

Shocks Abroad, Pain at Home?

Bank-Firm Level Evidence on Financial Contagion during the Recent Financial Crisis

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March 2012

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Abstract

We identify the occurrence of contagion through international wholesale liquidity markets and through foreign bank ownership that occurred during the recent financial crisis. Compared to other domestic banks operating in Eastern Europe and Near Asia, internationally-borrowing and foreign banks contract lending more during the crisis, though less so when funded with retail deposits. However, firms that are connected to the internationally-borrowing banks remain unaffected, except for the least capitalized ones. Firms connected to foreign banks, on the other hand perform less, though smaller firms do better. Overall the estimates suggest an interaction between an international bank lending channel and a firm balance-sheet channel operating through the international wholesale liquidity markets and a potent international bank lending channel based on foreign ownership. (121 words)

Keywords: contagion, international transmission, foreign banks, international wholesale liquidity, bank lending channel, firm balance-sheet channel.

JEL: G21, F23, F36.

1. INTRODUCTION

The international bank lending channel has garnered substantial prominence during the recent crisis.¹ The U.S. and Western Europe suffered their worst banking crisis since the 1930s with international wholesale liquidity evaporating and Western banks suffering important capital losses, followed by a severe economic recession in developed countries. The main channel by which banks affect the economy at large is through a reduction in credit availability – i.e., a so-called bank lending channel. Globalization of the financial system, in particular of European banks, both through extended operations on the international wholesale liquidity market and through foreign bank ownership, has dramatically deepened over the last two decades and potentially could internationally transmit shocks through the banking sector, in turn generating an international bank lending channel.

In this paper we assess the potency of this international bank lending channel, exploiting the transmission of the 2007-08 crisis shock through two key channels that spring from international wholesale bank liquidity and foreign bank ownership. In particular we analyze the following questions: Does the financial crisis spread through international bank linkages? In particular, do banks that relied on international wholesale liquidity cut credit to firms? And do financial problems at parent banks propagate via their internal capital markets to subsidiaries contracting business lending in domestic markets? Are there consequently real effects for the domestic borrowers? And are there heterogeneous effects across their size and net worth for example? So ultimately the question this paper aims to answer: Is a globalized banking sector a shock propagator or a shock absorber?

We analyze 238 banks and 43,847 firms located across 14 countries in Eastern Europe and Near Asia. Banks there were initially not directly affected by the Western banking crisis

¹ Financial shocks of various types can be channeled internationally to affect bank lending abroad, as in Cetorelli and Goldberg (2011a), Kalemlı-Ozcan, Papaıoannou and Peydró (2010), Cetorelli and Goldberg (2011b), De Haas and Van Horen (2011), Kalemlı-Ozcan, Papaıoannou and Peydró (2011), and de Haas and van Horen (2012), among others. In a domestic context the bank lending channel mostly pertains to the transmission of monetary policy shocks (e.g., Bernanke (2007)).

but a substantial proportion of them were either domestic banks borrowing from international wholesale markets or foreign owned banks (mostly headquartered in Western Europe). To assess international contagion between banks, identify the bank lending channel controlling for borrower fundamentals, and analyse the real and heterogeneous effects of credit unavailability across firms we rely on a bank-level measure of international wholesale liquidity dependency, a comprehensive world-wide bank-ownership dataset and a corresponding dataset of bank-firm relationships matched with bank and firm balance sheets. Given these ingredients we can identify the differential impact of the crisis on firms connected to internationally-borrowing and foreign banks versus firm connected to local banks.

To accomplish such an analysis we need to link *five databases*. The bank-level variable on bank borrowing in international wholesale liquidity markets comes from *Dealogic*. Foreign bank ownership is derived from a comprehensive world-wide bank-ownership dataset compiled by *Claessens and van Horen (2012)*. The latter two databases are used in conjunction with *Bankscope* that records world-wide bank balance sheet data. *Amadeus* records balance sheet information on European non-financial firms; and – making the connection between banks and firms – *Kompass* records bank-firm connections for a subset of European non-financial firms, both large and small.

We analyze a matched sample of banks and firms over the period 2005 to 2009 to have sufficient coverage before and during the 2007-09 financial crisis. We analyze changes in bank lending and changes in firm real outcomes through difference-in-differences via domestic banks' borrowing before the crisis (or not) from international wholesale markets and foreign (or domestic) bank ownership. We control for unobservable fundamentals with bank-, respectively firm fixed effects in the bank- and firm-level analyses. Given the likely existence

of a regular domestic bank lending channel and a firm balance-sheet channel we also allow for differential effects of bank and firm balance-sheet characteristics during the crisis, and control for country*year fixed effects. Ours is the first paper – as far as we are aware – in the literature dealing with the international bank lending channel that accounts for both observable and unobservable firm heterogeneity (by including firm fixed effects) while analyzing real effects across more than one country.

We find that compared to domestically borrowing and owned banks, the internationally-borrowing (domestic) banks and the foreign owned banks cut back more on lending to firms during the crisis, though less so when funded more with retail deposits. In contrast, after comprehensively controlling for firm fundamentals (demand) we find that firms connected to internationally-borrowing banks do not perform worse than those connected to the other domestic banks, except for the less capitalized firms. Firms connected to foreign banks perform less, though the small firms do better. In sum, the results suggest an interaction between an international bank lending channel through international wholesale liquidity and a firm balance-sheet channel and the presence of an international bank lending channel through foreign ownership. Our findings have therefore important implications for both theory and policy, in that recognizing bank and firm heterogeneity is essential for our understanding of the impact of financial shocks.

The paper proceeds as follows. In Section 2 we review the literature. Section 3 discusses the data and the bank shocks we analyze. Section 4 presents and discusses the results. Section 5 concludes highlighting the policy implications.

2. Literature Review

Our paper is relevant for three related but usefully separable literatures on: (1) the bank lending channel and the financial crisis; (2) the international contagion through (a) cross-border lending, (b) liquidity shocks, and (c) foreign ownership; and (3) the role played by foreign banks in emerging markets. We now review each of these literatures.

2.1. *Bank Lending Channel and Financial Crisis*

Our empirical evidence is broadly consistent with theoretical and empirical work on international contagion (Allen and Gale (2000); Morgan, Rime and Strahan (2004)) and the bank lending channel (Bernanke and Blinder (1988); Bernanke and Gertler (1989); Bernanke and Blinder (1992); Holmstrom and Tirole (1997); Stein (1998); Kashyap and Stein (2000); Khwaja and Mian (2008); Jiménez, Ongena, Peydró and Saurina (2011)), and also fits in the quickly expanding literature dealing with the recent crisis (Chari, Christiano and Kehoe (2008), Cohen-Cole, Duygan-Bump, Fillat and Montoriol-Garriga (2008), Huang (2010), Ivashina and Scharfstein (2010)).

We contribute to both by providing the first evidence on the potency and real implications of the international bank lending channel during the recent crisis using firm-level data.² Importantly, and in contrast to other studies, we rely on recorded bank – firm

² Claessens, Tong and Wei (2011) study if changes in external financing conditions, domestic demand, and international trade during the 2007-2009 crisis affect the profits, sales and investment of 7,722 firms across 42 countries. The crisis had a larger negative impact on firms with greater sensitivity to demand and trade, especially in countries more open to trade, but financial openness appears to play only a limited role. Amiti and Weinstein (2011) studies how the deterioration in Japanese bank health between 1990 and 2010 through the contraction in (domestic) trade financing shrank Japanese firm-level exporting.

connections to identify the impact on individual firm financial and operating performance across multiple countries of different shocks that affected different banks.

