# Running for the Exit: International Banks and Crisis Transmission

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**Abstract**

The global financial crisis has reignited the debate about the risks of financial globalization, in particular the international transmission of financial shocks. We use data on individual loans by the largest international banks to their various countries of operation to examine whether banks' access to borrower information affects the transmission of a financial shock across borders. The simultaneous use of country fixed effects and bank fixed effects allows us to disentangle credit supply and demand and to control for general bank characteristics. We find that during a crisis banks are more likely to keep lending to countries in which they own a subsidiary, that are geographically close, and where they have gained experience over time by building relationships with (repeat) borrowers.

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## 1. Introduction

In the wake of the 2007/2009 global crisis the virtues and vices of financial globalization are being re-evaluated. Financial linkages between countries, in particular in the form of bank lending, have been singled out as a key channel of international crisis transmission (IMF, 2009). Indeed, after the collapse of Lehman Brothers in September 2008, syndicated cross-border lending declined on average by 53 percent compared to pre-crisis levels (Dealogic Loan Analytics). Figure 1 illustrates that the magnitude of this 'sudden stop' in international bank lending differed substantially across countries.

[INSERT FIGURE 1 HERE]

A pertinent question that is high on the academic and policy agenda is why cross-border bank lending to some countries is relatively stable whereas it is more volatile in other cases. The recent crisis, which originated in the U.S. sub-prime market but spilled over to much of the developed and developing world, provides for an ideal testing ground to answer this question. In this paper we use detailed data on lending by a large number of individual banks to corporate borrowers in a large number of countries to demonstrate that banks' access to borrower information is a key determinant of lending stability in times of crisis.

The use of micro data allows us to make a significant contribution to the emerging literature on the transmission of the recent crisis. A number of papers use *aggregate* data from the Bank for International Settlements (BIS) to study the 2008/2009 contraction in international bank lending. They find that international banks contributed to the spreading of the crisis and that this impact was most severe in the case of banking *sectors* that were vulnerable to USD funding shocks (Cetorelli and Goldberg, 2010), that displayed a low *average* level of profitability or high *average* expected default frequency (McGuire and Tarashev, 2008), or that had a poor *average* stock-market performance (Herrmann and Mihaljek, 2010). Takáts (2010) shows that supply factors – proxied by the volatility of the S&P 500 financial index – were a more important driver of the reduction in lending to emerging markets than local demand.

While these papers provide useful insights into the factors that influence aggregate bank lending, they do not tell us much about what type of banks transmitted the crisis to what type of countries. Our data has the advantage that it not only contains information about the

destination of loans but also about their bank-level origin. This makes it particularly well-suited to understand to what extent the stability of cross-border credit flows is affected by characteristics of the lenders themselves. More specifically, we analyse how differences in banks' access to borrower information influenced the severity of the sudden stop in lending to particular destination countries.

Our empirical approach is based on the theoretical literature that deals with the impact of information asymmetries between banks and borrowers on banks' willingness to lend. Banks screen new borrowers and monitor existing ones to reduce information asymmetries and the agency problems associated with debt (Allen, 1990). Banks' ability to screen and monitor varies across borrowers: agency problems are more pronounced for opaque and small companies. Banks need to exercise considerable effort to collect 'soft' information about such borrowers, for instance by building up a lending relationship over time (Rajan, 1992; Ongena, 1999). When screening and monitoring is difficult, the scope for adverse selection and moral hazard remains high and banks may resort to credit rationing (Stiglitz and Weiss, 1981). Because opaque borrowers are particularly difficult to screen and monitor they experience more credit rationing than transparent firms (Berger and Udell, 2002).

Banks' screening and monitoring intensity also varies over time. An adverse economic shock increases the marginal benefits of screening and monitoring as the proportion of firms with a high default probability increases (Ruckes, 2004).[1] During a recession or crisis the net worth of firms drops, adverse selection and moral hazard increase, and banks need to step up their screening and monitoring (Rajan, 1994; Berger and Udell, 2004; De Haas and Van Horen, 2010). However, banks face difficulties in offsetting increased agency problems if borrowers are opaque. In response to an adverse shock they therefore resort to credit rationing of such intransparent borrowers in particular ('flight to quality', Bernanke et al., 1996).

In line with the above, we expect that during the recent crisis cross-border lending was reduced most to countries where banks were unable to limit the increase in uncertainty through generating additional information about borrowers and had to resort to credit rationing instead. Economic theory suggests a number of factors that influence whether a bank is able to limit agency problems. In this paper we use unique data on international bank lending to put these theoretical priors to the test.

[1] Conversely, during boom periods default probabilities are low and the advantages of screening and monitoring – such as reduced shirking by firm management – mostly benefit shareholders rather than creditors.

First, we consider the geographical distance between the bank and its borrowers (Petersen and Rajan, 1994; 2002). Distant borrowers are more difficult to screen and monitor and banks therefore lend less to far-away clients (Jaffee and Modigliani, 1971; Hauswald and Marquez, 2006). In line with geographical credit rationing, Portes et al. (2001), Buch (2005), and Giannetti and Yafeh (2008) document a negative relationship between distance and international asset holdings, including bank loans (although Carling and Lundberg (2005) do not find such evidence). Similarly, and in line with an international flight to quality, we expect that distant firms were more rationed by international banks during the crisis.

A mechanism for banks to overcome distance constraints in cross-border lending is to set up a local subsidiary (Mian, 2006; Giannetti and Yafeh, 2008). A presence on the ground reduces information asymmetries as local loan officers are better placed to extract soft information from borrowers. Developing closer ties with clients may allow the bank to continue to lend to borrowers during periods of high uncertainty because screening and monitoring can be stepped up quite easily. Local staff on the ground can also make it easier for a bank to generate (and subsequently monitor) new cross-border deals. Berger et al. (2005) argue that (small) banks that use soft information may sustain longer relationships with clients because they can provide clients with better lending terms compared to banks that lack access to such information. In a similar vein, we hypothesize that a bank with a subsidiary may find it easier to continue to lend cross-border to firms since the subsidiary gives access to (soft) information that allows the bank to refrain from adjusting lending terms too much. Finally, because soft information is not easily transferable across banks, international banks with a local subsidiary may have greater market power over firms than banks without a subsidiary. Firms that are a client of a bank with a local presence may find it more costly to switch to another bank during a crisis and the lending relationship may therefore be more stable.

However, while a local subsidiary reduces the physical distance between the firm and the loan officer, it also creates 'functional distance' within the bank.[2] Banks may experience difficulties in efficiently passing along (soft) information from the subsidiary to headquarters (Aghion and Tirole, 1997; Stein, 2002). If the incentives of subsidiary managers are not aligned with those of the parent bank, internal agency costs (Scharfstein and Stein, 2000) may hamper cross-border lending as well. Such costs increase with distance if parent banks find it

[2] Cerqueiro et al. (2009) provide an excellent overview of the literature on the relationship between distance, banks' organisational structure and the supply of bank lending.

more difficult to supervise management in far-away places (Rajan et al., 2000).[3] Whether the presence of a subsidiary makes cross-border lending more stable or not therefore depends on whether the positive effect of the shorter distance between loan officer and borrower is offset by the negative effect of a longer within-bank functional distance.

Finally, another way for banks to overcome distance constraints in cross-border lending is to co-operate with domestic banks. Domestic banks can possess a comparative advantage in reducing information asymmetries vis-à-vis local firms (Mian, 2006; Carey and Nini, 2007; Houston et al., 2007) as they share the same language and culture and have a more intimate knowledge of local legal, accounting, and other institutions and their impact on firms. By (repeatedly) co-lending with domestic banks, foreign banks may gradually increase their own knowledge of local firms and reduce information asymmetries.[4]

To empirically examine the influence of banks' ability to process borrower information on the stability of their cross-border lending one needs detailed bank-level data. Such an analysis should ideally be based on loan flows from individual banks to individual countries over a prolonged period of time. Data should preferably contain lending to various countries from individual banks (to exploit within-bank variation) as well as lending flows from various banks to individual countries (to control for credit demand at the country level). And finally, such data should ideally contain the individual deals that underlie credit flows, so that micro information on borrowers and on inter-bank co-operation can be exploited. We use data on cross-border syndicated bank lending that fulfil all of these requirements.

Loan syndications – groups of financial institutions that jointly provide a loan to a corporate borrower – are one of the main channels of cross-border debt finance to both developed and emerging markets.[5] In 2007, international syndicated loans made up over 40 percent of all cross-border funding to U.S. borrowers and more than two-thirds of cross-border flows to

[3] Alessandrini et al. (2009) show for Italy that a greater functional distance between loan officers and bank headquarters adversely affects the availability of credit to local firms.

[4] Local bank participation leads to larger, longer, and cheaper syndicated loans (Carey and Nini, 2007). Borrowers may still value the presence of foreign banks if these are part of international bank networks that provide firms with a deeper and more liquid loan base, further reducing borrowing costs (Houston et al., 2007).

[5] We define emerging markets as all countries except high-income OECD countries. Although Slovenia and South-Korea were recently reclassified as high-income countries we still consider them as emerging markets.

emerging markets.[6] We concentrate on the largest banks in the cross-border syndicated loan market which together account for over 90 percent of this market. We use data on individual cross-border deals to construct for each of these banks a monthly snap-shot of their credit flows to firms in individual countries. This allows us to compare post-crisis and pre-crisis lending by each bank to each country.

We use regression techniques to explain this lending behaviour through variables that measure the ability of banks to screen and monitor borrowers in specific countries. We control for changes in credit demand and other destination country variables by using destination country fixed effects – in effect analyzing how different banks change their lending to the same country differently (within-country comparison). Moreover, we are able to control for bank-specific characteristics by using bank-fixed effects – in effect analysing how a particular bank changes its lending to different countries differently (within-bank comparison). This combination of country and bank fixed effects allows us to narrowly focus on information variables that are specific to particular bank-country pairs and to empirically isolate the impact of these variables on the stability of international lending relationships.

We find that during a crisis banks are better able to lend effectively to countries in which they have a subsidiary, that are geographically close, and where they have gained lending experience over time through relationships with (repeat) borrowers. Older subsidiaries and subsidiaries that are the result of a takeover of a domestic bank have a more positive impact on lending stability, arguably because they can better generate 'soft' information. This is mainly important in emerging markets, where trustworthy 'hard' information may not be readily available and a local presence is crucial. Our analysis shows that information asymmetries between banks and their foreign customers are an important determinant of the resilience of cross-border lending during a crisis. It also indicates that even in a 'hard information' setting such as the market for syndicated corporate loans, access to soft information may be important.

Because international banks were more inclined to keep up lending to some countries than to others, we document a substantial variety in the severity of the 'sudden stop' after the collapse of Lehman Brothers (Figure 1). While a full analysis of the impact of the sudden stop on destination countries is beyond the scope of this paper, Figure 2 illustrates that most

[6] Cross-border funding is defined as the sum of international syndicated credit, international money market instruments, and international bonds and notes (Bank for International Settlements, Tables 10, 14[a], and 14[b]).

countries were unable to offset the decline in cross-border lending through increasing domestic syndicated lending. The left-hand pane shows that there were only few countries – India, China, Japan – where increased lending by (often state-owned) banks more than compensated for the severe drop in cross-border inflows. The right-hand pane shows that most countries experienced a decline in total syndicated lending very similar to the decline in cross-border syndicated lending (observations on the 45º line). Domestic lending was unable to cushion much of the decline in credit from abroad. Only a few countries – such as Germany, South Africa, and Taiwan – partially counterbalanced reduced inflows with increased domestic lending. This imperfect substitutability between cross-border and domestic syndicated loans implies that the results we document in this paper are likely to have had severe consequences for the total lending supply in the destination countries.

