Cross-Border Banking and the International Transmission of Financial Distress during the Crisis of 2007-2008*

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Abstract

We study the effect of financial distress in foreign parent banks on local SME financing in 14 central and eastern European countries during the early stages of the 2007-2008 financial crisis. We use survey data on applicant and non-applicant firms that enable us to disentangle effects driven by shocks to the banking system from recession-driven demand shocks that may vary across lenders. We find strong evidence that credit tightened in the relatively early stages of the crises caused by the following types of bank financial distress: 1) low equity ratio; 2) low Tier 1 capital ratio; and 3) losses on financial assets. We also find that foreign banks transmit to Main Street a larger portion of similar financial shocks than domestic banks. The observed decline in credit is greater among informationally opaque firms and firms with fewer tangible assets.

JEL classification: E44, E51, F34, G21

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1 Introduction

The increasing integration of the European banking industry offers the prospect of important gains in terms of efficiency and diversification, but it also creates potential risks. One such risk is associated with the possibility that a shock to a cross-border bank's capital will result in a reduction in lending to firms and consumers in an economic environment that is uncorrelated with the origins of that shock. Given the size and penetration of a number of west European and U.S. banks in central and eastern Europe, their financial distress associated with the meltdown of sub-prime mortgages and securitized products in 2007 and 2008 and the run on banks by short-term creditors, counterparties, and borrowers concerned about the liquidity and solvency of the banking sector[1], may have led to such a realization.[2] The goal of this paper is to put this hypothesis to the test.

We investigate one key mechanism through which foreign financial distress may have been transmitted to local economic conditions, namely the supply of credit to small and medium enterprises. SMEs dominate the corporate landscape in central and eastern Europe, comprising up to 99% of all firms. Moreover, because of their opacity SMEs may be particularly vulnerable to contractions in the supply of credit. With this high dependency on the SME sector and with immature capital markets, banks are by far the main provider of funds for capital investment and expansion. An important feature of the central and eastern European banking market is its ownership structure. In particular, foreign ownership in the banking sector has grown so dramatically in the recent decade, that by 2008 foreign banks controlled around 80% of the assets in the the region's banking industry. The serious financial distress of pan-European banks like Erste, KBC, and Societe Generale since 2007 stemming from economic circumstances unrelated to their operation in central and eastern Europe provides a natural experiment to study the channels through which the effects of

[1] See Brunnermeier (2009), Gorton (2009), and Ivashina and Scharfstein (2009) for a timeline of the 2007-2008 global financial crisis. See Table 1 for developments concerning the financial sector in the countries covered by this paper.

[2] Signs of the negative effects of the global financial crisis on business firms in emerging Europe through the channel of bank lending were seen as early as the Fall of 2007. For instance, in October, the EBRD's chief economist Erik Berglof warned that "the crisis in the West will be a serious one which will last for some time and this means it will definitely have an impact on our countries [...] due to the difficulties and higher costs associated with obtaining credit" (EBRD (2007)). The euro zone Bank Lending Survey indicated that euro zone banks started tightening lending standards in Q3:2007 (ECB (2008)).

the financial crisis that started in the U.S. spread through out the global economy.

Our key data come from a survey of a large group of SMEs in emerging Europe administered in April 2005 and April 2008. The data allow us to directly observe firms whose loan application was turned down over the course of the previous year, or which were discouraged from applying for bank credit by high rates and unfavorable collateral requirements. While we do not observe the bank which granted/denied the loan, we observe the extent of the operations of all banks present in the firm's city of incorporation. By using balance sheet data on the parent banks, foreign or domestic, we construct an index of financial distress at the level of each locality in 14 countries in the region, which we then map into data on loan rejection rates. The final data consist of $4,421$ firms in $1,266$ localities served by a total of 141 banks over the 2005-2008 period. The majority of localities, however, are served by just a handful of banks, with foreign ownership of those varying by country and locality. This allows us to answer two important questions: 1) did banks transmit their financial distress by shrinking loans to business customers issued by their branches and subsidiaries in the early stages of the 2007–2008 crisis?, and 2) did foreign banks react differently from domestic banks to their respective financial troubles?

The classic problem with identifying a credit crunch is that firms' demand shifts during a credit crunch following the deterioration of firms' balance sheets. This wouldn't be an issue if we were studying the cross-border transmission of financial distress into an economic area insulated from that distress through all other channels but the bank lending channel. As the sub-prime mortgage crisis was associated since its very beginning with the expectations of a global recession, the measured effect of bank loan supply shocks will likely be contaminated by demand shifts. Some studies that identify demand use the decline in loan applications across differentially affected lenders to argue that there haven't been variations in the decrease in demand across lenders. One problem with that identification approach may be limited data availability on loan applications. However, even when one observes the universe of loan applications, it is still the case that applicant firms are a trunctated sub-sample of all firms. Some firms do not apply because they do not need credit, and some because they are discouraged. This implies a selection process which makes the sample of applicant firms not perfectly representative of the population. Then it could well be that for banks

negatively affected by the crisis, it is the financially healthy borrowers that are selecting themselves out of the application process (firms that do well during a recession), while for other banks, it is the weak firms that do so, discouraged by news of a contraction in lending. Thus, at different types of banks, non-applicant firms may have systematically different reasons for selecting themselves out of the application process, confounding identification and making it difficult to separate the bank lending from the balance sheet channel.

We overcome this obstacle by employing observable survey information on firms that choose to select themselves out of the bank credit application process, be it because they were discouraged, or because they do not need credit. Thus we are able to account not just for the decrease in firms' demand, but also for the *composition* of firms that account for the decrease in demand. While there is already extensive evidence on the real effects of this financial crisis[3], our paper is the only one we know of which simultaneously 1) studies the international transmission of financial distress, 2) accounts for the changes in loan demand, and 3) is able to purge the bank lending channel from the contamination which arises due to the changing composition of firms demanding bank credit during a recession. As such, our paper adds to a very scarce literature employing data on the selection process involved in the granting of business loans.[4]

This paper confirms the hypothesis that the contraction of banks' balance sheets caused by losses on financial assets and the deterioration of their equity positions was transmitted cross-border to central and eastern Europe in the relatively early stages of the 2007-2008 crisis. In particular, we find a higher probability of firms' being credit constrained in localities served by foreign banks whose parents had 1) a low ratio of equity to total assets, 2) a low Tier 1 capital ratio, and 3) high losses on financial assets, including ABSs and MBSs.[5] The key results hold both when we assume equal access of each firm to all banks present in the firm's locality, or when we weigh access by the branch penetration of each bank. For example, we find that in foreign-dominated markets if the

[3] De Haas and van Horen (2009), Huang (2009), Ivashina and Scharfstein (2009), Jimenes, Ongena, Peydro, and Saurina (2009), Puri, Rochol, and Steffen (2009), Santos (2009), and Tong and Wei (2009) all provide evidence on the credit crunch associated with the 2007-2008 financial crisis.

[4] The very few studies known to us that do so are Cerqueiro (2009), Chakravarty and Yilmazer (2009), and Ongena and Popov (2009).

[5] Initial evidence indicates that high share of mortgage lending to total lending is also associated with transmission of financial distress, but due to the many missing data in Bankscope we do not report these findings.

average Tier 1 capital ratio of the parent of banks present in a particular locality decreases by 2 standard deviations, the probability of firms in that locality being constrained increases by about 55%. Similarly, we find that if the average equity capital ratio by the parent of banks present in a particular locality decreases by two standard deviations, the probability of firms in that locality being constrained increases by about 30%. It also increases by 32% following a 2-standard deviation deterioration in gains on financial assets by banks in that locality. We find that foreign banks are more likely to shrink their portfolio in response to financial distress, especially low Tier 1 capital ratios, the measure of financial distress that is most consistently associated with credit rationing. Finally, we find that financial distress is transmitted differently across firms and industries, in that firms that are informationally opaque and firms with fewer tangible assets suffer the most.

Our paper relates to a number of studies that have aimed at identifying the transmission of shocks from banks' balance sheets to lending activity in various economic circumstances. The bank lending channel has been studied extensively (e.g., Kashyap and Stein (2000)), and banks have been found to rely heavily on the use of internal capital markets in order to dampen domestic liquidity shocks (e.g., Stein (1997); Houston, James, and Marcus (1997)). The U.S. credit crunch in 1990-92 spawned a large literature that investigated its causes and its effects (e.g., Bernanke and Lown (1991); Berger and Udell (1994); Peek and Rosengren (1995); Wagster (1996); Hancock and Wilcox (1998)). Banking crises and liquidity shocks elsewhere in the world similarly generated considerable academic attention (e.g., Woo (1999); Kang and Stulz (2000); Hayashi and Prescott (2002); Khwaja and Mian (2008); Paravisini (2008)). Peek and Rosengren (1997) were one of the first to identify the international transmission of financial shocks when they investigated how the collapse of asset prices in Japan during the early 1990s affected the operations of Japanese bank subsidiaries abroad. In particular, they show that the decline in the parents' risk-based capital ratio translated into a significant decline in total loans by the U.S. subsidiaries. Chava and Purnanandam (2009) and Schnabl (2009) use the exogenous shock provided by the Russian crisis of 1998 to study the effect on lending to U.S. and Peruvian borrowers, respectively. Cetorelli and Goldberg (2008) show that the existence of internal capital markets with foreign bank affiliates contributes to an international propagation of domestic liquidity shocks to lending by affiliated banks abroad. In the context of

the financial crisis of 2007-2008, Ivashina and Scharfstein (2009) document that new loans to large borrowers declined by 79% by the end of 2008 relative to the peak of the credit boom (Q2:2007). They analyze the effect that the failure of Lehman Brothers had on the syndicated loan market to identify the reduction in new lending. Jimenez, Ongena, Peydro, and Saurina (2009) use the universe of bank loans by Spanish banks to identify separately the bank lending channel and the balance sheet channel, and find that they dampen each other: more liquid firms are less vulnerable to the contraction of bank lending, and if banks have ample liquidity, the balance sheet channel partially shuts down. Finally, Puri, Rocholl, and Steffen (2009) test the effect of deteriorating balance sheets of U.S. banks on lending to business firms in Germany. While they account for the shift in firms' loan demand, they do not account for the variation across lenders in the change in the composition of firms that select themselves out of the application process.