2.2. *International Contagion*

2.2.1. Cross-Border Lending

In particular our paper contributes to a nascent literature that empirically analyzes international contagion during the recent crisis through cross-border bank lending. Cetorelli and Goldberg (2011a) and Kalemli-Ozcan, Papaioannou and Perri (2011) for example analyze contagion during the recent crisis at the country-level with the international banking data from the Bank for International Settlements. Their results suggest that there is an international contagion channel of international banking.

Looking at cross-border syndicated lending at the bank level de Haas and van Horen (2012) find also evidence of an international bank lending channel. They show that banks that were hit by a funding shock during the current crisis reduced cross-border lending more, especially to smaller firms, than banks that were not. In a related paper De Haas and Van Horen (2011) find that, controlling for differences in funding shocks, banks during the crisis continued to lend more to geographically close countries, and where they had a network of domestic lenders and past experience. Our study examines whether this contagion channel of international banking has any real effects.

2.2.2. Liquidity Shocks

Two papers analyze the international transmission of financial (liquidity) shocks with borrower-level data in one country. Puri, Rocholl and Steffen (2011) analyze household loan applications during the recent crisis following German (domestic) saving banks' exposure to

U.S. subprime assets, and Schnabl (2011) analyzes Peruvian bank lending to firms after the 1998 LTCM-Russian crisis.

Both studies have access to precise loan-level data (loan applications in the first case and credit register data in the second paper) which allow a very precise identification of credit supply, but differently from this paper they do not analyze real effects that are heterogeneous across borrowers. This is important as the bank lending channel implies real effects through changes in bank credit availability and the heterogeneous firm effects calls for a testing of the interaction between the international bank lending channel and the firm balance-sheet channel. Moreover, Puri, Rocholl and Steffen (2011) do not analyze the two international channels that we analyze in this paper (international liquidity and foreign bank ownership) and Schnabl (2011) does not analyze the recent financial crisis. In addition, we analyze more than one country.

2.2.3. Foreign Banks

Recent papers also show that foreign banks can contribute to financial instability by transmitting shocks during periods of turmoil. Popov and Udell (2012) find that foreign subsidiaries in emerging European countries reduced their lending more than domestic banks, and that result holds for foreign subsidiaries of large multinational banking groups vis-à-vis large domestic banks (de Haas and van Lelyveld (2011)). Similarly, Claessens and van Horen (2011) study a large group of foreign and domestic banks in 118 countries and find that during the global financial crisis foreign banks reduced credit more compared to domestic banks, but not when dominant in the local banking system.

Our paper adds to this literature by not only comparing lending contraction of domestic versus foreign banks, but by also differentiating between locally funded domestic banks and

domestic banks that used international wholesale liquidity to finance a domestic lending boom.

2.3. *Foreign Banks in Emerging Markets*

Finally, our paper contributes to the literature on the differences between domestic and foreign banks in emerging markets. Giannetti and Ongena (2009) and Bruno and Hauswald (2008) find that foreign bank presence benefits the real economy, while Gormley (2010) finds negative effects of foreign bank entry. Foreign banks are found to be more inclined to lend to large firms with foreign owners (Mian (2006), Berger, Klapper, Martinez Peria and Zaidi (2008) and Berger, Klapper and Udell (2001)).

On the other hand, foreign banks may induce domestic banks to increase lending to opaque firms (Dell'Ariccia and Marquez (2004)) and benefit all firms by indirectly enhancing credit access (Giannetti and Ongena (2011)) and spurring competition (Claessens, Demirgüç-Kunt and Huizinga (2001)). Our paper contributes to this literature by studying the heterogeneous impact on firm performance of firms linked to foreign compared to those linked to domestic banks.

3. IDENTIFICATION, DATA, SAMPLE AND SHOCKS

3.1. *Identification Strategy*

We aim to investigate if the real corporate growth is affected by shocks that emanate in the financial sector. Domestic banks that were borrowing on the international capital markets prior to the crisis may have suddenly faced adverse borrowing conditions there, while foreign banks may have internally retracted funds from their domestic subsidiaries. Firms connected

to these international and foreign banks may have been therefore differentially affected during the crisis years than firms connected to domestic local banks that were relying mostly on local funding and were domestically-owned.

Formally think of a firm i as being treated when the bank is shocked ($D_i = 1$) and not being treated when it is connected to a bank that is not shocked ($D_i = 0$). We are interested in the firm's performance, Y_i . Given the potentially negative effects of a bank funding shock on the firm's performance, our hypothesis is:

$$H_1: E[Y_i | D_i = 1] - E[Y_i | D_i = 0] < 0, \quad (1)$$

where $E[Y_i | D_i = 1]$ is the average firm's performance if it is treated, and $E[Y_i | D_i = 0]$ when it is not.³ As firms have as their main bank either an international/foreign bank (that is shocked), or a local bank (that is not shocked) we can infer what the performance of a firm connected to a non-local bank would have been had this bank not been affected by a shock by looking at the average firm's performance when they are connected to a local bank. Hence we rewrite expression (1) as:

$$\begin{aligned} E[Y_i | D_i = 1] - E[Y_i | D_i = 0] \\ &= E[Y_{Ii} | D_i = 1] - E[Y_{Oi} | D_i = 0], \\ &= (E[Y_{Ii} | D_i = 1] - E[Y_{Oi} | D_i = 1]) + (E[Y_{Oi} | D_i = 1] - E[Y_{Oi} | D_i = 0]), \end{aligned} \quad (2)$$

³ $E[\bullet]$ is the population average of a random variable. For continuous random variables, $E[Y_i] = \int yf(y)dy$, where $f(y)$ is the density of Y_i . Sample averages converge to population averages so $E[\bullet]$ gives the sample average in very large samples.

which equals the average treatment effect on the treated plus a selection bias (both between parentheses). The expression for the average treatment effect on the treated shows the counter-factual nature of the causal effect. The first term is the average performance of firms with a (domestic) international or a foreign bank; this is an observable quantity. The second term is the average performance of the same firms had their bank not been hit by a shock. This cannot be observed.

The selection bias then is due to the fact that the average performance of firms connected to local banks need not be a good proxy for the performance of firms connected to non-local banks had these banks not been affected by a shock. We will assess this selection bias by studying if firms connected to non-local and local banks perform differently prior to the crisis years. But before assessing this possible selection and then studying the crisis impact on firm performance, we first study loan growth by bank type before and during the crisis years in order to show that both international and foreign banks indeed reduced credit more during the crisis.

3.2. Databases

The final data set used in the analysis connects five databases lining up yearly information on balance-sheet items for both banks and firms connected to these banks for the period 2005 to 2009 for fourteen countries in Eastern Europe and Near Asia, i.e., Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Lithuania, Poland, Romania, Serbia and Montenegro, Slovakia, Slovenia, Turkey, and Ukraine.

We start by identifying those domestic banks in these countries that financed (part of their) pre-crisis lending by borrowing on international wholesale liquidity markets. Using

information from *Dealogic* we consider a bank an international borrower when it borrowed at least once between 2004 and 2007 from the international syndicated loan or bond market.

Next, we access the database on world-wide bank-ownership compiled by *Claessens and van Horen (2012)*. While this database provides panel information on bank ownership for virtually all banks in the world and identifies the home country of the parent bank for foreign owned banks, it does not provide information on the actual parent company. Therefore, we extend the database by matching foreign banks (i.e., those banks with 50 percent or more of their shares owned by foreigners) with their parents. We augment the bank information with local and headquarter balance-sheet information from *Bureau van Dijk Bankscope*.