[INSERT FIGURE 2 HERE]

This paper not only contributes to the emerging literature on the transmission of the recent crisis but also to several other strands of the literature. First, we add to the literature on banking sector globalization. A first branch of this literature analyzes the impact of *multinational* banking: the creation of banks with subsidiaries and branches in various countries. Earlier evidence suggests that foreign bank entry can lead to greater efficiency of the domestic banking sector in developing countries (Claessens et al., 2001), to more accessible and cheaper credit (Crystal et al., 2000), and to faster GDP growth (Berger et al., 2004). A number of papers also demonstrate that home-country shocks can force affiliates of multinational banks to reduce lending abroad. Peek and Rosengren (1997, 2000) show how the drop in Japanese stock prices in 1990 led Japanese bank branches in the U.S. to reduce credit. De Haas and Van Lelyveld (2010) find that lending by multinational bank subsidiaries depends on the financial strength of the parent bank. Cull and Martinez Peria (2010) summarize the empirical evidence and conclude that multinational banking has a positive impact on bank efficiency without leading to increased banking system instability. The impact on lending to small firms or on the overall credit supply is less clear-cut.

A second branch of the literature on the globalization of banks deals with *international* banking: the cross-border provision of loans from a bank's headquarters to a foreign company. *On aggregate* such cross-border lending tends to be less stable during crisis periods

than lending through subsidiaries on the ground (Peek and Rosengren, 2000 and García Herrero and Martinez Peria, 2007). We contribute to and connect both of these branches of the banking literature by analyzing cross-border lending by banks with and without a subsidiary in a particular destination country. The detailed nature of our data also allows us to distinguish between subsidiaries in terms of size, age, mode of establishment, and distance to the parent bank. This yields new insights into the conditions that make cross-border lending more or less volatile during a crisis.

Our paper is also related to the literature on financial contagion through international bank lending. Van Rijckeghem and Weder (2001, 2003) find that international banks that are exposed to a financial shock – either in their home or in a third country – reduce their bank lending to other countries. Jeanneau and Micu (2002) show that cross-border lending is determined by macroeconomic factors, such as the business cycle and monetary policy stance, in both the home and host country. Buch et al. (2010) analyze the cross-border transmission of shocks through international bank lending and find that interest rate differentials and also energy prices determine the amount of international bank lending. An important methodological contribution of this paper is the use of detailed information on individual loans to create bank-specific data on cross-border lending. This allows us to go beyond assessing the impact of macroeconomic factors on international bank lending and instead test a number of hypotheses on mechanisms that banks use to mitigate information costs that hitherto have not been analyzed in an international context.

The paper is structured as follows. Section 2 explains our data and econometric methodology after which Section 3 describes our empirical findings. Section 4 concludes.

## 2. Data and econometric methodology

### *2.1. Data*

Our main data source is the Dealogic Loan Analytics database, which provides comprehensive market information on virtually all global syndicated loans issued since the 1980s. We use this database to download all syndicated loans to private borrowers world-wide during the period 2005-2009 and then break each syndicated loan down into the portions provided by individual banks. Loan Analytics provides precise information on loan break down for about 25 per cent of all loans and we use this information to derive a rule of

thumb for breaking down *all* loans in our full sample.[7] The information from Loan Analytics shows that about 50 per cent of a typical loan is distributed to participants (junior banks) whereas the other half is retained by the loan arrangers (senior banks). We therefore allocate half of each loan to the arrangers and half to the participants and then further subdivide these loan portions within the arranger and participant groups on an equal basis. We do this for the full sample, i.e. for both loans with and without actual information on loan allocation.

We then use these loan portions to reconstruct the volume and country distribution of individual banks' monthly lending over the sample period. We focus on cross-border lending, which we define as loans where the nationality of the (parent) bank is different from the nationality of the borrower.[8] We identify all banks that at the group level provided at least 0.01 per cent of global syndicated cross-border lending and that participated in at least twenty cross-border loans in 2006.[9] This leaves us with 118 banks from 36 countries, both advanced (75 banks) and emerging markets (43 banks). Together these banks lent to borrowers in 60 countries and accounted for over 90 per cent of all cross-border syndicated lending in 2006. Table 1 and 2 in the Appendix list all banks and destination countries in our sample, respectively. Table 1 also shows each bank's country of incorporation as well as its absolute and relative position in the global market for cross-border lending. Although most banks have a pre-crisis market share of less than 1 per cent, there are a number of big players which each make up more than 3 per cent of the market: RBS/ABN Amro (8.3 percent), Deutsche Bank (5.4), BNP Paribas (5.1), Citigroup (4.9), Barclays (4.7), Credit Suisse (3.6), Mitsubishi UFJ (3.4), JPMorgan (3.2), and Commerzbank (3.1).[10]

For each of these banks we calculate monthly cross-border lending volumes – overall and to individual destination countries – for the pre-crisis period (January 2005-July 2007) and the

[7] See De Haas and Van Horen (2010) for a comparison of syndicated loans with full versus limited information on loan distribution in Loan Analytics and for evidence on the limited differences between both.

[8] This means we also include syndicated lending by subsidiaries of a foreign bank in the country of the borrower (Citibank Poland participating in a syndicated loan to a Polish firm). However, the vast majority (94 per cent) of our cross-border lending is truly cross-border (Citibank lending from the U.S. directly to a Polish firm).

[9] We only include commercial banks, savings banks, cooperative banks, and investment banks.

[10] During our sample period RBS acquired part of ABN Amro; Bank of America acquired Merrill Lynch; and Wells Fargo acquired Wachovia. We consider these merged banks as a single entity over our whole sample period. We add the number of loans their respective parts provided during the pre-merger period and calculate other bank-specific variables as weighted averages, using total assets of the pre-merger entities as weights.

period after the Lehman collapse (October 2008-October 2009).[11] We then use the percentage change between these post-Lehman and pre-crisis averages as our bank-specific dependent variables. Table 1 shows that banks on average reduced their lending to a destination country by 52 per cent during the crisis (46 per cent to advanced countries and 58 per cent to emerging markets). The table also indicates that our dataset includes 2,257 bank-country pairs which are about evenly split between emerging markets and advanced countries. On average an international bank lends to firms in 19 different countries.

[INSERT TABLE 1 HERE]

We create a number of variables that measure for individual bank-country combinations the ability of banks to mitigate the increase in information costs during the crisis ('Information variables' in Table 1). We start with using the great circle distance formula to calculate the geographical distance between each bank's headquarters and its various countries of operation as the number of kilometers (in logs) between the capitals of both countries. The average distance to a foreign borrower is 4,782 km but there is considerable variation (the standard deviation is 3,769 km).

In line with the theoretical priors set out in the introduction, we also create variables that proxy for the extent to which a bank can overcome distance-related agency problems through using loan officers based in the destination country itself. We first link each of our banks to Bureau van Dijk's BankScope database, which not only contains information on balance sheets and income statements, but also on ownership structure (both of the banks themselves and their minority and majority equity participations). For each bank we identify all majority-owned foreign bank subsidiaries. On average the international banks in our sample built up a subsidiary network equal to almost 20 percent of the group balance sheet. We first create a dummy variable *Subsidiary* that is one in each country where a particular bank owns a subsidiary. A typical bank owns a subsidiary in seven foreign countries and this means that in about 23 per cent of our bank-country pairs a subsidiary is present. Next, we measure the size of each of these subsidiaries relative to both the parent bank and the host country. *Size relative to parent* measures subsidiary size by dividing its total assets through the balance

[11] Underlying these cross-border lending volumes is detailed information on 23,237 syndicated loans that are subdivided into 108,530 loan portions as provided by our 118 banks.

sheet of the unconsolidated group. The average subsidiary makes up about seven per cent of the balance sheet of the parent bank. *Size relative to country* measures subsidiary size by dividing total assets through total bank lending to the private sector in the particular host country. Subsidiaries of international banks have an average market share of about 8 per cent in a destination country.

Next, we use the database developed by Claessens, Van Horen, Gurcanlar, and Mercado (2008) to calculate the age of each subsidiary (number of years since its establishment by the current owner). The average age is 11.7 years. However, for about half of our sample we set the age to 16 years as these subsidiaries were established or taken over before 1995, the earliest period covered by Claessens et al. (2008). In our regressions we therefore use three age dummies that assign each subsidiary to the 0-5, the 6-15, or the 15+ age bracket. We also make a distinction between greenfield subsidiaries – established from scratch by the parent bank – and M&A subsidiaries that are the result of a takeover. Information on the entry mode is again taken from Claessens et al. (2008). Eighty per cent of the subsidiaries in our dataset are former domestic banks whereas 20 per cent are greenfields.[12]

In line with the literature on the impact of banks' organizational structure on lending behavior, we expect that subsidiary characteristics may impact the stability of cross-border lending. Not only do we expect that a presence on the ground reduces information asymmetries and makes lending more stable, we also hypothesize that this effect is stronger for larger subsidiaries, older subsidiaries, and M&A subsidiaries. Subsidiaries that are large compared to the local market may be particularly well-suited to screen and monitor borrowers. We thus expect a positive impact on lending stability. Similarly, subsidiaries that are large relative to the parent may continue to lend due to the fact that their size reflects the strategic commitment of the parent to a certain country. On the other hand, however, large subsidiaries may be more difficult to manage by distant parent banks. Internal agency costs may be high and increase during a crisis, leading to less lending stability.

We also expect that older subsidiaries know the local business sector better and are thus well placed to limit the increase in uncertainty during the crisis. The same holds for M&A subsidiaries, which may be better able to process soft information given that they are former domestic banks. Claeys and Hainz (2007) develop a model in which greenfield foreign banks

[12] Subsidiaries established before 1995 are assumed to be M&A subsidiaries as we have no information on their actual mode of entry. This assumption is reasonable to the extent that over time greenfields become more like M&A subsidiaries as they hire more local staff and integrate better into the local economy.

have no access to soft information. They only use hard, quantitative client information, which they process through screening technologies introduced by their parent banks. In contrast, acquired foreign banks still have access to soft information about the old customers from the pre-acquisition period (Van Tassel and Vishwasrao, 2007). We expect that these differences also determine how effectively a subsidiary can help the parent bank by providing it with additional (soft) information during a crisis.

Next, we count for each bank and each of its countries of operation the number of different domestic banks (in logs) it has cooperated with in a lending syndicate since 2000. A better embedding in a network of local banks may allow a bank to become less of an 'outsider' and to free-ride on the ability of local banks to generate information about local borrowers. On average a bank has worked with 19 different domestic banks in a given country.

Finally, we create a variable that measures a bank's prior experience in syndicated bank lending to a specific country. Banks that build up a lending track-record gradually reduce information asymmetries over time and become more closely integrated into a stable network of co-lenders. We measure *Experience* as the number of six-month periods since 2000 during which a bank granted at least one loan to a borrower in a destination country. This variable thus measures whether a bank has been persistently active in a country over a prolonged period of time or whether it has been active for a short period of time only.

### *2.2. Econometric methodology*

To examine whether increased information costs and banks' ability to mitigate such costs impact the cross-border transmission of a financial shock, we use the bankruptcy of Lehman Brothers as an exogenous event that triggered a sudden stop in cross-border bank lending. By comparing the average monthly lending volume after the Lehman collapse to average monthly lending before the start of the crisis, we control directly for all time-invariant characteristics of recipient countries that influence the level of cross-border lending (such as the institutional environment and the level of economic development). This allows us to focus on testing for heterogeneous bank behaviour as a result of differences in the way banks deal with information asymmetries vis-à-vis foreign borrowers. Collapsing the monthly time series information on lending into pre-crisis lending averages and post-Lehman lending averages (again overall and to individual destination countries) also prevents inconsistent standard errors due to auto-correlation (Bertrand, Duflo, and Mullainathan, 2004).

We use country fixed effects to focus on differences *within* banks *across* countries. A key advantage of this approach is that it allows us to neatly control for changes in credit demand at the country level. In particular, we follow Khwaja and Mian (2008) and Schnabl (2010) who control for credit demand at the firm level by using firm fixed effects in regressions on a dataset of firms that borrow from multiple banks. Since our dataset contains information on multiple banks lending to the same country we can use country fixed effects to rigorously control for credit demand at the host country level (cf. Cetorelli and Goldberg, 2010). This is important because the crisis hit the real economy of countries to a different extent and with a different lag. Firms' demand for external funds to finance working capital and investments will consequently have been affected to varying degrees. Our model specification is:

$$\Delta L_{ij} = \beta' \cdot I_{ij} + \gamma' \cdot X_i + \varphi_j + \eta_{ij} \qquad (1)$$

where subscripts *i* and *j* denote individual banks and destination countries, respectively, $\beta$` and $\gamma$` are coefficient vectors, $I_{ij}$ is a matrix of information variables for individual bank-destination country pairs, $X_i$ is a matrix of bank-specific control variables, $\varphi$ is a vector of country fixed effect coefficients, and $\eta$ is the error term. $\Delta L_{ij}$ captures the percentage change in the average monthly cross-border lending volume by bank i to country j in the post-Lehman compared to the pre-crisis period.