The paper proceeds as follows. Section 2 presents the data. Section 3 describes the empirical methodology and the identification strategy. Section 4 presents the empirical results. Section 5 concludes with the main findings of the paper.

2 Data

The data for our analysis come from three main sources. The core firm level data come from the 2008 version of the Business Environment and Enterprise Performance Survey (BEEPS), administered jointly by the World Bank and the European Bank for Reconstruction and Development. The survey were carried out between March 10th and April 20th 2008 among $11,668$ firms from 30 countries in central and eastern Europe and the former Soviet Union. The survey response rate was 36.9%. Surveyees who declined to participate or were unavailable for interviews accounted for 38.3% of the original target group. Firms that were ineligible due to the necessity to fulfill industry quotas and firm size quotas accounted for the remainder. We narrowed that sample down to the countries that were most relevant in terms of foreign bank penetration. We complement this data with analogical information on firms operating in the same countries and localities derived from the 2005 version of the survey. The final sample consists of $4,421$ firms in 14 countries: Albania,

Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Slovakia, and Slovenia.

The main purpose of the survey is to obtain information from firms about their experience with financial and legal constraints, as well as government corruption. In addition, however, BEEPS also included questions about firm ownership structure, sector of operation, industry structure, export activities, use of external auditing services, subsidies received from central and local governments, etc. Respondent firms come from 6 different sectors: construction; manufacturing (11 sub-sectors); transport; wholesale and retail; IT; and hotels and restaurants. The number of firms covered is roughly proportional to the number of firms in the country, ranging from 133 in Albania to 709 in Romania. The survey tried to achieve representativeness in terms of the size of firms it surveyed: between two thirds and nine tenths of the firms surveyed are "small" (less than 100 workers) and around 3% of the firms surveyed are "large" (more than 500 workers).[6] The survey also aimed to strike a balance among domestic private, state owned, and foreign owned firms. Table 2 provides the summary statistics on the number of firms and their size distribution by country.

For the purpose of estimating the effect of the financial crisis on business lending, we focus on the information on credit constraints faced by the firms in the past fiscal year. Question K16 asks: "Did the establishment apply for any loans or lines of credit in fiscal year 2007?"[7] For firms that answered "No" to K16, Question K17 subsequently asks: "What was the main reason the establishment did not apply for any line of credit or loan in fiscal year 2007?". For firms that answered "Yes" to K16, Question K18a subsequently asks: "In fiscal year 2007, did this establishment apply for any new loans or new credit lines that were rejected?". Firms that answered "No need for a loan" to K17 were classified as firms that do not desire bank credit. Firms that answered "Yes" to K18a or "Interest rates are not favorable", "Collateral requirements are too high", "Size of loan and maturity are insufficient", or "Did not think it would be approved" to K17 were classified as constrained. The latter classification is in line with the unofficial definition by the US Federal

[6] See http://www.ebrd.com/country/sector/econo/surveys/beeps.htm for further detailed reports on the representativeness of the survey.

[7] Fiscal year 2007 refers to the calender year 2007. However, for tax purposes, in most of the countries in the sample firms can choose to extend it to March 31, 2008, which is precisely why the Survey was administered in March-April 2008. Given that signs of credit crunch started emerging right after August 9, 2007, the data gives us at least two and at most three quarters of credit crunch potentially experienced by firms.

Reserve of a credit crunch, i.e., a simultaneous increase in the price and decrease in the availability of credit.[8] This strategy of grouping firms that were turned down and firms that were discouraged from applying is also employed in Cox and Jappelli (1993) and is standard in studies that rely on detailed questionnaires.[9] Also, it is crucial given our empirical strategy to separate the firms that did not apply for credit because they didn't need it from those that did not apply because they were discouraged. Table 3 presents summary by country of the shares of firms in need of bank loan and of constrained firms. Appendix 1 explains the construction of all firm-level variables in the data.

In addition to the information described above, BEEPS contains information on the locality of the operation of each firm. A total of $1,266$ localities are present in the data, for an average of 3.5 firms per locality. That geographic information was then matched with data on bank presence coming from the central banks of the 14 countries involved in the study.[10] For the sake of manageability, we narrowed our focus to the banks that comprise at least 90% of the banking sector assets in each country. This gives us a range of between 4 banks in Estonia and 9 banks in Bulgaria. Given this criterion, we performed an internet search of the localities in which each of the banks of interest have branches, as well as the total number of branches in each locality. The search determined that the $1,266$ localities were served by a total of 141 banks. Out of those, 27 are domestic banks, and 114 are branches or subsidiaries of 25 foreign banks. There is considerable variation in foreign bank penetration in the sample: in 2008, foreign ownership of bank sector assets ranges from 28.8% in Slovenia to 98.9% in Slovakia.

Next, we used Bankscope to extract balance sheet information on those 141 bank. We collected data from 2005 to 2008 in order to evaluate how (both current and ex-post) financial performance is associated with a potential reduction in credit. We chose our potential explanatory variables in the context of the main issues surrounding the financial crisis of 2007-2008. The bursting of

[8] The origin can be traced to Bernanke and Lown (1991) who define a credit crunch as a "[...] significant leftward shift in the supply curve for loans, holding constant both the safe real interest rate and the quality of potential borrowers".

[9] Using data on central and east European firms, Brown, Ongena, Popov, and Yesin (2009) show that the share of firms discouraged from applying is up to twice as large than the share of firms which applied and had their loan application rejected.

[10] The matching was made possible after an extensive research of the web pages of all banks involved. In quite a few cases, information was only available in the respective national language.

the housing bubble forced banks to write down several hundred billion dollars in bad loans caused by mortgage delinquencies. At the same time, the stock market capitalization of the major banks declined by more than twice that amount. The total loss on financial assets globally is estimated in the neighborhood of trillions of dollars. Central banks around the world pumped hundreds of billions of dollars in short-term liquidity, alongside reducing discount rates at an unprecedented speed, in order to prop up illiquid and likely insolvent banks (Brunnermeier (2009)).

Hence, we focused primarily on banks' profit, capital ratios (Tier 1 and total), mortgage lending as a share of the loan portfolio, customer lending as a share of the loan portfolio, problem loans, equity ratios, money market funding, loss on financial assets, and loss on available for sale securities. In the case of foreign ownership, we focused on the financial position of the parent bank in order to study, for example, how the investment allocation of UniCredit Group into MBSs and the loss of capital associated with this allocation affects business lending by international branches and subsidiaries of UniCredit. Table 4 summarizes the main variables of interest which were used in the final empirical tests. There are apparent cross-country differences - for example, in 2007-2008 Romanian banks had a somewhat low average Tier 1 capital ratio (6.46), close to the 4% regulatory requirement, owing to the relative undercapitalization of their parent foreign banks, while Polish banks had an average Tier 1 capital ratio of 9.9, mostly due to the fact that the largest bank in Poland is the well-capitalized domestic bank PKO Bank Polski. Also, the banks present in Macedonia incurred almost no losses on financial assets in 2007-08, while in 2008 the parents of the banks present in the Czech Republic had an average ratio of gains on financial assets to total assets of -0.15.

Appendix 2 illustrates the degree of foreign bank penetration in each country in the sample. Clearly, a group of 22 west European and U.S. banks controls the vast majority of assets in the region. These are Erste Group, Hypo Group, Reiffeisen, and Volksbank (Austria), Dexia and KBC (Belgium), Danske Pank (Denmark), Nordea Bank (Finland), Societe Generale (France), Bayerische Landesbank and Commerzbank (Germany), Alpha Bank, EFG Eurobank, Emporiki Bank, National Bank of Greece, and Piraeus Bank (Greece), Intessa San Paolo and UniCredit Group (Italy), ING Bank (Netherlands), Swedbank and Skandinaviska Enskilda Bank (Sweden), and Citibank (U.S.).

There is also substantial regional variation in the degree of penetration: for example, the Greek banks operate mostly in south-eastern Europe, the Scandinavian banks in the Baltic countries, and the Austrian banks in central Europe. In addition, there is one domestic "global" bank, the Hungarian OTP, as well as cross-border penetration by, for example, Parex Group - Latvia and Snoras Bank - Lithuania.

3 Empirical methodology and identification

3.1 Main empirical model

We start by using the 2008 cross-section data on bank balance sheets, firm characteristics, and credit constraints to check for a "credit crunch" by estimating the following basic model:

$$Y_{ijkl} = \beta_1 \cdot X_{ijkl} + \beta_2 \cdot Finance_{jk} + \beta_3 \cdot D_k + \beta_4 \cdot D_l + \varepsilon_{ijkl} \tag{1}$$

where Y_{ijkl} is a dummy variable equal to 1 if firm i in city j in country k in industry l is credit constrained in fiscal year 2007; X_{ijkl} is a matrix of firm characteristics; $Finance_{jk}$ is the index of bank health in city j in country k; D_k is a matrix of country dummies; D_l is a matrix of industry dummies; and ε_{ijkl} is an idiosyncratic error term. The firm level characteristics control for observable firm-level heterogeneity. The two sets of dummy variables control for any unobserved market and industry variation. Essentially, they eliminate the contamination of the estimates by sectoral and macroeconomic circumstances, like growth opportunities, taxes, or unemployment, that are common to all firms in a particular country.

Next, we pool the 2005 and 2008 samples in order to be able to conduct a proper pre-post analysis using both firms that were observed in 2007/2008 (the beginning of the financial crisis) and in 2004/2005 (the peak of the credit cycle). We estimate the model

$$Y_{ijkl} = \beta_1 \cdot X_{ijkl} + \beta_2 \cdot Finance_{jk} + \beta_3 \cdot D_k + \beta_4 \cdot D_l + \beta_5 \cdot D_t + \varepsilon_{ijkl} \tag{2}$$

That procedure is analogical to (1), with the exception that we include year fixed effects to

account for the change in common macro factors between 2005 and 2008.

The main parameter of interest in both models is β_2, which measures the effect of financial distress of the banks in each locality on credit access by firms in that locality. As lower values of *Finance* are associated with bigger bank distress, we expect the sign of β_2 to be negative. We construct our bank distress index by aggregating balance sheet information from Bankscope after determining which banks were present in that locality, and the original ownership of each bank in that locality. The underlying assumption in the absence of a direct match of each loan to the lending bank and of each rejection to the rejecting bank is that if firms were granted/denied credit, then it was most likely the result of interaction with banks in the firms' locality of incorporation. We use two different weighting criteria in constructing the index, namely, giving equal weight to each bank in that particular locality, or weighting each bank's financial position by the number of branches it has in the locality.

