

Powerful Parents? The Local Impact of Banks' Global Business Models

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Abstract

We collect information about multinational banks' internal capital markets from interviews with over 400 bank CEOs across emerging Europe. Using these unique data, we document substantial variation in how banks financially manage foreign subsidiaries and then assess how this variation affected local credit growth during the Great Recession. We show that subsidiaries grew faster if the parent bank set explicit growth targets; supported these targets with relatively cheap funding; and was *less* involved in local risk management. We then combine our data with firm-level information about credit constraints during the crisis. In line with our bank-level evidence, we find that in localities where foreign banks received cheap parent funding, firms were less credit constrained. These results point to the importance of banks' business models—over and above funding structure—as a determinant of crisis transmission in integrated banking markets.

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1. Introduction

In the wake of the Great Recession, both academics and policy makers have stepped up efforts to better understand the internal organization of globally active banks. It is increasingly recognized that it is not only these banks' size but their sheer complexity and interconnectedness that contributed to the cross-border transmission of the financial crisis. Against this background, we shed new light on how global banks operate an internal capital market to financially manage foreign subsidiaries. Prising open the global banking 'black box' is no easy task but we break new ground by culling hitherto unavailable information from over 400 face-to-face interviews with the 'ultimate bank insiders', their CEOs.

Our focus is on emerging Europe, a region with one of the highest levels of cross-border banking integration. This makes it an ideal testing ground for our purpose, which is twofold. First, we aim to document the variation between and within global banks in the financial management of foreign subsidiaries. We focus on how and to what extent banks operate an internal capital market to distribute funding across borders, a mechanism that by its very nature is difficult to observe by outsiders. Second, we gauge how this variation can help us understand changes in local lending conditions in the countries where these banks operate.

Our unique data allow us to classify internal capital markets along four dimensions. We measure whether parent banks set explicit growth targets for their subsidiaries; whether they then centrally fund these subsidiaries; whether such funding is relatively cheap; and whether parent banks engage directly in the management of local credit risk. We document substantial variation across global banks along these characteristics. Interestingly—and important for subsequent identification purposes—this variation is also largely orthogonal to banks' funding structure, such as their capitalization and use of wholesale funding.

In a next step, we estimate how differences in global banks' internal capital markets impacted subsidiary lending before and during the Great Recession. We show that before the crisis, at the height of the credit boom in emerging Europe, what mattered for credit growth was whether the parent bank provided its subsidiaries with cheap liquidity. This gave these subsidiaries a competitive advantage vis-à-vis foreign banks with less powerful parents.

This picture changes drastically during the crisis when funding dried up and capital became scarce. When we analyze credit growth in 2009-11, all four of our business-model

characteristics now impact local bank lending. This holds even when we control for a battery of regular determinants of credit growth. In particular, we find that subsidiaries grew faster if the parent steered them actively; provided them with funding; when this funding was relatively cheap; and if the parent was less involved in local risk management.

A final question we attempt to answer is whether variation in banks' business models had tangible impacts 'on the ground'. More precisely, did firms located close to tightly managed foreign-bank subsidiaries become more credit constrained during the crisis as compared to similar firms in localities with more independent subsidiaries? To answer this question, we link our bank-level data to newly collected and comprehensive information about the geographical location of bank branches in emerging Europe. We then match this information with firm-level survey data from the EBRD-World Bank's BEEPS survey. These combined data allow us to paint a detailed picture of the banks that surround each firm and to identify, at the local level, the impact of banks' business models on firms' credit constraints. The richness of our data allows us to control for a large array of firm-, bank-, and locality covariates. In line with our bank-level evidence, we find that in localities where foreign banks had access to cheap parent funding, firms were less credit constrained. In all, these results point to the importance of banks' business models—over and above their funding structure—as a key determinant of crisis transmission in integrated banking markets.

This paper contributes to three main strands of the literature. First, we add to the literature on internal capital markets in bank holdings. Previous contributions have presented either indirect or direct evidence for the existence of such markets.¹ Indirect evidence is provided by Houston, James and Marcus (1997) who show for a sample of U.S. bank holding companies that the credit growth of subsidiaries within a holding is negatively correlated. Local lending is also sensitive to the cash flow available at the holding level. Both findings suggest that internal reallocation of funding takes place. De Haas and Van Lelyveld (2010, 2014) apply a similar approach to a cross-country dataset. They document how lending by foreign bank subsidiaries is related to the business cycle in the parent bank's home country and the financial strength of the parent itself. More direct evidence is provided by Dahl et al. (2002) and Ashcraft (2008) who show that correlated credit growth patterns within bank holdings are indeed due to internal equity flows. Cetorelli and Goldberg (2012) show how

¹¹ A seminal theoretical contribution is Stein (1997).

foreign affiliates of U.S. banks reallocated funding towards their parent banks when the latter unexpectedly had to take off-balance sheet commitments back on their balance sheet. These papers thus show that bank holdings can internally reallocate both equity and liquidity and that such reallocation takes place both within and across national borders. In a more qualitative contribution, De Haas and Naaborg (2006) argue that internal capital markets may actually go beyond the allocation of capital and liquidity. They argue—on the basis of interviews with bank CEOs—that such reallocation is part of a broader management system in which not only book but also economic capital is reallocated. Moreover, some parent banks set explicit growth targets for subsidiaries which they may then back up with intra-bank funding. Our first contribution is to extend this line of research by more systematically collecting data on the mechanisms through which multinational banks operate internal capital markets and manage their foreign subsidiaries.

Second, we use these innovative data to shed new light on the implications of the presence of multinational banks for destination countries. The seminal contribution by Morgan, Rime and Strahan (2004), a two-country version of Holmström and Tirole's (1997) 'double-decker' moral hazard model, predicts that banking integration increases (decreases) output co-movement after asymmetric shocks to the financial (real) sector. Kalemli-Ozcan, Papaioannou, and Perri (2012) arrive at similar predictions using a general equilibrium model of international business cycles with multinational banks. The intuition is that banks reallocate capital to countries where bank capital is in short supply (e.g. those experiencing a banking crisis) and away from countries where investment opportunities are scarce (e.g. countries in a downturn). Multinational banks consequently mitigate local financial shocks, transmit foreign financial shocks, and exacerbate shocks to the real economy.

A number of empirical papers have confirmed these theoretical predictions. At the macro level, Kalemli-Ozcan, Papaioannou, and Peydró (2012) show that when real productivity shocks dominate shocks to the financial sector, deeper financial integration leads to more divergent output fluctuations. As expected, this positive relationship weakened during 2007-09 as the cross-border transmission of financial shocks synchronized business cycles. Bruno and Hauswald (2013) show that financially-dependent industries are less affected during banking crises when multinational bank subsidiaries are present that can act as a 'safety net' by mitigating the adverse impact of a local credit crunch. De Haas and Van Lelyveld (2006) find for emerging Europe that during bouts of financial turmoil lending by foreign banks was

more stable than lending by domestic banks. De Haas and Van Lelyveld (2010) present similar results for a broader set of countries.

As regards the role of multinational banks as shock transmitters, two key papers are Peek and Rosengren (1997, 2000) who demonstrate how the drop in Japanese stock prices in 1990 made Japanese bank branches in the U.S. reduce lending. In a similar vein, Schnabl (2012) analyzes how the 1998 Russian crisis spilled over to Peru as banks, including multinational bank subsidiaries, had to reduce local lending. Chava and Purnanandam (2011) find similar evidence for U.S. banks. Moreover, evidence for the U.S. (Morgan, Rime, and Strahan, 2004 and Loutskina and Strahan, 2011); Japan (Imai and Takarabe, 2011); and the Netherlands (Cremers, Huang, and Sautner, 2011) indicates that similar mechanisms are at play in the case of large banks that operate across several regions or states *within* one and the same country.