We include a number of variables that measure banks' ability to overcome agency problems: *Subsidiary* is a dummy variable that is 1 if bank i has a subsidiary in country j; *Distance* measures the distance (in log km) between the home country of bank i and destination country j; *Domestic lenders* measures the number of different domestic lenders (in log) that bank i has co-lent with in country j since 2000, and *Experience* measures the number of six-month periods since 2000 during which bank i participated in at least one loan to a borrower in country j. We include both *Experience* and *Experience squared* to account for a decreasing marginal impact of experience on credit stability. Finally, we control for a bank's syndicated loan exposure to a specific country at the time of the collapse of Lehman Brothers (as a percentage of total assets). On average this outstanding exposure was 0.5 per cent of the parent bank's balance sheet (Table 1). We expect that banks with higher pre-crisis cross-border exposures to a particular country adjusted their international lending more.

In a first set of regressions we use bank-level controls to learn more about what type of banks let their international bank lending reduce the most. As bank-specific control variables we use a number of pre-crisis (2006) variables (taken from BankScope) that control for the financial strength of each bank (see Table 1). These are *Solvency* (equity/total assets), *Liquidity* (Liquid assets/deposits and other short-term funding), and *Profitability* (return on assets). Controlling for banks' pre-crisis financial health is important as banks with weak balance sheets can be expected to reduce foreign exposures the most (McGuire and Tarashev, 2008; De Haas and Van Lelyveld, 2010). We also include these variables as changes over 2006-2009 to take into account that banks did not only differ in terms of initial conditions but also in terms of how hard they were hit by the financial crisis.

Finally, we include a dummy variable *State support* that indicates whether a bank received government support during the crisis. To create this dummy, we develop a database of all financial support measures – capital injections, loan guarantees, and removals of toxic assets – since the onset of the crisis. Thirty percent of the banks in our sample received some form of official government support and this translates into 47 per cent of the bank-country pairs (cf. Table 1). State support can be seen as an indicator of a bank's financial fragility during the crisis and thus as a proxy for the bank's need to deleverage – including through reducing cross-border lending. In addition, Kamil and Rai (2010) suggest that public rescue programs may also have *caused* banks to 'accelerate the curtailment of cross-border bank flows'. Anecdotal evidence indeed suggests that rescue packages came with strings attached as banks were asked to refocus on domestic lending. For instance, when the UK government decided to guarantee a substantial part of Royal Bank of Scotland's assets, the bank "promised to lend GBP 50 billion more in the next two years, expanding its *domestic* loan book by a fifth (The Economist, February 28th 2009, p. 37, Italics added). Likewise, French banks that received state support had to increase domestic lending by 3-4 per cent annually, while Dutch bank ING announced that it would lend USD 32 billion to Dutch borrowers in return for government assistance (World Bank, 2009, p. 70).

We also estimate regressions in which we substitute the bank-specific control variables for bank fixed effects. Since banks are active in multiple countries, we can use bank fixed effects in addition to the country-fixed effects which allows for the most rigorous testing of the bank-country pair information variables. These regressions thus take the following form:

$$\Delta L_{ij} = \beta' \cdot I_{ij} + \varepsilon_i + \varphi_j + \eta_{ij} \quad (2)$$

where $\varepsilon$ is a vector of bank fixed effects. We estimate all our models using OLS with robust standard errors clustered by bank.

## 3. Empirical results

### *3.1. Univariate statistics*

Figure 3 gives a first impression of how our main information variables are related to the severity of the sudden stop after the demise of Lehman Brothers. Each bar measures for a particular group of bank–destination country pairs the average decline in cross-border syndicated lending. The first two bars compare bank–country pairs where the bank has a subsidiary ( 1st bar) with pairs where the bank does not have a local presence (2nd bar). There is a substantial difference in terms of bank lending stability: banks reduced their lending to countries where they own a subsidiary by 26 per cent on average, compared to a decline of almost 60 per cent in countries where they do not have a local presence. The second set of bars contrasts bank–country pairs with a below (3rd bar) and above (4th bar) average geographical distance. This rough split indicates that the sudden stop was somewhat more limited in the case of countries nearer to the bank.

[INSERT FIGURE 3 HERE]

Next we compare bank–country pairs for banks with above (5th bar) and below (6th bar) average pre-crisis cooperation with domestic banks. In the case of above-average cooperation, lending declined by 36 per cent during the crisis whereas the reduction in lending amounted to 55 per cent for banks that had interacted less with local banks before the crisis. Finally, we compare bank-country pairs that had above (7th bar) and below (8th bar) average pre-crisis lending experience in a country. The univariate results are again in line with our theoretical prior: more experience is correlated with a milder sudden stop (-49 versus -56 per cent).

Section 3.2 now integrates these explanatory variables in a multivariate regression framework in which we also control extensively for bank-specific and country-specific factors.

### *3.2. Baseline regression results*

Table 2 presents the results from our baseline regressions. The top panel shows regressions for our full dataset, whereas the two panels at the bottom split the sample into lending to advanced countries and emerging markets. To preserve space we only report the bank fixed effects regressions for the last two tables while we report both regressions with bank fixed effects and with bank controls for the full sample. We explain close to 20 per cent in the variation in banks' post-Lehman retrenchment from specific countries (around 30 per cent when we add bank fixed effects).

[INSERT TABLE 2 HERE]

In line with our theoretical priors and the univariate results presented in Section 3.1, it becomes clear that cross-border lending to countries in which a bank owns a subsidiary is more stable. However, a local presence only matters in emerging markets, where (increases in) information asymmetries may have been particularly pronounced and where 'hard' information on firms is less reliable. Banks on average reduced their lending to a country in which they have a subsidiary by 19 (17) percentage points less compared to a country where they do not own a subsidiary.[13]

We find an equally significant negative effect of *Distance* on lending stability, both in lending to advanced and emerging markets. Banks continue to lend more during a crisis to borrowers that are relatively close. We thus document that distance not only has a negative impact on the amount but also on the stability of cross-border bank lending. Banks reduce their lending to borrowers at a mean distance by 21 (32) per cent more compared to borrowers that are at the minimum distance (all else equal). Note that when we include both *Distance* and *Subsidiary* at the same time (last columns) both variables remain highly significant. The size of the subsidiary variable is about twice that of the distance variable:

[13] The first number reflects the coefficient for regressions with bank-level controls while the number in brackets shows the value for regressions with bank fixed effects.

establishing a subsidiary has approximately the same effect as a hypothetical reduction from the mean to the minimal distance to the borrower.

Next, we find that cooperation with domestic banks is not a significant determinant of lending stability. For both cross-border lending to developed and emerging markets we find that international banks that are relatively well-connected to domestic banks do not outperform less-connected banks in terms of lending stability during a crisis. In contrast, we find that previous experience with cross-border syndicated lending to a particular country is very important for lending stability.[14] A bank with average experience reduces its cross-border lending by 39 (29) percentage points less compared to a bank without any previous experience in a country. Banks that built up a track-record of syndicated lending over time turn out to be less fickle during a crisis. Note that both the linear and the quadratic term are significant: the marginal value of experience decreases when banks are longer active in a certain country.[15] Interestingly, experience tends to be of less value in emerging markets. The panels at the bottom of Table 2 indicate that whereas distance to borrowers negatively affects lending stability in both emerging and advanced countries, banks can rely on experience in advanced countries whereas they overcome information asymmetries in emerging markets mainly through local subsidiaries.

Finally, our control variables tell some interesting stories as well (top panel only). As expected, banks with a high pre-crisis cross-border exposure to a particular country were those that reined in lending the most during the crisis in order to rebalance portfolios in response to stricter country limits. We also find reasonably strong evidence for a negative correlation between state support and cross-border lending during the crisis, in line with an increased focus on domestic lending by supported banks. The result holds when we include a battery of other bank-specific control variables. While this seems to confirm the anecdotal evidence on a negative causal impact of financial protectionism on cross-border lending, it may also partly reflect selection bias. Weaker banks, with the most binding balance sheet

[14] We check whether lending experience is equally important for senior and junior syndicate members (arrangers and participants) and find that this is indeed the case.

[15] The concave function has a maximum beyond the 95$^{th}$ percentile which means that the overall effect of *Experience* on lending stability remains positive. As a robustness test we also measure *Experience* as the total number of loans that a bank granted to a given country and that had matured at the time of the collapse of Lehman Brothers. We find quantitatively and qualitatively very similar results (available upon request).

constraints and the biggest need to deleverage, were also those most in need of government support. Indeed we find that large banks and, less significantly, more liquid banks, were able to keep up lending more.

### *3.3. Variation across subsidiary types*

Section 3.2 established that the presence of a subsidiary significantly reduces the severity of a sudden stop in international bank lending. In this sub-section we present results that delve deeper into this issue by looking at various types of subsidiaries that can be expected to differ in their ability to limit the increase in information asymmetries during a financial crisis. Table 3 presents results for our full sample as well as for lending to emerging markets, as the previous results suggests that the presence of a subsidiary has a stabilising role in emerging markets in particular. We continue to control for the distance to and lending experience with borrowers in each destination country.

[INSERT TABLE 3 HERE]

The results indicate that the size of the subsidiary – neither relative to the parent bank nor to the destination country's banking system – does not matter for lending stability. What matters is whether there is a subsidiary on the ground or not, independent of its size.[16] Next, we find a significant interaction term between *Distance* and *Subsidiary* in the case of emerging markets. Distance not only has a direct negative effect on lending stability but it also reduces the positive effect of the presence of a subsidiary on lending stability. This is line with earlier evidence that intra-bank agency costs increase with distance (Rajan et al., 2000). While setting up a subsidiary is an effective tool to reduce distance-related agency costs, the effectiveness of this tool itself decreases with distance.

Next, we find that subsidiaries that are the result of a take-over of a former domestic bank have a larger impact on lending stability than greenfield subsidiaries. This holds in general but in particular in emerging markets (both in terms of economic and statistical significance).

[16] We also ran regressions where we measure absolute subsidiary size as the (log of) the number of employees. Absolute subsidiary size did not have an impact on lending stability either (i.e. over and above the mere presence of a subsidiary).

Compared to a similar bank without a subsidiary or with a greenfield subsidiary, a bank with a take-over subsidiary reduced its lending by 30 percentage points less during the crisis. This may indicate that reducing information asymmetries on the ground works better when an international bank 'buys' local information by taking over an existing bank rather than setting up a new subsidiary from scratch. We find related results when we allocate each subsidiary to one of three age brackets: 0-5 years, 6-15 years, and older than 15 years. Only subsidiaries that have been present in a destination country for at least 5 years have a stabilizing impact on cross-border credit flows. This result holds for both advanced and emerging markets, but is in economic terms much stronger in the latter, in particular for subsidiaries that have been present for over 15 years.

In sum, we find that setting up a subsidiary is a very effective tool for international banks to reduce information asymmetries vis-à-vis local borrowers. While this does not completely solve distance-related information problems, in particular not in case subsidiaries themselves are relatively remote, we do find that the presence of a subsidiary significantly cushions the sudden stop in cross-border bank lending during a crisis, in particular in emerging markets. In line with theories that stress the importance of a local presence for generating and processing 'softer' information, we find that this positive impact is the strongest for older subsidiaries and subsidiaries that are the result of a take-over of a former domestic bank.