Here is an example to clarify the above procedure. There are 4 banks in Estonia that hold close to 100% of the banking assets in the country: Swedbank, SEB, Sampo Pank, and Nordea. They are subsidiaries of Swedbank - Sweden, SEB - Sweden, Danske Pank - Denmark, and Nordea - Finland. In 2008, the 4 parent banks had Tier 1 capital ratios of 8.4, 8.4, 6.9, and 12, respectively. Consider the city Lihula in which only Swedbank has branches. We assign Lihula a Tier 1 capital ratio of 8.4, and then we match the index of financial distress in Lihula with all firms present in that city. Consider alternatively the city of Kuresaare, in which Swedbank, SEB, and Nordea are present. They have 2, 1, and 1 branches in that city, respectively. Consequently, in the main analysis, where we assign equal probability of each firm in that city doing business with each bank present in that city, we assign a Tier 1 capital ratio of $9.6 = \frac{1}{3} \cdot 8.4 + \frac{1}{3} \cdot 8.4 + \frac{1}{3} \cdot 12$, which is then matched to all firms located in Kuresaare. And in the exercises where we weigh the probability of each firm doing business with each bank present in Kuresaare by the number of that bank's branches in that locality, we assign a Tier 1 capital ratio of 9.3 ($\frac{1}{2} \cdot 8.4 + \frac{1}{4} \cdot 8.4 + \frac{1}{4} \cdot 12$).

Now we come to the estimation of the international transmission of financial distress. Equations (1) and (2) simply test for whether banks' asset and liquidity problems affect business lending, but we also hypothesize that banks with a foreign owner are more likely to do so than domestic

banks. For example, if bank-firm relationships are particularly strong and important, banks may be reluctant to reduce credit to their long-time domestic customers and shift more of the shock to overseas markets (Peek and Rosengren (1997)).

There are two ways in which we address this issue. First, we estimate (1) and (2) on the subsample of localities where more than 67% of the banking assets are controlled by branches or subsidiaries of foreign banks. This gives an answer to the question, do foreign banks transmit financial distress. Second, in order to study whether foreign or domestic banks transmit a larger share of their respective financial distress, we estimate the following difference-in-differences specification:

$$Y_{ijkl} = \beta_1 \cdot X_{ijkl} + \beta_2 \cdot Finance_{jk} \cdot FB_{jk} + \beta_3 \cdot Finance_{jk} + \beta_4 \cdot FB_{jk} + \beta_5 \cdot D_k + \beta_6 \cdot D_l + \beta_7 \cdot D_t + \varepsilon_{ijkl} \quad (3)$$

where FB_{jk} is the share of total branches in city j in country k of banks which represent branches or subsidiaries of foreign banks. The primary control group here is all firms incorporated in locations with little foreign bank penetration. Now β_2 measures whether for the same degree of financial distress, foreign banks translate more of it into loan application rejections. Consistent with our hypothesis, we expect the sign of β_2 to be negative.

While in our specifications so far we are capable of estimating the effect of financial distress net of industry-wide and country-wide recession developments that are common to all firms in the respective industry (country), they don't allow us to test whether financial distress differentially affects firms, and our estimates are prone to contamination by location-specific unobservables. Regarding the first point, it is generally predicted that informationally opaque firms and firms with fewer tangible assets are more likely to be shut out of credit markets (see, for example, Berger, Ofek, and Swary (1996), Beck, Demirgüç-Kunt, and Maksimovic (2005), and Brown, Jappelli, and Pagano (2009)). Regarding the second one, macroeconomic circumstances like unemployment usually vary at the city level, and so our specification so far will be contaminated by this variation. To address both points, we employ our third and final specification

$$Y_{ijkl} = \beta_1 \cdot X_{ijkl} + \beta_2 \cdot Finance_{jk} \cdot Z_l + \beta_3 \cdot D_l + \beta_4 \cdot D_{jk} + \varepsilon_{ijkl} \tag{4}$$

Now the location dummies in D_{jk} absorb the effect of locality-specific unobservables. The interaction term containing the industry-level benchmark for information opacity and asset tangibility in Z_l allows us to measure whether the potential effect of the credit crunch is indeed strongest for those firms which theory predicts are most vulnerable to credit market shutdowns.

Finally, we need to emphasize that throughout the paper, it is implicitly assumed that the effect of bank financial distress is localized and realized predominately by firms headquartered in the locality in which the bank has operations. All our empirical specifications presume that firms borrow from banks located near their address of incorporation, which is identical to the approach in, for example, Gormley (2009). In general this is expected to hold as banks tend to derive market power ex ante from geographical proximity (e.g., Degryse and Ongena (2005)). Lending support to that conjecture, empirical work regarding lending relationships in different countries has demonstrated that the average distance between firms and banks is usually very small. For example, Petersen and Rajan (2002) find that the median distance between a firm and its main bank in 1993 was only five miles (eight kilometers).

3.2 Isolating demand shocks

It is a common challenge of studies that analyze the association between financial distress and bank lending to isolate supply shocks satisfactorily. Namely, it is likely that not only does loan demand weaken for all firms in periods when bank capital declines, but the composition of firms that demand credit during recessions changes. The solutions to this problem vary in the literature. For example, Peek and Rosengren (1997) bypass this issue by claiming that the identification problem is rather weak in the case of the international transmission of financial shocks into a recession-free environment. However, the financial crisis of 2007-2008 was followed by one of the deepest global recessions in postwar history, and this recession was already being predicted as soon as the extent of the sub-prime mortgage meltdown became apparent in late summer 2007. Hence, as we observe the

firms in our sample in late 2007 and early 2008, it is conceivable that they were already behaving in a way consistent with a global recession environment. Puri, Rocholl, and Steffen (2009) and Jimenez, Ongena, Peydro, and Saurina (2009) incorporate data on loan applications to account for the explicit weakening of the firm balance sheet channel. However, this strategy does not account for the changing composition across business lenders of firms that demand bank credit as these studies do not observe firms which select themselves out of the loan application process due to 1) weak own demand for loans, or to 2) being discouraged by the deteriorating lending environment. Not accounting for that estimating the true extent of the transmission of financial distress with a bias.

As we explained in Section 2, we eliminate the contamination of the estimates induced by 2) by incorporating data on discouraged firms in the measure of credit constraint. As for 1), we eliminate the effect of the balance sheet channel by incorporating observable information on firms which did not apply for bank credit in fiscal year 2007 because they did not need one (see Section 2 for the exact definition). We apply Heckman's (1979) selection procedure to eliminate the bias arising from the left-truncation of the sample in that sense. Thus, credit constraint is only observable when a firm actually applies for a loan, and the firm only does so if it needs one, or it's not discouraged. Let the dummy variable Q equals 1 if the firm desires positive bank credit and equals 0 otherwise. The value of Q is in turn determined by the latent variable:

$$q = \zeta \cdot Z_{ijkl} + \varepsilon_{ijkl} \tag{5}$$

where Z_{ijkl} contains firm and location variables that may effect the firm's fixed costs and convenience associated with using bank credit. The variable $Q = 1$ if $q > 0$ and $Q = 0$ otherwise. The error ε_{ijkl} is normally distributed with mean 0 and variance σ^2. Models (1)-(4) are then updated by adding the term $\sigma \frac{\phi(q)}{\Phi(q)}$ to the RHS, where $\frac{\phi(q)}{\Phi(q)}$ is the inverse of Mill's ratio (Heckman (1979)), and where q has been estimated on a set of variables that is larger by at least one variable then the set of variables in (1), (2), (3), and (4), respectively.

4 Empirical results

4.1 Bank credit application

Before considering our main empirical model, we first consider the bank credit application tests that we use for our Heckman selection correction. Table 5 presents the results from the first stage probit regression. The probability of needing bank credit is higher for firms in more financially distressed localities, in the sense of a low bank equity ratio and large losses on financial assets. This implies that not accounting for that selection would bias the estimates of the transmission of financial distress towards zero. If there is such transmission, then by making sure that it is not the case that the financially strong firms are selecting themselves out of the application process in locations where banks are severely distressed, we will be measuring an even stronger effect than when selection is not accounted for.

The need for bank credit increases in the size of the firm, which is somewhat surprising as one would expect small firms to have a higher preference for bank credit. However, in a beginning-of-a-recession environment it might be that small firms are better equipped to finance investment with cash flows than - potentially - more highly leveraged large firms. In addition, some of the size effects may be picked by ownership and structural characteristics, as sole properitorships and stand-alone firms have a higher demand for loans. The probability of desiring credit is higher for exporters potentially due to their faster expansion, and for audited firms, which might simply imply that firms choose to be audited (i.e., they are willing to pay for transparency) when they plan to apply for bank credit.[11] It may also be the case that audited firms have access to financial statement lending which may be a cheaper lending technology. In all, these results justify our selection procedure: financial distress not only (potentially) affects business lending, but also the degree to which firms demand loans. Not accounting for this will introduce bias into the main estimates.

[11] The results are broadly consistent with Ongena and Popov (2009) who apply a double selection technique to the BEEPS 2005 sample.

4.2 Transmission of financial distress

4.2.1 Nonparametric difference-in-differences estimates

Table 6 gives a simple non-parametric illustration of the validity of our empirical strategy. We average the data on rejection rates across localities for 2005 and 2009, and for two distinct criteria: affected vs. non-affected, and foreign-bank dominated vs. domestic bank-dominated. In determining which localities are affected, we look at Tier 1 capital and define "affected" as localities where the average Tier 1 capital ratio of banks present in that locality decreased between 2005 and 2008. Likewise, we define "foreign-bank dominated" as localities where more than 2/3 of the branches of all banks present in that localities are held by subsidiaries or branches of foreign banks. The table implies that our estimates depend on the differential response over time of foreign vs. domestic banks to their respective financial problems. In particular, on average rejection rates went down substantially between 2005 and 2008 in localities populated by banks which were not affected by the crisis, regardless of whether these were foreign or domesetic banks. This in itself may potentially reflect a general easing of credit over time or an improvement in the pool of borrowers. However, in localities populated by affected banks, credit tightened between 2005 and 2008. Importantly, while in localities dominated by affected domestic banks rejection rates increased from 27.1% to 30.1%, and the increase is not significant, in localities populated predominantly by affected foreign banks rejection rates went from 30.4% to 42.3%, and that increase is significant at the 5% level.