More recent studies ask whether multinational banks also transmitted the 2008-09 crisis across borders. De Haas and Van Lelyveld (2014) use an international dataset and find that foreign-bank subsidiaries curtailed credit more aggressively than domestic banks. In line with this evidence, Popov and Udell (2012) show how multinational banks transmitted the crisis to emerging Europe and that the severity of shock transmission depended on the strength of parent banks' balance sheets. Ongena, Peydró, and Van Horen (2013) find that not only foreign banks but also domestic banks that borrowed in international wholesale markets, had to cut back lending more during the crisis.

Our main contribution to this literature is to document the variation among multinational banks in how they operate internal capital markets and to analyze to what extent these differences in business models can help explain lending stability. Moreover, by linking this information to micro data on the geographical location of both bank branches and firms we are—to the best of our knowledge—the first to bring evidence to bear on how internal capital markets directly affect firms' credit constraints in destination countries.

Third, we also contribute to the literature on bank-funding structure and lending stability. During the Great Recession, banks that relied more on short-term wholesale funding reduced domestic credit more (Ivashina and Scharfstein, 2010; Iyer et al., 2010); cut cross-border credit more (Cetorelli and Goldberg, 2011); were more often financially distressed (Cihák and Poghosyan, 2009); and experienced a worse stock-price performance (Beltratti and Stulz,

2012). De Haas and Van Lelyveld (2014) analyse an international sample of multinational banks and find that subsidiaries of parent banks that used more wholesale funding reduced credit more during the recent crisis. Our contribution is to focus on the interaction between parent bank's internal capital market and subsidiaries' funding structure. We show that internal capital markets acted as a conduit through which parent banks channelled (cheap) liquidity to subsidiaries, thus fuelling local credit growth.

The remainder of the paper is structured as follows. The next section describes the different data sources we combine after which Section 3 presents our methodology. Section 4 discusses our empirical results and Section 5 concludes.

2. Data

In this section we introduce the data that we combine to categorize banks' internal capital markets and to subsequently gauge the impact of variation in these characteristics on bank lending as well as firms' credit constraints. Our identification rests on joining three key pieces of information: data on multinational banks' internal capital markets; data on the geo-coordinates of these banks' branch networks; and data on the credit constraints of individual firms that are surrounded by these branches. We focus our analysis on 16 countries in Central-Eastern Europe, the Baltics and South-Eastern Europe.

2.1. Characterizing internal capital markets

We start by creating four core internal capital market characteristics. To create these variables we turn to the 2nd Banking Environment and Performance Survey (BEPS II) undertaken by the EBRD and Tilburg University in 2012.² As part of BEPS a common questionnaire in either English or the local language was administered during a face-to-face interview with 262 CEOs of the main banks operating in our country sample. The interviews were carried out by a specialized team of senior financial consultants, each with first-hand banking experience. The interviewed banks represent 63.8 per cent of all bank assets in 2007 (as reported in BankScope) in our country sample.

² For more details: <http://www.ebrd.com/pages/research/economics/data/beps.shtml>.

For our purposes we focus on interviews conducted with CEOs of foreign bank subsidiaries, not domestic banks. Appendix 3 gives an overview of all the parent banks and subsidiaries in our sample. For these banks the survey contained a separate module with various questions about the financial interactions between the subsidiary and its parent bank. Using these questions, we first create the dummy variable *Parent steering*, which is one if the CEO answered “Yes” to the question “Does your parent bank set annual targets for your bank in terms of credit growth?” and/or to the question “Does your parent bank set annual targets for your bank in terms of market share?” As can be gleaned from Panel A in Table 1 this was the case for 86 per cent of the interviewed subsidiaries in our country sample, indicating that a large majority of subsidiaries gets direct growth instructions from their parents.

Next, we create the variable *Parent funding management*—which can range between 0 and 3—and measures to what extent the parent bank actually supports subsidiaries with funding. A point is added to this variable if the CEO answered “Agree” or “Strongly agree” to one of the following questions (which were both asked in the form of a five-point Likert scale): “Financial support from our parent bank is an important determinant of our credit growth” and “Our parent bank typically provides us with sufficient funding so that we can meet our growth targets”. An additional point could be gained if the CEO answered “Yes” to “Does your parent bank operate a centralized treasury department or desk (i.e. a desk that centrally raises funding for subsidiaries in several countries)?” The average score for this variable is 0.68 but there is substantial variation, the standard deviation is 1.06. For instance, the average score in the Czech Republic is only 0.75 while it amounts to 2.40 in Hungary. This indicates that Hungarian subsidiaries were much more dependent on parent bank funding than their Czech counterparts.

Third, we create the dummy variable *Cheap funding*, which is one if the bank “Agreed” or “Strongly agreed” that “Parent bank funding was a relatively cheap funding source for us in 2007 and/or 2011”. This was the case for 69 percent of the interviewed subsidiaries. Again there is substantial variation, with cheap funding being particularly important in some South-Eastern European countries such as Bosnia, Romania, and Slovenia and less important in, for instance, Poland and Estonia (Table 1, Panel B). However, even in the latter two countries half of all interviewed banks mention that parent bank funding was a cheaper source of liquidity as compared to locally available funding. This suggests that access to such cheap funding has given multinational bank subsidiaries, or at least a large subset of them, a

competitive advantage vis-à-vis domestic banks, which had to rely on more expensive local funding sources such as retail deposits.

Fourth, we create *Parent credit risk management*, a variable that measures the parent bank's involvement in local credit risk management. We aggregate the score of the bank for the following two questions, each asked on a 5-point Likert scale: “*How important is the influence of your parent bank in shaping the credit risk assessment of clients?*” and “*How important is the influence of your parent bank in shaping credit risk portfolio management?*”. We then create a dummy that is one if the bank scores above median.

Finally, we also create a dummy variable *Support received*, which is one if the subsidiary received an internal loan or line of credit from its parent bank at least once between 2007 and 2012. This was the case for 84 percent of the banks in our sample.

[Insert Table 1 here]

2.2. Firm data: credit constraints and covariates

We use the EBRD-World Bank's Business Environment and Enterprise Performance Survey (BEEPS), undertaken in 2008-2009, to measure the incidence of credit constraints among 4,643 firms across our 16 countries in Eastern Europe³. Face-to-face interviews were held with the owner or main manager of each enterprise. The purpose of the survey is to gauge the extent to which different features of the business environment (including access to finance) pose obstacles to firms' operations. The survey also includes a large number of firm characteristics such as the number of employees, age, ownership, legal structure, export activity and industry. We also know the geographical location of each firm.

Firms were selected using random sampling with three stratification levels to ensure representativeness across industry, firm size, and region. Due to stratification the sample includes firms from all non-agricultural sectors, allowing us to use sector fixed effects in our regression framework. Stratification also yields more precise estimates.

³The BEEPS survey provides combined data for Serbia and Montenegro, while the BEPS survey provides data for the two countries separately.

