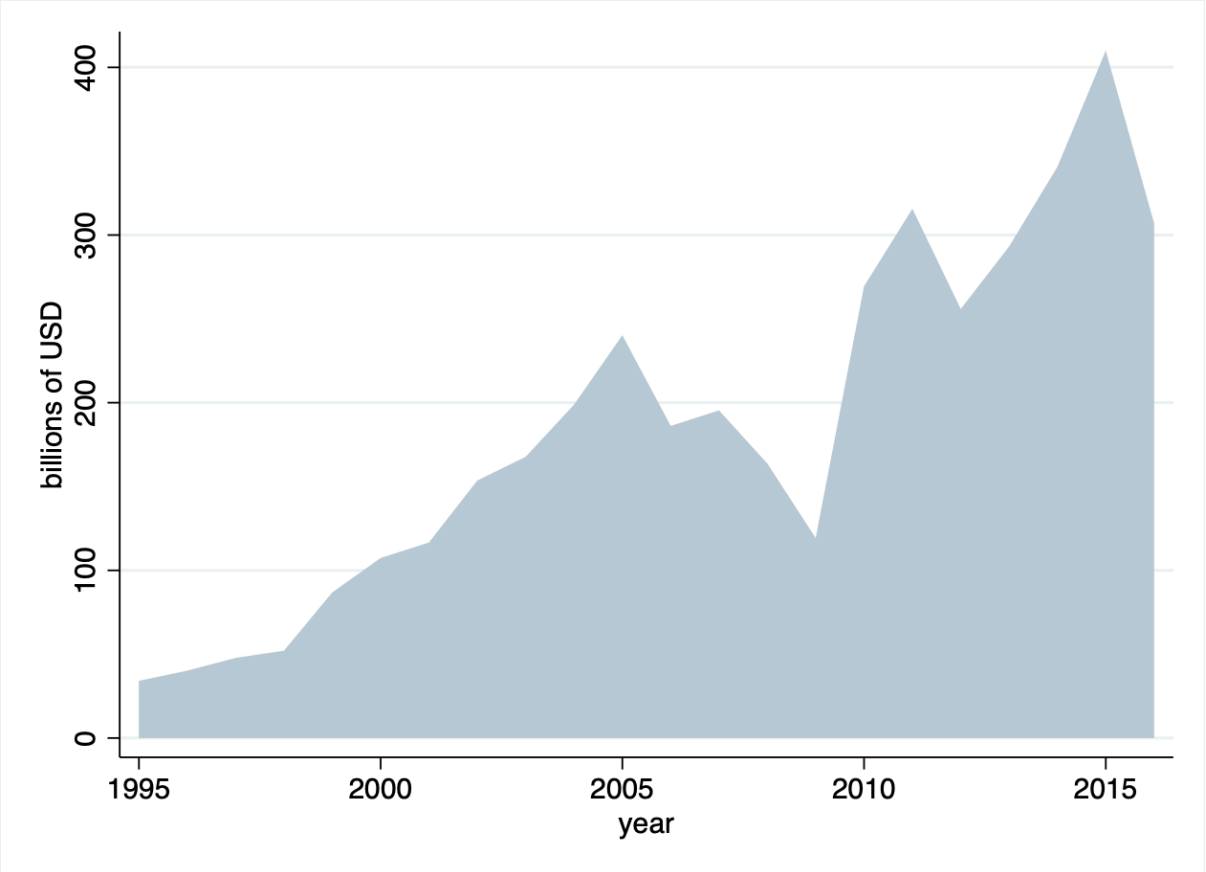

Figure 2: Fraction of cross-border syndicated loan volume provided by foreign bank subsidiaries

This graph shows the ratio of cross-border loan volume provided by foreign subsidiaries relative to the total volume of cross-border syndicated loans.

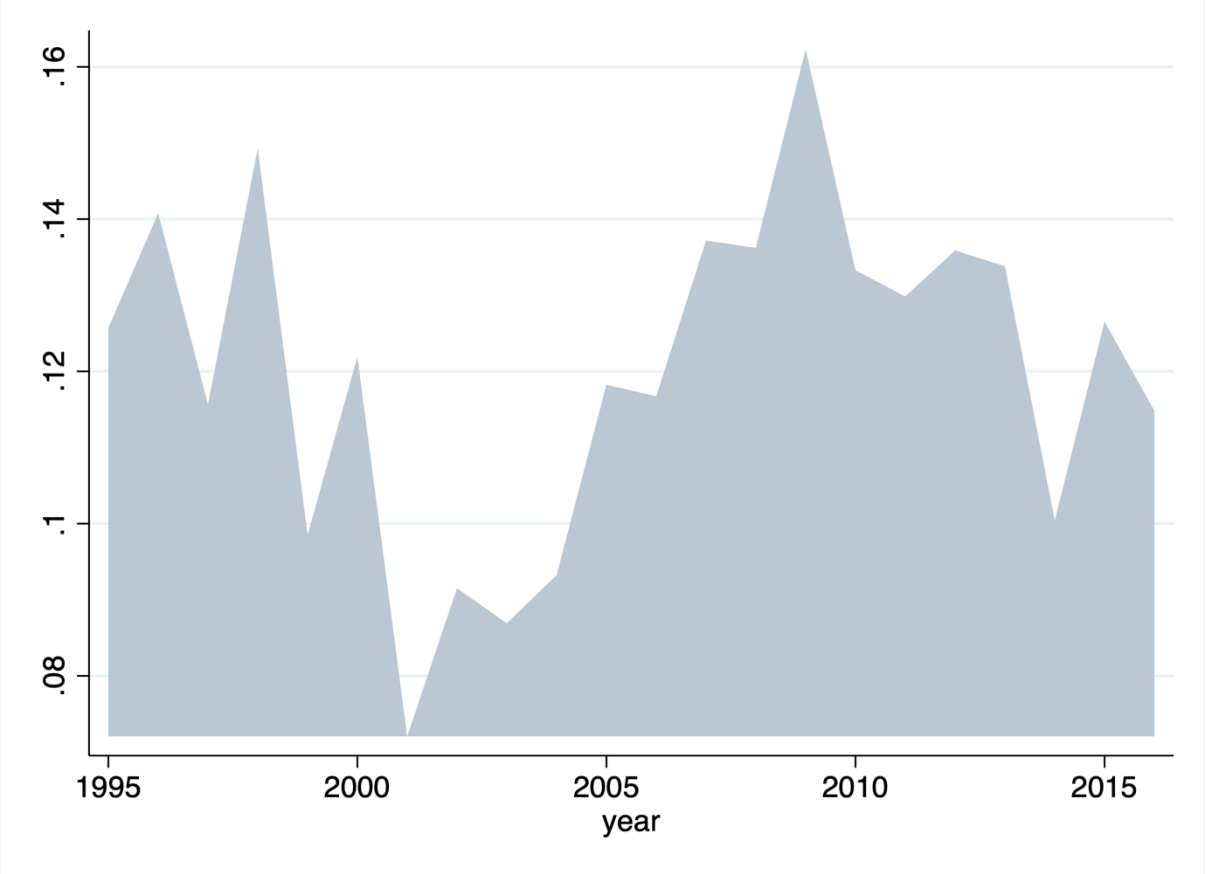

Figure 3: Fraction of "arbitraged" cross-border syndicated loan volume

This graph shows the volume of cross-border loans provided by foreign subsidiaries located in countries with less stringent capital regulation than in the parent bank's country divided by the total volume of cross-border syndicated loans.