4.2.2 Cross-section results

Table 7 reports the estimates of the effect of parent banks' financial distress on credit constraints faced by local firms for all firms present in BEEPS 2008. We report the results of the model in equation (1) alongside the results from the Heckman selection-corrected version of it in order to contrast the two approaches. The three main explanatory variables of interest are: the ratio of equity over total assets; the Tier 1 capital ratio; and the gain on financial assets over total assets.[12] We first report the results from the model in which each bank is given equal weight in

[12] The effect of other variables, like the ratio of problem loans to total loans, profit, money market funding, and gain on available for sales securities was tested, but the results were insignificant.

each locality where the bank is present (Panel A). As expected, all else equal, small firms are more credit constrained, potentially indicating lower ability to tap alternative capital markets, and firms that export part of their production are less constrained, potentially signalling the willingness of banks to lend to firms with higher growth prospects.

Turning to the variables of interest, only the Tier 1 capital ratio turns out to have a significant impact on the probability of firms being constrained in the credit market. The effect has the predicted sign, namely, banks whose parents have lower regulatory capital ratios tend to restrict credit access more. The result continues to hold once we eliminate the effect of the balance sheet channel by integrating out the unobservable information associated with the decision to apply for bank credit or to select oneself out of the application process. Numerically, a 2-standard deviation decrease in average Tier 1 capital ratio for banks in a particular locality increases the probability of firms in that locality being constrained by about 24%.

When we apply the second weighting criterion in Panel B, namely, weighting the probability of the firm doing business with each particular bank by the number of branches the bank has in that locality, the effect of the bank's Tier 1 capital ratio becomes larger and more significant. The interpretation of the latter is roughly identical to the one in Panel A, and a 2-standard deviation decrease in average Tier 1 capital ratio for banks in a particular locality increases the probability of firms in that locality being constrained by about 40%. The sign of the inverse of Mill's ratio is generally positive, implying that unobservables which increase the probability of needing bank credit, also increase the probability of being constrained in credit markets.

Although some of the effects are only significant at the 10% level (namely, when we weight banks' Tier 1 capital ratios equally), recall that by looking at fiscal year 2007, we are capturing only the initial stages of the crisis up to March 31, 2008. In addition to that, our results are contaminated by months of pre-crisis experience before August 2007. In that sense, if there is bias in our estimates, it only goes against finding any transmission of crisis-related financial distress.

4.2.3 Pooled 2008 and 2005 data

We next repeat the empirical tests on the sample of firms that are present both in the 2008 and the 2005 BEEPS, employing equation (2) and the Heckman selection-corrected version of it. This allows us to account for the changing composition of firms that select themselves out of the applciation process, going from the peak to the trough of the credit cycle. In other words, the information on whether firms do not apply for credit because they don't need it, or because they are discouraged, and how that changes over time, is used eliminate the potential contamination of our estimates by the correlation between credit needs and bank financial health. These results are reported in Table 8. The simple correlation between the probabilities of being constrained in 2005 and 2008 is 0.63, implying that variations in past credit constraints explain a large part of the variation in current ones.[13] In this specification, only Tier 1 capital seems to matter for credit constraints, once the effect of demand for credit is eliminated (Panel A). Similar to the full sample, once we weigh the probability of firms doing business with a particular bank by the number of branches the bank has in the locality of the firm, the effect of low Tier 1 capital ratio on rejection probabilities becomes larger and significant at the 1% level (Panel B). Importantly, we confirm that not accounting for selection introduces downward bias. This time, once year effects are eliminated, the sign of the inverse of Mill's ratio is generally negative, implying that unobservables which increase the probability of needing bank credit, also decrease the probability of being constrained in credit markets.

4.3 International transmission of financial distress

The analysis so far tests the international transmission of financial distress indirectly, by matching local loan access data to balance sheet data on parent banks. However, as illustrated by Table 4, still relatively large portions of the banking sector are owned by domestic banks. That share in 2008 is 21% for the sample, 24% for Poland, 36% for Hungary and Latvia, and 71% for Slovenia. In essence, so far we have measured the transmission of distress from the financial to the corporate sector regardless of bank ownership. For that reason, we next improve the model by restricting the sample to localilties where more than 2/3 of the assets of present banks are held by foreign

[13] In all tables to follow, only coefficients of interest are reported for brevity.

banks. That share is calculated individually for each locality by calculating the share of retail branches held by subsidiaries and branches of foreign banks present in that particular locality by the total number of bank branches in that locality. We then look at localities with at least 2/3 foreign presence.

Table 9 reports the estimates of this empirical exercise on the *international* transmission of financial distress during the 2007-2008 crisis. It turns out that once we restrict our attention to foreign bank-dominated localities, all measures of financial distress matter. In other words, higher financial distress is associated with lower loan granting probability when financial distress is measured as a low equity ratio, a low Tier 1 capital ratio, or high losses on financial assets. Numerically, a 2-standard deviation decrease in equity capital, Tier 1 capital, and gains on financial assets is associated with a 30%, 55%, and 32% increase in rejection rates, respectively. This result holds after the correction for the possibility that weak firms select themselves out of the application process in the case of Tier 1 capital, and only appears after accounting for selection in the case of equity capital for the 2008 sub-sample.

In unreported tests, we check if the geographic origin of the main foreign owner matters. This is interesting question given that we study a heterogeneous group of foreign banks, that is, there are countries in the sample dominated by Greek banks vs. countries dominated by Austrian and Belgian banks vs. countries dominated by Skandinavian banks. The different dimension of the domestic recession in these countries may have led some of them to cut supply abroad more. For example, it is possible to think of the exposure of Dutch and Spanish banks to domestic mortgages and hypothesize that these banks would want to keep good relations with their domestic depositors by transmitting a smaller portion of an identical financial shock domestically and, by extension, a larger portion internationally. However, we find that this is not the case.

4.4 Transmission of financial distress: foreign vs. domestic

An important question that arises given the evidence so far is, do foreign or domestic banks transmit a larger portion of an identical financial shock. Table 10 reports the estimates from the difference-in-differences regression where we compare the transmission of financial distress by domestic and

foreign banks, that is, equation (3). Tellingly, whenever significant, the interaction effect implies that foreign banks react to the same shock to balance sheets by shrinking their portfolio more than domestic banks. This is observed in the case of shocks to Tier 1 capital and to equity capital. The one exception is gains on financial assets, where we find weak evidence to the opposite effect. The positive sign on the coefficient implies that for the same level of bank distress so defined, firms in localities dominated by foreign banks face a lower probability of being credit constrained. This one result implies that domestic banks indeed shrink their loan portfolios more than foreign owned banks in response to asset losses. However, it is only significant in one case, and only at the 10% level. Consequently, we can conclude with a fair degree of statistical certainty that foreign banks transmit more of an identical financial shock than domestic banks.

Apart from a parametric confirmation of the non-parametric observation in Table 6, this result offers important insights into the role of foreign banks in emerging markets. In general, the effect of foreign banks on business lending in the literature is ambiguous. A large literature has found that foreign bank presence is associated with higher access to loans (Clarke, Cull, and Peria (2006)), higher firm-level sales (Giannetti and Ongena (2009)), and lower loan rates and higher firm leverage (Ongena and Popov (2009)). On the other hand, Berger, Klapper, and Udell (2001), Mian (2006), and Gormley (2009) show that foreign banks tend to finance only larger, established, and more profitable firms. Our paper complements that picture by providing evidence that while at the peak of the credit cycle lending by foreign banks is indistinguishable from lending by domestic banks in terms of acceptance rates, foreign banks do tend to shrink their loan portfolio following a capital crunch, even after controlling for the degree of financial distress.

4.5 Transmission of financial distress: differential effects

Finally, we ask which firms are most affected from the transmission of financial distress. There are clear arguments in the literature on which firms and industries should be most affected by credit rationing. Information asymmetries and the tangibility of the firm's assets, for example, are expected to play an important role in explaining differences in credit availability across firms. Informationally opaque firms tend to suffer more from credit rationing, especially when foreign bank

lending is involved (Berger, Klapper, and Udell (2001)). Firms are expected to be informationally opaque when they come from an industry where banks find it difficult to evaluate projects and price risk properly. Berger, Klapper, and Udell (2001) also show that firm size is not a good proxy for informational opacity. However, we know that banks do less business with informationally opaque firms, and based on that, we hypothesize that firms in industries which use a lot of external finance in mature financial markets are less informationally opaque than firms which use little external finance. Regarding asset tangibility, Berger, Ofek, and Swary (1996) show that firms with less tangible assets are more likely to lose access to credit when banks reprice risk. The rationale is that lenders rely more on collateral when making lending decision rather than investing in costly screening technologies, and this problem will tend to be exacerbated in an environment where risk is suddenly priced higher.

We proceed by collecting data on mature U.S. firms and using it to construct industry benchmarks for informational opacity and asset tangibility. The rationale for doing so goes back to Rajan and Zingales (1998) who argued that the actual capital structure of small firms is a function of financial constraints, while the capital structure of large mature firms is more representative of the cross-industry variations in the scale of projects, gestation period, the ratio of hard vs. soft information, the ratio of tangible vs. intangible assets, follow-up investments, etc. In addition, doing so for large U.S. firms makes sure that what is taken as a "natural" industry feature is not contaminated by shallow financial markets.

Following Rajan and Zingales's (1998) original approach, we proceed by taking all Compustat firms between 1990 and 2000. We first exclude all firms that are young in the sense that they have gone public only recently (in the last 10 years) to make sure that we are not capturing the excessive appetite for funds exhibited during the early life of a public firm. For each firm, we sum across all years total capital expenditures minus cash flow, normalized by total sales, and take industry-median values. This is our industry benchmark "dependence on external finance". Next, we sum across all years each firm's ratio of research and development expenses over sales. We take the median industry value of that ratio and this value constitutes our industry benchmark for "R&D intensity". Finally, we sum across all years each firm's ratio of total physical capital used in

production over the number of employees. The industry median value of that variable constitutes our industry benchmark for "Capital intensity". For each benchmark, we have an 18-industry variation.