### *3.4. Geography, culture, or institutions?*

The regressions in Tables 2 and 3 provide robust evidence for a negative relationship between geographical distance and cross-border lending stability. However, the effective collection and transmission of borrower information from the destination country to a bank's headquarters may also be impacted by cultural and institutional differences between home and destination country. For instance, notwithstanding the large geographical distance involved, Spanish banks may have kept up their syndicated lending to Mexican firms quite well during the crisis because the cultural and historical ties between both countries made Spanish banks more at ease with dealing with Mexican clients than with borrowers in, say, Turkey (which is closer in geographical but not in cultural terms). Similarly, banks may feel more confident – in particular during a crisis – when lending to firms in countries where the institutional and legal environment is similar to the one in the banks' home country.

To look into the relative importance of geographical, cultural, and institutional distance in more detail, we analyze the impact of a number of non-geographical distance measures on lending stability. These include a dummy variable that indicates whether the bank's home country and the destination country share a common language, a dummy that indicates whether both countries share colonial links, a variable that measures the absolute difference between both countries in the World Bank Doing Business legal rights index (which measures the degree to which collateral and bankruptcy laws facilitate lending), and a variable that measures the absolute difference between both countries in the Doing Business credit information index (which measures rules affecting the scope, access and quality of credit information). None of these cultural and legal distance measures have a significant impact on cross-border lending stability.

[INSERT TABLE 4 HERE]

In line with the importance of geography we do find a highly significant positive impact on cross-border lending stability of countries sharing a common border. However, this variable loses significance when we include it together with the geographical distance variable. This indicates that there is no specific border effect but rather that the border dummy acts as an inferior proxy for geographical distance. We conclude that geographical distance is what matters for lending stability: during a crisis banks continue to lend more to borrowers that are physically closer.

### *3.5. Repeat versus first-time borrowers*

Successful prior loans and the associated borrower reputation can attenuate information asymmetries between lenders and their borrower (Diamond, 1991 and Gorton and Pennachi, 1995). Indeed, De Haas and Van Horen (2010) find that arrangers of syndicated loans need to retain less in the case of loans to repeat borrowers and that retention rates for loans to such borrowers needed to increase less during the 2008-2009 financial crisis. If loans to repeat borrowers are plagued by fewer agency problems, we expect that the information variables we use in our analysis will have less of an impact on the reduction in cross-border lending to such borrowers.

In Table 5 we present regressions for both borrower types to find out whether our information variables indeed had a more significant impact on the extensive than on the intensive margin. In the first set of regressions the dependent variable is the change in lending to borrowers that a particular bank has never lent to before, while in the second set the dependent variable is the change in lending to repeat borrowers (borrowers that the particular bank had lent to at least once since 2000).

[INSERT TABLE 5 HERE]

As expected, we find that the information variables matter most for lending to first-time borrowers. Only in the case of new borrowers, was lending stability influenced by the presence of a subsidiary and the distance to the borrower. Moreover, the experience of the bank in lending to a certain country was a much more important determinant of the stability of lending to new borrowers. The evidence in Table 5 also indicates that during the crisis exposure limits became more binding for first-time than for repeat borrowers.

These results also confirm that the presence of subsidiaries is important because they reduce agency problems. One possible alternative interpretation of our earlier findings on the stabilising effect of a local subsidiary could be that this reflects that during the crisis banks started to lend more to repeat borrowers and that they did so in particular in countries where they own a subsidiary (for instance because subsidiary managers can be lobbied more effectively by local firms for repeat funding than loan officers at the bank's foreign headquarters). If this was true, the stabilising effect of a subsidiary would be most pronounced when lending to repeat clients. In contrast, we find the opposite: in an uncertain environment a subsidiary appears to be particularly important to reduce agency problems associated with lending to *new* clients.

## 4. Conclusions

We use a detailed dataset on cross-border bank lending to analyze to what extent mechanisms to mitigate information costs enable banks to limit their decrease in cross-border lending during a crisis. We employ both country and bank fixed effects to rigorously control for changes in credit demand and other confounding factors, instead focusing on the impact of

information variables on the stability of lending by specific banks to borrowers in specific countries. In line with our theoretical priors, we find a strong and robust negative effect of geographical distance on lending stability, both in lending to advanced and to emerging markets. Distant borrowers are not only more difficult to screen and monitor in general, their creditworthiness is particularly difficult to assess during a crisis.

An effective way for banks to (partially) offset the impact of distance is to set up a subsidiary. A local presence allows banks to generate 'soft' information to complement the hard information that is widely available on the large borrowers that use the syndicated loan market. Interestingly, having a subsidiary only works in emerging markets where hard information on borrowers – such as accounting reports – may not be available or not be of sufficient quality to allow for efficient long-distance lending. We also find that this positive impact is stronger for older subsidiaries and subsidiaries that are former domestic banks.

Banks that have built up a track-record of syndicated lending to a particular country turn out to be less fickle during a crisis. Track-records matter on the side of borrowers too: we find that information related problems were most pronounced in the case of lending to first-time borrowers. Our findings thus paint a more nuanced picture than the black-and-white dichotomy of transaction-based lending by large banks versus relationship lending by small banks. We show that even in a sample of the largest international banks that provide loans to large companies, access to 'soft' information – gathered through a local presence on the ground or through repeat interactions with borrowers – is important.

Our results clearly bear on the policy debate on financial globalization and in particular on whether and how countries should integrate their banking systems with global financial markets. A key feature of cross-border lending that this debate has focused on, and that has been further underlined by the recent crisis, is its instable character (for instance compared to lending by domestic banks or foreign bank subsidiaries). Our results provide some first answers to the question when cross-border lending is particularly volatile and when it is not. Perhaps somewhat controversially, we find that banks that are further away from their customers are less reliable funding sources during a crisis. Clearly, policy makers not only need to make a decision on whether to open up their financial system but also to whom.

A second key finding is that international banks with a local presence on the ground tend to be more stable providers of credit. For countries that are considering to open up their banking system this implies that stimulating banks to 'set up shop' may kill two birds with one stone.

Not only do foreign bank subsidiaries provide for a relatively stable credit source themselves, their presence may also stabilize the cross-border component of bank lending. Rather than imposing capital controls to reduce the volatility of cross-border lending, countries may thus contemplate to allow international banks to also set up a local affiliate.

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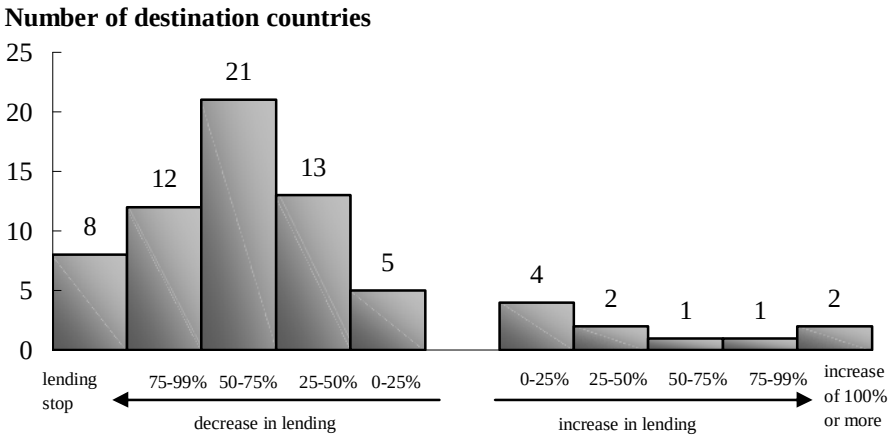
## Figure 1

## Distribution of the change in cross-border lending after the Lehman collapse

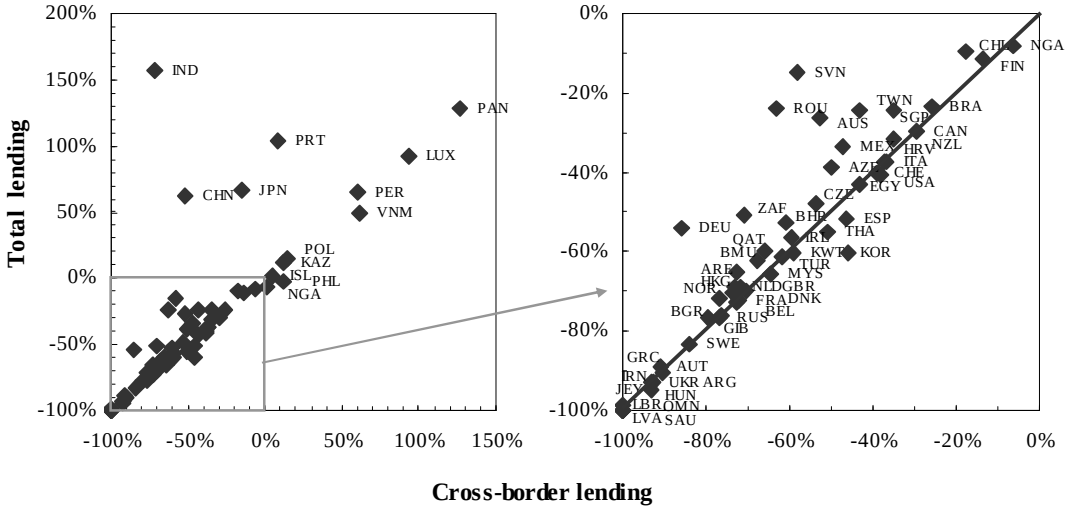
This figure shows the distribution across destination countries of the change in the average monthly cross-border syndicated lending inflows after the collapse of Lehman Brothers compared to the pre-crisis period. The pre-crisis period is defined as January 2005 to August 2007 and the post-Lehman period as October 2008 to October 2009. Each bar indicates the number of destination countries that experienced a post-Lehman change in bank lending that falls within the percentage bracket on the horizontal axis. For instance, there were 13 countries to which cross-border syndicated bank lending *declined* by between 25 and 50 per cent while there were only 2 countries that experienced an *increase* in cross-border syndicated lending of between 25-50%. In 20 countries (8+12) lending declined by more than 75 per cent.



## Figure 2

## Change in cross-border syndicated lending and total syndicated lending during the crisis

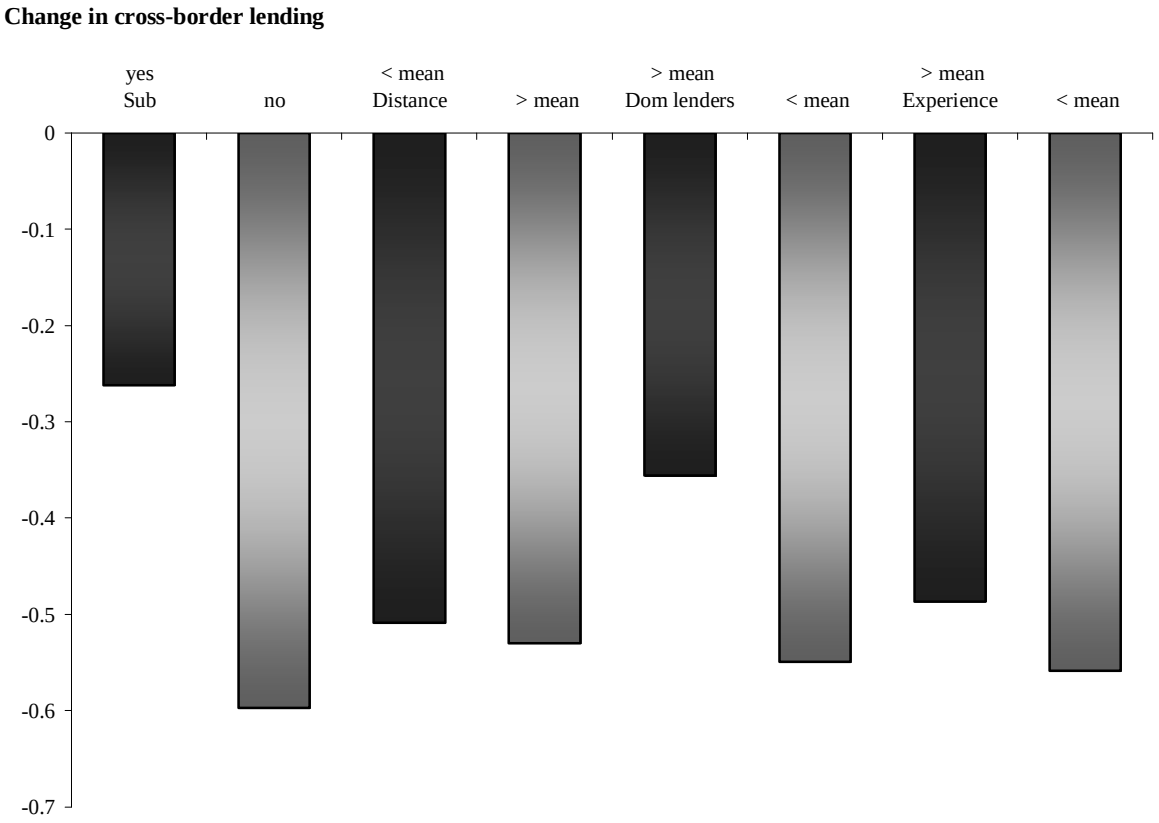
This figure compares the change in cross-border syndicated lending to a country (horizontal axis) with the change in total syndicated lending (cross-border plus domestic syndicated lending) in that country. Lending change is the percentage change in average monthly lending in the pre-crisis period compared to the post-Lehman period. The pre-crisis period is defined as January 2005 to August 2007 and the post-Lehman period as October 2008 to October 2009. The left-hand pane shows all 60 destination countries included in our dataset whereas the right-hand pane zooms in on those countries that experienced a *decline* in both cross-border and total syndicated lending. Countries that experienced a percentage change in domestic lending that was exactly equal to the percentage change in cross-border lending are on the 45º line. Countries where domestic lending shrank faster (slower) than cross-border lending are to the right (left) of this line.