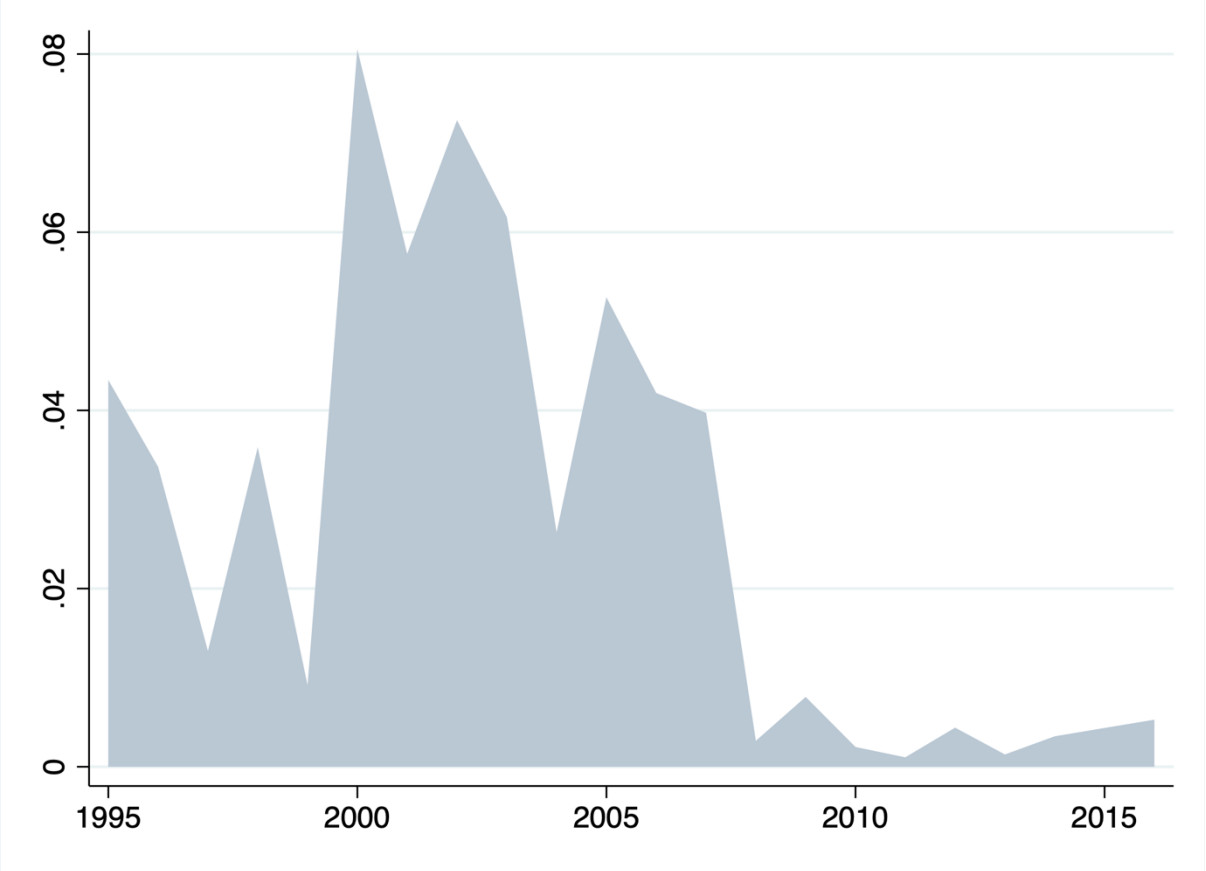

Figure 4: Mean, 10th and 90th percentile of the capital regulation index

This graph shows the mean value, and 10th and 90th percentiles of the capital regulation index for all countries in the World Bank Regulation and Supervision Survey.

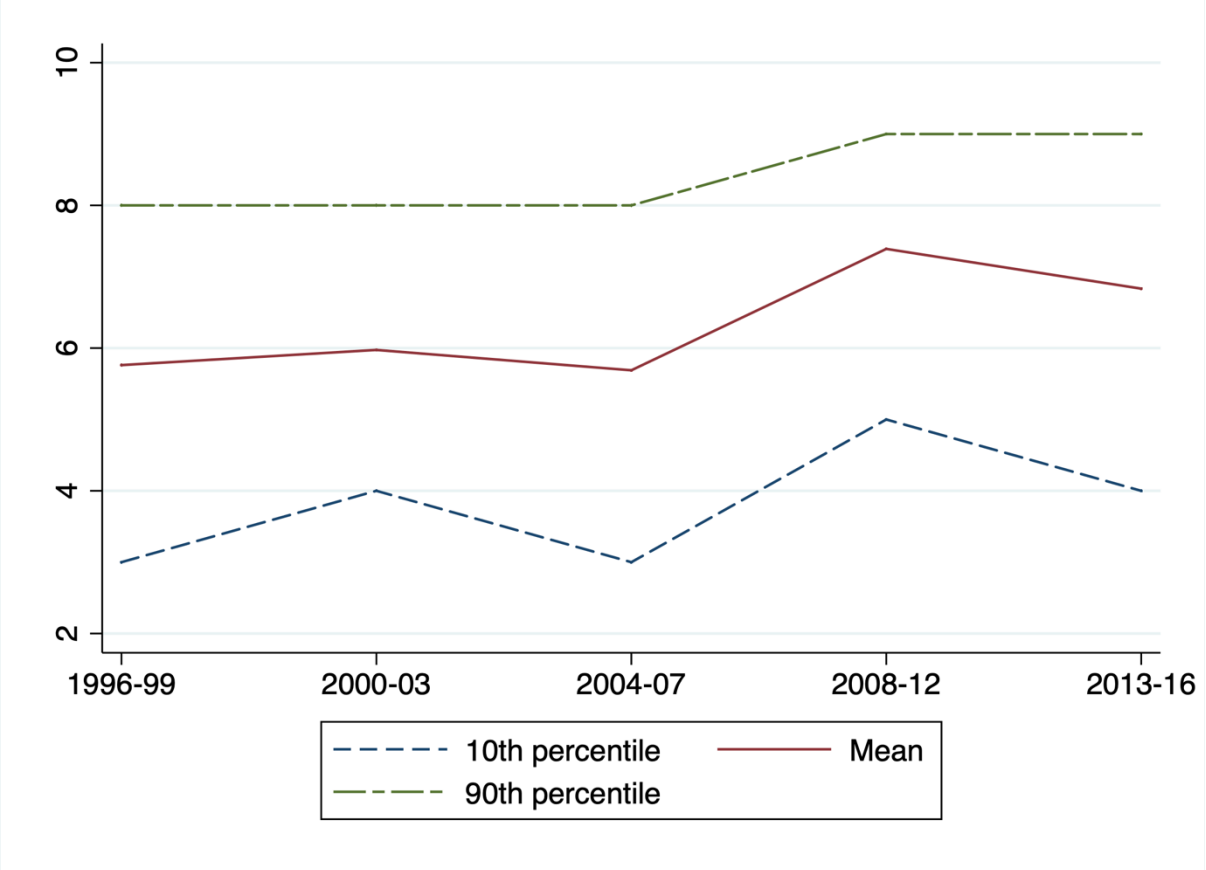

Figure 5: Fraction of "arbitraged" cross-border syndicated loan volume by subsidiaries located in borrower countries and third countries

This graph shows the volume of cross-border loans provided by foreign subsidiaries located in borrower (third) countries with less stringent capital regulation than in the parent bank's country divided by the total volume of cross-border syndicated loans provided by borrower-country (third-country) subsidiaries.