Table 11 reports the estimates of equation (4) where each measure of financial distress has been interacted with a dummy variable equal to 1 if the industry is in the bottom 50% of the distribution of "External financial dependence" (informationally opaque), in the top 50% of the distribution of "R&D intensity" (low asset tangibility), and in the bottom 50% of "Capital intensity" (low asset tangibility). We only forcus on financial distress as measured by low Tier 1 capital ratios, as this is the one measure that is most consistently associated with higher loan rejection rates in the analysis so far. Importantly, this specification gives us interaction at the city and industry level, and thus we can include city dummies in the regression. The direct effect of financial distress is now fully absorbed by these dummies, along with any unobservable variation in macroeconomic conditions at the location level. The effect of the natural industry benchmarks is absorbed by the industry dummies.

The results confirm the intuition: firms tend to suffer more from the transmission of financial distress when they are informationally opaque or don't have enough assets to pledge as collateral. Numerically, the same Tier 1 capital ratio is associated with a 6.0% higher probability of loan rejection for firms in industries with low dependence on external finance; with a 7.8% higher probability of loan rejection for firms in industries with high R&D intensity; and with a 7.1% higher probability of loan rejection for firms in industries with low per-worker capital.

5 Conclusion

The financial crisis of 2007-2008, which started with the meltdown of sub-prime mortgages and securitized products and which has been characterized by severe losses and depletion of bank capital, has spurred unprecedented government recapitalization programs and liquidity injections by central banks. Since the inception of the crisis, it was feared that this depletion of capital may result in a severe credit crunch, especially to the corporate sector in countries populated by the

hardest hit banks. Because the European economy is heavily bank-dependent and SMEs - usually the most vulnerable to a credit crunch due to their opacity - comprise up to 99% of the corporate sector, it was feared that European firms would be particularly heavily hit, despite the fact that the causal factors of the credit crunch originated elsewhere.

In this paper, we investigate empirically the international transmission of financial distress, from the loss in value of financial assets to the balance sheets of big European and U.S. banks to business lending in their foreign markets - specifically, central and eastern Europe. Several current unpublished studies have documented a credit crunch associated with weakened capital positions, however, ours is the first one to simultaneously 1) demonstrate the cross-border dimensions of this phenomenon, and 2) eliminate the contamination of the lending channel by selection bias resulting from the changing composition of firms' demand for credit during recessions.

We find that different types of financial distress at western European and U.S. parent banks are associated with a significant impact on business lending to central and eastern European firms. While we do not observe an actual match between a bank and a firm, we match firms and banks by the locality of their respective operation. We find that as early as late 2007/early 2008, firms reported higher credit constraints in localities populated by branches or subsidiaries of banks who in 2007 and 2008 had low equity capital, low Tier 1 capital ratios, and had recorded severe losses on financial assets. Importantly, we find that this effect is stronger for localities predominantly populated by foreign banks. We also find that informationally opaque firms and firms with fewer tangible assets were differentially more affected by this capital crunch. These results hold when we eliminate the effect of demand shifts in response to weakening firm balance sheets, as well as the bias resulting from the systematic selection of firms out of the application process. Our evidence implies that all else equal, firms in countries like the Czech Republic and Romania, where major portions of the banking market are held by the relatively undercapitalized Erste Group and UniCredit Group, were 1) more credit constrained than firms in countries like Hungary and Poland, where the largest banks are the domestically-owned and well capitalized OTP and PKO, respectively, but also 2) more credit constrained than firms in Slovenia, served by equally undercapitalized domestic banks. This is direct evidence of the global transmission of financial distress in the relatively early stages

of the 2007-2008 financial crisis, in a way unrelated to the demand for loans in local markets.

The financial crisis of 2007-2008 has finally laid to rest the idea that the effect of large financial shocks can be confined locally. We have shown how the collapse of housing values in the U.S. has affected the financing conditions of Slovak firms through the deteriorating portfolios of Austrian, Belgian, and Italian banks, loaded with assets backed by those mortgages, and operating in Slovakia through their subsidiaries. While the credit crunch only started in the third quarter of 2007, banks kept tightening credit standards until as late as the fourth quarter of 2008[14], and most likely long after that. Thus, despite the coordinated actions of various national and supranational authorities, which kept the global financial system from collapsing after the fall of Lehman Brothers in September 2008, it is likely that the losses that the financial system endured have induced, and will continue to induce, a much larger impact on the real sector than the one estimated in this paper. The true extent of the credit crunch will only become clear with the availability of new, more comprehensive data.

[14] See ECB (2008) for details.

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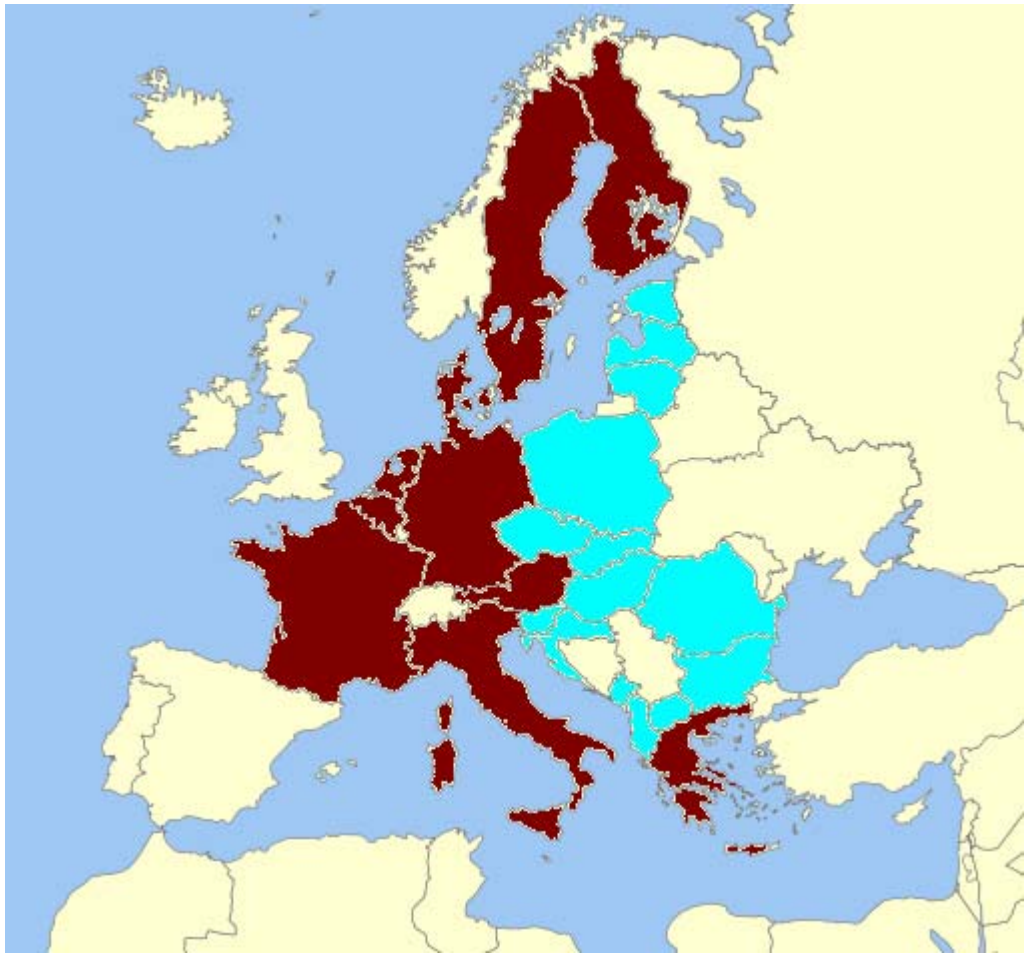
Figure 1. Origin and target countries in the data



The map shows the cross-border dimension of the underlying data. Countries in dark color (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Netherlands, and Sweden) are those in which the parent banks in the dataset are incorporated. Countries in light color (Albania, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithiania, Macedonia, Montenegro, Poland, Romania, Slovakia, and Slovenia) are those where the firms in the dataset are incorporated.

Table 1.
Timeline of events during the 2007-2008 crisis concerning banks and countries in the data

Timeline	Country	Event
Aug. 2007 – Aug. 2008	Germany	Bayerische LandesBank is one of three LandesBanken to receive capital injections, credit lines, and asset-backed securities loss guranatees.
Sept. 2008	France	The government recapitalizes Dexia.
	U.S.	Emergency Economic Stabilization Act, containing a commitment for up to 700 bln. USD to purchase bad assets from banks.
	Italy	The parliament approves a law granting the government the possibility to recapitalize distressed banks.
	Netherlands	The government announces that public fudns can be used for bank recapitalization, of which 20 bln. EUR are immediately available.
Oct. 2008	France	The Government approves 320 bln. EUR to provide loans to banks and other financial firms, including a 40 billion euro recapitalization plan.
	Sweden	The government announces that it will guarantee up to 1.5 trillion SEK in new debt issues, and a 15 billion SEK stabilization fund.
	Germany	The government announces a 400 billion EUR plan to guarantee bank financing, including a 70 billion EUR recapitalization fund.
	US	The Treasury subscribes 20 bln. USD preferred shares at Citigroup and ring-fences its troubled assets worth up to 300 billion USD.
Nov. 2008	Italy	The government approves a law to inject capital into sound banks.
	Germany	Bayerische LandesBank receives 7 billion EUR of capital from the Bavarian state.
Dec. 2008	Germany	The Finance ministry provides Bayerische LandesBank with 15 billion EUR .
	Germany	The Finance ministry provides Commerzank with a 8.2 billion EUR loan, and buys 1.8 trillion EUR worth of equity.
Jan. 2009	France	The government implements a second round of bank recapitalization for 10.5 billion EUR.
	Netherlands	The Dutch government provides a cack-up facility to back up the risks of ING's securitized mortgage portfolio worth 35.1 billion EUR.