Kompass provides the bank – firm connections that are crucial to our investigation. *Kompass* provides records for over two million firms in 70 countries including firm address, executive names, industry, turnover, date of incorporation and, critically for our purposes, the firms' primary bank relationships. Giannetti and Ongena (2011) were among the first to use this dataset in their investigation of which borrowers are able to benefit from a foreign bank presence in Eastern European emerging markets (see their paper and also Ongena and Şendeniz-Yüncü (2011) for a more detailed description of the dataset).

Kompass collects data using information provided by chambers of commerce and firm registries, but also conducts phone interviews with firm representatives. Firms are also able to voluntarily register with the *Kompass* directory, which is mostly sold to companies searching for customers and suppliers. We use the 2010 vintage of the database and take the prime bank – firm connection. We identify all firms that are connected to one of the banks in our sample.

Unfortunately *Kompass* does not provide any balance sheet information for the firms. To access this information we match *Kompass* to *Bureau van Dijk Amadeus*. This matching process is rather cumbersome as only a small portion of the firms can be matched directly by

name (as writing conventions differ between the two databases). We therefore match the rest of the firms using information on website, email address and/or telephone numbers. For the latter matching we consider a firm matched when we find a matching string of at least 6 consecutive numbers. We carefully checked the matched firms by cross-referencing address information to assure a correct match.

3.3. *Sample*

To assure the representativeness of banks and firms we require financial statements for at least three out of five years. Furthermore, we require all banks and firms to be active over the whole sample period as to avoid changes in the sample due to entries or exits. Our final sample consists of 208 different banks that are connected with 43,847 different firms.

Of the 238 banks, 116 are domestic- and 122 are foreign-owned. Among the domestic banks 40 banks borrowed at least once from the international syndicated loan or bond market between 2004 and 2007. We label these banks (domestic) International. The remaining 76 domestic banks did not borrow at all internationally. We will call these banks (domestic) Local. Of the 43,847 firms, 6,891 are connected with a (domestic) International bank, 6,483 with a (domestic) Local Bank, and 30,473 with a Foreign bank. Tables 1 and 2 provide the distribution of banks and firms by country.

3.4. *Shocks Affecting Banks*

To identify bank shocks we rely on the combination of bank type and time. As discussed above we distinguish three types of banks: International, Local and Foreign banks. As the crisis developed in several phases, we split the crisis up in two crisis years: 2008 and 2009.

While international capital markets already witnessed a serious collapse in 2008, most parent banks only got in trouble after the collapse of Lehman Brothers.

To the extent that liquidity on the international capital markets dried up more than local domestic funding (e.g., through retail deposits), one would expect that the crisis shock was stronger for International than for Local banks. Therefore, International banks can be expected to cut lending more.

The impact of foreign ownership on credit availability during the crisis is a bit more ambivalent. To the extent that parent banks, facing funding problems, would re-allocate liquidity away from their subsidiaries in Eastern Europe and Near Asia to the headquarters (or an other more important) market (Cetorelli and Goldberg (2011b)) or to the extent that headquarters are mainly in Western Europe where the banking crisis hit strongly, also banks that are Foreign (in 2007) suffer a stronger shock than Local banks and, hence, can be expected to cut lending more. However, at the same time it is possible that parent banks, faced with reduced economic prospects in their home country allocate more funds to their subsidiaries in growth markets (e.g., in Eastern Europe and Near Asia). This would reduce the magnitude of the international bank lending channel through foreign ownership.

4. RESULTS

4.1. Bank Loan Growth

4.1.1. Loan Growth by Bank Type

Do domestic international and/or foreign banks curtail lending more or less during the financial crisis than domestic local banks? Graphs of the mean and median loan growth by bank type suggest international and foreign banks restrain loan growth by more than local

growth across all bank-year observations equals 25 percent (see Table 2), these differences are sizeable and economically meaningful.

During the crisis years 2008 and 2009 lending by local banks contracted by 20.2** and 19.6** percent, respectively, while the interaction terms with the crisis years indicate that the international banks not only expanded their lending more prior to the crisis years but during the crisis years also contracted it more, by 19.3*** percentage points more in 2008 and another 21.4*** percentage points more in 2009. Foreign banks contracted it by 2 and 13.9*** percentage points more than local banks. These estimated differentials are potentially biased, however, as we do not control adequately enough (yet) for bank and country heterogeneity.

In Models 2 to 4 we therefor consecutively saturate the specifications with bank, bank and year, and bank and country*year fixed effects to account for all observed and unobserved bank and time-variant country heterogeneity. The estimated contractions in lending decrease somewhat but still equal 9.3* and 13.2** percentage points for international banks and 2 and 10.7** percentage points for foreign banks. In sum, international and foreign banks contract their lending more than local banks during the crisis years.

4.1.2. Loan Growth by Bank Type and Bank Characteristics

We now investigate if loan growth by bank type is further differentiated by bank characteristics before and during the second crisis year.⁵ That is in equation (1) we add interactions with bank characteristics. The specifications we now estimate are:

⁵ To keep specifications parsimonious we focus on the later-crisis-year interactions. Results are similar and mostly unaffected if we include the first crisis year (2008). This is also the case in the later reported firm performance regressions.

$$\begin{aligned}
\text{Loan Growth}_{bt} = & \\
& \text{International}_b * \text{Crisis}_t * d(\text{Bank Characteristics}_b) + \text{Foreign}_b * \text{Crisis}_t * d(\text{Bank} \\
& \text{Characteristics}_b) + \text{Crisis}_t * d(\text{Bank Characteristics}_b) + \text{Bank Characteristics}_{b,t-1} + \\
& \text{fixed effects} + \varepsilon_{bt},
\end{aligned} \tag{4}$$

where the *Bank Characteristics* we feature are: Size which is the logarithm of assets, Liquidity which is liquid over total assets, Deposits which is demand deposits over total liabilities, and in a robustness test we replace Size by Market Share which is the bank's share of total domestic lending. The bank characteristics are taken in the previous year while in the interactions we construct from every characteristic a dummy variable $d(.)$ which equals one for banks with the indicated characteristic above the median in 2007, and equals zero otherwise. Vienna Initiative equals one if the foreign bank participates in this initiative, and equals zero otherwise.⁶ In a robustness test we also include Loan Growth, again taken in the previous year. *Crisis* is a dummy that equals one for t equal to 2009, and equals zero otherwise. We include bank and country*year fixed effects in all specifications and standard errors are double clustered by bank and year.

The estimates are in Table 5. Model 1 includes the interactions for international banks, Model 2 for foreign banks, Model 3 for both bank types, and Model 4 adds past loan growth, while Model 5 replaces Size by Market Share.

Focusing on the estimates in Model 3 we find that international banks that prior to the crisis were above-median liquid and below-median financed with retail deposits contract

⁶ The Vienna Initiative was created in January 2009 and brought together The European Bank for Reconstruction and Development (as lead founder), the IMF, EIB and Worldbank, the European Commission and ECB, home and host country regulatory and fiscal authorities of large cross-border bank groups, and the largest banking groups operating the (EBRD) region. The aims of the initiative were to prevent a large-scale and uncoordinated withdrawal of cross-border bank groups from the region and to agree on basic crisis management and resolution principles.

lending by 18.2*** and 16.4*** percentage points more (than local above-median liquid and below-median retail-deposit-financed banks), while for foreign banks the corresponding additional contraction equals 9.2** and 8.8* percentage points. Foreign banks that participated in the Vienna Initiative contract their lending much less than any other banks in 2009 (but the interpretation of the point estimate needs to account for the fact that only foreign banks participated in this Initiative and that the estimate is for a below-median sized, liquid, and retail deposit-taking bank, and for the fact that adding past loan growth substantially lowers this estimate).