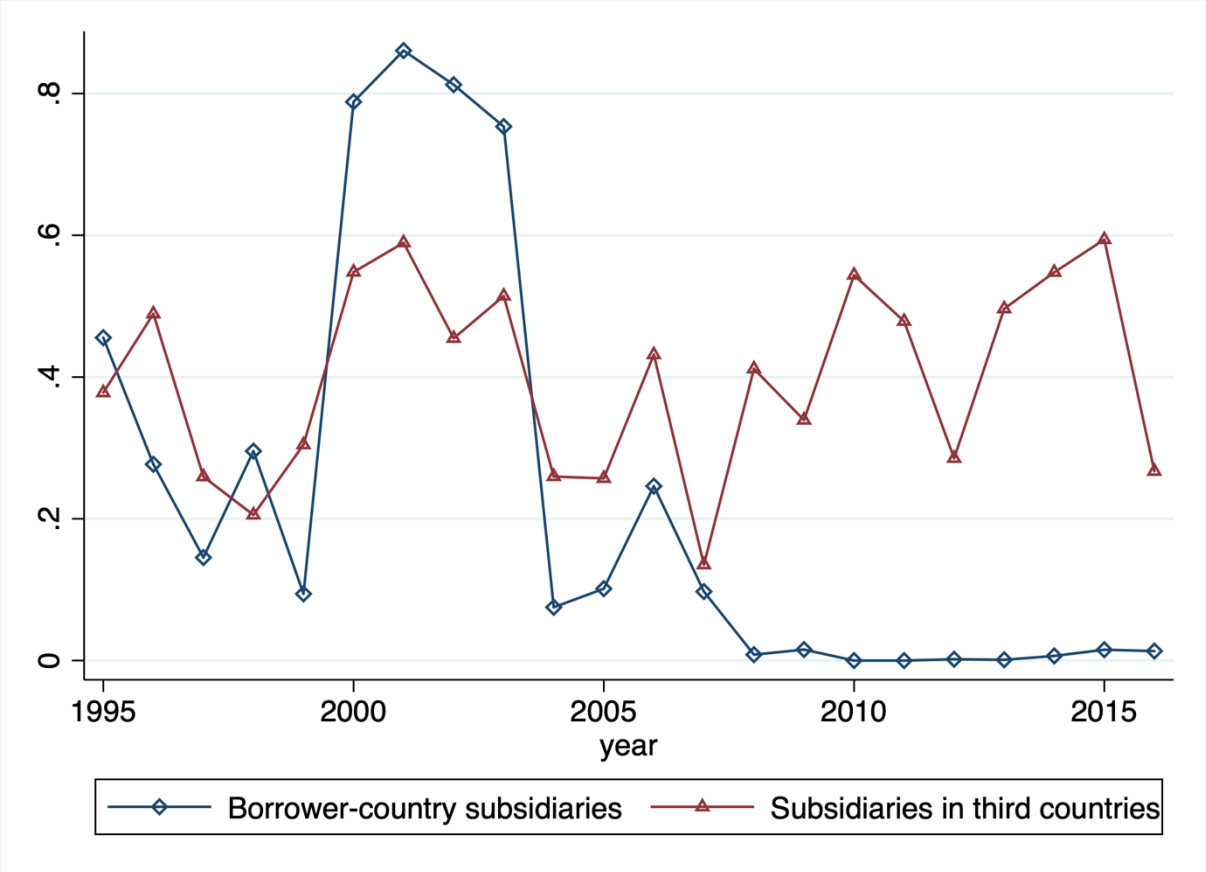

Figure 6: Fraction of cross-border syndicated loan volume to borrower countries with capital regulation less stringent than in the country of the lender's parent bank

This graph shows the volume of cross-border loans provided to borrowers located in countries with less stringent capital regulation than in the parent bank's country divided by the total volume of cross-border syndicated loans.

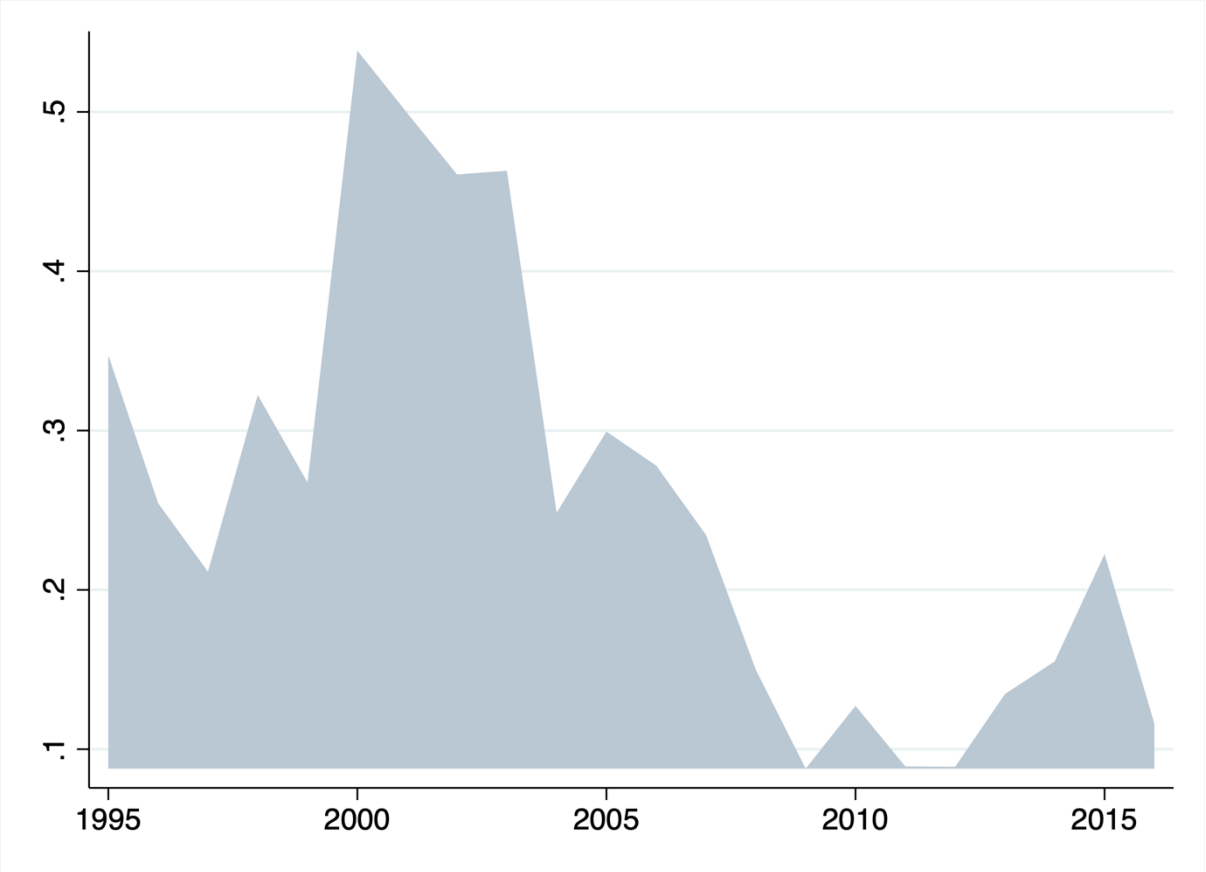

Figure 7: The effect of capital regulation on the location of loan origination by year

This graph shows point estimates and corresponding 95% confidence intervals of the coefficients of interactions of Capital regulation with a set of dummy variables indicating calendar years in which loans in the sample were originated. The regression is analogous to regression 1 in Table 7 except that it includes interactions of a set of year dummy variables separately with Capital regulation, Overall activity restrictions, Official supervisory power, and Monitoring. The horizontal axis shows the year of the loan origination. See Table A1 in the Appendix for variable definitions.