Table 2.
Summary statistics: Firm characteristics

country	# firms	Small firm	Big firm	Public company	Private company	Sole proprietorship	Privatized	Subsidized	Exporter	Competition	Audited
Albania	133	0.90	0.04	0.00	0.33	0.63	0.08	0.03	0.27	0.65	0.63
Bulgaria	457	0.84	0.02	0.05	0.47	0.43	0.14	0.07	0.25	0.63	0.43
Croatia	208	0.81	0.04	0.06	0.51	0.38	0.23	0.20	0.36	0.85	0.47
Czech Republic	316	0.72	0.03	0.07	0.61	0.29	0.09	0.22	0.46	0.82	0.54
Estonia	402	0.78	0.03	0.16	0.62	0.19	0.10	0.16	0.34	0.75	0.80
Hungary	406	0.73	0.06	0.01	0.65	0.31	0.15	0.22	0.34	0.87	0.75
Latvia	385	0.70	0.04	0.02	0.69	0.23	0.14	0.12	0.34	0.80	0.70
Lithuania	386	0.75	0.03	0.02	0.71	0.22	0.15	0.17	0.37	0.78	0.39
Macedonia	477	0.80	0.03	0.06	0.56	0.23	0.17	0.04	0.41	0.85	0.59
Montenegro	134	0.85	0.01	0.04	0.27	0.69	0.12	0.03	0.15	0.68	0.53
Poland	621	0.79	0.02	0.05	0.24	0.67	0.12	0.13	0.28	0.81	0.37
Romania	709	0.70	0.03	0.06	0.66	0.22	0.14	0.10	0.18	0.71	0.38
Slovakia	349	0.70	0.06	0.05	0.18	0.64	0.13	0.15	0.34	0.79	0.57
Slovenia	397	0.71	0.05	0.10	0.62	0.25	0.23	0.24	0.61	0.80	0.44
Total	5,380	0.76	0.03	0.06	0.53	0.36	0.14	0.14	0.33	0.77	0.53

Note: The table presents statistics on the number of firms and the share of firms by size, ownership, privatization history, subsidies from central and local governments, access to foreign product markets, degree of competition, and access to international auditing, by country. See Appendix 1 for exact definitions. Source: BEEPS (2008 & 2005).

Table 3.
Summary statistics: Credit demand and access

	2008		2005	
Country	Need loan	Constrained	Need loan	Constrained
Albania	0.29	0.47	0.74	0.46
Bulgaria	0.58	0.52	0.65	0.45
Croatia	0.59	0.42	0.77	0.19
Czech Republic	0.53	0.32	0.78	0.38
Estonia	0.54	0.27	0.58	0.47
Hungary	0.41	0.31	0.88	0.42
Latvia	0.59	0.48	0.74	0.58
Lithuania	0.60	0.23	0.70	0.61
Macedonia	0.59	0.50	0.77	0.82
Montenegro	0.78	0.48	0.80	0.45
Poland	0.53	0.41	0.66	0.59
Romania	0.61	0.33	0.75	0.47
Slovakia	0.53	0.40	0.60	0.38
Slovenia	0.64	0.15	0.77	0.12
Total	0.57	0.37	0.72	0.46

Note: The table presents statistics on the share of firms who declare bank loans desirable, and the share of firms out of those that need a lon that have been formally rejected or did not apply because they found access to finance too difficult, by country. The data are for the fiscal year 2007 (until March 31, 2008). See Appendix 1 for exact definitions. Source: BEEPS (2008).

Table 4.
Bank ownership balance sheet data

	2005	2008	2005	2008	2005	2008	2005	2008
Country	% foreign owned bank assets		Equity/assets		Tier 1 capital ratio		Gain on financial assets	
Albania	0.92	0.94	0.068	0.051	9.01	7.01	0.02	-0.04
Bulgaria	0.75	0.82	0.065	0.061	9.65	7.43	0.06	-0.03
Croatia	0.91	0.90	0.073	0.063	7.84	7.03	0.06	-0.02
Czech Republic	0.82	0.86	0.049	0.044	8.74	7.26	0.09	-0.15
Estonia	0.99	0.99	0.049	0.038	9.39	7.57	0.05	-0.03
Hungary	0.83	0.64	0.071	0.058	8.51	7.38	0.01	-0.06
Latvia	0.58	0.64	0.084	0.062	9.31	9.76	0.02	-0.06
Lithuania	0.92	0.92	0.061	0.053	8.59	7.68	0.03	-0.04
Macedonia	0.51	0.86	0.069	0.065	9.77	7.60	0.06	-0.01
Montenegro	0.88	0.79	0.092	0.091	9.13	8.16	0.02	-0.03
Poland	0.74	0.76	0.066	0.065	9.41	9.91	0.02	-0.09
Romania	0.59	0.87	0.064	0.053	8.44	6.46	0.04	-0.05
Slovakia	0.97	0.99	0.059	0.054	8.60	7.63	0.01	-0.06
Slovenia	0.23	0.29	0.062	0.055	8.08	6.81	0.07	-0.06

Note: The table reports summary statistics on the share of the domestic banking system owned by branches and subsidiaries of foreign banks, of the average ratio of equity financing to total bank assets, of the average Tier 1 capital ratio, and of average gains on financial assets by the parent of the banks operating in each country, by country. The data are averaged for 2007-2008. See Appendix 1 for exact definitions. Source: EBRD Transition Report (2008) and Bankscope (2007 and 2008).

Table 5.
Probability of desiring bank credit

	Finance = Equity/assets	Finance = Tier 1 capital ratio	Finance = Gains on fin assets
Finance	-0.056	0.039	-0.023
	(0.031)*	(0.063)	(0.013)*
Small firm	-0.245	-0.169	-0.169
	(0.053)***	(0.060)***	(0.060)***
Big firm	0.082	-0.009	-0.010
	(0.117)	(0.137)	(0.137)
Public company	-0.008	-0.054	-0.051
	(0.124)	(0.146)	(0.146)
Private company	0.151	0.137	0.141
	(0.092)	(0.114)	(0.114)
Sole proprietorship	0.200	0.223	0.227
	(0.093)**	(0.119)*	(0.119)*
Privatized	0.047	0.094	0.095
	(0.061)	(0.071)	(0.071)
Exporter	0.149	0.159	0.1159
	(0.043)***	(0.054)***	(0.054)***
Competition	0.089	0.088	0.088
	(0.051)*	(0.051)*	(0.051)*
Audited	0.086	1.141	0.140
	(0.045)*	(0.050)***	(0.049)**
Subsidized	0.281	0.281	0.281
	(0.069)***	(0.069)***	(0.069)***
Stand-alone firm	0.271	0.271	0.271
	(0.075)***	(0.075)***	(0.075)***
Firm age	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)
Manager experience	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)
Country fixed effects		Yes	
Industry fixed effects		Yes	
Observations	4,709	4,709	4,813
Pseudo R-squared	0.06	0.06	0.07

Note: The dependent variable is a dummy variable equal to 1 if the firm desires bank credit. 'Finance' is one of the three financial variables from Table 4. Ommited category in firm size is 'Medium firm'. All regressions include country, industry, and year fixed effects. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2005 and 2008) and Bankscope (2005 and 2008).

Table 6.
Affected vs. non-affected banks: rejection rates

	Foreign banks-dominated	
	Affected localities	Non-affected localities
2005	0.304	0.357
2008	0.423	0.143
Difference	-0.119**	0.214***

	Domestic bank-dominated	
	Affected localities	Non-affected localities
2005	0.271	0.385
2008	0.301	0.150
Difference	-0.030	0.235***

Note: The table presents acceptance rates aggregated across localities. 'Affected' are localities where the average Tier 1 capital ratio of banks present in that locality went down between 2005 and 2008. 'Foreign banks-dominated' are localities where more than 2/3 of the branches are held by subsidiaries or branches of foreign banks. The statistical significance of the difference-in-differences estimate from a two-sided Mann-Whitney test can be found next to the difference, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. Source: BEEPS (2005 and 2008) and Bankscope (2005-2008).

Table 7.
Probability of being constrained (2008 sample)

Panel A. Equally weighted bank data for each locality

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	0.018	0.028	-0.219	-0.237	0.093	0.325
	(0.075)	(0.076)	(0.132)*	(0.116)**	(0.651)	(0.699)
Small firm	0.396	0.560	0.394	0.556	0.395	0.543
	(0.084)***	(0.110)***	(0.084)***	(0.110)***	(0.084)***	(0.109)***
Big firm	-0.188	-0.141	-0.186	-0.138	-0.187	-0.132
	(0.186)	(0.194)	(0.186)	(0.195)	(0.186)	(0.194)
Public company	0.324	0.315	0.323	0.314	0.324	-0.312
	(0.216)	(0.226)	(0.216)	(0.226)	(0.216)	(0.226)
Private company	-0.103	-0.127	-0.106	-0.129	-0.102	-0.118
	(0.171)	(0.183)	(0.171)	(0.183)	(0.171)	(0.182)
Sole proprietorship	-0.065	-0.017	0.064	-0.015	0.065	-0.001
	(0.177)	(0.196)	(0.177)	(0.196)	(0.177)	(0.195)
Privatized	-0.031	-0.034	-0.029	-0.030	-0.031	-0.024
	(0.099)	(0.107)	(0.099)	(0.107)	(0.099)	(0.106)
Exporter	-0.211	-0.252	-0.214	-0.254	-0.211	-0.242
	(0.075)***	(0.087)***	(0.075)***	(0.087)***	(0.075)***	(0.086)***
Audited	-0.285	-0.354	-0.283	-0.350	-0.285	-0.343
	(0.070)***	(0.085)***	(0.070)***	(0.085)**	(0.070)***	(0.085)***
Subsidized	-0.072	-0.269	-0.074	-0.268	-0.073	-0.243
	(0.090)	(0.142)*	(0.090)	(0.142)*	(0.090)	(0.140)*
Stand-alone firm	-0.023	-0.139	-0.021	-0.137	-0.023	-0.121
	(0.107)	(0.132)	(0.108)	(0.132)	(0.108)	(0.131)
Inverse Mill's ratio		0.301		0.294		0.247
		(0.209)		(0.209)		(0.202)
Country fixed effects			Yes			
Industry fixed effects			Yes			
Observations	2,082	2,005	2,082	2,005	2,082	2,005
Pseudo R-squared	0.12	0.13	0.12	0.13	0.12	0.13

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is one of the three financial variables from Table 4. Each finance variable is locality-specific and is constructed by weighting equally the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. Ommited category in firm size is 'Medium firm'. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. Omitted categories from the probit equation in Table 5 are 'Competition', 'Firm age', and 'Manager experience'. The analysis is performed on all firms present in the 2008 survey. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2008) and Bankscope (2007 and 2008).