## Figure 3

## Impact of information variables on stability of cross-border lending

This figure shows the percentage change in monthly cross-border lending between the pre-crisis and post-Lehman period averaged across bank-country pairs. Pairs are split into high (dark) and low (light) information pairs. The first two bars split the sample into bank-country pairs where banks have a subsidiary in the country and pairs where there is no subsidiary. The second set of bars distinguishes between bank-country pairs where the bank is closer to the destination country than the mean distance and bank-country pairs where the bank is further away. The third set of bars distinguishes between bank-country pairs where the bank has cooperated with more domestic lenders compared to the mean and bank-country pairs in which the bank has cooperated with less domestic banks. The last group of bars distinguishes between bank-country pairs where the bank has higher than average experience in the country and pairs where experience is below the average.



## Table 1
## Summary statistics

The table shows summary statistics for the main variables used in the paper. *Change in cross-border lending* is the change in average monthly lending flows from a bank to a destination country in the pre-crisis period compared to the post-Lehman period. The pre-crisis period is defined as January 2005 to August 2007 and the post-Lehman period as October 2008 to October 2009. *Distance to destination country* is the log of the distance (in kilometers) between the home country of the bank and the borrower country. *Subsidiary* is a dummy variable that is one if a bank has a subsidiary in a destination country. *Subsidiary size relative to parent* measures total assets of the subsidiary of bank i in country j as a percentage of total parent bank assets (calculations conditional on the presence of a subsidiary). *Subsidiary size relative to country* measures total assets of the subsidiary of bank i as a percentage of total bank lending in country j (calculations conditional on the presence of a subsidiary). *Greenfield subsidiary* is a dummy that is one if bank i established a subsidiary from scratch in country j. *M&A subsidiary* is a dummy that is one if bank i established a subsidiary by taking over a bank in country j. *Subsidiary age* measures the number of years since a subsidiary was established (16 is the maximum age as we set the age to 16 for subsidiaries that were present in a country before 1995). *Domestic lenders* is the number of different domestic lenders (in logs) in a destination country with whom a bank has cooperated in a syndicate between 2000 and the collapse of Lehman Brothers. *Experience* measures the number of six-month periods (since 2000) during which the bank granted at least one loan to a borrower in a destination country. *Exposure* equals the loan volume to a destination country as a percentage of total assets of the bank at the moment of the Lehman Brothers collapse. *State support* is a dummy that is one if the bank received government support during the crisis. *Bank size* measures total assets of the bank at end 2006 (billion US$). *Bank solvency* is the equity to asset ratio of the bank in % (2006). *Change in bank solvency* measures the percentage point change in solvency over 2006-2009. *Bank liquidity* measures liquid assets to deposits and other short-term funding in % (2006). *Change in bank liquidity* measures the percentage point change in liquidity over 2006-2009. *Bank profitability* measures return on assets in %. *Change in bank profitability* measures the percentage point change in profitability over 2006-2009.

| | Obs | Mean | Median | St Dev | Min | Max |
|---|---|---|---|---|---|---|
| *Dependent variable* | | | | | | |
| Change in cross-border lending | 2,257 | -0.52 | -0.89 | 0.89 | -1.00 | 5.54 |
| Change in cross-border lending (to advanced countries) | 1,086 | -0.46 | -0.76 | 0.89 | -1.00 | 5.54 |
| Change in cross-border lending (to emerging markets) | 1,171 | -0.58 | -1.00 | 0.88 | -1.00 | 5.31 |
| *Information variables* | | | | | | |
| Distance to destination country | 2,257 | 4,782 | 3,604 | 3,769 | 102 | 14,966 |
| Subsidiary | 2,257 | 0.23 | 0.00 | 0.42 | 0.00 | 1.00 |
| Subsidiary size relative to parent | 516 | 7 | 1 | 12 | 0 | 57 |
| Subsidiary size relative to country | 517 | 8 | 1 | 24 | 0 | 330 |
| Greenfield subsidiary | 517 | 0.18 | 0.00 | 0.39 | 1.00 | 1.00 |
| M&A subsidiary | 517 | 0.79 | 1.00 | 0.41 | 0.00 | 1.00 |
| Subsidiary age | 509 | 11.74 | 15.00 | 0.10 | 0.00 | 16.00 |
| Domestic lenders | 2,257 | 19 | 6 | 54 | 0 | 484 |
| Experience | 2,257 | 11.63 | 12.00 | 4.90 | 1.00 | 18.00 |
| *Control variables* | | | | | | |
| Exposure | 2,256 | 0.48 | 0.11 | 1.25 | 0.00 | 15.97 |
| State support | 2,257 | 0.47 | 0.00 | 0.50 | 0.00 | 1.00 |
| Bank size (2006) | 2,257 | 987.5 | 555.4 | 1,025 | 2.7 | 5,317 |
| Bank solvency (2006) | 2,257 | 5.48 | 5.35 | 2.66 | -13.71 | 17.89 |
| Change in bank solvency (2006-2009) | 2,257 | 0.39 | 0.33 | 1.16 | -2.87 | 3.68 |
| Bank liquidity (2006) | 2,257 | 51.02 | 37.35 | 43.61 | 3.14 | 312.11 |
| Change in bank liquidity (2006-2009) | 2,257 | -7.69 | -4.81 | 23.35 | -70.36 | 114.95 |
| Bank profitability (2006) | 2,257 | 0.72 | 0.60 | 0.58 | -2.77 | 3.67 |
| Change in bank profitability (2006-2009) | 2,257 | -0.63 | -0.54 | 0.61 | -4.00 | 0.89 |

# Table 2
## Information and crisis transmission - Baseline results

The dependent variable is the percentage change in average monthly cross-border lending of bank i to country j in the period after the collapse of Lehman Brothers (Oct 2008-Oct 2009) compared to the pre-crisis period (Jan 2005-July 2007). Definitions of the independent variables are given in Table 1. The top panel shows regressions for the full sample, alternatingly with bank-specific control variables or bank-specific fixed effects. The lower panel shows regressions with bank fixed effects for lending to advanced (high-income OECD) countries and emerging markets, respectively. All specifications include destination country fixed effects. The model is estimated using OLS where standard errors are heteroskedasticity robust and clustered by bank. Robust p-values appear in brackets and ***, **, * correspond to one, five and ten percent level of significance, respectively.

| | All countries | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subsidiary | 0.190*** | 0.165*** | | | | | | | 0.199*** | 0.166*** |
| | [0.001] | [0.009] | | | | | | | [0.001] | [0.008] |
| Distance | | | -0.053** | -0.084*** | | | | | -0.044* | -0.087*** |
| | | | [0.030] | [0.003] | | | | | [0.092] | [0.005] |
| Domestic lenders | | | | | 0.054 | 0.041 | | | | |
| | | | | | [0.108] | [0.255] | | | | |
| Experience | | | | | | | 0.057*** | 0.048** | 0.064*** | 0.052*** |
| | | | | | | | [0.003] | [0.011] | [0.001] | [0.005] |
| Experience sq. | | | | | | | -0.002*** | -0.002** | -0.003*** | -0.003*** |
| | | | | | | | [0.010] | [0.011] | [0.001] | [0.001] |
| Exposure | -0.986 | -6.045*** | -0.943 | -6.477*** | -0.997 | -5.709*** | -0.754 | -4.481** | -0.882 | -6.220*** |
| | [0.246] | [0.002] | [0.233] | [0.001] | [0.223] | [0.004] | [0.257] | [0.012] | [0.287] | [0.001] |
| State support | -0.099* | | -0.112** | | -0.103* | | -0.101* | | -0.105* | |
| | [0.065] | | [0.043] | | [0.061] | | [0.068] | | [0.052] | |
| Size | 0.053** | | 0.077*** | | 0.057*** | | 0.061*** | | 0.070*** | |
| | [0.012] | | [0.000] | | [0.007] | | [0.010] | | [0.006] | |
| Solvency | 0.538 | | 0.842 | | 0.356 | | 0.32 | | 0.77 | |
| | [0.698] | | [0.553] | | [0.798] | | [0.816] | | [0.578] | |
| Solvency change | -0.043 | | -0.038 | | -0.043 | | -0.045 | | -0.037 | |
| | [0.346] | | [0.450] | | [0.363] | | [0.360] | | [0.452] | |
| Liquidity | 8.02 | | 8.068 | | 8.675* | | 8.685* | | 7.324 | |
| | [0.117] | | [0.126] | | [0.096] | | [0.083] | | [0.132] | |
| Liquidity change | -0.963 | | -0.475 | | -0.553 | | -0.434 | | -0.964 | |
| | [0.694] | | [0.852] | | [0.828] | | [0.863] | | [0.689] | |
| Profitability | -0.169** | | -0.146* | | -0.177** | | -0.183** | | -0.141 | |
| | [0.026] | | [0.094] | | [0.022] | | [0.028] | | [0.110] | |
| Profitability change | 5.593* | | 4.508 | | 5.458 | | 5.359 | | 4.875 | |
| | [0.092] | | [0.180] | | [0.107] | | [0.110] | | [0.129] | |
| Country FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE? | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| Observations | 2200 | 2257 | 2200 | 2257 | 2200 | 2257 | 2200 | 2257 | 2200 | 2257 |
| R-squared | 0.19 | 0.26 | 0.18 | 0.26 | 0.18 | 0.25 | 0.18 | 0.25 | 0.19 | 0.26 |

| | Advanced countries | | | | | Emerging markets | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subsidiary | 0.058 | | | | 0.024 | 0.267*** | | | | 0.225*** |
| | [0.507] | | | | [0.785] | [0.003] | | | | [0.010] |
| Distance | | -0.131*** | | | -0.138*** | | -0.119*** | | | -0.091** |
| | | [0.002] | | | [0.003] | | [0.007] | | | [0.041] |
| Domestic lenders | | | 0.05 | | | | | 0.087* | | 0.032 |
| | | | [0.529] | | | | | [0.079] | | [0.526] |
| Experience | | | | 0.074** | 0.083** | | | | 0.019 | |
| | | | | [0.029] | [0.014] | | | | [0.522] | |
| Experience sq. | | | | -0.003* | -0.004** | | | | -0.001 | |
| | | | | [0.056] | [0.017] | | | | [0.451] | |
| Exposure | -0.554 | -0.771** | -0.644 | -0.547 | -0.736* | -0.861 | -0.834 | -0.702 | -0.3 | -1.303* |
| | [0.133] | [0.047] | [0.113] | [0.148] | [0.072] | [0.192] | [0.227] | [0.312] | [0.680] | [0.073] |
| Country FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1086 | 1086 | 1086 | 1086 | 1086 | 1171 | 1171 | 1171 | 1171 | 1171 |
| R-squared | 0.31 | 0.32 | 0.31 | 0.32 | 0.33 | 0.31 | 0.30 | 0.30 | 0.30 | 0.31 |