Overall, the estimates suggest that the extra contraction in lending by international and foreign banks that we observe during the crisis years (compared to local banks) is further differentiated according to liquidity and deposit-taking prior to the crisis.

4.2. Firm Performance

4.2.1. Firm Selection by Bank Type

Given that we have observed so far that international and foreign banks curtail their lending more during the financial crisis than local banks, the next question we want to try to answer is: Are firms that have relationships with these international or foreign banks affected more in their performance during the financial crisis than other firms (that have relationships with local banks)?

Again we construct a graph of the mean and median operational revenue growth of the 43,847 firms in our sample by bank type (Figure 2). Now the answer to the question does not seem so obviously present in the graph, but of course the variation in growth may also be due to firm heterogeneity. Hence to try to answer this question more carefully we next investigate

if firm performance is differentiated by bank type before and during the crisis years with panel estimations.

But before trying to answer this question we want to check if international and foreign banks lend to different firms prior to the crisis than local banks do. The specifications we therefore estimate are:

$$\begin{aligned} \text{Firm Characteristic}_{bit} = & \text{International}_b + \text{Foreign}_b + \text{Other Firm Characteristics}_{bit} + \\ & \text{Bank Characteristics}_b + \text{fixed effects} + \varepsilon_{bit}, \end{aligned} \quad (5)$$

where the dependent variable varies for each firm i for which we know its bank connection to bank b . As firm characteristics we analyze: ROA, Size, Solvency, and Liquidity. For each indicated firm characteristic we create a dummy variable $d(.)$ which equals one for firms with the indicated characteristic below the quartile value in 2007, and equals zero otherwise.⁷ We include industry and country fixed effects. The standard errors are clustered by bank and country. The descriptive statistics for all firm variables are in Table 6.

The estimates are in Table 7. Overall we can conclude that international and foreign banks do not select firms that perform differently than local banks, and that international and foreign banks also do not differ in their choice of firm type.

4.2.2. Firm Performance by Bank Type

We next investigate if firm performance is differentiated by bank type before and during the crisis years with panel estimations. The specifications we now estimate are:

⁷ We use quartile values as for solvency for example especially low values may determine the decision of banks to be willing to engage the firm.

$$\begin{aligned}
& \text{Firm Performance}_{bit} = \\
& \text{International}_b + \text{International}_b * \text{Crisis}_t + \text{Foreign}_b + \text{Foreign}_b * \text{Crisis}_t + \text{Crisis}_t + \quad (6) \\
& \text{fixed effects} + \varepsilon_{bit},
\end{aligned}$$

where the dependent variable varies for each firm i for which we know its bank connection to bank b . As firm performance variables we analyze the yearly firm operational revenue growth and the yearly firm asset growth. *Crisis* is a dummy that equals one for t equal to 2008 and 2009 and equals zero otherwise. We consecutively include (1) no fixed effects and (2) firm, industry * year, and country * year fixed effects. The standard errors are clustered by bank.

The estimates are in Table 8. Models 1 and 3 suggest that firm operational revenue and asset growth dropped precipitously during the crisis years. For firms connected with local banks, revenue growth dropped by 12.6*** and 36.5*** percentage points in 2008 and 2009, respectively, and asset growth by 12.4*** and 21.4*** percentage points. However, at first sight firms connected with international and foreign banks do not perform any worse than firms connected to local banks. But these estimated differentials are potentially biased, however, as we may not control adequately enough for firm, year and country heterogeneity.

In Models 2 and 4 we therefore saturate the specification with firm, industry*year, and country*year fixed effects to account for all observed and unobserved firm, and time-variant industry and country heterogeneity. The estimates suggest that firms connected to foreign banks in 2009 face a 2.3** and 1.9** percentage points lower revenue and asset growth than firms connected with domestic banks (both local, as these banks are the benchmark group, and international as the estimated coefficients on the interactions of international and crisis do not differ statistically significantly from zero). Given that the mean revenue and asset growth

across all firm-years equals 3 and 9 percent, respectively, these additional declines in growth for firms of foreign banks are economically large.

4.2.3. Firm Performance by Bank Type and by Firm Characteristics

Finally, we investigate if firm performance is differentiated by bank type and by firm characteristics before and during the second crisis year. The specifications we now estimate are:

$$\begin{aligned}
 \text{Firm Performance}_{bit} = & \\
 & \text{International}_b * \text{Crisis}_t * d(\text{Firm Characteristics}_b) + \text{Foreign}_b * \text{Crisis}_t * d(\text{Firm} \quad (7) \\
 & \text{Characteristics}_b) + \text{Crisis}_t * d(\text{Firm Characteristics}_b) + \text{fixed effects} + \varepsilon_{bt},
 \end{aligned}$$

where the firm performance variables are again the yearly firm operational revenue growth or the yearly firm asset growth. The *Firm Characteristics* we feature include Size, which is the logarithm of assets, Solvency, which is assets over equity, and Liquidity which is liquid over total assets. In the interactions we construct from every firm characteristic a dummy variable $d(.)$ which equals one for firms with the indicated characteristic above the quartile value in 2007, and equals zero otherwise. *Crisis* is a dummy that equals one for t equal to 2009, and equals zero otherwise. We saturate all specifications with firm and country*year effects. The standard errors are clustered by bank.

The estimates are in Table 9. The dependent variable in Models 1 to 7 is firm operational revenue growth, in Models 8 to 14 it is firm asset growth. In Models 1 to 3 and 8 to 10 we interact above-quartile firm size, solvency and liquidity with International, in Models 4 to 6

and 11 to 13 with Foreign, and with all firm characteristics and both bank type at once in Models 7 and 14.

Results are interesting. Take the estimates from Models 7 and 14 for example. Above-quartile solvent firms connected with international banks grow 5.9*** and 6.7*** percentage points more in revenue and assets than similar firms with local banks, which grow 4.5*** and 2.3** percentage points more than below-quartile solvent firms. Hence international banks curtail lending and their less solvent firms incur stunted growth as a consequence, consistent with a firm balance sheet channel in which firm balance sheet strength determines whether firms can obtain substitute financing when current funding evaporates.

All firms below-quartile in size, solvency and liquidity connected with foreign banks grow 2* and 2.3** percentage points less in revenue and assets in 2009 than similar firms connected with local banks. This finding is consistent with foreign banks curtailing lending more during the crisis than local banks. At the same time foreign-bank firms that are above-quartile in size grow 6.4*** and 4.4*** percentage points less than similar local-bank firms. Hence the picture that arises is one in which foreign banks may re-allocate funding towards smaller firms that may have more growth opportunities and/or carry higher margins.

5. CONCLUSION

The recent banking crisis which was followed by a strong and persistent recession in many advanced countries makes it essential to understand international contagion through the globalized banking system. In this paper we analyze two key channels that may have played a crucial role during the recent crisis, i.e., the international wholesale liquidity channel and the foreign bank ownership channel.

To identify the potency of either channel, we analyze banks and firms located across countries in Eastern Europe and Near Asia. In these countries banks were not immediately affected by the Western banking crisis, but there were many domestic banks borrowing from internationally wholesale banking markets before the crisis and foreign owned banks that were headquartered in Western Europe.