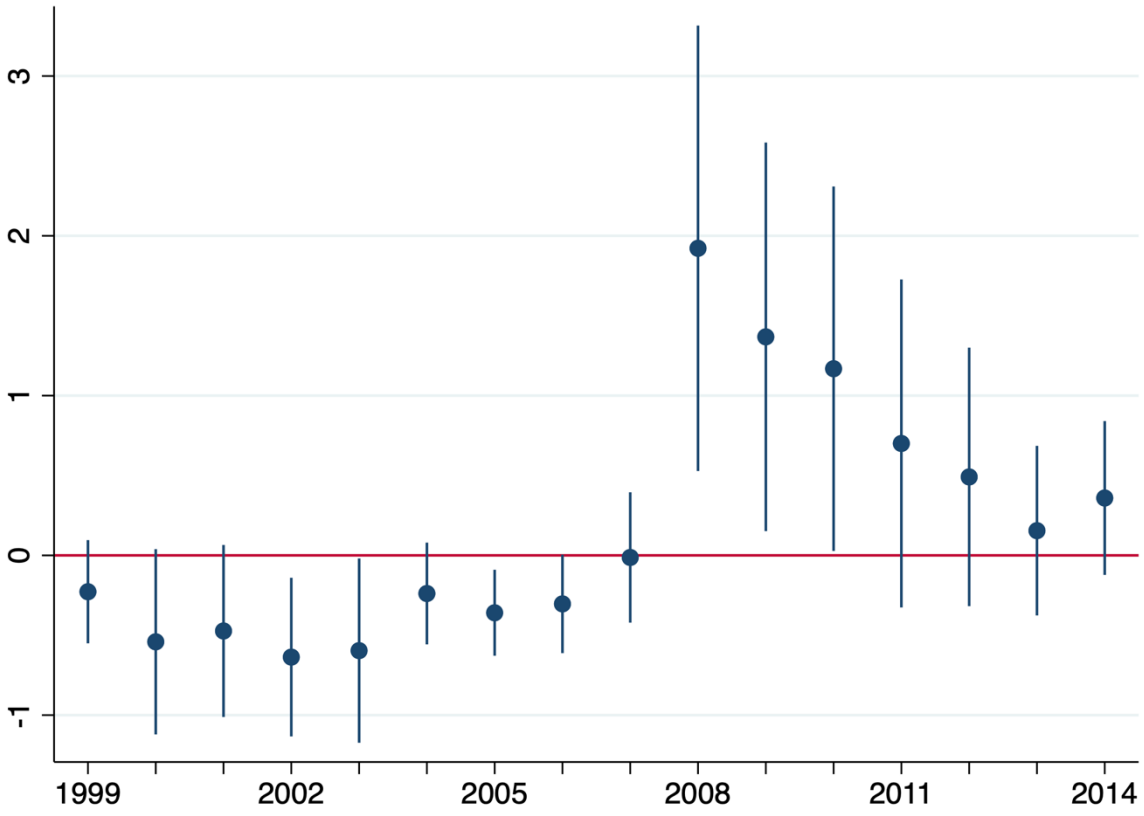

Table 1: Descriptive statistics

Volume is the value of all cross-border syndicated loans in billions of US dollars. Log(Volume +1) and Arsinh(Volume) are transformations of the loan volume using the natural logarithm and the inverse hyperbolic sine functions, respectively. Foreign subsidiary/total volume is the ratio of the US dollar value of syndicated loans provided by foreign subsidiaries relative to the US dollar value of all syndicated loans. Borrower-country subsidiary/total volume is the ratio of the US dollar value of syndicated loans provided by foreign subsidiaries located in the borrower's country relative to the US dollar value of all syndicated loans. Third-country subsidiary/total volume is the ratio of the US dollar value of syndicated loans provided by foreign subsidiaries located in a third country relative to the US dollar value of all syndicated loans. Loan volumes are aggregated at the borrower country level in Panel A and at the borrower country-lender country level in Panel B. In Panel A the sample and variables correspond to the regressions in Table 3. In Panel B the sample and variables correspond to the regressions in Table 4. Lead is a dummy variable indicating lead arranger role in a syndicated loan. In Panel C the sample and variables correspond to the regressions in Table 6. See Table A1 in the Appendix for variable definitions of the regulatory, institutional and control variables that are included in the various regression tables.

Panel A	Observations	Mean	SD	Min	Max
Volume	1440	2,604	13,512	0	192,890
Log(Volume + 1)	1440	11.99	9.926	0	25.99
Arsinh(Volume)	1440	12.41	10.26	0	26.68
Foreign subsidiary/total volume	866	0.0952	0.173	0	1
Borrower-country subsidiary/total volume	866	0.0179	0.0798	0	1
Third-country subsidiary/total volume	866	0.0774	0.159	0	1
Capital regulation (borrower)	1440	6.333	1.938	1	10
Overall activity restrictions (borrower)	1440	7.121	2.001	3	12
Official supervisory power (borrower)	1440	11.00	2.324	4	16
Monitoring (borrower)	1440	7.717	1.627	3	11
Creditor rights (borrower)	1440	1.913	1.102	0	4
Information sharing (borrower)	1440	3.496	2.234	0	6
Time to enforce contracts (borrower)	1440	628.8	304.0	120	1580
Rule of law (borrower)	1440	0.406	0.957	-1.690	2.100
Log real GDP/capita (borrower)	1440	9.137	1.350	5.386	11.43
Log population (borrower)	1440	16.78	1.422	14.31	21.04

Panel B	Observations	Mean	SD	Min	Max
Volume	4991	352	1,811	0	32,183
Log(Volume + 1)	4991	7.902	9.266	0	24.19
Arsinh(Volume)	4991	8.198	9.605	0	24.89
Foreign subsidiary/total volume	2127	0.0955	0.239	0	1
Borrower-country subsidiary/total volume	2127	0.0208	0.103	0	1
Third-country subsidiary/total volume	2127	0.0747	0.221	0	1
Capital regulation (borrower)	4991	6.096	1.860	2	10
Capital regulation (lender)	4991	6.538	1.387	3	9
Overall activity restrictions (borrower)	4991	7.158	1.939	3	12
Overall activity restrictions (lender)	4991	6.028	1.952	3	10
Official supervisory power (borrower)	4991	11.00	2.473	4	16
Official supervisory power (lender)	4991	10.13	2.332	5.385	14.50
Monitoring (borrower)	4991	8.200	1.390	4	11
Monitoring (lender)	4991	8.732	1.421	6	11
Creditor rights (borrower)	4991	1.937	1.038	0	4
Information sharing (borrower)	4991	3.857	2.026	0	6
Time to enforce contracts (borrower)	4991	612.0	307.8	120	1510
Time to enforce contracts (lender)	4991	421.2	79.25	120	570
Concentration (borrower)	4991	76.31	17.69	23.18	100
Government bank ownership (borrower)	4991	16.75	20.71	0	95.78
Rule of law (borrower)	4991	0.615	0.962	-1.676	2.014
Rule of law (lender)	4991	1.603	0.192	1.065	1.983
Log real GDP/capita (borrower)	4991	9.478	1.204	5.683	11.43
Log real GDP/capita (lender)	4991	10.68	0.207	10.25	11.43
Log population (borrower)	4991	16.99	1.456	14.42	21.00
Log population (lender)	4991	17.78	1.132	15.23	19.56
Log distance	4991	8.417	1.037	5.162	9.851
Common spoken language	4991	0.305	0.293	0	1.000

Panel C	Observations	Mean	SD	Min	Max
Lead	149416	0.427	0.495	0	1
Capital regulation (lender)	149416	6.545	1.596	3	10
Overall activity restrictions (lender)	149416	5.835	1.819	3	10
Official supervisory power (lender)	149416	10.42	2.094	5.385	14.50
Monitoring (lender)	149416	8.073	1.774	5	11
Information sharing (lender)	149416	5.322	0.827	3	6
Time to enforce contracts (lender)	149416	442.8	88.99	120	830
Rule of law (lender)	149416	1.605	0.195	0.902	1.923
Log real GDP/capita (lender)	149416	10.66	0.124	10.25	10.93
Log population (lender)	149416	18.06	0.844	15.23	19.59
Log assets	149416	13.63	0.834	7.685	14.90
Log syndicated lending	149416	22.52	2.193	0	24.75
Loans/deposits	149416	0.902	0.741	0.0613	12.10
Equity/assets	149416	0.0497	0.0212	0.0179	0.149
Past relationship	149416	0.436	0.496	0	1

Table 2: Means of regulatory variables for loans originated by foreign subsidiaries and parent banks

Panels A to D show the means of Capital regulation, Activity restrictions, Official supervisory power and Monitoring, respectively, for loans provided by foreign subsidiaries in borrower countries, foreign subsidiaries in third countries, and parent banks. See Table A1 in the Appendix for variable definitions. In all panels column 1 shows the sample period for which means are calculated. Columns 2, 4, and 6 (3, 5, 7) show the sample means of the pertinent regulatory variables for (number of) loans provided by foreign subsidiaries in borrower countries, foreign subsidiaries in third countries, and parent banks. Columns 8, 9 and 10 show differences between means shown in columns 2 and 6, 4 and 6; and 4 and 2, respectively. *, **, and *** denote significance at 10%, 5%, and 1%.

Panel A

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							Difference of means		
Period	Mean of Capital regulation in borrower countries	Number of borrower-country loans	Mean of Capital regulation in third countries	Number of third-country loans	Mean of Capital regulation in lender countries	Number of lender-country loans	Borrower-country and lender-country loans (2) - (6)	Third-country and lender-country loans (4) - (6)	Third-country and borrower-country loans (4) - (2)
All years	7.803	13650	6.74	4952	6.526	130495	1.277***	0.214***	-1.063***
1996-2005	5.9476	4733	6.04193	2181	6.036	59148	-0.0884***	0.00593	0.0943***
2006-2016	8.789	8917	7.291	2771	6.933	71347	1.856***	0.358***	-1.499***

Panel B

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							Difference of means		
Period	Mean of Activity restrictions in borrower countries	Number of borrower-country loans	Mean of Activity restrictions in third countries	Number of third-country loans	Mean of Activity restrictions in lender countries	Number of lender-country loans	Borrower-country and lender-country loans (2) - (6)	Third-country and lender-country loans (4) - (6)	Third-country and borrower-country loans (4) - (2)
All years	7.582	13757	5.521	5163	5.888	130495	1.694***	-0.367***	-2.061***
1996-2005	7.627	4840	5.517	2392	5.668	59148	1.959***	-0.151***	-2.110***
2006-2016	7.559	8917	5.525	2771	6.071	71347	1.488***	-0.546***	-2.034***

Panel C

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							Difference of means		
Period	Mean of Official supervisory power in borrower countries	Number of borrower-country loans	Mean of Official supervisory power in third countries	Number of third-country loans	Mean of Official supervisory power in lender countries	Number of lender-country loans	Borrower-country and lender-country loans (2) - (6)	Third-country and lender-country loans (4) - (6)	Third-country and borrower-country loans (4) - (2)
All years	12.389	13748	11.13	5106	10.45	130495	1.939***	0.680***	-1.259***
1996-2005	12.894	4840	11.145	2392	9.949	59148	2.945***	1.196***	-1.748***
2006-2016	12.118	8908	11.121	2714	10.87	71347	1.248***	0.251***	-0.997***