By combining answers to various questions we identify firms that were credit constrained: those that were either discouraged from applying for a loan or were rejected when they applied (Cox and Japelli, 1993; Duca and Rosenthal, 1993). In particular, we follow Popov and Udell (2012) and use BEEPS question K16: “*Did the establishment apply for any loans or lines of credit in the last fiscal year?*” For firms that answered “*No*”, we move to question K17, which asks: “*What was the main reason the establishment did not apply for any line of credit or loan in the last fiscal year?*”. For firms that answered “*Yes*”, question K18a subsequently asks: “*In the last fiscal year, did this establishment apply for any new loans or new credit lines that were rejected?*” We classify firms that answered “*No need for a loan*” to K17 as unconstrained, while we classify firms as credit constrained if they either answered “*Yes*” to K18a or answered “*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. This strategy allows us to differentiate between firms that did not apply for a loan because they did not need one and those that did not apply because they were discouraged (but actually needed a loan).

The summary statistics in Table 2 indicate that 26 percent of all sample firms were credit *Constrained*. Behind these averages, however, lies substantial variation across and within countries. For instance, while in Slovenia only 12 percent of all firms were credit constrained, this percentage was substantially higher, at 43 percent, in Bulgaria.

[Insert Table 2 here]

We also use the BEEPS survey to create firm-level covariates. These include firm size (*Small firm* and *Large firm* – distinguishing between firms with less than 20 or more than 100 employees and using *Medium firm* (firms with between 20 and 100 employees as the base category) in our regressions); whether a firm is publicly listed (*Public company*); is a *Sole proprietorship*; is an *Exporter*; whether a firm has been a private company from its start up (*Private at start up*); and whether a firm’s financial statements are audited by an external auditor (*External audit*). We expect that larger, publicly listed, and audited firms—all transparency proxies that should be inversely related to information asymmetries—face less credit constraints. Appendix 1 provides definitions of all firm-level variables. The summary

statistics in Table 2 show that 61 percent of firms in our dataset are *Small firms* with less than 20 employees whereas only 9 percent are publicly listed. About half of all firms are publicly audited and 35 percent are exporters.

2.3. Bank branch networks

The next step in our data construction is to collect information on the bank branches in the vicinity of each firm. Such detailed information is not publicly available and we therefore hired a team of consultants with extensive banking experience to hand-collect these data. Information was gathered by either directly contacting the banks or by downloading data from bank websites and subsequently double-checking them with the bank. In some countries—such as Hungary—the central bank was able to provide current as well as historical geo-coordinates for all bank branches. We cross-check all data with the (more limited) information available in the SNL Financial database. We merge this information with two other datasets: Bureau Van Dijk’s BankScope, to get balance sheet and income statement data for each of these banks, and the Claessens and Van Horen (2014) database on bank ownership.

We connect the firm and branch data in two ways. First, we make sure that the names of localities (cities and towns) are spelled consistently in both datasets and then match firms and branches by locality. For instance, we link all BEEPS firms in the Czech city of Brno to all bank branches in Brno.⁴ The (plausible) assumption is that a firm has access to all branches in the locality where it is incorporated. Second, we draw circles with a radius of 5 or 10 kilometers around the geo-coordinates of each firm and link the firm to only those branches inside that circle.⁵ Most of the localities in our dataset are relatively large towns and cities. For instance, the second largest city of the Czech Republic, Brno, covers an area of 230 km². This exceeds the surface of a 5 km circle (79 km²) but is smaller than the surface of a 10 km circle (314 km²). Consequently, the typical number of branches in our localities lies somewhere between that of a 5 km circle and that of a 10 km circle. In our analysis we use

⁴ Only very few firms are based in a locality without any bank branches. We link these firms to the branches in the nearest locality. Excluding them from the analysis does not impact any of our results.

⁵ According to the president of the Italian Bankers’ Association “*the banker’s rule of thumb is to never lend to a client located more than three miles from his office*” (quoted in Guiso, Sapienza and Zingales, 2004).

the locality variables but all results hold when using the alternative (circle) measures of spatial firm-bank closeness.

After having identified the individual bank branches that surround each sample firm, the final step in our data construction is to create variables that measure key characteristics of these banks (our internal capital market characteristics and bank balance sheet indicators) at the locality level. All of these locality-level bank variables are averages weighted by the number of branches that each bank operates in the locality.

Figure 1 shows a heat map for one of our internal capital market variables, *Cheap funding*, in each of the localities where at least one BEEPS firm is based. Darker colors indicate a higher proportion of branches owned by subsidiaries that received relatively cheap funding from their parent bank (*Share cheap funding*). The map shows that there is substantial variation both between and *within* countries. This is precisely the cross-locality variation that we exploit in our tests to assess whether active internal capital markets alleviated credit constraints.

[Insert Figure 1 here]

Analogously to our locality-level internal capital market variables, we also calculate another locality-level bank variable, *Share parent tier 1 capital*, which measures for each firm the average Tier 1 ratio of the surrounding banks (as in Popov and Udell, 2012). Appendix 1 provides definitions for all locality-level variables.

3. Empirical methodology

3.1. Determinants of internal capital markets

We start our empirical analysis with a simple exploratory exercise to get a better understanding of the variation between multinational bank subsidiaries as to how they are managed financially by their parent banks. We do this in the form of probit regressions, where we regress each internal capital market (ICM) characteristic against seven standard (parent) bank variables: *Wholesale dependence*, *Solvency*, *Return on equity (ROE)*, *Loan*

quality, Parent Wholesale dependence, Parent Solvency, and Parent ROE. Appendix 1 contains the exact variable definitions.

We are interested in the correlation between these bank covariates and ICM characteristics for two reasons. First, we want to know whether particular types of subsidiaries are managed in different ways by their parent than other types of subsidiaries. Second, it is useful to know to what extent these standard covariates are orthogonal to our ICM characteristics in order to decide which of these characteristics we can include later on as additional controls in our credit growth regressions.

In addition to these bank-level explanatory variables we also add home and host-country characteristics. Appendix 2 contains a correlation matrix of these variables and our ICM characteristics and shows that many of the country-level variables are significantly correlated with each other. To preclude multicollinearity issues, we therefore add the country variables one at a time (while keeping all the bank-level controls in each specification).

3.2. Internal capital markets and credit growth

As a second step we then run bank-level credit growth regressions where we aim to explain credit growth by multinational bank subsidiaries before the crisis (2006-07) and during the crisis (2009-11) through a number of standard bank-level covariates as well as our ICM characteristics. All of these regressions now include country fixed effects so that we compare within one and the same country the lending growth of otherwise similar subsidiaries whose parent banks operate an internal capital market in different ways.

3.3. Internal capital markets and firms' credit constraints

In the third step of our empirical analysis, we estimate the relationship between the share of bank branches with a certain ICM characteristic in the vicinity of a firm and the probability that the firm is credit constrained. We estimate the following baseline model:

$$Y_{ijkl} = \beta_1 X_{ijkl} + \beta_2 L_{jk} + \beta_3 ICM_{jk} + \beta_4 D_k + \beta_5 D_l + \varepsilon_{ijkl} \quad (1)$$

where Y_{ijkl} is a dummy variable equal to 1 if firm i in locality j of country k in industry l is credit constrained (rejected or discouraged), and zero otherwise. Our main independent

variable of interest is ICM_{jk} , the share of bank branches in locality j of country k that belong to banks with a certain internal capital market characteristic. We are interested in β_3 which can be interpreted as the impact of this ICM characteristic on firms' credit constraints.