Crucially for identification, we can access: (1) A bank-level measure of international wholesale liquidity dependency and a comprehensive world-wide bank-ownership dataset to analyze bank-level transmission of international contagion; (2) A corresponding dataset of bank-firm relationships matched with both bank- and firm- balance-sheet data that allows us to circumvent the typical shortcomings that plague the identification of the bank lending channel (i.e., to convincingly control for borrower fundamentals), and that also enables us to analyze both the real effects of credit unavailability and the heterogeneity of this impact across firms.

We find that compared to locally funded domestic banks, the internationally-borrowing domestic banks and foreign banks during the crisis cut back their lending more, and that the impact is stronger when these banks are funded relatively less with retail deposits. In contrast, when we analyze firm-level effects (controlling for firm fundamentals, i.e., firm demand) we find that only firms borrowing from foreign banks suffer negative real effects on average, but that smaller firms borrowing from these banks have relatively better real outcomes. Firms borrowing from internationally-borrowing banks do not face worse real effects on average, except for the less capitalized firms.

In sum, the results suggest an interaction between an international bank lending channel and a firm balance-sheet channel through international wholesale liquidity and the presence of an international bank lending channel through foreign ownership. Our findings therefore have

important implications for both theory and policy and highlight the need to study firm-level data.

On the one hand our results indicate that despite the contraction in loan growth by internationally-borrowing and foreign banks, the average customers of international-borrowing banks are unaffected in their real performance. On the other hand, the impact on firm performance depends on bank and firm characteristics, suggesting the need for theoretical models to incorporate both bank and firm heterogeneity, and cautioning policymakers from basing interventions on too broad generalizations.

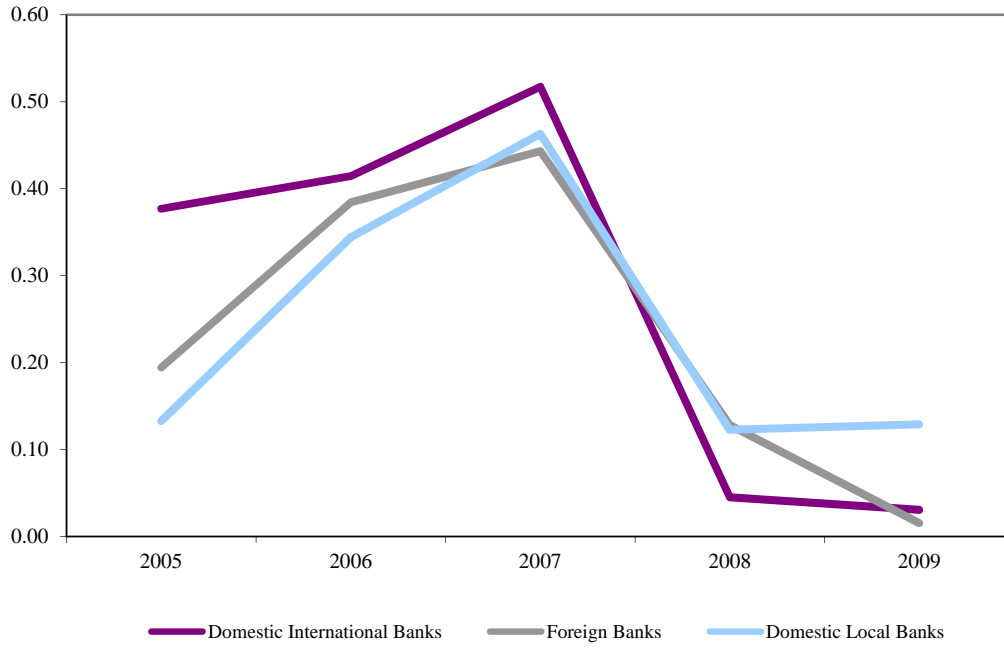
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Figure 1
Mean and Median Loan Growth by Bank Type