Panel D

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
							Difference of means		
Period	Mean of Monitoring in borrower countries	Number of borrower-country loans	Mean of Monitoring in third countries	Number of third-country loans	Mean of Monitoring in lender countries	Number of lender-country loans	Borrower-country and lender-country loans (2) - (6)	Third-country and lender-country loans (4) - (6)	Third-country and borrower-country loans (4) - (2)
All years	8.278	13650	8.805	4952	8.063	130495	0.215***	0.742***	0.527***
1996-2005	9.753	4733	9.664	2181	8.61	59148	1.143***	1.054***	-0.0895***
2006-2016	7.495	8917	8.129	2771	7.609	71347	-0.114***	0.520***	0.634***

Table 3: Syndicated loan volume at the borrower country level

In regression 1 the dependent variable is the natural logarithm of the dollar value of loans plus 1. In regressions 2 and 3 the dependent variable is the dollar value of loans transformed using the inverse hyperbolic sine function. Regressions 1 and 2 are OLS regressions, and regression 3 is a Tobit regression. In regressions 4 and 7 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries to the dollar value of all loans. In regressions 5 and 8 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in the borrower's country to the dollar value of all loans. In regressions 6 and 9 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in a country different from the borrower's and the parent bank's country to the dollar value of all loans. Regressions 4-6 are OLS regressions. In regressions 7 to 9 regulatory variables are instrumented by their sample means excluding the pertinent country, a dummy variable indicating that the central bank supervises banks for prudential purposes, and the 5-year moving average of the Gini coefficient measuring income inequality in the borrower country. Detailed variable definitions can be found in Table A1 in the Appendix. Variables are for borrowing countries. The sample period is 1995-2016. Borrower country and time fixed effects are included. In all regressions except for regression 3 standard errors are clustered at the borrower country level. *, **, and *** denote significance at 10%, 5%, and 1%.

	OLS		Tobit	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log(Volume + 1)	Arsinh(Volume)	Arsinh(Volume)	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume
Capital regulation (borrower)	-0.0365	-0.0383	-0.0968	-0.00302	0.00137	-0.00439	-0.00686*	-0.000260	-0.00660*
	(-0.22)	(-0.22)	(-0.52)	(-0.88)	(0.74)	(-1.30)	(-1.82)	(-0.20)	(-1.87)
Overall activity restrictions (borrower)	-0.112	-0.114	0.00505	0.00658	0.00623	0.000353	0.00281	0.000621	0.00219
	(-0.72)	(-0.71)	(0.02)	(1.01)	(1.25)	(0.06)	(0.53)	(0.44)	(0.42)
Official supervisory power (borrower)	-0.0210	-0.0224	-0.0353	-0.00674*	-0.00200	-0.00474	-0.00592	-0.00232	-0.00360
	(-0.17)	(-0.17)	(-0.21)	(-1.69)	(-0.86)	(-1.43)	(-1.52)	(-1.12)	(-1.12)
Monitoring (borrower)	0.330*	0.340*	0.468*	0.0108*	0.00936*	0.00141	0.0104	0.00878	0.00159
	(1.74)	(1.74)	(1.75)	(1.70)	(1.81)	(0.27)	(1.47)	(1.62)	(0.27)
Creditor rights (borrower)	0.679	0.711	-0.182	0.305**	0.177	0.128	0.272***	0.00717	0.265***
	(0.54)	(0.55)	(-0.25)	(2.48)	(1.22)	(1.66)	(3.55)	(0.44)	(3.45)

Information sharing (borrower)	-0.657**	-0.678**	-0.698**	0.000646	0.00240	-0.00176	0.000368	0.00231	-0.00194
	(-2.58)	(-2.57)	(-2.53)	(0.06)	(0.88)	(-0.18)	(0.04)	(0.80)	(-0.20)
Time to enforce contracts (borrower)	-0.00122	-0.00125	-0.00316	-0.000103*	-0.0000306	-0.0000724	-0.000116*	-0.0000226	-0.0000935
	(-0.31)	(-0.31)	(-1.22)	(-1.68)	(-1.06)	(-1.19)	(-1.95)	(-0.96)	(-1.50)
Rule of law (borrower)	3.477**	3.607**	4.233***	0.0394	-0.0538	0.0932**	0.0510	-0.0316	0.0826*
	(2.25)	(2.25)	(3.59)	(0.78)	(-1.59)	(2.08)	(1.14)	(-1.16)	(2.00)
Log real GDP/capita (borrower)	8.071***	8.351***	5.463***	-0.159**	0.0186	-0.177***	-0.201***	0.00334	-0.204***
	(3.09)	(3.08)	(5.84)	(-2.21)	(0.66)	(-2.87)	(-2.89)	(0.16)	(-3.23)
Log population (borrower)	9.320**	9.692**	6.238***	-0.427***	-0.0610	-0.366**	-0.482***	-0.112	-0.370**
	(2.36)	(2.36)	(10.11)	(-2.69)	(-0.62)	(-2.55)	(-3.24)	(-1.60)	(-2.63)
Observations	1440	1440	1440	866	866	866	790	790	790
Adjusted R-squared	0.629	0.626		0.257	0.404	0.206	0.170	0.374	0.148
Overid. test (p value)	-	-	-	-	-	-	0.953	0.221	0.568
Underid. test (p value)	-	-	-	-	-	-	0.000	0.000	0.000

Table 4: Bilateral syndicated loan volumes

In regression 1 the dependent variable is the natural logarithm of the dollar value of loans plus 1. In regressions 2 and 3 the dependent variable is the dollar value of loans transformed using the inverse hyperbolic sine function. Regressions 1 to 2 are OLS regressions, and regression 3 is a Tobit regression. In regressions 4 and 7 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries to the dollar value of all loans. In regressions 5 and 8 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in the borrower's country to the dollar value of all loans. In regressions 6 and 9 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in a country different from the borrower's and the parent bank's country to the dollar value of all loans. Regressions 4-6 are OLS regressions. In regressions 7 to 9 regulatory variables are instrumented by their sample means excluding the pertinent country, a dummy variable indicating that the central bank supervises banks for prudential purposes, and the 5-year moving average of the Gini coefficient measuring income inequality in the borrower country. Log real GDP/capita (borrower, lender) and Log population (borrower, lender) are included but not reported. Detailed variable definitions can be found in Table A1 in the Appendix. The sample period is 1995-2016. Borrower country, lender country and time fixed effects are included. In all regressions except for regression 3 standard errors are clustered at the borrower country level. *, **, and *** denote significance at 10%, 5%, and 1%.

	OLS		Tobit	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Log(Volume + 1)	Arsinh(Volume)	Arsinh(Volume)	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume
Capital regulation (borrower)	0.114	0.118	0.0844	-0.000974	0.00296	-0.00394	-0.00148	0.00222	-0.00369
	(0.83)	(0.83)	(0.48)	(-0.23)	(1.48)	(-0.90)	(-0.28)	(1.34)	(-0.74)
Capital regulation (lender)	-1.008***	-1.043***	-1.398***	0.0281***	0.00369	0.0244***	0.0294***	0.00345	0.0260***
	(-5.88)	(-5.88)	(-4.51)	(3.00)	(1.03)	(2.72)	(2.93)	(0.92)	(2.70)
Overall activity restrictions (borrower)	-0.340**	-0.351**	-0.269	0.00499	0.00624	-0.00125	0.00391	0.00210	0.00181
	(-2.07)	(-2.06)	(-1.29)	(0.73)	(1.12)	(-0.22)	(0.51)	(0.51)	(0.27)
Overall activity restrictions (lender)	1.382***	1.433***	1.410***	0.00835	-0.00179	0.0101	0.0103	-0.00186	0.0122
	(6.53)	(6.55)	(5.14)	(0.68)	(-0.25)	(1.06)	(0.63)	(-0.22)	(0.86)
Official supervisory power (borrower)	-0.0644	-0.0678	0.0739	-0.00190	-0.00302	0.00112	0.0000700	-0.00273	0.00280
	(-0.64)	(-0.65)	(0.50)	(-0.55)	(-1.43)	(0.31)	(0.02)	(-1.42)	(0.65)
Official supervisory power (lender)	-0.136	-0.141	-0.166	0.0115*	-0.00498*	0.0165***	0.00971	-0.00467	0.0144***
	(-1.39)	(-1.39)	(-0.85)	(1.88)	(-1.79)	(3.42)	(1.50)	(-1.46)	(2.81)