X_{ijkl} is a matrix of firm covariates to control for observable firm-level heterogeneity: *Small firm*; *Large firm*, *Publicly listed*; *Sole proprietorship*; *Privatized*; *Exporter*; and *External audit*. L_{jk} is an indicator of bank characteristics in locality j of country k , in particular bank solvency (*Share parent tier 1 capital*). We further saturate the model with country and industry fixed effects D_k and D_l , with the latter defined at the ISIC Rev 3.1 2-digit level, to wipe out (un)observable variation at these aggregation levels.

4. Results

4.1. Determinants of internal capital markets

Table 3 presents our first set of empirical results based on probit regressions that aim to uncover some of the determinants of banks' ICM characteristics. A first important finding is that variation in our four main ICM characteristics appears to be largely orthogonal to variation in other parent bank and subsidiary characteristics. In particular, the results show no relationship between a subsidiary's use of wholesale funding, its solvency, or of its profitability and the various ICM characteristics. We find that the parent banks are *more* involved with the subsidiary's risk management in case of lower loan quality (as proxied by a higher ratio between loan-loss provisions and net interest income). We also find that parent banks that rely more on wholesale funding were more likely to provide their subsidiaries with relatively cheap funding suggesting that parent banks that find it easy to obtain wholesale funding pass on part of this funding advantage to their foreign subsidiaries through the internal capital market.

When we add, one-by-one, home and host (destination) country characteristics to these regression specifications, we find a number of other interesting patterns. In particular, the data show that subsidiaries were more likely to receive cheap parent bank funding if they are based in a country with a higher net interest rate margin in the banking sector (proxied by banks' net interest revenue as a share of their average interest-bearing total earning assets). Parent banks are thus more likely to allocate cheap funding to countries where wider interest

margins can still be exploited. They are also more likely to do so if the local banking sector is less concentrated (and thus more competitive). This last result is also mirrored in the finding that parent banks tend to provide cheap funding to countries where they themselves perceive competition from other foreign banks to be relative strong.⁶ In other words, parent banks are more likely to fuel subsidiary credit growth with cheap funding in countries where competition from other foreign banks is strong and where the potential pay-off, in the form of high margins, is high. However, in countries with higher entry requirements into the banking business (i.e. potentially less competition) parent banks are more inclined to set growth targets for their subsidiaries.

Interestingly, parent banks are more likely to provide cheap funding to their subsidiaries if their own activities in their home countries are more restricted by the regulator. The finding in Ongena, Popov, and Udell (2013), using similar data to ours, that tighter restrictions on bank activities at home are associated with lower bank lending standards abroad would then imply that the cheap funding provide by parent banks is used to lend to ex-ante riskier borrowers. However, if the supervisor in the home country has more comprehensive authority parent banks seem to reduce their funding activities but are more likely to steer their subsidiaries by setting growth targets. These findings may imply that parent banks utilize their ICMs to steer subsidiaries' lending in a less observable way if their home supervisors are more efficient. At the same time they increase their efforts in managing subsidiaries' credit risk which might explain why Ongena, Popov, and Udell (2013) do not find any direct effect from home-country supervision on lending standards abroad.

Overall, our results in Table 3 show that parent bank and especially home and host country characteristics seem to play a role in explaining the variation in ICM characteristics whereas traditional indicators of subsidiaries' funding patterns are unrelated to their integration in ICMs.

[Insert Table 3 here]

⁶ This variable is a composite index of whether foreign state-owned, foreign private and cross-border lenders are perceived as strong competitors for lending to SMEs, large firms and households. Source: BEPS II survey.

4.2. *Internal capital markets and credit growth*

In Table 4 we take the second step in our analysis and now run cross-sectional regressions where the dependent variable is average yearly credit growth over the period 2006-07 (pre-crisis, Panel B) or the period 2009-11 (crisis, Panel A).

The results in Panel B show that before the crisis the impact of our internal capital market characteristics on subsidiary credit growth was limited. In all cases the coefficients have the expected sign: positive for all except *Parent credit risk management* where one would expect a negative sign as stronger parent bank involvement could put a break on local credit growth. The only coefficient that is precisely estimated is the one for *Cheap funding*. Subsidiaries that had access to cheap parent bank funding grow significantly faster than subsidiaries that lacked such funding (note that all regressions also include country fixed effects). The size of this effect is significant too: compared to banks without advantageous parent bank funding, subsidiaries with access to such funding grew on average by 23 percentage points more over the 2006-2007 period.

The other covariates have the expected sign and are in some cases statistically significant. In particular, the results show that subsidiaries that relied heavily on wholesale funding grew faster during this pre-crisis period (in which wholesale funding was abundantly available) and banks with a lower loan quality had more difficulty in expanding their loan portfolio. Finally, subsidiaries of more solvent parent banks grew more slowly. We take this as showing that higher parent-bank solvency is a reflection of their relative aversion to risk which is also reflected in less rapid credit growth at the subsidiary level.

Next, in Panel A we show similar regressions for the crisis period 2009-11. We also add the variable *Support received*, to gauge whether subsidiaries that were actively supported by their parents at least once during the period 2007-12 grew faster as a result of this support. In contrast to our findings for the pre-crisis period, we now find significant impacts—all in the expected direction—of all our ICM characteristics on lending growth. This indicates that the operation of *internal* capital markets only really started to matter for subsidiary growth when the crisis had erupted and *external* capital markets increasingly dried up. In particular, we find that during the crisis years subsidiaries were able to grow faster if their parent bank set explicit credit growth and/or market share targets for them; if they managed funding within the bank holding in a more centralized way more generally; if they backed up the

growth/market share targets with relatively cheap internal liquidity; and if the parent bank was less involved in the credit risk management of the subsidiary. Interestingly, when we separately add the variable *Support received* in columns (2) to (6) we find that such support did not have a strong independent impact on credit growth over and above the other more structural ICM characteristics.

An interesting other result is that—opposite to what we find for the pre-crisis period— a subsidiary’s dependence on wholesale funding now has a negative impact on lending growth. This is in line with the findings of De Haas and Van Lelyveld (2014) and indicates that when the credit cycle had turned, the use of wholesale funding rather than retail credit turned from a blessing into a curse.

To look into the role of wholesale funding in somewhat more detail, we re-run the same regressions as in Table 4 while now interacting *Wholesale funding* with the various ICM characteristics. The results are presented in Table 5 where we do not show the coefficients for all the covariates for brevity. It is interesting to see that both before and during the crisis there is a negative base relationship between a subsidiary’s reliance on wholesale funding and its credit growth. However, in both periods the interaction terms between the ICM characteristics and wholesale funding are significantly positive, suggesting that wholesale funding only led to more rapid credit growth if this funding had been channeled through the parent bank’s internal capital market.⁷ In other words, the evidence in Table 4 points to a key role for internal capital markets: they acted as conduits through which wholesale funding flowed from the core to the periphery, thus boosting local credit growth. This latter effect is particularly strong before the crisis, while ICM characteristics play a more independent (of a subsidiary’s wholesale funding) role during the crisis given the significant base effects of the ICM characteristics in Panel A of Table 5 and their insignificant counterparts in Panel B.

[Insert Tables 4 and 5 here]

⁷ Note that, as one would expect, there is no such interaction effect with *Parent credit risk management*. This confirms that this variable picks up a very different aspect of the parent bank’s role in steering the subsidiary, a role that is largely orthogonal to the funding flows between parent and subsidiary and to the parental targets.