Table 7.
Probability of being constrained (2008 sample)

Panel B. Branch-weighted bank data for each locality

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	-0.068	-0.070	-0.338	-0.408	0.284	0.204
	(0.069)	(0.071)	(0.124)***	(0.131)***	(0.573)	(0.585)
Small firm	0.394	0.560	0.393	0.557	0.395	0.571
	(0.084)***	(0.110)**	(0.084)***	(0.110)***	(0.084)***	(0.110)***
Big firm	-0.181	-0.135	-0.189	-0.143	-0.188	-0.142
	(0.186)	(0.194)	(0.186)	(0.195)	(0.186)	(0.194)
Public company	0.322	0.312	0.318	0.303	0.325	0.317
	(0.216)	(0.226)	(0.216)	(0.227)	(0.216)	(0.226)
Private company	-0.105	-0.133	-0.104	-0.133	-0.101	-0.133
	(0.171)	(0.183)	(0.171)	(0.183)	(0.171)	(0.182)
Sole proprietorship	0.067	-0.018	0.074	0.008	0.067	-0.027
	(0.177)	(0.196)	(0.177)	(0.196)	(0.177)	(0.196)
Privatized	-0.029	-0.031	-0.021	-0.020	-0.028	-0.035
	(0.099)	(0.107)	(0.096)	(0.107)	(0.099)	(0.107)
Exporter	-0.210	-0.253	-0.214	-0.256	-0.211	-0.259
	(0.075)***	(0.086)***	(0.075)***	(0.087)***	(0.075)***	(0.086)***
Audited	-0.282	-0.352	-0.281	-0.351	-0.284	-0.362
	(0.070)	(0.085)***	(0.070)***	(0.085)***	(0.070)***	(0.085)***
Subsidized	-0.069	-0.269	-0.071	-0.270	-0.073	-0.290
	(0.090)	(0.141)*	(0.090)	(0.141)*	(0.090)	(0.141)**
Stand-alone firm	-0.020	-0.138	-0.023	-0.141	-0.025	-0.154
	(0.108)	(0.131)	(0.108)	(0.103)	(0.108)	(0.132)
Inverse Mill's ratio		0.307		0.302		0.340
		(0.207)		(0.209)		(0.207)*
Country fixed effects			Yes			
Industry fixed effects			Yes			
Observations	2,082	2,005	2,082	2,005	2,082	2,005
Pseudo R-squared	0.12	0.13	0.12	0.13	0.12	0.13

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is one of the three financial variables from Table 4. Each finance variable is locality-specific and is constructed by weighting by number of branches the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. Omitted category in firm size is 'Medium firm'. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. Omitted categories from the probit equation in Table 5 are 'Competition', 'Firm age', and 'Manager experience'. The analysis is performed on all firms present in the 2008 survey. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2008) and Bankscope (2007 and 2008).

Table 8.
Probability of being constrained (pooled 2005 and 2008 samples)

Panel A. Equally weighted bank data for each locality

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	0.061	0.056	-0.153	-0.175	0.010	-0.001
	(0.073)	(0.074)	(0.110)	(0.105)*	(0.022)	(0.022)
Inverse Mill's ratio		-0.193		-0.196		-0.190
		(0.109)*		(0.109)*		(0.090)**
Country fixed effects				Yes		
Industry fixed effects				Yes		
Year fixed effects				Yes		
Observations	2,398	2,365	2,398	2,365	2,414	2,481
Pseudo R-squared	0.14	0.15	0.14	0.15	0.14	0.15

Panel B. Branch-weighted bank data for each locality

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	-0.042	-0.041	-0.355	-0.392	0.012	0.011
	(0.068)	(0.069)	(0.121)***	(0.125)***	(0.019)	(0.020)
Inverse Mill's ratio		-0.200		-0.208		-0.194
		(0.109)*		(0.109)**		(0.091)**
Country fixed effects				Yes		
Industry fixed effects				Yes		
Year fixed effects				Yes		
Observations	2,398	2,365	2,398	2,365	2,447	2,414
Pseudo R-squared	0.14	0.15	0.14	0.15	0.14	0.15

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is one of the three financial variables from Table 4. Each finance variable is locality-specific and is constructed by weighting equally (Panel A) or by number of branches (Panel B) the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. The regressions also include the rest of the independent variables from table 6. Omitted categories from the probit equation in Table 5 are 'Competition', 'Firm age', and 'Manager experience'. The analysis is performed on all firms present in the 2008 survey. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2005 and 2008) and Bankscope (2005-2008).

Table 9.
Probability of being constrained, foreign banks dominated localities

Panel A. 2008 sample

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	0.137	-0.309	-0.849	-0.899	0.006	0.926
	(0.216)	(0.179)*	(0.435)**	(0.346)***	(0.007)	(1.285)
Inverse Mill's ratio	0.456	0.703	-0.093	0.707	-0.063	0.732
	(0.303)	(0.354)**	(0.363)	(0.357)**	(0.366)	(0.353)**
Country fixed effects			Yes			
Industry fixed effects			Yes			
Observations	1,568	1,167	1,244	1,167	1,244	1,167
Pseudo R-squared	0.13	0.15	0.09	0.16	0.09	0.15

Panel B. Pooled 2008 and 2005 samples

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance	-0.397	-0.286	-0.849	-0.812	-0.369	0.065
	(0.223)*	(0.169)*	(0.503)*	(0.294)***	(0.221)*	(0.055)
Inverse Mill's ratio	0.011	0.007	0.005	-0.002	-0.029	-0.032
	(0.144)	(0.143)	(0.144)	(0.144)	(0.110)	(0.112)
Country fixed effects			Yes			
Industry fixed effects			Yes			
Year fixed effects						
Observations	1,383	1,383	1,383	1,383	1,414	1,414
Pseudo R-squared	0.16	0.16	0.16	0.17	0.16	0.16

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is one of the three financial variables from Table 4. Each finance variable is locality-specific and is constructed by weighting equally (Columns 1, 3, and 5) or by number of branches (Columns 2, 4, and 6) the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. The regressions also include the rest of the independent variables from table 6. The analysis is performed on all firms present in the 2008 survey (Panel A) and on the pooled sample of firms present either in the 2008 or the 2005 survey (Panel B). Only localities where more than 67% of banking assets are owned by branches or subsidiaries of foreign banks are included in the regressions. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2005 and 2008) and Bankscope (2005-2008).

Table 10.
Probability of being constrained: foreign vs. domestic banks

Panel A. 2008 sample

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance*Foreign	-0.451	-0.150	-0.792	-0.086	0.329	0.002
	(0.494)	(0.210)	(0.376)**	(0.180)	(0.184)*	(0.182)
Finance	0.060	-0.025	-0.260	-0.390	-0.177	0.252
	(0.145)	(0.095)	(0.212)	(0.175)**	(0.159)	(0.977)
Foreign	0.066	0.377	-0.227	0.274	-0.057	0.252
	(0.748)	(0.253)	(0.450)	(0.229)	(0.533)	(0.202)
Inverse Mill's ratio	0.082	0.482	0.097	0.448	0.087	0.527
	(0.347)	(0.310)	(0.348)	(0.313)	(0.337)	(0.311)*
Country fixed effects			Yes			
Industry fixed effects			Yes			
Observations	1,293	1,410	1,293	1,410	1,293	1,410
Pseudo R-squared	0.15	0.15	0.15	0.16	0.15	0.15

Panel B. Pooled 2008 and 2005 samples

	Finance = Equity/assets		Finance = Tier 1 capital		Finance = Gains on fin assets	
Finance*Foreign	-1.264	-0.319	-0.195	-0.004	-0.174	-0.078
	(0.400)***	(0.196)*	(0.122)*	(0.178)	(0.352)	(0.215)
Finance	0.024	0.006	-0.054	-0.386	-0.046	0.020
	(0.095)	(0.094)	(0.161)	(0.167)**	(0.031)	(0.035)
Foreign	0.514	0.503	0.455	0.258	0.481	0.373
	(0.197)***	(0.220)**	(0.213)**	(0.240)	(0.267)	(0.190)**
Inverse Mill's ratio	-0.777	-0.774	-0.774	-0.781	-0.644	-0.653
	(0.098)***	(0.098)***	(0.098)***	(0.098)***	(0.084)***	(0.085)***
Country fixed effects			Yes			
Industry fixed effects			Yes			
Year fixed effects			Yes			
Observations	1,664	1,664	1,664	1,664	1,710	1,710
Pseudo R-squared	0.14	0.13	0.13	0.13	0.13	0.13

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is a dummy equal to 1 if the respective financial variable from Table 4 is in the top 50% of its distribution. Each finance variable is locality-specific and is constructed by weighting equally (Columns 1, 3, and 5) or by number of branches (Columns 2, 4, and 6) the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. 'Foreign' is a dummy equal to 1 if the share of branches in each locality owned by branches or subsidiaries of foreign banks is more than 2/3, and to 0 if it is less than 1/3. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. The regressions also include the rest of the independent variables from table 6. The analysis is performed on all firms present in the 2008 survey (Columns (2), (4), and (6)) and on the subsample of firms present in both the 2008 and the 2005 survey (Columns (3), (5), and (7)). All regressions include country and industry fixed effects (Panel A), and country, industry, and year fixed efefcts (Panel B). *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2005 and 2008) and Bankscope (2005-2008).