Mean Loan Growth



Median Loan Growth

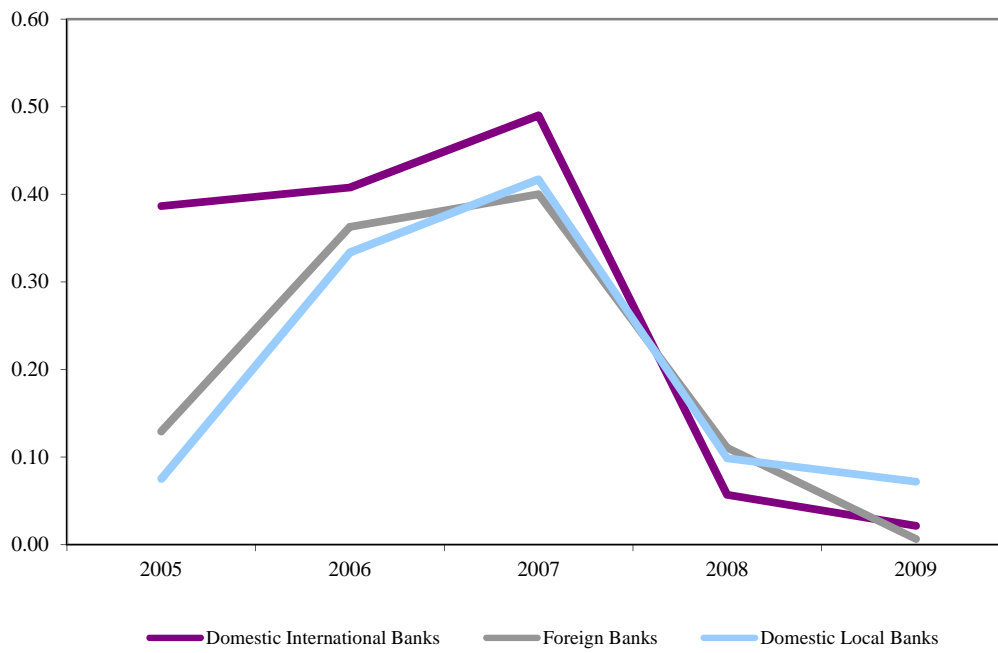


Figure 2

Mean and Median Firm Operational Revenue Growth by Bank Type

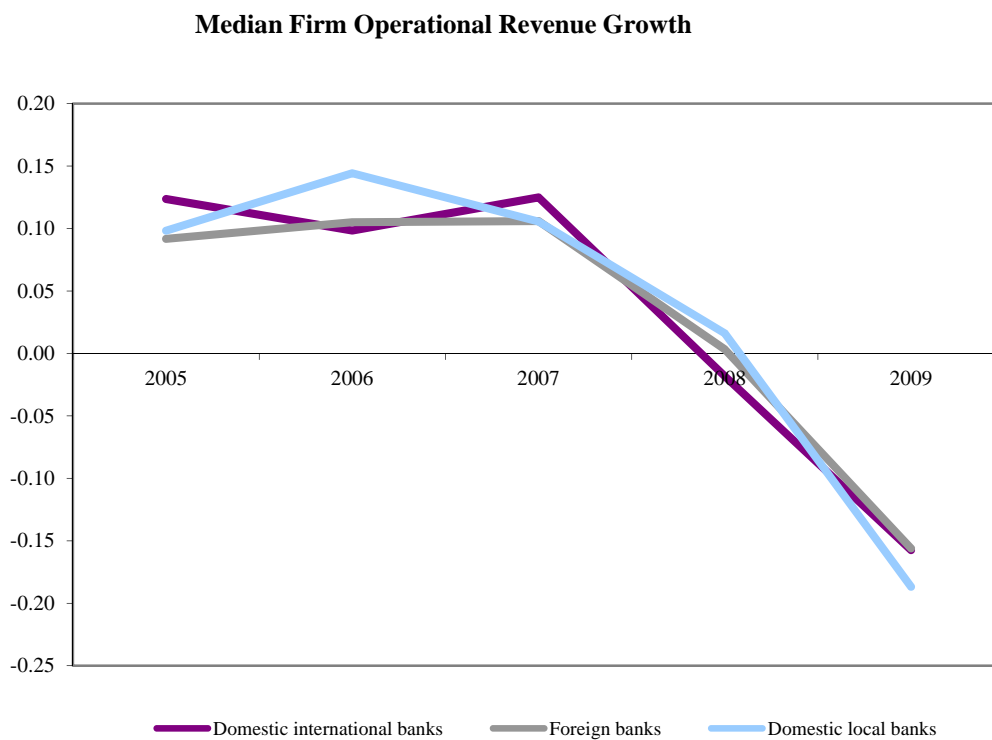
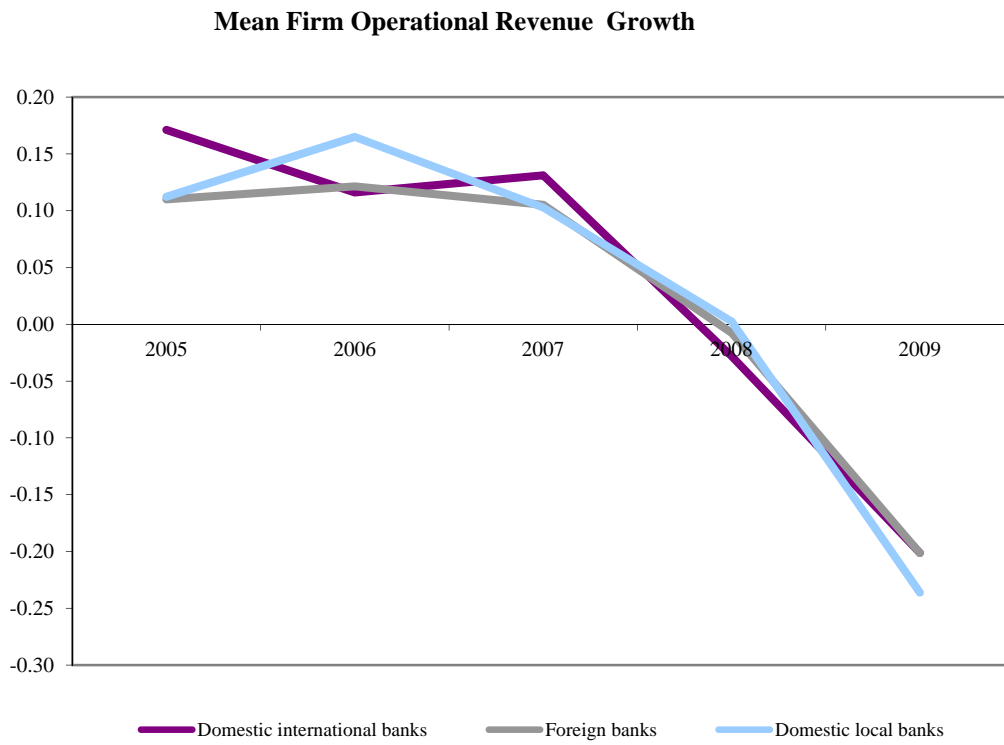


Table 1

Number of Banks by Bank Type in Sample Countries

Country	Domestic International Banks	Foreign Banks	Domestic Local Banks	Total Number of Banks	Share in Percent
Bosnia-Herzegovina	0	7	5	12	5.0%
Bulgaria	4	7	4	15	6.3%
Croatia	0	10	16	26	10.9%
Czech Republic	0	9	8	17	7.1%
Estonia	0	2	2	4	1.7%
Hungary	1	14	1	16	6.7%
Lithuania	2	5	1	8	3.4%
Poland	2	15	8	25	10.5%
Romania	1	12	3	16	6.7%
Serbia and Montenegro	0	8	12	20	8.4%
Slovakia	0	12	0	12	5.0%
Slovenia	5	6	5	16	6.7%
Turkey	9	6	6	21	8.8%
Ukraine	16	9	5	30	12.6%
Total Number of Banks	40	122	76	238	100%
Share, in Percent	16.8%	51.3%	31.9%	100%	

Notes: Domestic *International* (*Local*) Banks are banks that (do not) borrow internationally prior to 2008. *Foreign* Banks are majority-owned by foreigners. Only banks with more than two observations during the sample period 2005-2009 are retained in the sample.

Table 2

Number of Firms by Bank Type in Sample Countries

Country	Firms with Domestic International Banks	Firms with Foreign Banks	Firms with Domestic Local Banks	Total Number of Firms	Share <i>in Percent</i>
Bosnia-Herzegovina	0	8	20	28	0.1%
Bulgaria	46	641	7	694	1.6%
Croatia	0	12,545	2,023	14,568	33.2%
Czech Republic	0	1,585	0	1,585	3.6%
Estonia	0	799	0	799	1.8%
Hungary	1,007	3,685	23	4,715	10.8%
Lithuania	4	66	2	72	0.2%
Poland	1,088	6,772	557	8,417	19.2%
Romania	385	1,726	1,570	3,681	8.4%
Serbia and Montenegro	0	166	1,210	1,376	3.1%
Slovakia	0	440	4	444	1.0%
Slovenia	2,543	1,391	879	4,813	11.0%
Turkey	191	5	4	200	0.5%
Ukraine	1,627	644	184	2,455	5.6%
Total Number of Firms	6,891	30,473	6,483	43,847	100%
<i>Share, in Percent</i>	15.7%	69.5%	14.8%	100%	

Notes: Domestic *International* (*Local*) Banks are banks that (do not) borrow internationally prior to 2008. *Foreign* Banks are majority-owned by foreigners. Only firms that have a connections with banks with more than two observations during the sample period 2005-2009 are retained in the sample.

Table 3

Bank Variables : Definition, Unit, and Descriptive Statistics

Variable	Definition	Unit	Obs.	Mean	Median	St.Dev	Min.	Max.
Loan Growth	the log change in total bank loans	-	1,066	0.25	0.22	0.27	-0.52	1.26
International	= 1 if domestic bank is observed to fund itself on the international capital markets in 2007; =0 otherwise	0/1	1,066	0.17	0.00	0.37	0	1
Foreign	= 1 if bank is majority foreign held in 2007; =0 otherwise	0/1	1,066	0.52	1	0.50	0	1
Size	the log of bank assets	-	1,066	14.17	14.21	1.67	9.99	18.28
Market Share	the percent share of national lending	-	1,066	0.05	0.02	0.07	0.00	0.36
Liquidity	liquid over total assets	-	1,059	0.25	0.22	0.15	-0.05	0.75
Deposits	demand deposits over total liabilities	-	1,039	0.57	0.60	0.21	0.00	0.96
d(Size)	= 1 for banks with Size above the median in 2007; =0 otherwise	0/1	1,064	0.52	1	0.50	0	1
d(Market share)	= 1 for banks with Market Share above the median in 2007; =0 otherwise	0/1	1,066	0.55	1	0.50	0	1
d(Liquidity)	= 1 for banks with Liquidity above the median in 2007; =0 otherwise	0/1	1,060	0.49	0	0.50	0	1
d(Deposits)	= 1 for banks with Deposits above the median in 2007; =0 otherwise	0/1	1,041	0.51	1	0.50	0	1