4.3. Internal capital markets and firms' credit constraints

The final step in our analysis is to analyze whether a subsidiary's access to a parent bank's internal capital market and the subsequent competitive advantage it could reap had actual implications for firms' funding conditions on the ground. To this end we estimate probit regressions where the dependent variable is an indicator of whether a firm was credit constrained (rejected by a bank or even discouraged from applying). The main independent variables of interest are locality-level variables that measure the proportion of bank branches in the locality where the firm is based that were exposed to a certain ICM characteristic. For instance, here the variable *Share cheap funding* measures the proportion of bank branches in a city or town that were operated by subsidiaries that had access to relatively cheap internal funding sources from their parent banks. In all specifications we control for firm-level covariates as well as for the average Tier 1 ratio of the parent banks of all banks operating branches in the locality (following Popov and Udell, 2012), and for industry and country fixed effects. We run these regressions for a subsample of 7 countries in which we find sufficient within-country variation of the locality-specific ICM variables.⁸

The results in Table 6 show that all the coefficients are estimated with the expected sign (except for those in columns (8)-(9)): firms in localities with banks that had easier access to parent funding were less likely to be credit constrained. However, we find that only *Share cheap funding* had a significant independent effect over and above that of the capitalization level of the parent banks (*Share parent tier 1 capital*) of the local banks as documented in Popov and Udell (2012).

[Insert Table 6 here]

5. Conclusions

In this paper we use unique data from face-to-face interviews with bank CEOs in emerging Europe to provide first evidence on the role that banks' internal capital markets played in the recent crisis. We document substantial variation in how banks financially manage foreign

⁸These countries are Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland and Serbia.

subsidiaries and then assess how this variation affected local credit growth during the Great Recession. We show that subsidiaries grew faster if the parent bank set explicit growth targets; supported these targets with relatively cheap funding; and was *less* involved in local risk management. We then combine our data with firm-level information about credit constraints during the crisis. In line with our bank-level evidence, we find that in localities where a larger share of foreign banks received cheap parent funding, firms were less credit constrained. All our results hold when we control for indicators of the banks' funding structure. Our findings therefore point to the importance of banks' business models—over and above funding structure—as a determinant of crisis transmission in integrated banking markets.

Our findings indicate that ICMs actually acted as conduits through which wholesale funding flowed from the core to the periphery, thus boosting local credit growth. The crisis has underlined the importance of funding structures for banking stability. In particular, it became clear that an excessive use of wholesale funding exposes banks to the bouts of illiquidity that characterise these markets. Before the crisis, policy makers and academics had focused mainly on the potentially adverse effects of depositor runs, largely ignoring the risks in the increasingly important wholesale markets. During the crisis it became clear that, relative to “flighty” wholesale funding, (insured) deposits actually turned out to be quite “sticky”.

A dependence on wholesale funding may hurt lending stability particularly when a bank's assets and liabilities are denominated in different currencies. When banks carry substantial currency mismatches on their balance sheets, they become heavily exposed to temporary breakdowns in FX swap markets. During the recent crisis, this affected both domestic and globalised banks. In pre-crisis emerging Europe, many domestic banks had borrowed in local currency wholesale markets and, after swapping these funds into euros, turned them into euro loans. During the crisis this became increasingly difficult. Likewise, global banks with US branches found it increasingly problematic to swap euros into US dollars and therefore experienced difficulties in supporting these branches with funding through their internal capital markets (Ivashina, Scharfstein and Stein, 2013).

The Latin American experience has shown that deep financial integration through a large-scale presence of foreign banks may go hand in hand with financial stability if sufficient local deposit and wholesale funding is available. Kamil and Rai (2010) show that crisis transmission to Latin America was less severe in countries where foreign banks were lending

through subsidiaries rather than across borders. Subsidiaries that were funded locally instead of through the international wholesale markets or through their parent banks were particularly stable credit sources.

Some (but not all) multinational bank subsidiaries, particularly in emerging Europe, may have to adjust their funding models in this direction. These subsidiaries will increasingly have to stand on their own financial feet by raising local customer deposits and topping these up with wholesale funding if and when required. This will be easier for and more relevant to subsidiaries that target retail rather than corporate clients. This paper shows that not only the funding type per se but also the way how subsidiaries are integrated into their parent banks' internal capital markets has an impact on subsidiaries' lending before and during a global crisis. To this end, more research is needed to understand the interactions between banks' funding and business models in more detail.

References

- Ashcraft, A. (2008), Are Bank Holding Companies a Source of Strength to Their Banking Subsidiaries?, *Journal of Money, Credit and Banking* 40(2-3), 273-294.
- Beltratti, A. and R.M. Stulz (2012), The Credit Crisis Around the Globe: Why Did Some Banks Perform Better?, *Journal of Financial Economics* 105(1), 1–17.
- Bruno, V. and R. Hauswald (2014), The Real Effects of Foreign Banks, *Review of Finance*, forthcoming.
- Cetorelli, N. and L.S. Goldberg (2011), Global Banks and International Shock Transmission: Evidence from the Crisis, *IMF Economic Review* 59(1), 41–76.
- Cetorelli, N. and L.S. Goldberg (2012), Liquidity Management of U.S. Global Banks: Internal Capital Markets in the Great Recession, *Journal of International Economics* 88(2), 299-311.
- Chava, S. and A. Purnanandam (2011), The Effect of Banking Crisis on Bank-Dependent Borrowers, *Journal of Financial Economics* 99(1), 116–135.
- Cihák, M. and T. Poghosyan (2009), Distress in European banks: An analysis based on a new data set, IMF Working Paper No. WP/09/9, International Monetary Fund, Washington D.C.
- Claessens, S. and N. Van Horen (2013), Foreign banks: Trends and Impact, *Journal of Money, Credit, and Banking*, forthcoming.
- Cornett, M.M., J.J. McNutt, P.E. Strahan, and H. Tehranian (2011), Liquidity Risk Management and Credit Supply in the Financial Crisis”, *Journal of Financial Economics* 101(2), 297–312.
- Cremers, M., R. Huang, and Z. Sautner (2011), Internal Capital Markets and Corporate Politics in a Banking Group, *Review of Financial Studies* 24(2), 358–401.
- Dahl, D., R.E. Shrieves and M.F. Spivey (2002), Financing Loan Growth at Banks, *Journal of Financial Services Research* 22, 189–202.
- De Haas, R. and I.J. Naaborg (2006), Foreign banks in transition countries: To whom do they lend and how are they financed? *Financial Markets, Institutions, and Instruments* 15, 159-199.

De Haas, R. and I. Van Lelyveld (2006), Foreign Banks and Credit Stability in Central and Eastern Europe. A panel data analysis, *Journal of Banking and Finance* 30(7), 1927-52.

De Haas, R. and I. Van Lelyveld (2010), Internal Capital Markets and Lending by Multinational Bank Subsidiaries, *Journal of Financial Intermediation* 19(1), 1–25.

Holmström, B. and J. Tirole (1997), Financial intermediation, loanable funds, and the real sector, *Quarterly Journal of Economics* CXII, 663-691.

Houston, J.F., James, C., Marcus, D. (1997), Capital market frictions and the role of internal capital markets in banking, *Journal of Financial Economics* 46, 135-64.

Imai, M. and S. Takarabe (2011), Bank Integration and Transmission of Financial Shocks: Evidence from Japan, *American Economic Journal: Macroeconomics* 3, 155–183.

Ivashina, V. and D.S. Scharfstein (2010), Bank Lending During the Financial Crisis of 2008, *Journal of Financial Economics*, 97, 319–38.

Iyer, R., S. Lopes, J.-L. Peydró and A. Schoar (2010), The Inter-Bank Liquidity Crunch and the Firm Credit Crunch: Evidence from the 2007–2009 Crisis, manuscript.