# Table 3
# Information and crisis transmission - Variation across subsidiary types

The dependent variable is the percentage change in average monthly cross-border lending of bank i to country j in the period after the collapse of Lehman (Oct 2008-Oct 2009) compared to the pre-crisis period (Jan 2005-July 2007). The columns show regressions for the full country sample ('All') or for the emerging markets sample ('EMs'). *Interaction sub*distance* is an interaction term between the subsidiary dummy and the distance between the parent bank and country j. *Age* are three dummy variables that indicate whether a subsidiary is present in country j that was established 0-5 years ago, 6-15 years ago, or longer than 15 years ago, respectively. Definitions of the other variables are given in Table 1. All models are estimated using OLS and include country fixed effects as well as bank fixed effects. Standard errors are heteroskedasticity robust and clustered by bank. Robust p-values appear in brackets and ***, **, * correspond to one, five and ten percent level of significance, respectively.

| Country sample | All | EMs | All | EMs | All | EMs | All | EMs | All | EMs |
|---|---|---|---|---|---|---|---|---|---|---|
| Subsidiary | 0.144** | 0.249*** | 0.143** | 0.215** | 0.583** | 1.331** | | | | |
| | [0.012] | [0.008] | [0.020] | [0.037] | [0.042] | [0.014] | | | | |
| Sub size relative to parent | 0.472 | 0.769 | | | | | | | | |
| | [0.405] | [0.649] | | | | | | | | |
| Sub size relative to country | | | 0.337 | 0.688 | | | | | | |
| | | | [0.111] | [0.291] | | | | | | |
| Interaction sub*distance | | | | | -0.054 | -0.134** | | | | |
| | | | | | [0.135] | [0.046] | | | | |
| Greenfield subsidiary | | | | | | | 0.173* | 0.198 | | |
| | | | | | | | [0.081] | [0.211] | | |
| M&A subsidiary | | | | | | | 0.180** | 0.301*** | | |
| | | | | | | | [0.010] | [0.003] | | |
| Age 0-5 years | | | | | | | | | 0.177 | 0.127 |
| | | | | | | | | | [0.153] | [0.403] |
| Age 6-15 years | | | | | | | | | 0.169** | 0.274** |
| | | | | | | | | | [0.028] | [0.031] |
| Age over 15 years | | | | | | | | | 0.175** | 0.418*** |
| | | | | | | | | | [0.039] | [0.003] |
| Distance | -0.088*** | -0.107** | -0.085*** | -0.109** | -0.073** | -0.083* | -0.087*** | -0.108** | -0.087*** | -0.106** |
| | [0.005] | [0.021] | [0.007] | [0.017] | [0.022] | [0.086] | [0.006] | [0.019] | [0.006] | [0.022] |
| Experience | 0.053*** | 0.021 | 0.053*** | 0.023 | 0.053*** | 0.021 | 0.052*** | 0.02 | 0.052*** | 0.023 |
| | [0.005] | [0.471] | [0.005] | [0.431] | [0.004] | [0.466] | [0.005] | [0.489] | [0.005] | [0.445] |
| Experience sq. | -0.003*** | -0.002 | -0.003*** | -0.002 | -0.003*** | -0.002 | -0.003*** | -0.002 | -0.003*** | -0.002 |
| | [0.001] | [0.179] | [0.001] | [0.125] | [0.001] | [0.163] | [0.001] | [0.188] | [0.001] | [0.168] |
| Country FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2257 | 1171 | 2257 | 1171 | 2257 | 1171 | 2257 | 1171 | 2257 | 1171 |
| R-squared | 0.26 | 0.31 | 0.27 | 0.31 | 0.26 | 0.31 | 0.26 | 0.31 | 0.26 | 0.31 |

# Table 4
# Distance and crisis transmission

The dependent variable is the percentage change in average monthly cross-border lending of bank i to country j in the period after the collapse of Lehman Brothers (Oct 2008-Oct 2009) compared to the pre-crisis period (Jan 2005-July 2007). *Distance* is the log of the distance (in kilometers) between the home country of the bank and the borrower country. *Border* is a dummy which is one if the home country of the bank and the borrower country share a common border. *Language* is a dummy which is one if the home country of the bank and the borrower country share the same language. *Colonial links* is a dummy which is one if the home country of the bank and the borrower country shared the same colonizer or one country used to be the colony of the other country. *Legal rights* measures the difference between the score of the home country of the bank and the borrower country on the Doing Business legal rights index (this index measures the degree to which collateral and bankruptcy laws facilitate lending). *Credit info* measures the difference between the score of the home country of the bank and the borrower country on the Doing Business credit information index (this index captures rules affecting scope, access and quality of credit information). The model is estimated using OLS and includes country fixed effects and bank fixed effects. Standard errors are heteroskedasticity robust and clustered by bank. Robust p-values appear in brackets and ***, **, * correspond to one, five and ten percent level of significance, respectively.

| | All countries | | | | | | |
|---|---|---|---|---|---|---|---|
| Distance | -0.099*** | | | | | | -0.093*** |
| | [0.001] | | | | | | [0.007] |
| Border | | 0.159*** | | | | | 0.041 |
| | | [0.006] | | | | | [0.526] |
| Language | | | 0.066 | | | | |
| | | | [0.234] | | | | |
| Colonial links | | | | 0.2 | | | |
| | | | | [0.136] | | | |
| Legal rights | | | | | 0.007 | | |
| | | | | | [0.602] | | |
| Credit info | | | | | | 0.014 | |
| | | | | | | [0.603] | |
| Experience | 0.047** | 0.049*** | 0.048** | 0.045** | 0.047** | 0.047** | 0.048** |
| | [0.011] | [0.008] | [0.010] | [0.015] | [0.012] | [0.011] | [0.010] |
| Experience sq. | -0.003*** | -0.002*** | -0.002*** | -0.002** | -0.002** | -0.002** | -0.003*** |
| | [0.004] | [0.006] | [0.009] | [0.012] | [0.012] | [0.011] | [0.004] |
| Exposure | -5.643*** | -5.342*** | -4.678*** | -4.427** | -4.420** | -4.339** | -5.800*** |
| | [0.002] | [0.004] | [0.010] | [0.013] | [0.012] | [0.012] | [0.002] |
| Country FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2257 | 2257 | 2257 | 2257 | 2257 | 2257 | 2257 |
| R-squared | 0.259 | 0.255 | 0.254 | 0.255 | 0.254 | 0.254 | 0.259 |

## Table 5
## First-time versus repeat borrowers

The dependent variable is the percentage change in average monthly cross-border lending of bank i to country j in the period after the collapse of Lehman (Oct 2008-Oct 2009) compared to the pre-crisis period (Jan 2005-July 2007). The first set of regressions includes lending to first-time borrowers, defined as borrowers that never before borrowed from bank i. The second set of regressions includes lending to repeat borrowers, borrowers to whom bank i has lent at least once. Definitions of all variables are given in Table 1. The model is estimated using OLS and includes country fixed effects and bank fixed effects. Standard errors are heteroskedasticity robust and clustered by bank. Robust p-values appear in brackets and ***, **, * correspond to one, five and ten percent level of significance, respectively.

| | All countries | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | First-time borrowers | | | | Repeat borrowers | | | |
| Subsidiary | 0.353*** | | | | 0.085 | | | |
| | [0.001] | | | | [0.195] | | | |
| Distance | | -0.169*** | | | | -0.034 | | |
| | | [0.002] | | | | [0.359] | | |
| Domestic lenders | | | 0.067 | | | | 0.059 | |
| | | | [0.335] | | | | [0.219] | |
| Experience | | | | 0.225*** | | | | 0.162* |
| | | | | [0.001] | | | | [0.061] |
| Experience sq. | | | | -0.039*** | | | | -0.021* |
| | | | | [0.001] | | | | [0.093] |
| Exposure | -8.443** | -8.914*** | -7.254** | -2.053 | 0.364 | 0.597 | 0.134 | 1.909 |
| | [0.012] | [0.004] | [0.030] | [0.542] | [0.895] | [0.827] | [0.963] | [0.589] |
| Country FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Bank FE? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1848 | 1848 | 1848 | 1848 | 1371 | 1371 | 1371 | 1371 |
| R-squared | 0.285 | 0.284 | 0.278 | 0.282 | 0.251 | 0.251 | 0.251 | 0.253 |

## Appendix Table 1

## List of international lenders

This table lists all 118 banks in our sample, ordered by country of incorporation. *Pre-crisis* refers to the period Jan 2005-July 2007 and *post-Lehman* to the period Oct 2008-Oct 2009. *Share of cross-border in total lending* measures the volume of cross-border syndicated lending of the bank divided by the total volume of syndicated lending by that bank (in percent). *Volume of cross-border lending* measures the total volume of cross-border syndicated lending by the bank in USD millions. *Number of cross-border loans* measures the number of cross-border syndications the bank took part in. *Market share* measures the market share of the bank in 2006 in the total global market for cross-border syndicated lending (in percentage points).