Table 11.
Probability of being constrained: differential effects

Panel A. Equally weighted bank data for each locality			
Tier 1 capital * External fin. dependence	-0.071		
	(0.097)		
Tier 1 capital * R&D intensity		-0.172	
		(0.107)*	
Tier 1 capital * capital intensity			-0.134
			(0.084)*
City fixed effects		Yes	
Industry fixed effects		Yes	
Observations	1,226	1,226	1,226
Pseudo R-squared	0.15	0.16	0.16
Panel B. Branch-weighted bank data for each locality			
Tier 1 capital * External fin. dependence	-0.144		
	(0.080)*		
Tier 1 capital * R&D intensity		-0.185	
		(0.095)**	
Tier 1 capital * capital intensity			-0.182
			(0.080)**
City fixed effects		Yes	
Industry fixed effects		Yes	
Observations	1,226	1,226	1,226
Pseudo R-squared	0.16	0.16	0.16

Note: The dependent variable is a dummy variable equal to 1 if the firm is credit constrained. 'Finance' is one of the three financial variables from Table 4. Each finance variable is locality-specific and is constructed by weighting equally (Panel A) or by number of branches (Panel B) the respective financial variable for each parent bank which has at least one branch or subsidiary in that locality. 'External financial dependence' is a dummy equal to 1 if the industry is in the bottom 50% of the distribution of industry medians of the proportion of capital expenditures financed with external funds for mature Compustat firms over the period 1990-2000. 'R&D intensity' is a dummy equal to 1 if the industry is in the top 50% of the distribution of industry medians of the ratio of research and development expenses to sales for mature Compustat firms over the period 1990-2000. 'Capital intensity' is a dummy equal to 1 if the industry is in the bottom 50% of the distribution of industry medians of capital usage per worker with external funds for mature Compustat firms over the period 1990-2000. 'Inverse Mill's ratio' is the inverse of Mills'ratio from the probit model in Table 5 for each respective financial variable. The regressions also include the rest of the independent variables from table 6. The analysis is performed on all firms present in the 2008 survey. All regressions include city and industry fixed effects. *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level. See Appendix 1 for exact definitions. Source: BEEPS (2008) and Bankscope (2007 and 2008).

Appendix 1. Variables – Definitions and sources

Variable Name	Definition	Source
	Firm characteristics	
Small firm	Dummy=1 if firm has less than 99 employees	BEEPS 2005 & 2008
Medium firm	Dummy=1 if the firm has betwee 100 and 499 employees	BEEPS 2005 & 2008
Big firm	Dummy=1 if firm has more than 500 employees	BEEPS 2005 & 2008
Size	Dummy=1 if the firm has more than 10 employees	BEEPS 2005 & 2008
Age	Dummy=1 if more than 10 years have elapsed since the firm's incorporation	BEEPS 2005 & 2008
Public company	Dummy=1 if firm is a shareholder company / shares traded in the stock market	BEEPS 2005 & 2008
Private company	Dummy=1 if firm is a shareholder company / shares traded privately if at all	BEEPS 2005 & 2008
Sole proprietorship	Dummy=1 if firm is a sole proprietorship	BEEPS 2005 & 2008
Privatized	Dummy=1 if the firm went from state to private ownership in the past	BEEPS 2005 & 2008
Subsidized	Dummy=1 if the firm has received state subsidized in the past year	BEEPS 2005 & 2008
Exporter	Dummy=1 if firm's production is at least partially exported	BEEPS 2005 & 2008
Competition	Dummy=1 if pressure from competitiors is "fairly" or "very" severe	BEEPS 2005 & 2008
Audited	Dummy=1 if the firm has its financial accounts externally audited	BEEPS 2005 & 2008
Firm age	Number of years since the firm's year of incorporation	BEEPS 2005 & 2008
Stand-alone firm	Dummy=1 if the firm is stand-alone, 0 if it is part of larger establishment	BEEPS 2005 & 2008
Manager experience	Number of years of experience in the sector of the general manager	BEEPS 2005 & 2008

	Firm financing, credit demand, and credit access	
Investment – Earnings	Share of recent investment financed by retained earnings, in %	BEEPS 2005 & 2008
Investment - Bank credit	Share of recent investment financed by bank credit, in %	BEEPS 2005 & 2008
Investment - Trade credit	Share of recent investment financed by trade credit, in %	BEEPS 2005 & 2008
Needs loan	Dummy=1 if the firm needs a loan	BEEPS 2005 & 2008
Constrained	Dummy=1 if the firm was refused a loan or didn't apply for one because of adverse loan conditions	BEEPS 2005 & 2008
Has loan	Dummy=1 if the firm at present has a bank loan	BEEPS 2005 & 2008
	Industry benchmarks	
External financial dependence	Median proportion of capital expenditures financed with external funds for mature Compustat firms over the period 1990-2000	Compustat
R&D intensity	Median proportion of the ratio of research and development expenses to sales for mature Compustat firms over the period 1990-2000	Compustat
Capital intensity	Median proportion of capital usage per worker for mature Compustat firms over the period 1990-2000	Compustat
	Bank-level variables	
% foreign owned bank assets	Share of banking sector assets owned by branches or subsidiaries of foreign banks	EBRD Transition report 2008
Foreign	Dummy=1 if more than 2/3 of the banking assets in the locality are owned by foreign banks, and to 0 if less than 1/3 are.	Bankscope 2005-2008
Equity/assets	Ratio of total equity to total assets	Bankscope 2005-2008
Tier 1 capital	Ratio of Tier 1 capital to total risk-weighted assets	Bankscope 2005-2008
Gain on financial assets	Gain on financial assets held by the bank	Bankscope 2005-2008

Appendix 2. Domestic and parent banks in the sample

Country	Bank	Parent bank and country of incorporation
Albania	Alpha Bank	Alpha Bank - Greece
	Raiffeisen	Raiffeisen - Austira
	Banka Kombetare Trektare	domestic
	Tirana Bank	Pireus Bank - Greece
	Intessa San Paolo Bank Albania	Intessa San Paolo - Italy
	National Bank of Greece	National Bank of Greece
	Emporiki	Emporiki Bank - Greece
	Banka Credins	domestic
Bulgaria	Alpha bank	Alpha Bank - Greece
	Unicredit Bulbank	UniCredit Group - Italy
	DSK	OTP - Hungary
	First Investment Bank	domestic
	PostBank	EFG Eurobank - Greece
	Expressbank	Societe Generale - France
	United Bulgarian Bank	National Bank of Greece
	Reiffeisen	Raiffeisen - Austira
	Piraeus	Piraeus Bank - Greece
Croatia	Zagrebaska Bank	UniCredit Group - Italy
	Privredna Bank Zagreb	Intessa San Paolo - Italy
	Erste & Steiermarkische Bank	Erste Group - Austria
	Raiffeisen Bank	Raiffeisen - Austria
	Societe Generale - Splitska Banka	Societe Generale - France
	Hypo Alde Adria Bank	Hypo Group - Austria
	OTP Banka Hrvatska	OTP - Hungary
	Slavonska Banka	domestic
	Hrvatska Postanska Banka	domestic
Czech Republic	Ceska Sporitelna	Erste Group - Austria
	CSOB	KBC - Belgium
	Komercni Banka	Societe Generale - France
	UniCredit Bank CR	UniCredit Group - Italy
	Citibank	Citibank - US
	Ceskomoravska zarucni a rozvojova banka	domestic
	GE Money Bank	GE Money - US
	Hypotecni Banka	KBC - Belgium
	Raiffeisenbank	Raiffeisen - Austira
Estonia	Swedbank Estonia	Swedbank - Sweden
	SEB	Skandinavska Enskilda Banken - Sweden
	Sampo Pank	Danske Pank - Denmark
	Nordea	Nordea Bank - Finland
Hungary	OTP Bank	domestic
	K&H Commercial and Credit Bank	KBC - Belgium
	MKB Bank	Bayerische Landesbank - Germany
	CIB Bank	Intessa San Paolo - Italy
	Raiffeisen Bank	Raiffeisen - Austira
	Erste Bank Hungary	Erste Group - Austria
	KDB Bank	KDB Seoul - Korea
	UniCredit Bank Hungary	UniCredit Group - Italy
Latvia	Parex	domestic
	Hansabank	Swedbank - Sweden
	Latvijas Krajbanka	Snoras Bank - Lithuania
	SMP Bank	domestic

	Rietumu Banka	domestic
	Trasta Komercbanka	domestic
Lithuania	SEB	Skandinavska Enskilda Banken - Sweden
	Sampo Pank	Danske Pank - Denmark
	Nordea	Nordea Bank - Finland
	Snoras Bank	domestic
	Ukio Bankas	domestic
	Hansabankas	Swedbank - Sweden
	Parex Bankas	Parex Group - Latvia
Macedonia	Alpha Bank	Alpha Bank - Greece
	Stopanska Banka	National Bank of Greece
	Komercijalna Banka	domestic
	NLB Tutunska Banka	NLB - Slovenia
	Ohridska Banka	Societe Generale - France
	Pro Credit Bank	Pro Credit Group
Montenegro	AtlasMont Bank	domestic
	Crnogorska Komercijalna Banka	OTP - Hungary
	Hypo-Alpe-Adria Bank	Hypo Group - Austria
	Komercijalna Banka ad Budva	domestic
	NLB Montenegro Banka	NLB - Slovenia
	Prva Banka Crne Gore	domestic
	Invest Banka Montenegro	domestic
	Podgoricka Banka SG	Societe Generale - France
	Opportunity Bank	domestic
Poland	PKO Bank	domestic
	Bank Pekao	UniCredit Group - Italy
	Bank BPH	UniCredit Group - Italy
	Bank Zachodni WBK	domestic
	ING Bank Slaski	ING Bank - Netherlands
	Bank Pocztowy	domestic
	Kredyt Bank	KBC - Belgium
	mBank	Commerzbank - Germany
	Getin Bank	domestic
Romania	BCR	Erste Group - Austria
	BRD Group Societe General	Societe Generale - France
	Volksbank Romania	Volksbank - Austria
	Raiffeisen Bank	Raiffeisen - Austira
	Alpha Bank Romania	Alpha Bank - Greece
	UniCredit Tiriac Bank	UniCredit Group - Italy
	Banca Transilvania	domestic
	Bancpost	EFG Eurobank - Greece
	CEC Bank	domestic
Slovakia	Vseobecna Uverova banka	Intessa San Paolo - Italy
	Slovenska Sporitelna	Erste Group - Austria
	Tatra Banka	Raiffeisen - Austira
	OTP Banka Slovensko	OTP - Hungary
	Dexia Banka Slovensko	Dexia - Belgium
	UniCredit Bank Slovakia	UniCredit Group - Italy
	Volksbank Slovensko	Volksbank - Austria
	CSOB Slovakia	KBC - Belgium
Slovenia	Nova Ljubljanska Banka	KBC - Belgium
	Nova Kreditna Banka Maribor	domestic
	Abanka	domestic
	SKB	Societe Generale - France

UniCredit	UniCredit Group - Italy
Banka Koper	Intessa San Paolo - Italy
Banka Celje	domestic
Reiffeisen Krekova banka	Raiffeisen - Austira