Kalemli-Ozcan, S., E. Papaioannou and F. Perri (2012), Global Banks and Crisis Transmission, *Journal of International Economics*, forthcoming.

Kalemli-Ozcan, S., E. Papaioannou and J.-L. Peydró (2012), Financial Regulation, Financial Globalization, and the Synchronization of Economic Activity, *Journal of Finance*, forthcoming.

Morgan, D.P., B. Rime and P.E. Strahan (2004), Bank Integration and State Business Cycles, *Quarterly Journal of Economics* 119(4), 1555–1585.

Ongena, S., J.-L. Peydró and N. Van Horen (2013), Shocks Abroad, Pain at home? Bank-Firm Level Evidence on Financial Contagion during the Recent Financial Crisis, manuscript.

Ongena, S., A. Popov and G.F. Udell (2013), When the Cat’s Away the Mice Will Play’: Does Regulation At Home Affect Bank Risk Taking Abroad?, *Journal of Financial Economics*, forthcoming.

Peek, J. and E.S. Rosengren (1997), The International Transmission of Financial Shocks: The Case of Japan, *American Economic Review* 87(4), 495-505.

Peek, J. and E.S. Rosengren (2000), Collateral Damage: Effects of the Japanese Bank Crisis on the United States, *American Economic Review* 90(1), 30–45.

Popov, A. and G.F. Udell (2012), Cross-Border Banking, Credit Access, and the Financial Crisis, *Journal of International Economics* 87(1), 147–161.

Schnabl, P. (2012), Financial Globalization and the Transmission of Bank Liquidity Shocks: Evidence from an Emerging Market, *Journal of Finance* 67(3), 897-932.

Stein, J.C. (1997), Internal Capital Markets and the Competition for Corporate Resources, *Journal of Finance* 52, 111-34.

Table 1. Internal Capital Markets: Summary Statistics

This table reports summary statistics for the internal capital market (ICM) characteristics for the full sample (Panel A) and for each country (Panel B). See Appendix 1 for definitions and sources of all variables.

Panel A. Full sample

	Full sample				
	Mean	Sd	Min	Max	No. Banks
Parent steering	0.86	0.34	0	1	162
Parent funding management	1.68	1.06	0	3	157
Cheap funding	0.69	0.46	0	1	160
Parent credit risk management	0.54	0.50	0	1	163

Panel B. By country

Country	Parent steering		Parent funding management		Cheap funding		Parent credit risk management		No. Banks
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	
Albania	1.00	0.00	0.88	0.64	0.56	0.53	0.67	0.50	9
Bosnia	0.90	0.30	1.45	1.04	0.90	0.30	0.73	0.47	11
Bulgaria	1.00	0.00	1.61	0.96	0.54	0.52	0.54	0.52	13
Czech Republic	0.88	0.35	0.75	0.46	0.63	0.52	0.38	0.52	8
Estonia	1.00	0.00	2.00	0.82	0.50	0.58	0.75	0.50	4
Croatia	0.69	0.48	2.08	1.04	0.62	0.51	0.46	0.52	13
Hungary	1.00	0.00	2.40	1.07	0.90	0.31	0.40	0.52	10
Lithuania	0.50	0.55	1.67	0.52	0.67	0.52	0.83	0.42	6
Latvia	0.67	0.52	2.20	0.84	0.84	0.41	0.50	0.55	6
Montenegro	1.00	0.00	1.60	0.55	0.60	0.55	1.00	0.00	5
Macedonia	1.00	0.00	1.57	1.13	0.50	0.55	0.71	0.49	7
Poland	0.56	0.51	1.18	1.29	0.50	0.51	0.26	0.45	19
Romania	0.84	0.37	2.00	0.94	0.94	0.24	0.53	0.51	19
Serbia	1.00	0.00	1.84	1.07	0.79	0.42	0.58	0.51	19
Slovak Republic	1.00	0.00	1.00	1.00	0.29	0.49	0.57	0.53	7
Slovenia	1.00	0.00	2.71	0.76	1.00	0.00	0.43	0.53	7

Table 2. Firm variables: Summary Statistics

This table reports summary statistics for the firm variables. See Appendix 1 for definitions and sources of all variables.

	Mean	Sd	Min	Max	No. obs.
Constrained	0.26	0.44	0	1	2745
Small firm	0.61	0.49	0	1	4545
Medium firm	0.29	0.46	0	1	4545
Large firm	0.10	0.29	0	1	4545
Public company	0.09	0.29	0	1	4643
Sole proprietorship	0.15	0.36	0	1	4643
Private at start up	0.83	0.37	0	1	3867
Exporter	0.35	0.48	0	1	4643
External audit	0.53	0.50	0	1	4521

Figure 1. Proportion of branches owned by subsidiaries that received relatively cheap funding from their parent bank

This figure shows the proportion of branches that received relatively cheap funding (*Share cheap funding*) from their parent banks in each locality with at least one firm included in the BEEPS survey in our 15 sample countries. Darker colors indicate a higher share of such branches. See Appendix 1 for the definitions and sources of all variables.



Table 3. Determinants of Internal Capital Market Characteristics

This table reports average marginal effects from probit estimations regressing each ICM characteristic against seven bank and parent bank variables (*Wholesale dependence, Solvency, ROE, Loan quality, Parent Wholesale dependence, Parent Solvency* and *Parent ROE*) along with one country-level variable at a time. The first seven rows report the results of a regression on just the bank-level variables, while all subsequent rows report the results of adding the country-level variables one at a time. Standard errors are reported in parentheses and account for clustering at the country level. ***, **, * denote significance at the 1, 5 and 10% level.

Dependent variable (ICM characteristic)	(1) Parent steering	(2) Parent funding management	(3) Cheap funding	(4) Parent credit risk management
<i>Bank and parent bank characteristics</i>				
Wholesale dependence	0.036 (0.024)	0.012 (0.010)	0.018 (0.016)	0.133 (0.243)
Solvency	0.002 (0.166)	-0.076 (0.121)	-0.127 (0.123)	0.136 (0.146)
ROE	-0.017 (0.143)	-0.204 (0.296)	-0.013 (0.225)	0.468* (0.255)
Loan quality	0.338 (0.232)	0.040 (0.063)	0.134* (0.078)	0.083** (0.035)
Parent Wholesale dependence	-0.241* (0.131)	1.984 (5.884)	0.307** (0.149)	10.144 (9.317)
Parent Solvency	1.269* (0.763)	0.560 (0.722)	-2.192** (0.906)	-0.767 (0.602)
Parent ROE	-0.174 (0.436)	0.208 (0.357)	-0.370 (0.575)	-0.495 (0.635)
<i>Host-country characteristics</i>				
2001-07 average overall net interest margin host	0.023 (0.026)	0.017 (0.028)	0.077*** (0.028)	0.063** (0.027)
2001-07 average bank concentration 3 host	0.004 (0.003)	0.001 (0.002)	-0.007*** (0.003)	0.006** (0.003)
2001-07 average real GDP host	-0.001*** (0.000)	-0.001*** (0.000)	-0.001* (0.000)	-0.002*** (0.000)
2001-07 average real GDP growth	-0.000 (0.022)	0.057* (0.029)	0.009 (0.035)	0.041 (0.040)
2001-07 average entry requirements host	0.181*** (0.041)	0.118 (0.149)	0.153 (0.097)	0.313*** (0.117)
Perceived foreign competition host	0.035** (0.016)	0.010 (0.015)	0.071** (0.028)	-0.017 (0.026)
<i>Home-country characteristics</i>				
2001-07 average restrictions on bank activities home	0.006 (0.018)	0.011 (0.015)	0.049*** (0.019)	-0.008 (0.028)
2001-07 average supervisory power home	0.012* (0.006)	-0.030*** (0.006)	-0.021 (0.017)	0.037** (0.018)