Table 4

Loan Growth by Bank Type Before and During Crisis Years

Model	(1)	(2)	(3)	(4)
Independent Variables				
International	0.115** (0.039)			
International * 2008	-0.193*** (0.000)	-0.180*** (0.005)	-0.180*** (0.005)	-0.093* (0.085)
International * 2009	-0.214*** (0.001)	-0.188*** (0.005)	-0.190*** (0.007)	-0.132** (0.037)
Foreign	0.026 (0.327)			
Foreign * 2008	-0.020 (0.320)	-0.026 (0.469)	-0.023 (0.534)	-0.020 (0.650)
Foreign * 2009	-0.139*** (0.000)	-0.142*** (0.001)	-0.139*** (0.001)	-0.107** (0.022)
2008	-0.202** (0.018)	-0.210** (0.030)		
2009	-0.196** (0.025)	-0.208** (0.037)		
Constant	0.324*** (0.000)	0.977*** (0.000)	0.768*** (0.000)	0.109 (0.202)
Bank Fixed Effects	no	yes	yes	yes
Year Fixed Effects	no	no	yes	no
Country * Year Fixed Effects	no	no	no	yes
Number of Observations	1,066	1,066	1,066	1,066
R2	0.265	0.487	0.568	0.682

Notes: The table reports the estimation results of ordinary least squares models. The dependent variable in all models is the yearly loan growth by bank (of which the below 1 percent and above 99 percent are removed). The sample period runs from 2005 to 2009. For each variable in the specification the table reports the estimated coefficient, statistical significance level and p-value (below in parentheses). In all estimations standard errors are double clustered by bank and year. ***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

Table 5

Loan Growth by Bank Type and by Bank Characteristics Before and During the Second Crisis Year

Model	(1)	(2)	(3)	(4)	(5)
Independent Variables					
International * 2009	-0.049 (0.442)	-0.024 (0.389)	-0.053 (0.492)	-0.024 (0.696)	-0.006 (0.920)
International * 2009 * d(Size)	-0.028 (0.505)		0.001 (0.994)	-0.023 (0.726)	
International * 2009 * d(Market Share)					-0.042 (0.450)
International * 2009 * d(Liquidity)	-0.124*** (0.005)		-0.182*** (0.000)	-0.190*** (0.000)	-0.178*** (0.001)
International * 2009 * d(Deposits)	0.098*** (0.000)		0.164*** (0.000)	0.163*** (0.000)	0.143*** (0.001)
Foreign * 2009	-0.079** (0.012)	-0.078* (0.071)	-0.081 (0.134)	-0.070 (0.325)	-0.099** (0.033)
Foreign * 2009 * d(Size)		0.031 (0.416)	0.031 (0.608)	0.013 (0.821)	
Foreign * 2009 * d(Market Share)					0.050 (0.359)
Foreign * 2009 * d(Liquidity)		-0.041 (0.365)	-0.092** (0.031)	-0.066 (0.136)	-0.056 (0.105)
Foreign * 2009 * d(Deposits)		0.026 (0.448)	0.088* (0.059)	0.086** (0.015)	0.079** (0.028)
Foreign * 2009 * Vienna Initiative		1.562*** (0.000)	1.569*** (0.000)	-0.457*** (0.003)	-0.455*** (0.003)
2009 * d(Size)	0.020 (0.237)	-0.010 (0.658)	-0.010 (0.803)	-0.018 (0.693)	
2009 * d(Market Share)					-0.022 (0.522)
2009 * d(Liquidity)	0.069*** (0.000)	0.079*** (0.005)	0.127*** (0.000)	0.110*** (0.007)	0.105*** (0.005)
2009 * d(Deposits)	-0.023 (0.163)	-0.027 (0.423)	-0.089* (0.052)	-0.083** (0.013)	-0.082** (0.012)
Size	-0.359*** (0.000)	-0.363*** (0.000)	-0.363*** (0.000)	-0.459*** (0.000)	-0.460*** (0.000)
Liquidity	0.315*** (0.008)	0.328*** (0.005)	0.320*** (0.006)	0.408*** (0.000)	0.401*** (0.000)
Deposits	-0.192** (0.018)	-0.190** (0.022)	-0.195** (0.018)	-0.197* (0.079)	-0.195* (0.074)
Loan Growth				0.102 (0.191)	0.100 (0.192)
Constant	4.509*** (0.000)	4.976*** (0.000)	4.993*** (0.000)	7.006*** (0.000)	7.017*** (0.000)
Bank Fixed Effects	yes	yes	yes	yes	yes
Country * Year Fixed Effects	yes	yes	yes	yes	yes
Number of Observations	1,022	1,022	1,022	807	807
R2	0.776	0.775	0.777	0.828	0.828

Notes: The table reports the estimation results of ordinary least squares models. The dependent variable in all models is the yearly loan growth by bank (of which the below 1 percent and above 99 percent are removed). The sample period runs from 2005 to 2009. International and Foreign Bank type are determined in 2007. Bank characteristics are: Size is the logarithm of assets, Liquidity is liquid over total assets, Deposits is demand deposits over total liabilities, and Market Share is the percent share of national lending. All bank characteristics are taken in the previous year. d(.) is a dummy variable which equals one for banks with the indicated characteristic above the median in 2007, and equals zero otherwise. Vienna Initiative equals one if the foreign bank participates in this initiative, and equals zero otherwise. For each variable in the specification the table reports the estimated coefficient, statistical significance level and p-value (below in parentheses). In all estimations standard errors are double clustered by bank and year. ***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

Table 6

Firm Variables : Definition, Unit, and Descriptive Statistics

Variable	Definition	Unit	Obs.	Mean	Median	St.Dev	Min.	Max.
Operational Revenue Growth	the log change in operational revenue	-	196,631	0.03	0.04	0.60	-13.94	16.39
Asset Growth	the log change in total assets	-	200,018	0.09	0.05	0.44	-9.99	11.90
International	= 1 if the firm is connected with an International bank; =0 otherwise	0/1	219,235	0.16	0	0.36	0	1
Foreign	= 1 if the firm is connected with a Foreign bank; =0 otherwise	0/1	219,235	0.69	1	0.46	0	1
Size	log of assets	log	208,752	13.70	13.63	1.95	1.39	20.72
Solvency	assets over equity	%	202,441	42.04	39.80	26.73	0	100
Liquidity	current over total assets	%	201,072	1.68	0.93	3.79	0.00	99.17
d(Size)	= 1 for firms with Size above the 25 percentile in 2007; =0 otherwise	0/1	219,130	0.25	0	0.43	0	1
d(Solvency)	= 1 for firms with Solvency above the 25 percentile in 2007; =0 otherwise	0/1	211,605	0.25	0	0.43	0	1
d(Liquidity)	= 1 for firms with Liquidity above the 25 percentile in 2007; =0 otherwise	0/1	212,305	0.25	0	0.43	0	1