Monitoring (borrower)	0.509**	0.526**	1.187***	0.00912	0.00875	0.000372	0.00825	0.00864	-0.000384
	(2.08)	(2.08)	(4.73)	(1.16)	(1.33)	(0.08)	(0.93)	(1.17)	(-0.08)
Monitoring (lender)	0.373**	0.387**	0.959***	-0.0218**	0.00215	-0.0240***	-0.0198	0.00463	-0.0244***
	(2.06)	(2.06)	(3.20)	(-2.06)	(0.28)	(-3.50)	(-1.64)	(0.54)	(-3.11)
Creditor rights (borrower)	1.113	1.141	0.990**	0.185**	0.102	0.0824**	0.153***	-0.00545	0.159***
	(0.54)	(0.53)	(2.10)	(2.54)	(1.23)	(2.11)	(3.59)	(-0.31)	(3.68)
Information sharing (borrower)	-0.470	-0.489	0.363	0.00985	0.00806	0.00179	0.0135	0.00569	0.00776
	(-1.21)	(-1.22)	(1.32)	(0.65)	(1.31)	(0.12)	(0.76)	(1.32)	(0.45)
Time to enforce contracts (borrower)	0.000317	0.000298	-0.00419**	-0.000544***	-0.000140	-0.000404**	-0.000563**	-0.0000600	-0.000503**
	(0.06)	(0.05)	(-2.33)	(-3.04)	(-1.35)	(-2.15)	(-2.65)	(-0.58)	(-2.38)
Time to enforce contracts (lender)	0.00575	0.00561	0.00996	0.00766***	0.00244	0.00521***	0.0118**	0.000846	0.0110***
	(0.19)	(0.18)	(1.54)	(4.17)	(1.26)	(4.24)	(2.36)	(0.19)	(3.36)
Concentration (borrower)	0.0321	0.0336	0.0711***	-0.000455	0.000367	-0.000822	-0.000640	0.000180	-0.000820
	(1.13)	(1.14)	(2.94)	(-0.58)	(0.67)	(-1.20)	(-0.79)	(0.37)	(-1.16)
Government bank ownership (borrower)	-0.0114	-0.0120	-0.0869***	0.000541	0.0000307	0.000510	0.000103	0.000349	-0.000245
	(-0.41)	(-0.42)	(-3.31)	(0.32)	(0.06)	(0.31)	(0.06)	(0.91)	(-0.15)
Rule of law (borrower)	2.473*	2.573*	3.809***	0.0226	-0.0345	0.0571	0.0260	-0.0111	0.0370
	(1.67)	(1.68)	(4.16)	(0.50)	(-1.45)	(1.29)	(0.50)	(-0.45)	(0.76)
Rule of law (lender)	-18.61***	-19.32***	-1.243	-0.0587	-0.00835	-0.0503	-0.0640	-0.00238	-0.0616
	(-9.13)	(-9.13)	(-0.38)	(-0.51)	(-0.36)	(-0.46)	(-0.53)	(-0.09)	(-0.52)
Log distance	-1.262***	-1.303***	-1.709***	-0.00668	-0.00143	-0.00524	-0.00360	-0.000824	-0.00278
	(-5.06)	(-5.05)	(-3.11)	(-0.80)	(-0.33)	(-0.67)	(-0.40)	(-0.18)	(-0.34)
Common spoken language	3.365***	3.486***	4.383**	-0.0261	0.0329	-0.0591	-0.0259	0.0330	-0.0589
	(3.16)	(3.17)	(1.96)	(-0.49)	(1.02)	(-1.65)	(-0.42)	(0.88)	(-1.41)

Observations	4991	4991	4994	2122	2122	2122	1907	1907	1907
Adjusted R-squared	0.399	0.398		0.111	0.234	0.111	0.098	0.226	0.105
Overid. test (p value)	-	-	-	-	-	-	0.835	0.241	0.568
Underid. test (p value)	-	-	-	-	-	-	0.000	0.000	0.000

Table 5: Bilateral syndicated loan volumes in 1995-2005 and 2006-2016

In regressions 1, 4, 7 and 10 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries to the dollar value of all loans. In regressions 2, 5, 8 and 11 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in the borrower's country to the dollar value of all loans. In regressions 3, 6, 9 and 12 the dependent variable is the ratio of the dollar value of loans provided by subsidiaries located in a country different from the borrower's and the parent bank's country to the dollar value of all loans. Regressions 1 to 3 and 7 to 9 are OLS regressions. In regressions 4 to 6 and 10 to 12 regulatory variables are instrumented by their sample means excluding the pertinent country, a dummy variable indicating that the central bank supervises banks for prudential purposes, and the 5-year moving average of the Gini coefficient measuring income inequality in the borrower country. Other variables are included as in Table 4 but not reported. Detailed variable definitions can be found in Table A1 in the Appendix. In regressions 1 to 6 the sample period is 1995-2005. In regressions 7 to 12 the sample period is 2006-2016. Borrower country, lender country and time fixed effects are included. In all regressions standard errors are clustered at the borrower country level. *, **, and *** denote significance at 10%, 5%, and 1%.

	Sample period: 1995 - 2005						Sample period: 2006 - 2016					
	OLS			IV			OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume	Foreign subsidiary/ total volume	Borrower-country subsidiary/ total volume	Third-country subsidiary/ total volume
Capital regulation (borrower)	0.00308	0.00439	-0.00131	-0.000440	0.00585	-0.00629	0.00331	-0.00105	0.00435	0.0145	-0.000812	0.0153
	(0.50)	(1.06)	(-0.24)	(-0.06)	(1.60)	(-0.92)	(0.42)	(-0.38)	(0.53)	(1.37)	(-0.27)	(1.37)
Capital regulation (lender)	0.0493***	0.00952	0.0397***	0.0329**	0.00768	0.0252**	-0.0568	0.00120	-0.0580	-0.0552	-0.00200	-0.0532
	(4.50)	(1.67)	(3.95)	(2.65)	(1.53)	(2.16)	(-1.59)	(0.22)	(-1.65)	(-1.52)	(-0.30)	(-1.49)
Overall activity restrictions (borrower)	0.000492	0.0140	-0.0135*	-0.0125	-0.00174	-0.0108	-0.00174	0.00560	-0.00734	-0.00211	0.00793	-0.0100
	(0.04)	(1.22)	(-1.80)	(-1.17)	(-0.24)	(-1.03)	(-0.19)	(1.33)	(-0.79)	(-0.19)	(1.26)	(-0.87)
Overall activity restrictions (lender)	0.0122	-0.00453	0.0168	0.0368*	-0.00360	0.0404**	-0.114***	-0.00417	-0.110***	-0.106**	0.00648	-0.112**
	(0.80)	(-0.49)	(1.46)	(1.76)	(-0.40)	(2.19)	(-2.99)	(-0.63)	(-3.00)	(-2.29)	(0.71)	(-2.60)
Official supervisory power (borrower)	0.00200	0.000328	0.00167	0.00646	-0.000115	0.00657	-0.00961	-0.00671	-0.00290	-0.0153*	-0.00807	-0.00727
	(0.34)	(0.12)	(0.29)	(0.77)	(-0.04)	(0.84)	(-1.19)	(-1.51)	(-0.38)	(-1.70)	(-1.58)	(-0.81)
Official supervisory power (lender)	0.0164**	-0.00137	0.0177***	0.00639	-0.00333	0.00971	0.0307**	-0.00125	0.0319**	0.0339**	0.000419	0.0335**
	(2.35)	(-0.46)	(3.06)	(0.67)	(-0.78)	(1.23)	(2.55)	(-0.60)	(2.65)	(2.67)	(0.18)	(2.64)
Monitoring	0.00594	0.00588	0.0000608	-0.00118	0.00143	-0.00261	0.00160	0.00107	0.000526	0.0115	0.00200	0.00946

(borrower)	(0.71)	(0.66)	(0.01)	(-0.13)	(0.16)	(-0.45)	(0.14)	(0.47)	(0.04)	(0.88)	(0.62)	(0.69)
Monitoring	-0.0239*	-0.00141	-0.0225**	-0.000459	0.00493	-0.00539	-0.0217	0.00537*	-0.0271	-0.0299	0.00210	-0.0320*
(lender)	(-1.92)	(-0.16)	(-2.63)	(-0.03)	(0.45)	(-0.42)	(-1.31)	(1.75)	(-1.67)	(-1.62)	(0.83)	(-1.79)
Observations	1311	1311	1311	1163	1163	1163	809	809	809	739	739	739
Adjusted R-squared	0.150	0.301	0.136	0.145	0.295	0.135	0.096	0.166	0.104	0.090	0.178	0.101
Overid. test (p value)	-	-	-	0.218	0.150	0.374	-	-	-	0.332	0.363	0.166
Underid. test (p value)	-	-	-	0.000	0.000	0.000	-	-	-	0.001	0.001	0.001

Table 6: Determinants of the location of loan origination

The dependent variable is a dummy variable indicating that a country harbouring a subsidiary or parent bank is chosen as the bank origination location. The estimation implements a conditional logit model. Observations are grouped together at the loan-banking group level. Independent variables capture characteristics of possible location alternatives. Detailed variable definitions can be found in Table A1 in the Appendix. In regressions 1 and 2 the sample period is 1999-2014. In regression 3 the sample period is 1999-2005. In regression 4 the sample period is 2006-2014. Standard errors are clustered at the banking group level. *, **, and *** denote significance at 10%, 5%, and 1%.