Table 4. Internal Capital Markets and Credit Growth

This table reports coefficients for ICM as well as (parent) bank characteristics from OLS regressions. The dependent variable in Panel A is *Average loan growth 2009-11*, average bank-level loan growth during the crisis, and the dependent variable in Panel B is *Average loan growth in 2006-07*, the average bank-level loan growth pre-crisis. All explanatory variables are defined in Appendix 1. Robust standard errors are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

Panel A. Average loan growth during the financial crisis (2009-2011)

Dependent variable <i>ICM characteristic</i>	(1)	(2)	(3)	(4)	(5)	(6)
	<i>None</i>	<i>None</i>	<i>Parent steering</i>	<i>Parent funding management</i>	<i>Cheap funding</i>	<i>Parent credit risk management</i>
ICM characteristic			0.079*** (0.029)	0.024* (0.013)	0.056** (0.027)	-0.037* (0.023)
Support received		-0.035 (0.034)	-0.049 (0.032)	-0.055* (0.031)	-0.075** (0.030)	-0.032 (0.033)
Log(Total assets)	-0.039*** (0.011)	-0.045*** (0.012)	-0.042*** (0.012)	-0.043*** (0.013)	-0.046*** (0.013)	-0.049*** (0.012)
Wholesale dependence	-0.011*** (0.003)	-0.012*** (0.003)	-0.013*** (0.003)	-0.013*** (0.003)	-0.011*** (0.003)	-0.011*** (0.003)
Solvency	-0.007 (0.179)	-0.050 (0.180)	-0.041 (0.173)	-0.080 (0.176)	-0.041 (0.184)	-0.062 (0.182)
ROE	0.119 (0.077)	0.136 (0.085)	0.123 (0.095)	0.143* (0.084)	0.130 (0.078)	0.157* (0.090)
Loan quality	-0.058* (0.033)	-0.057* (0.034)	-0.058* (0.034)	-0.064* (0.035)	-0.066** (0.032)	-0.064* (0.033)
Parent Log (Total assets)	0.014* (0.007)	0.017** (0.008)	0.017** (0.008)	0.014* (0.008)	0.017** (0.008)	0.015* (0.008)
Parent Wholesale dependence	-0.271 (2.176)	-0.762 (2.286)	-0.934 (2.175)	-1.239 (2.309)	-1.356 (2.280)	0.041 (2.296)
Parent Solvency	-0.836** (0.346)	-0.802** (0.354)	-0.876** (0.351)	-0.800** (0.338)	-1.002** (0.409)	-0.908** (0.372)
Parent ROE	0.014 (0.201)	-0.085 (0.210)	-0.150 (0.205)	-0.121 (0.201)	0.001 (0.196)	-0.054 (0.204)
Constant	0.401** (0.182)	0.475** (0.190)	0.377** (0.179)	0.509** (0.198)	0.496** (0.194)	0.585*** (0.202)
N	135	130	130	126	127	130
Adjusted R2	0.275	0.304	0.332	0.321	0.349	0.313
Country FE	yes	yes	yes	yes	yes	yes

Panel B. Average loan growth before the financial crisis (2006-2007)

Dependent variable <i>ICM characteristic</i>	(1)	(2)	(3)	(4)	(5)
	<i>None</i>	<i>Parent steering</i>	<i>Parent funding management</i>	<i>Cheap funding</i>	<i>Parent credit risk management</i>
ICM characteristic		0.097 (0.155)	0.010 (0.046)	0.231** (0.090)	-0.081 (0.083)
Log (total assets)	-0.032 (0.030)	-0.019 (0.034)	-0.025 (0.036)	-0.016 (0.030)	-0.034 (0.035)
Wholesale dependence	0.158* (0.091)	0.169* (0.087)	0.164* (0.088)	0.167** (0.078)	0.170* (0.090)
Solvency	0.337 (0.237)	0.385 (0.238)	0.360 (0.242)	0.350 (0.222)	0.295 (0.238)
ROE	-0.400 (0.335)	-0.371 (0.335)	-0.395 (0.341)	-0.337 (0.331)	-0.321 (0.348)
Loan quality	-0.122** (0.051)	-0.117** (0.054)	-0.117** (0.055)	-0.151*** (0.051)	-0.114** (0.051)
Parent log (total assets)	-0.026 (0.019)	-0.028 (0.019)	-0.030 (0.020)	-0.044** (0.019)	-0.030 (0.020)
Parent wholesale dependence	-1.950 (6.729)	-2.059 (7.219)	-2.358 (7.036)	-4.449 (6.849)	-1.222 (6.905)
Parent solvency	-1.210* (0.624)	-1.220* (0.623)	-1.171* (0.661)	-1.154 (0.969)	-1.350* (0.712)
Parent ROE	-0.035 (0.691)	-0.089 (0.748)	-0.047 (0.732)	-0.122 (0.691)	-0.101 (0.688)
Constant	1.504*** (0.464)	1.284* (0.663)	1.391** (0.533)	1.466*** (0.471)	1.682*** (0.573)
N	120	116	113	113	116
Adjusted R2	0.281	0.274	0.269	0.326	0.277
Country FE	yes	yes	yes	yes	yes

Table 5. Wholesale Funding, Internal Capital Markets and Credit Growth

This table reports coefficients for ICM characteristics and their interaction effects with wholesale funding from OLS regressions. The dependent variable in Panel A is *Average loan growth 2009-2011*, the average bank-level loan growth during the crisis, and the dependent variable in Panel B is *Average loan growth in 2006-2007*, the average bank-level loan growth pre-crisis. All regressions control for the same (parent) bank characteristics as in Table 3. All explanatory variables are defined in Appendix 1. Robust standard errors are reported in parentheses. ***, **, * denote significance at the 1, 5, and 10% level.

Panel A. Average loan growth 2009-2011

Dependent variable	Average loan growth 2009-2011				
	(1)	(2)	(3)	(4)	
	<i>ICM characteristic</i>	<i>Parent steering</i>	<i>Parent funding management</i>	<i>Cheap funding</i>	<i>Parent credit risk management</i>
ICM characteristic*Wholesale dependence	0.104** (0.045)	0.037** (0.017)	0.131** (0.052)	-0.016 (0.069)	
ICM characteristic	0.072** (0.030)	0.023* (0.013)	0.051* (0.027)	-0.037 (0.023)	
Wholesale dependence	-0.116** (0.044)	-0.125** (0.052)	-0.142*** (0.051)	0.005 (0.068)	
Constant	0.402** (0.180)	0.527*** (0.199)	0.514*** (0.195)	0.584*** (0.204)	
N	130	126	127	130	
Adjusted R2	0.335	0.325	0.357	0.307	
Bank and parent bank characteristics	yes	yes	yes	yes	
Country FE	yes	yes	yes	yes	