| | | Share of cross-border in total lending | | Volume of cross-border lending (USD m) | | Number of cross-border loans | | Market share (ppts.) |
|---|---|---|---|---|---|---|---|---|
| | Name | Pre-crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman | Pre-crisis | Crisis: post-Lehman | Pre-crisis |
| Australia | National Australia Bank | 55 | 31 | 21,082 | 2,507 | 266 | 51 | 0.44 |
| Australia | ANZ | 36 | 43 | 15,114 | 5,388 | 231 | 80 | 0.26 |
| Australia | Commonwealth Bank of Australia | 33 | 23 | 10,507 | 2,437 | 141 | 32 | 0.25 |
| Australia | Westpac | 30 | 17 | 10,323 | 1,729 | 125 | 35 | 0.23 |
| Austria | RZB | 94 | 97 | 18,504 | 4,196 | 783 | 55 | 0.38 |
| Austria | Erste Group Bank AG | 96 | 96 | 9,754 | 927 | 482 | 21 | 0.26 |
| Austria | Hypo Alpe-Adria-Bank | 99 | 100 | 1,089 | 133 | 48 | 2 | 0.05 |
| Austria | Oesterreichische Volksbanken AG | 93 | 90 | 1,861 | 198 | 64 | 6 | 0.03 |
| Austria | BAWAGPSK | 88 | 100 | 1,190 | 187 | 89 | 3 | 0.03 |
| Bahrain | Gulf International Bank BSC | 97 | 100 | 5,924 | 75 | 111 | 1 | 0.14 |
| Bahrain | Arab Banking Corp - BSC | 94 | 100 | 4,787 | 302 | 100 | 8 | 0.09 |
| Belgium | Fortis | 85 | 80 | 77,901 | 8,732 | 1,269 | 149 | 1.53 |
| Belgium | KBC | 87 | 85 | 31,153 | 3,786 | 646 | 62 | 0.62 |
| Belgium | Dexia | 91 | 93 | 18,830 | 4,042 | 180 | 53 | 0.57 |
| Canada | Scotia Capital | 72 | 68 | 65,979 | 17,694 | 805 | 200 | 1.26 |
| Canada | BMO Capital Markets | 65 | 51 | 33,341 | 7,926 | 718 | 152 | 0.74 |
| Canada | RBC Capital Markets | 63 | 55 | 38,825 | 9,260 | 376 | 110 | 0.67 |
| Canada | TD Securities Inc | 51 | 56 | 18,785 | 8,225 | 312 | 138 | 0.36 |
| Canada | CIBC World Markets | 44 | 9 | 13,538 | 615 | 166 | 19 | 0.25 |
| China | Bank of China Ltd | 87 | 73 | 21,422 | 8,630 | 505 | 68 | 0.48 |
| China | Industrial & Commercial Bank of China - ICBC | 89 | 52 | 6,197 | 2,201 | 225 | 42 | 0.15 |
| China | Bank of Communications Co Ltd | 88 | 32 | 3,329 | 512 | 102 | 18 | 0.09 |
| China | China Construction Bank Corp - CCB | 72 | 33 | 3,577 | 723 | 159 | 20 | 0.08 |
| China | China Merchants Securities Co Ltd | 90 | 33 | 3,646 | 431 | 59 | 16 | 0.06 |
| China | Agricultural Bank of China | 71 | 9 | 1,574 | 137 | 69 | 6 | 0.03 |
| China | CITIC Group | 68 | 52 | 1,187 | 578 | 78 | 14 | 0.02 |
| Denmark | Danske Bank | 86 | 78 | 25,299 | 5,072 | 406 | 39 | 0.65 |
| Egypt | National Bank of Egypt | 75 | 100 | 1,306 | 174 | 126 | 2 | 0.04 |
| France | BNP Paribas | 78 | 85 | 213,787 | 45,450 | 2,359 | 474 | 5.10 |
| France | Calyon | 69 | 76 | 136,839 | 28,928 | 1,681 | 358 | 2.86 |
| France | SG Corporate & Investment Banking | 73 | 82 | 112,182 | 25,394 | 1,341 | 293 | 2.62 |
| France | Natixis | 55 | 70 | 50,563 | 10,147 | 960 | 168 | 1.22 |
| France | Banque Federative du Credit Mutuel - BFCM | 46 | 68 | 18,209 | 5,637 | 269 | 52 | 0.38 |
| France | CASDEN Banque Populaire | 40 | 16 | 2,415 | 94 | 64 | 4 | 0.12 |
| Germany | Deutsche Bank | 91 | 91 | 252,748 | 36,460 | 1,464 | 290 | 5.44 |
| Germany | Commerzbank Group | 71 | 72 | 125,951 | 16,476 | 1,792 | 152 | 3.13 |
| Germany | DZ Bank | 79 | 59 | 21,911 | 4,762 | 478 | 59 | 0.50 |
| Germany | NordLB | 74 | 67 | 9,852 | 2,028 | 301 | 32 | 0.17 |
| Germany | WGZ | 60 | 7 | 1,333 | 20 | 146 | 2 | 0.03 |
| Greece | Alpha Bank | 62 | 100 | 2,405 | 23 | 185 | 1 | 0.07 |
| Greece | National Bank of Greece | 64 | 96 | 1,919 | 496 | 178 | 21 | 0.03 |
| Hong Kong | Bank of East Asia | 64 | 73 | 2,104 | 614 | 131 | 22 | 0.05 |
| Hong Kong | Iyo Finance (Hong Kong) Ltd | 100 | 100 | 1,044 | 513 | 197 | 55 | 0.03 |
| India | SBI Capital Markets Ltd | 60 | 11 | 3,016 | 1,475 | 190 | 27 | 0.06 |
| India | ICICI Bank | 69 | 67 | 1,954 | 562 | 91 | 7 | 0.04 |
| Ireland | Bank of Ireland | 91 | 94 | 25,197 | 3,848 | 486 | 62 | 0.54 |
| Ireland | Allied Irish Banks plc | 92 | 95 | 25,778 | 2,454 | 561 | 51 | 0.53 |
| Israel | Bank Hapoalim BM | 100 | 100 | 3,490 | 48 | 149 | 2 | 0.09 |
| Israel | Bank Leumi Le-Israel BM | 100 | 100 | 2,191 | 329 | 63 | 13 | 0.06 |

## Appendix Table 1- cont'd

| | | Share of cross-border in total lending | | Volume of cross-border lending (USD m) | | Number of cross-border loans | | Market share (ppts.) |
|---|---|---|---|---|---|---|---|---|
| | Name | Pre-crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post- Lehman | Pre-crisis | Crisis: post-Lehman | Pre-crisis |
| Israel | Israel Discount Bank Ltd | 100 | 100 | 1,338 | 403 | 69 | 13 | 0.04 |
| Italy | UniCredit Group | 83 | 87 | 86,313 | 11,476 | 1,582 | 143 | 1.78 |
| Italy | Intesa Sanpaolo | 66 | 74 | 41,266 | 10,448 | 763 | 102 | 0.93 |
| Italy | Monte dei Paschi | 70 | 15 | 8,112 | 419 | 208 | 13 | 0.11 |
| Italy | Gruppo Banco Popolare di Verona e Novara Scarl | 51 | 1 | 3,180 | 16 | 117 | 1 | 0.05 |
| Japan | Mitsubishi UFJ Financial Group | 67 | 38 | 174,833 | 39,457 | 2,243 | 544 | 3.44 |
| Japan | Mizuho | 52 | 21 | 100,243 | 14,541 | 1,557 | 167 | 2.33 |
| Japan | Sumitomo Mitsui Financial Group, Inc | 45 | 19 | 78,368 | 15,660 | 1,364 | 211 | 1.54 |
| Japan | Nomura | 100 | 53 | 24,087 | 272 | 113 | 6 | 0.58 |
| Japan | Norinchukin Bank Ltd | 22 | 5 | 3,012 | 389 | 64 | 10 | 0.05 |
| Jordan | Arab Bank Group | 100 | 100 | 7,361 | 731 | 150 | 11 | 0.16 |
| Luxembourg | BCEE | 86 | 17 | 1,750 | 25 | 86 | 1 | 0.03 |
| Macao | Tai Fung Bank Ltd | 100 | 100 | 2,694 | 175 | 48 | 3 | 0.08 |
| Malaysia | Maybank Investment Bank Bhd | 93 | 83 | 3,070 | 536 | 156 | 17 | 0.08 |
| Malaysia | CIMB Group | 45 | 62 | 1,024 | 266 | 89 | 6 | 0.02 |
| Netherlands | ING | 86 | 84 | 98,876 | 15,820 | 1,418 | 204 | 1.99 |
| Netherlands | Rabobank | 78 | 75 | 33,342 | 6,723 | 659 | 132 | 0.73 |
| Netherlands | NIBC Bank | 63 | 43 | 3,693 | 481 | 83 | 12 | 0.09 |
| Norway | DnB NOR Bank ASA | 63 | 57 | 24,295 | 2,666 | 308 | 41 | 0.56 |
| Oman | Bank Muscat SAOG | 64 | 100 | 958 | 11 | 76 | 1 | 0.02 |
| Portugal | Caixa Geral de Depositos SA - CGD | 95 | 57 | 7,667 | 1,928 | 185 | 25 | 0.21 |
| Portugal | Banco Espirito Santo de Investimento | 94 | 57 | 5,686 | 1,352 | 117 | 29 | 0.17 |
| Portugal | Banco BPI | 93 | 22 | 2,347 | 253 | 60 | 5 | 0.11 |
| Qatar | Qatar National Bank | 56 | 15 | 1,904 | 45 | 56 | 3 | 0.04 |
| Qatar | Commercial Bank of Qatar QSC | 47 | 0 | 661 | 0 | 51 | 0 | 0.02 |
| Qatar | Doha Bank QSC | 65 | 19 | 568 | 36 | 55 | 3 | 0.01 |
| Singapore | DBS | 85 | 68 | 14,064 | 3,195 | 398 | 93 | 0.29 |
| Singapore | UOB | 86 | 48 | 9,678 | 1,137 | 282 | 33 | 0.24 |
| Singapore | Oversea-Chinese Banking Corp Ltd | 69 | 46 | 4,189 | 1,106 | 182 | 32 | 0.15 |
| South Africa | Standard Bank | 88 | 100 | 4,993 | 1,205 | 227 | 21 | 0.11 |
| Spain | BBVA | 79 | 77 | 55,402 | 18,017 | 781 | 217 | 1.50 |
| Spain | Banco Santander SA | 64 | 66 | 46,243 | 16,121 | 660 | 163 | 0.98 |
| Spain | Caja Madrid | 55 | 48 | 14,825 | 3,503 | 114 | 19 | 0.34 |
| Sweden | Nordea Bank AB | 84 | 88 | 40,912 | 7,206 | 451 | 75 | 1.09 |
| Sweden | SEB | 67 | 79 | 20,001 | 4,510 | 248 | 41 | 0.46 |
| Sweden | Svenska Handelsbanken AB | 76 | 91 | 17,383 | 3,389 | 163 | 33 | 0.39 |
| Sweden | Swedbank Markets | 51 | 53 | 3,722 | 626 | 105 | 8 | 0.10 |
| Switzerland | Credit Suisse | 97 | 93 | 167,344 | 23,598 | 1,083 | 155 | 3.59 |
| Switzerland | UBS | 97 | 87 | 106,681 | 18,008 | 854 | 160 | 2.31 |
| Taiwan | First Commercial Bank Co Ltd | 72 | 63 | 4,731 | 1,363 | 183 | 24 | 0.13 |
| Taiwan | Chang Hwa Commercial Bank Ltd | 72 | 42 | 4,544 | 954 | 190 | 33 | 0.13 |
| Taiwan | Mega International Commercial Bank Co Ltd | 59 | 53 | 5,564 | 966 | 276 | 34 | 0.11 |
| Taiwan | Bank of Taiwan | 52 | 51 | 3,000 | 690 | 170 | 20 | 0.08 |
| Taiwan | Hua Nan Commercial Bank Ltd | 53 | 26 | 2,351 | 301 | 144 | 13 | 0.05 |
| Taiwan | Cathay United Bank Co Ltd | 28 | 14 | 1,051 | 116 | 83 | 10 | 0.04 |
| Taiwan | Fubon Financial Holding Co Ltd | 27 | 25 | 1,158 | 364 | 70 | 14 | 0.03 |
| Taiwan | Taiwan Cooperative Bank | 30 | 15 | 1,085 | 178 | 62 | 11 | 0.03 |
| Taiwan | Shanghai Commercial & Savings Bank Ltd | 47 | 3 | 1,184 | 11 | 81 | 2 | 0.02 |
| Taiwan | Chinatrust Commercial Bank | 23 | 47 | 1,098 | 661 | 65 | 24 | 0.01 |
| Thailand | Bangkok Bank Ltd | 86 | 31 | 1,024 | 68 | 94 | 8 | 0.03 |

## Appendix Table 1- cont'd

| | | Share of cross-border in total lending | | Volume of cross-border lending (USD m) | | Number of cross-border loans | | Market share (ppts.) |
|---|---|---|---|---|---|---|---|---|
| | Name | Pre-crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post- Lehman | Pre-crisis | Crisis: post-Lehman | Pre-crisis |
| Turkey | Turkiye Garanti Bankasi AS | 100 | 100 | 1,123 | 29 | 103 | 2 | 0.02 |
| UAE | Mashreqbank PSC | 73 | 44 | 2,853 | 113 | 147 | 3 | 0.04 |
| UAE | Emirates NBD PJSC | 42 | 20 | 2,042 | 112 | 155 | 2 | 0.04 |
| UK | RBS / ABN AMRO | 77 | 79 | 360,862 | 44,010 | 2,930 | 445 | 8.33 |
| UK | Barclays Capital | 78 | 81 | 247,708 | 33,772 | 1,604 | 254 | 4.69 |
| UK | HSBC | 78 | 86 | 144,716 | 34,130 | 1,978 | 422 | 2.76 |
| UK | Lloyds Banking Group | 51 | 60 | 61,802 | 11,597 | 871 | 122 | 1.43 |
| UK | Standard Chartered Bank | 92 | 89 | 40,274 | 8,967 | 977 | 170 | 1.00 |
| UK | NM Rothschild | 88 | 100 | 2,188 | 7 | 60 | 1 | 0.03 |
| US | Citi | 48 | 36 | 234,311 | 30,775 | 1,646 | 195 | 4.85 |
| US | JPMorgan | 27 | 18 | 145,908 | 17,519 | 788 | 118 | 3.18 |
| US | Goldman Sachs | 52 | 24 | 76,400 | 6,302 | 204 | 21 | 1.47 |
| US | Bank of America - Merrill Lynch | 15 | 11 | 78,935 | 9,297 | 692 | 119 | 1.41 |
| US | Morgan Stanley | 49 | 22 | 58,251 | 4,113 | 210 | 35 | 1.12 |
| US | GE Capital Markets Inc | 24 | 28 | 18,074 | 3,043 | 275 | 30 | 0.47 |
| US | Wells - Wachovia Securities | 7 | 5 | 18,339 | 2,051 | 371 | 40 | 0.34 |
| US | Bank of New York Mellon Corp | 6 | 7 | 5,035 | 749 | 171 | 17 | 0.11 |
| US | Comerica Bank | 13 | 8 | 3,664 | 456 | 67 | 14 | 0.08 |
| US | PNC Bank NA | 37 | 22 | 25,992 | 3,763 | 764 | 120 | 0.05 |