Table 7

Selection of Firm Type By Bank

Model Dependent Variable	(1) d(ROA)	(2) d(Size)	(3) d(Solvency)	(4) d(Liquidity)
Independent Variables				
International	0.013 (0.024)	-0.058 (0.039)	0.028 (0.033)	-0.026 (0.022)
Foreign	-0.011 (0.018)	-0.057** (0.026)	0.023 (0.027)	-0.026 (0.023)
d(ROA)		0.023** (0.009)	0.204*** (0.041)	0.121*** (0.012)
d(Size)	0.005 (0.010)		0.023*** (0.004)	-0.031*** (0.012)
d(Solvency)	0.202*** (0.020)	0.032*** (0.009)		0.172*** (0.010)
d(Liquidity)	0.115*** (0.008)	-0.024*** (0.005)	0.166*** (0.017)	
Constant	0.572 (0.426)	-0.288 (0.292)	-0.108 (0.240)	1.118 (1.297)
Other Firm Characteristics	yes	yes	yes	yes
Bank Characteristics	yes	yes	yes	yes
Industry Fixed Effects	yes	yes	yes	yes
Country Fixed Effects	yes	yes	yes	yes
H ₀ : International = Foreign (p-value)	0.06	0.96	0.71	0.98
Number of Observations	31,179	30,807	31,179	31,179
R ²	0.133	0.210	0.167	0.107

Notes: The table reports the estimation results of ordinary least squares models. The dependent variables are indicated in the first row. d(.) is a dummy variable which equals one for firms with the indicated characteristic above the 25 percentile value in 2007, and equals zero otherwise. Other Firm Characteristics include past operational revenue growth, a dummy that equals one if the age of the firm is between 6 and 10 years, and equals zero otherwise, and a dummy that equals one if the firm is publicly listed, and equals zero otherwise. Bank Characteristics include Size, Liquidity, and Deposits. The sample period runs from 2005 to 2007. For each variable in the specification the table reports the estimated coefficient, statistical significance level and p-value (below in parentheses). In all estimations standard errors are clustered by bank and country. The standard error of the constant in Models 1 and 4 is calculated on the basis of single clustering by bank. ***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

Table 8

Firm Performance by Bank Type Before and During Crisis Years

Model	(1)	(2)	(3)	(4)
Dependent Variable	Operational Revenue Growth		Asset Growth	
Independent Variables				
International	0.010 (0.682)		-0.016 (0.586)	
International * 2008	-0.040 (0.380)	0.001 (0.939)	-0.040 (0.386)	-0.004 (0.659)
International * 2009	0.026 (0.593)	-0.003 (0.782)	0.042 (0.299)	-0.009 (0.322)
Foreign	-0.016 (0.442)		-0.023 (0.401)	
Foreign * 2008	0.005 (0.831)	-0.015 (0.108)	0.008 (0.786)	-0.009 (0.163)
Foreign * 2009	0.051 (0.206)	-0.023** (0.033)	0.025 (0.512)	-0.019** (0.019)
2008	-0.126*** (0.000)		-0.124*** (0.000)	
2009	-0.365*** (0.000)		-0.214*** (0.000)	
Constant	0.129*** (0.000)	-0.125*** (0.000)	0.169*** (0.000)	0.033*** (0.000)
Firm Fixed Effects	no	yes	no	yes
Industry * Year Fixed Effects	no	yes	no	yes
Country * Year Fixed Effects	no	yes	no	yes
Number of Observations	188,320	188,320	192,223	192,223
R2	0.107	0.369	0.070	0.365

Notes: The table reports the estimation results of ordinary least squares models. The dependent variable in Models 1 and 2 is the yearly firm operational revenue growth, in Models 3 and 4 the yearly firm asset growth (of which the below 1 percent and above 99 percent are removed). The sample period runs from 2005 to 2009. For each variable in the specification the table reports the estimated coefficient, statistical significance level and p-value (below in parentheses). In all estimations standard errors are clustered by firm. ***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.

Table 9

Firm Performance by Bank Type and by Firm Characteristics Before and During the Second Crisis Year

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Dependent Variable	Operational Revenue Growth							Asset Growth						
Independent Variables														
International * 2009	0.004 (0.733)	-0.000 (0.976)	-0.004 (0.767)	-0.013 (0.232)	-0.008 (0.482)	-0.006 (0.600)	0.005 (0.722)	-0.002 (0.797)	0.002 (0.847)	-0.005 (0.590)	-0.015* (0.060)	-0.010 (0.195)	-0.005 (0.556)	0.004 (0.723)
International * 2009 * d(Size)	0.067*** (0.003)						0.010 (0.750)	0.053** (0.010)						0.002 (0.909)
International * 2009 * d(Solvency)		0.040** (0.016)					0.059*** (0.007)		0.056*** (0.000)					0.067*** (0.000)
International * 2009 * d(Liquidity)			0.008 (0.672)				0.025 (0.310)			0.000 (0.975)				-0.001 (0.954)
Foreign * 2009	-0.016 (0.115)	-0.018* (0.082)	-0.018* (0.066)	-0.035*** (0.001)	-0.018* (0.080)	-0.015 (0.152)	-0.020* (0.073)	-0.017** (0.027)	-0.018** (0.016)	-0.018** (0.025)	-0.030*** (0.000)	-0.022*** (0.007)	-0.017** (0.041)	-0.023** (0.026)
Foreign * 2009 * d(Size)				-0.076*** (0.000)			-0.064*** (0.010)				-0.052*** (0.000)			-0.044*** (0.001)
Foreign * 2009 * d(Solvency)					-0.000 (0.998)		0.027 (0.134)					-0.011 (0.479)		0.023 (0.100)
Foreign * 2009 * d(Liquidity)						0.012 (0.461)	0.021 (0.281)						0.002 (0.836)	0.001 (0.951)
2009 * d(Size)	-0.036*** (0.001)			0.026* (0.094)			0.012 (0.586)	-0.041*** (0.000)			0.001 (0.880)			-0.004 (0.670)
2009 * d(Solvency)		0.065*** (0.000)			0.071*** (0.000)		0.045*** (0.003)		0.039*** (0.000)			0.054*** (0.000)		0.023** (0.020)
2009 * d(Liquidity)			0.002 (0.866)			-0.005 (0.682)	-0.030* (0.068)			0.000 (0.949)			-0.001 (0.904)	-0.009 (0.380)
Constant	0.003*** (0.424)	0.012*** (0.001)	0.006*** (0.073)	0.007*** (0.039)	0.012*** (0.000)	0.005*** (0.134)	0.020*** (0.000)	0.093*** (0.000)	0.099*** (0.000)	0.096*** (0.000)	0.095*** (0.000)	0.100*** (0.000)	0.096*** (0.000)	0.099*** (0.000)
Firm Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Country * Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of Observations	188,227	183,126	184,026	188,227	183,126	184,026	179,779	192,223	186,719	187,168	192,223	186,719	187,168	182,844
R2	0.364	0.365	0.364	0.364	0.365	0.364	0.365	0.363	0.362	0.363	0.363	0.362	0.363	0.363

Notes: The table reports the estimation results of ordinary least squares models. The dependent variable in Models 1 to 7 is the yearly firm operational revenue growth, in Models 8 to 14 the yearly firm asset growth. The sample period runs from 2005 to 2009. International and Foreign Bank type are determined in 2007. Firm characteristics are: Size is the logarithm of assets, Solvency is the assets over equity, and Liquidity is the current over total assets. All firm characteristics are taken in the previous year. d(.) is a dummy variable which equals one for firms with the indicated characteristic above the 25 percentile value in 2007, and equals zero otherwise. For each variable in the specification the table reports the estimated coefficient, statistical significance level and p-value (below in parentheses). In all estimations standard errors are clustered by firm. ***, **, * indicate significance at 1%, 5% and 10% level, two-tailed.