	Full sample		Sample period: 1999 - 2005	Sample period: 2006 - 2014
	(1)	(2)	(3)	(4)
Capital regulation	-0.119**		-0.384***	-0.0512
	(-2.29)		(-5.12)	(-0.72)
Parent country * Capital regulation		-0.166*		
		(-1.77)		
Borrower country * Capital regulation		0.0480		
		(0.53)		
Third country * Capital regulation		0.116		
		(0.47)		
Overall activity restrictions	-0.223		0.118	-0.176**
	(-1.54)		(1.01)	(-2.02)
Parent country * Overall activity restrictions		-0.274**		
		(-2.12)		
Borrower country * Overall activity restrictions		0.0543		
		(0.28)		
Third country * Overall activity restrictions		-0.0292		
		(-0.14)		
Official supervisory power	-0.000188		-0.0742	0.0843
	(-0.00)		(-0.86)	(1.09)
Parent country * Official supervisory power		0.0419		
		(0.37)		
Borrower country * Official supervisory power		-0.0446		
		(-0.54)		
Third country * Official supervisory power		0.0443		
		(0.70)		
Monitoring	-0.0814		0.269**	-0.205
	(-0.70)		(2.04)	(-1.60)
Parent country * Monitoring		-0.198		
		(-1.60)		
Borrower country * Monitoring		-0.0841		

		(-0.83)		
Third country * Monitoring		-0.0659		
		(-0.46)		
Creditor rights	0.174	0.342*	0.00928	0.300
	(0.84)	(1.86)	(0.08)	(1.13)
Information sharing	-0.608**	-0.899***	-0.293	-0.705**
	(-2.31)	(-3.90)	(-1.38)	(-2.41)
Time to enforce contracts	0.00533	0.00419*	-0.00418	0.00703***
	(1.52)	(1.70)	(-1.09)	(2.85)
Rule of law	4.324***	3.875***	3.713**	4.168***
	(3.27)	(3.88)	(2.13)	(3.06)
Log real GDP/capita	5.474***	5.262***	1.288	7.379***
	(3.31)	(2.63)	(0.80)	(3.36)
Log population	1.615***	1.405***	0.606	1.812***
	(3.23)	(4.21)	(1.41)	(5.01)
Log distance from parent country	-0.605***	-0.164	-0.531***	-0.757***
	(-7.29)	(-0.67)	(-6.23)	(-9.39)
Log distance from borrower country	-0.483***	-0.499***	-0.502***	-0.428***
	(-4.24)	(-2.64)	(-2.98)	(-5.40)
Common spoken language in parent country	2.538**	2.782***	3.424***	1.871
	(2.47)	(3.04)	(2.75)	(1.20)
Common spoken language in borrower country	1.293	-0.199	1.595	0.449
	(1.42)	(-0.45)	(1.61)	(0.54)
Borrower country		-8.472***		
		(-3.44)		
Third country		-8.222**		
		(-2.50)		
Observations	1179135	1179135	585371	593764
Pseudo R-squared	0.885	0.89	0.905	0.877

Table 7: Determinants of the lead bank role

The dependent variable is a dummy variable indicating a lead bank role. Regressions 1 to 4 are OLS regressions. In regressions 5 to 8 regulatory variables are instrumented by their sample means excluding the pertinent country, a dummy variable indicating that the central bank supervises banks for prudential purposes, and the 5-year moving average of the Gini coefficient measuring income inequality in the lender country. See Table A1 in the Appendix for the definitions of the other variables. The sample period is 1995-2016. Regressions 1 and 5 include facility and lender country fixed effects. Regressions 2 and 6 include facility and bank fixed effects. Regressions 3 and 7 include facility and bank * borrower country fixed effects. Regressions 4 and 8 include facility and bank borrower company fixed effects. Standard errors are clustered at the banking group level. *, **, and *** denote significance at 10%, 5%, and 1%.

	OLS				IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Capital regulation (lender)	-0.00202	-0.00502*	-0.00775***	-0.00444	-0.00154	-0.00495*	-0.00772***	-0.00562*
	(-0.55)	(-1.70)	(-2.87)	(-1.43)	(-0.41)	(-1.70)	(-2.83)	(-1.79)
Overall activity restrictions (lender)	0.00606*	0.00429*	0.00476**	-0.000269	0.00780*	0.00474	0.00525*	-0.000104
	(1.76)	(1.88)	(2.31)	(-0.08)	(1.87)	(1.65)	(1.93)	(-0.03)
Official supervisory power (lender)	0.000738	-0.00209	-0.00372*	0.00115	0.00127	-0.00206	-0.00420*	0.000181
	(0.25)	(-0.91)	(-1.69)	(0.43)	(0.44)	(-0.84)	(-1.75)	(0.06)
Monitoring (lender)	-0.00402	0.00178	0.00339	-0.000707	-0.00466	0.000776	0.00306	-0.00104
	(-0.99)	(0.47)	(0.88)	(-0.15)	(-1.07)	(0.19)	(0.68)	(-0.23)
Information sharing (lender)	-0.00982	-0.0236	-0.00649	0.0180	-0.00409	-0.0228	-0.0103	0.0225
	(-0.48)	(-1.33)	(-0.37)	(0.78)	(-0.19)	(-1.29)	(-0.55)	(1.09)
Time to enforce contracts (lender)	-0.0000755	0.0000719	0.0000722	0.0000919	-0.0000817	0.0000745	0.0000730	0.0000926
	(-0.82)	(0.82)	(0.85)	(0.84)	(-0.91)	(0.84)	(0.83)	(0.86)
Rule of law (lender)	0.140***	0.107***	0.0959**	0.117***	0.123**	0.103**	0.0969**	0.121***
	(2.92)	(2.83)	(2.56)	(2.74)	(2.38)	(2.52)	(2.52)	(2.85)
Log real GDP/capita (lender)	-0.188	0.0969	0.0626	-0.0750	-0.252	0.0836	0.0663	-0.102
	(-1.22)	(0.66)	(0.46)	(-0.37)	(-1.17)	(0.48)	(0.39)	(-0.45)

Log population (lender)	-0.600***	-0.306**	-0.194	0.361	-0.554***	-0.288**	-0.218	0.375*
	(-3.23)	(-2.45)	(-1.42)	(1.63)	(-2.98)	(-2.23)	(-1.62)	(1.69)
Log assets	0.113***	0.0321**	0.0371***	0.0316***	0.113***	0.0325**	0.0374***	0.0326***
	(8.66)	(2.07)	(2.73)	(2.76)	(8.46)	(2.04)	(2.72)	(2.94)
Log syndicated lending	0.00363**	0.00310	0.00302	0.00183	0.00354**	0.00299	0.00288	0.00185
	(2.09)	(1.61)	(1.57)	(1.34)	(2.00)	(1.53)	(1.47)	(1.33)
Loans/deposits	-0.00357	-0.00422**	-0.00450***	-0.0102***	-0.00357	-0.00408**	-0.00431***	-0.00985***
	(-1.03)	(-2.43)	(-2.89)	(-8.87)	(-1.06)	(-2.30)	(-2.71)	(-8.23)
Equity/assets	-1.342***	-0.129	0.0951	-0.588	-1.353***	-0.103	0.121	-0.517
	(-3.02)	(-0.24)	(0.23)	(-1.67)	(-3.02)	(-0.19)	(0.28)	(-1.40)
Past relationship	0.104***	0.102***	0.0914***	0.0182***	0.105***	0.104***	0.0926***	0.0181***
	(15.76)	(16.16)	(14.89)	(4.63)	(16.84)	(17.41)	(16.00)	(4.56)
Observations	149416	149412	148988	128281	146043	146039	145607	125285
Adjusted R-squared	0.528	0.533	0.564	0.794	-0.365	-0.403	-0.406	-0.420
Facility FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lender country FE	Yes	-	-	-	Yes	-	-	-
Bank FE	No	Yes	-	-	No	Yes	-	-
Bank * borrower country FE	No	No	Yes	-	No	No	Yes	-
Bank * borrower company FE	No	No	No	Yes	No	No	No	Yes
Overid. test (p value)	-	-	-	-	0.022	0.161	0.460	0.908
Underid. test (p value)	-	-	-	-	0.005	0.005	0.006	0.007