# Appendix Table 2
## Overview of destination countries

This table lists all 60 destination countries in our sample. Pre-crisis refers to the period Jan 2005-July 2007 and post-Lehman to the period Oct 2008-Oct 2009. *Volume of cross-border lending* measures the total volume of cross-border syndicated lending to the country by the banks in our sample (USD millions). *Number of cross-border loans* measures the number of loans to the country in which at least one of the banks in our sample was active (as a cross-border lender). *Number of cross-border loan portions* measures the total number of individual loan portions provided by the banks in our sample to the country (e.g. a loan with five lenders of which three foreign lenders yields three loan portions). *Number of banks active* measures the number of different banks that were active as cross-border lenders in the country.

| Country | Volume of cross-border lending (USD m) | | Number of cross-border loans | | Number of cross-border loan portions | | Number banks active | |
|---|---|---|---|---|---|---|---|---|
| | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman |
| Argentina | 3,587 | 382 | 16 | 4 | 79 | 13 | 11 | 10 |
| Australia | 96,627 | 21,781 | 261 | 86 | 968 | 299 | 45 | 47 |
| Austria | 11,712 | 299 | 27 | 4 | 166 | 16 | 21 | 7 |
| Azerbaijan | 1,454 | 198 | 13 | 3 | 93 | 12 | 16 | 8 |
| Belgium | 88,158 | 7,504 | 86 | 14 | 654 | 67 | 45 | 30 |
| Brazil | 37,861 | 1,935 | 88 | 14 | 526 | 50 | 32 | 24 |
| Bulgaria | 3,615 | 39 | 15 | 2 | 111 | 2 | 12 | 1 |
| Canada | 109,142 | 22,490 | 421 | 154 | 1,404 | 419 | 46 | 54 |
| Chile | 9,454 | 538 | 51 | 5 | 312 | 14 | 24 | 11 |
| China | 29,170 | 4,397 | 176 | 43 | 1,027 | 137 | 55 | 37 |
| Croatia | 2,440 | 646 | 17 | 6 | 105 | 21 | 15 | 11 |
| Czech Republic | 6,192 | 1,415 | 31 | 5 | 156 | 17 | 14 | 8 |
| Denmark | 59,826 | 13,913 | 66 | 9 | 441 | 36 | 45 | 23 |
| Egypt, Arab Rep. | 3,834 | 742 | 19 | 6 | 143 | 32 | 21 | 20 |
| Finland | 32,365 | 7,261 | 56 | 17 | 432 | 80 | 30 | 26 |
| France | 310,868 | 26,308 | 518 | 55 | 2,701 | 175 | 64 | 40 |
| Germany | 316,539 | 43,973 | 363 | 38 | 2,294 | 226 | 65 | 49 |
| Greece | 18,284 | 958 | 72 | 4 | 319 | 15 | 29 | 12 |
| Hong Kong, China | 57,417 | 6,494 | 226 | 30 | 1,875 | 205 | 57 | 48 |
| Hungary | 8,885 | 430 | 25 | 2 | 183 | 16 | 20 | 14 |
| Iceland | 10,551 | 4,288 | 41 | 1 | 369 | 11 | 39 | 10 |
| India | 31,166 | 2,265 | 195 | 22 | 1,635 | 53 | 68 | 26 |
| Indonesia | 5,042 | 4,280 | 52 | 21 | 270 | 65 | 32 | 26 |
| Iran, Islamic Rep. | 2,552 | 0 | 10 | 0 | 56 | 0 | 8 | 0 |
| Ireland | 20,531 | 4,241 | 41 | 20 | 237 | 40 | 26 | 16 |
| Italy | 83,724 | 19,630 | 334 | 63 | 1,035 | 197 | 43 | 36 |
| Japan | 33,429 | 11,910 | 431 | 90 | 718 | 179 | 34 | 29 |
| Kazakhstan | 16,559 | 653 | 70 | 3 | 829 | 17 | 62 | 16 |
| Korea, Rep. | 20,209 | 4,708 | 134 | 27 | 817 | 111 | 51 | 30 |
| Kuwait | 10,574 | 1,491 | 30 | 7 | 292 | 17 | 40 | 10 |
| Latvia | 2,359 | 0 | 24 | 0 | 233 | 0 | 35 | 0 |
| Luxembourg | 64,336 | 43,995 | 40 | 10 | 498 | 108 | 46 | 38 |
| Malaysia | 16,716 | 1,600 | 56 | 15 | 299 | 27 | 27 | 11 |
| Mexico | 41,019 | 8,097 | 100 | 18 | 701 | 115 | 35 | 32 |
| Netherlands | 155,037 | 13,078 | 183 | 27 | 1,155 | 153 | 63 | 48 |
| New Zealand | 23,184 | 6,363 | 99 | 32 | 326 | 114 | 13 | 21 |
| Nigeria | 2,963 | 478 | 15 | 7 | 60 | 12 | 8 | 6 |
| Norway | 50,639 | 4,927 | 216 | 26 | 837 | 62 | 47 | 18 |
| Oman | 2,740 | 0 | 15 | 0 | 105 | 0 | 20 | 0 |
| Peru | 1,425 | 487 | 8 | 4 | 54 | 8 | 7 | 7 |
| Philippines | 3,004 | 1,343 | 21 | 7 | 157 | 40 | 22 | 19 |
| Poland | 9,788 | 3,147 | 30 | 6 | 227 | 34 | 24 | 19 |

## Appendix Table 2 - cont'd

| Country | Volume of cross-border lending (USD m) | | Number of cross-border loans | | Number of cross-border loan portions | | Number banks active | |
|---|---|---|---|---|---|---|---|---|
| | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman | Pre- crisis | Crisis: post-Lehman |
| Portugal | 6,270 | 2,311 | 22 | 5 | 172 | 27 | 27 | 16 |
| Qatar | 13,649 | 3,379 | 27 | 7 | 232 | 36 | 31 | 19 |
| Romania | 3,728 | 754 | 36 | 4 | 226 | 18 | 23 | 12 |
| Russian Federation | 123,809 | 11,138 | 326 | 20 | 2,856 | 127 | 76 | 34 |
| Saudi Arabia | 22,997 | 0 | 27 | 0 | 270 | 0 | 32 | 0 |
| Slovenia | 3,815 | 1,417 | 19 | 7 | 172 | 43 | 22 | 19 |
| South Africa | 22,980 | 2,973 | 32 | 10 | 334 | 41 | 30 | 30 |
| Spain | 183,176 | 18,993 | 269 | 60 | 1,359 | 238 | 46 | 36 |
| Sweden | 66,016 | 4,605 | 117 | 11 | 664 | 30 | 41 | 15 |
| Switzerland | 100,474 | 17,095 | 101 | 16 | 882 | 158 | 56 | 46 |
| Taiwan, China | 9,705 | 1,326 | 229 | 48 | 491 | 80 | 25 | 19 |
| Thailand | 6,512 | 277 | 47 | 5 | 236 | 20 | 28 | 15 |
| Turkey | 41,565 | 6,615 | 128 | 18 | 1,742 | 227 | 71 | 49 |
| Ukraine | 7,565 | 221 | 74 | 4 | 491 | 10 | 38 | 7 |
| United Arab Emirate | 26,941 | 3,053 | 69 | 7 | 531 | 22 | 55 | 16 |
| United Kingdom | 385,362 | 48,073 | 700 | 89 | 3,216 | 451 | 77 | 75 |
| United States | 1,322,710 | 281,858 | 4,530 | 1,053 | 13,878 | 3,376 | 82 | 85 |
| Vietnam | 1,108 | 408 | 15 | 5 | 34 | 15 | 6 | 14 |

## Appendix Table 3
## Variable definitions and sources

This table presents definitions and sources of all variables used in the paper. Pre-crisis refers to the period Jan 2005-July 2007 and post-Lehman to the period Oct 2008-Oct 2009. Loan Analytics is Dealogic's Loan Analytics database on syndicated loans. BankScope is Bureau van Dijk's database of bank balance sheet and income statement data. IFS are the International Financial Statistics provided by the International Monetary Fund. Doing Business is the World Bank Doing Business Survey (2008).

| Variable name | Measurement period | Description | Source |
|---|---|---|---|
| | | *Data on bank-destination country pairs (# banks = 118 and # of destination countries is 60)* | |
| Change in cross-border lending | Jan 2005-Oct 2009 | Percentage change in average monthly cross-border lending by bank i to country j in post-Lehman period compared to pre-crisis period | Loan Analytics |
| Subsidiary | End 2007 | Dummy variable that is 1 if bank i majority owns a bank subsidiary in country j | BankScope |
| Sub size relative to parent | End 2007 | Total assets of the subsidiary of bank i in country j as a percentage of total parent bank assets | BankScope |
| Sub size relative to country | End 2007 | Total assets of the subsidiary of bank i (stock) as a percentage of total bank lending in country j (stock) | BankScope/IFS line 22d |
| Greenfield subsidiary | End 2007 | Dummy variable that is one if bank i established a subsidiary from scratch in country j | Claessens et al. (2008) |
| M&A subsidiary | End 2007 | Dummy variable that is one if bank i established a subsidiary by taking over an existing bank in country j | Claessens et al. (2008) |
| Subsidiary age | 2000-Oct 2009 | Dummy variables that indicates whether the subsidiary was established 0-5 years ago, 6-15 years ago, or longer than 15 years ago, respectively | Claessens et al. (2008) |
| Distance | 2005 | Distance in km between bank i and country j according to the great circle distance formula | CIA World Factbook 2005 |
| Border | 2005 | Dummy variable that is one if the home country of bank i and country j share a common border | CIA World Factbook 2005 |
| Language | 2005 | Dummy variable that is one if the home country of bank i and country j share the same dominant language | CIA World Factbook 2005 |
| Colonial links | 2005 | Dummy variable that is one if the home country of bank i and country j shared the same colonizer or one country used to be the colony of the other country | CIA World Factbook 2005 |
| Legal rights | 2008 | Difference between the score of the home country of bank i and country j on a legal rights index that measures the degree to which collateral and bankruptcy laws facilitate lending | Doing Business |
| Credit info | 2008 | Difference between the score of the home country of bank i and country j on a credit information index that captures rules affecting scope, access and quality of credit information | Doing Business |
| Domestic lenders | 2000-Oct 2009 | Number of different lenders (banks, insurance companies, etc.) in country j (in logs) with whom bank i has cooperated in a syndicate between 2000 and the Lehman Brothers collapse | Loan Analytics |
| Experience | 2000-Oct 2009 | Number of six-month periods (since 2000) when bank i granted at least one loan to a borrower in country j. Experience sq. is the square of experience. | Loan Analytics |
| Exposure | Sep-09 | Volume of loans to country j as a percentage of total volume of syndicated loans in the portfolio of bank i at the moment of the Lehman Brothers collapse | Loan Analytics |
| | | *Bank data (# banks = 118)* | |
| State support | Aug 2007-Oct 2009 | Dummy that is one if bank i received government support during the financial crisis | Internet, various publications |
| Bank size | End 2006 | Total assets of bank i in billion US$ | BankScope |
| Bank solvency | End 2006 | Equity to total assets of bank i (in %) | BankScope |
| Change in bank solvency | End 2009-End 2006 | Percentage point change in bank solvency | BankScope |
| Bank liquidity | End-2006 | Liquid assets to deposits and other short-term funding of bank i (in %) | BankScope |
| Change in bank liquidity | End 2009-End 2006 | Percentage point change in bank liquidity | BankScope |
| Bank profitability | End 2006 | Profitability of bank i as measured by return on average assets (in %) | BankScope |
| Change in bank profitability | End 2009-End 2006 | Percentage point change in bank profitability | BankScope |