Appendix

Table A1: Variable definitions and data sources

Variable	Definition	Source
Volume	The value of all syndicated loans in billions of US dollars aggregated either at the level of the borrower country, or the borrower country-lender country pair.	Dealscan
Log(Volume + 1)	Natural logarithm of 1 plus the US dollar value of all syndicated loans aggregated either at the level of the borrower country, or the borrower country-lender country pair.	Dealscan
Arsinh(Volume)	Transformed value of the US dollar value of all syndicated loans aggregated either at the level of the borrower country, or the borrower country-lender country pair, using the inverse hyperbolic sine function for the transformation defined as: $$\operatorname{arsinh}(x) = \ln\left(x + \sqrt{x^2 + 1}\right)$$	Dealscan
Foreign subsidiary/total volume	The ratio of the US dollar value of syndicated loans provided by foreign subsidiaries relative to the US dollar value of all syndicated loans aggregated either at the level of the borrower country, the lender country, or the borrower country-lender country pair.	Dealscan
Borrower-country subsidiary/ total volume	The ratio of the US dollar value of syndicated loans provided by foreign subsidiaries located in the borrower's country relative to the US dollar value of all syndicated loans aggregated either at the level of the borrower country, the lender country, or the borrower country-lender country pair.	Dealscan
Third-country subsidiary/ total volume	The ratio of the US dollar value of syndicated loans provided by foreign subsidiaries located neither in the borrower's nor the parent bank's country relative to the US dollar value of all syndicated loans aggregated either at the level of the borrower country, the lender country, or the borrower country-lender country pair.	Dealscan
Lead	Dummy variable indicating lead arranger role in a syndicated loan. Following Bharath et al. (2011) and Berg et al. (2016) we set it equal to one if 1) the reported lender role in Dealscan is either "Admin agent", "Agent", "Arranger", or "Lead bank"; or 2) the lead arranger credit field equals "Yes"; or 3) if the loan has a sole lender.	Dealscan
Capital regulation	Index measuring the stringency in determining minimum capital adequacy and initial capital stringency in borrower or lender country, with higher values indicating greater stringency.	World Bank Regulation and Supervision Survey (Barth et al., 2006)
Overall activity restrictions	Index of the extent to which banks can engage in securities, insurance and real estate activities in borrower or lender country, with higher values indicating more restrictions.	World Bank Regulation and Supervision Survey (Barth et al., 2006)
Official supervisory power	Index of the power of the supervisory authorities to take specific actions to prevent and correct problems in banks in borrower or lender country, with higher values indicating greater power.	World Bank Regulation and Supervision Survey (Barth et al., 2006)

Monitoring	An index measuring the strength of private monitoring incentives in borrower or lender country, with higher values indicating more private supervision. The index measures whether certified audit is required; the top ten banks are all rated by international credit rating agencies; no explicit deposit insurance scheme exists in the country; the income statement includes accrued or unpaid interest or principal on nonperforming loans and whether banks are required to produce consolidated financial statements; off-balance sheet items are disclosed to the public, banks must disclose risk management procedures to the public, and subordinated debt is allowable (required) as a part of regulatory capital.	World Bank Regulation and Supervision Survey (Barth et al., 2006)
Creditor rights	Index measuring the strength of creditor rights in borrower or lender country, with higher values indicating stronger creditor rights.	Djankov et al. (2007)
Information sharing	Index measuring rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries in borrower or lender country. The index ranges from 0 to 8, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions.	Doing Business Database
Time to enforce contracts	Index measuring the time required to resolve a commercial dispute, calculated as the average number of calendar days from the filing of the lawsuit in court until the final determination and, in appropriate cases, payment, in borrower or lender country. Higher values indicate easier contract enforcement.	Doing Business Database
Rule of law	Index capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence in borrower or lender country, with higher values indicating a stronger rule of law.	World Governance Indicators
Concentration	Assets of the five largest banks as a share of total commercial banking assets in borrower or lender country.	Global Financial Development Report
Government bank ownership	The proportion of banking assets in government owned banks (where a bank is considered government owned if 50 percent or more of the shares are controlled by the government) in borrower or lender country.	World Bank Regulation and Supervision Survey (Barth et al., 2006)
Log real GDP/capita	Natural logarithm of GDP per capita measured at constant 2010 US dollar prices in borrower or lender country.	World Development Indicators
Log population	Natural logarithm of the total population in borrower or lender country.	World Development Indicators
Log distance	Natural logarithm of 1 plus the geographic distance between the capital cities of the borrower and lender countries measured in kilometres.	http://techslides.com/list-of-countries-and-capitals (downloaded on June 27, 2016)
Log distance from parent country	Natural logarithm of 1 plus the geographic distance between the capital cities of the loan origination country and the country of the parent bank measured in kilometres.	http://techslides.com/list-of-countries-and-capitals (downloaded on June 27, 2016)
Log distance from borrower country	Natural logarithm of 1 plus the geographic distance between the capital cities of the loan origination country and the country of the borrower measured in kilometres.	http://techslides.com/list-of-countries-and-capitals (downloaded on June 27, 2016)

Common spoken language	The probability that a pair of people at random from the borrower and lender countries understand one another in some language.	Melitz and Toubal (2014)
Common spoken language in parent country	The probability that a pair of people at random from the loan origination country and the country of the parent bank understand one another in some language.	Melitz and Toubal (2014)
Common spoken language in borrower country	The probability that a pair of people at random from the loan origination country and the country of the borrower understand one another in some language.	Melitz and Toubal (2014)
Log assets	Natural logarithm of a bank's total assets ratio lagged by one year.	Compustat
Log syndicated lending	Natural logarithm of 1 plus the sum of the US dollar value of all loans provided by the lender in a given year, minus the pertinent loan amount. Missing loan shares are replaced by zeros.	Dealscan
Loans/deposits	A bank's total loans (net of total allowance for loan losses) to total deposits ratio lagged by one year.	Compustat
Equity/assets	A bank's total common equity to total assets ratio lagged by one year.	Compustat
Past relationship	Dummy variable indicating that the lender bank has provided a loan to the borrower before the pertinent loan.	Dealscan
Parent country	Dummy variable indicating that the loan was provided by an entity in the parent country.	Dealscan
Borrower country	Dummy variable indicating that the loan was provided by an entity in the borrower country.	Dealscan
Third country	Dummy variable indicating that the loan was provided by an entity in a third country.	Dealscan

Table A2: Total syndicated loan amounts by largest lender and borrower countries

This table provides information on the largest lender countries, their most significant borrower countries, and the countries where their most active foreign subsidiaries are located. Columns 1 and 2 show the main lender countries and the total amounts of cross-border syndicated loans provided by banking groups headquartered in these countries during the 1995-2016 period. Columns 3 and 4 show the total amount of syndicated loans provided to a given borrower country during the 1995-2016 period. Columns 5 and 6 show the total amount of syndicated loans provided by subsidiaries located in a given country during the 1995-2016 period. All loan amounts are in constant 2016 US dollars reflecting the US GDP deflator.

Lender country	Total lending in billions of USD	Borrower country	Total lending to borrower country in billions of USD	Country of foreign subsidiary	Total lending through country of foreign subsidiary in billions of USD
(1)	(2)	(3)	(4)	(5)	(6)
United Kingdom	1,290	USA	674	USA	118
		France	76	Hong Kong	9
		Spain	66	France	6
France	955	USA	408	Netherlands	53
		Spain	78	USA	42
		United Kingdom	65	Switzerland	13
Japan	891	USA	455	USA	100
		Australia	63	China	5
		United Kingdom	41	Singapore	3
Germany	665	USA	363	USA	39
		United Kingdom	81	Luxembourg	6
		France	40	Austria	4
USA	480	United Kingdom	78	United Kingdom	16
		France	39	Hong Kong	12
		Netherlands	35	Australia	6