Panel B. Average loan growth 2006-2007

Dependent variable	(1)	(2)	(3)	(4)
	<i>ICM characteristic</i>	<i>Parent steering</i>	Average loan growth 2006-2007 <i>Parent funding management</i>	<i>Parent credit risk management</i>
ICM characteristic*Wholesale dependence	0.429*** (0.077)	0.144*** (0.023)	0.367*** (0.059)	0.122 (0.119)
ICM characteristic	0.034 (0.156)	-0.010 (0.044)	0.201** (0.090)	-0.087 (0.085)
Wholesale dependence	-0.198** (0.097)	-0.189** (0.080)	-0.144** (0.065)	0.055 (0.073)
Constant	1.409** (0.664)	1.455*** (0.531)	1.475*** (0.473)	1.698*** (0.580)
N	116	113	113	116
Adjusted R2	0.310	0.309	0.351	0.270
Bank and parent bank characteristics	yes	yes	yes	yes
Country FE	yes	yes	yes	yes

Table 6. Internal Capital Markets and Firms' Credit Constraints

This table reports average marginal effects for the average ICM characteristics of the banks in a firm's locality as well as characteristics of the firm itself (based on probit regressions) for the subsample of firms in countries with sufficient within-country variation in the locality-specific variables (Croatia, Czech Republic, Estonia, Latvia, Lithuania, Poland, and Serbia). The dependent variable is *Constrained* which is '1' if a firm was refused a loan or did not apply due to adverse loan conditions (was discouraged); '0' otherwise. Source: BEEPS 2008-09. All explanatory variables are defined in Appendix 1. Robust standard errors are reported in parentheses. ***, **, * denote significance at the 1, 5 and 10% level.

Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	<i>ICM characteristic</i>	<i>None</i>	<i>Share parent steering</i>	Credit constrained			<i>Share parent credit risk management</i>		
				<i>Average parent funding management</i>		<i>Share cheap funding</i>			
ICM characteristic		-0.151 (0.099)	-0.122 (0.101)	-0.054 (0.051)	-0.044 (0.051)	-0.201* (0.103)	-0.199* (0.104)	-0.108 (0.097)	-0.092 (0.095)
Share parent tier 1 capital	-0.002 (0.008)		-0.023* (0.012)		-0.024** (0.012)		-0.024** (0.012)		-0.024** (0.012)
Small firm	0.089** (0.038)	0.090** (0.038)	0.092** (0.038)	0.091** (0.038)	0.093** (0.038)	0.090** (0.038)	0.092** (0.038)	0.091** (0.038)	0.093** (0.038)
Large firm	-0.035 (0.059)	-0.031 (0.058)	-0.026 (0.058)	-0.031 (0.058)	-0.027 (0.058)	-0.031 (0.058)	-0.025 (0.058)	-0.033 (0.058)	-0.029 (0.058)
Public company	0.086 (0.057)	0.086 (0.056)	0.081 (0.056)	0.083 (0.057)	0.079 (0.057)	0.086 (0.056)	0.080 (0.057)	0.086 (0.057)	0.081 (0.057)
Sole proprietorship	0.024 (0.037)	0.014 (0.037)	0.021 (0.037)	0.018 (0.037)	0.025 (0.037)	0.014 (0.037)	0.021 (0.037)	0.018 (0.037)	0.025 (0.037)
Private from start up	-0.031 (0.042)	-0.024 (0.043)	-0.024 (0.043)	-0.027 (0.043)	-0.028 (0.043)	-0.020 (0.043)	-0.019 (0.042)	-0.024 (0.043)	-0.025 (0.043)
Exporter	-0.007 (0.034)	-0.006 (0.034)	-0.000 (0.034)	-0.007 (0.034)	-0.001 (0.034)	-0.009 (0.034)	-0.002 (0.034)	-0.005 (0.034)	0.001 (0.034)

External audit	-0.045 (0.035)	-0.033 (0.036)	-0.033 (0.036)	-0.036 (0.036)	-0.036 (0.036)	-0.034 (0.036)	-0.033 (0.035)	-0.034 (0.035)	-0.034 (0.035)
N	852	834	834	827	827	832	832	827	827
Pseudo R2	0.048	0.049	0.054	0.048	0.053	0.051	0.056	0.049	0.053
Industry FE	yes								
Country FE	yes								

Appendix 1. Variable Definitions and Sources

Variable name	Definition	Unit	Source
<i>ICM characteristics</i>			
Parent steering	Parent bank sets targets in the form of credit growth and/or market share	1/0	BEPS II
Parent funding management	Composite index of whether parent bank operates a centralized treasury, parent bank funding is important determinant of credit growth and parent bank typically provides sufficient funding to meet growth targets	0-3	BEPS II
Cheap funding	Parent bank provided cheap funding to subsidiary in 2007 and/or 2011	1/0	BEPS II
Parent credit risk management	Indicator of the importance of parent bank in shaping credit risk assessment of subsidiary's clients and credit risk portfolio management (1 if value is equal or above sample median, 0 otherwise)	1/0	BEPS II
Support received	Indicator whether parent bank provided internal credit line/loan/liquidity to the subsidiary at least once between 2007 and 2012	1/0	BEPS II
<i>(Parent bank) Bank characteristics</i>			
(Parent) Total assets	Total bank assets	thousand EUR	BankScope
(Parent) Wholesale dependence	Gross loans/Customer deposits	0.01%	BankScope
(Parent) Solvency	Equity/net loans	%	BankScope
(Parent) ROE	Return on equity	%	BankScope
(Parent) Loan quality	Loan loss provisions/Net interest revenue	%	BankScope
<i>Host-country characteristics</i>			
2001-2007 average overall net interest margin host	Banks' net interest revenue as a share of their average interest-bearing total earning assets (country average 2001-2007)	%	GFDD
2001-2007 average bank concentration 3 host	Assets of the three largest commercial banks as a share of total commercial bank assets (country average 2001-2007)	%	GFDD
2001-2007 average real GDP host	Real GDP (country average 2001-2007)	billion EUR	IMF
2001-2007 average entry requirements host	Indicator of legal submissions required to obtain banking license (country average 2001-2007)	0-8	Barth, Caprio, Levine

Perceived foreign competition host	Composite index whether foreign state-owned, foreign private and cross-border lenders are perceived as strong competitors in 2007 for lending to SMEs, large firms and households	0-9	BEPS II
<i>Home-country characteristics</i>			
2001-2007 average restrictions on bank activities home	Composite index of regulatory restrictions on security market, insurance and real estate activities (country average 2001-2007)	3-12	Barth, Caprio, Levine
2001-2007 average supervisory power home	Composite index of whether the supervisory authorities have the authority to take specific actions to prevent and correct problems	0-14	Barth, Caprio, Levine
<i>Firm characteristics</i>			
Constrained	Firm was refused or did not apply for a loan because of adverse loan conditions	1/0	BEEPS
Small firm	Firm has less than 20 employees	1/0	BEEPS
Medium firm	Firm has between 20 and 100 employees	1/0	BEEPS
Large firm	Firm has more than 100 employees	1/0	BEEPS
Public company	Firm is a shareholder company with shares traded at the stock market	1/0	BEEPS
Sole proprietorship	Firm is a sole proprietorship	1/0	BEEPS
Private at start up	Firm has been a private company from its start up (otherwise, firm was state-owned and then privatized)	1/0	BEEPS
Exporter	Firm's production is at least partially exported	1/0	BEEPS
External audit	Firm has its financial accounts audited externally	1/0	BEEPS
Industry	Eight industry indicators (Mining and quarrying; Construction; Manufacturing; Transport; Trade; Real estate; Hotels and restaurants; Other services)	1/0	BEEPS
<i>Locality characteristics</i>			
Share parent steering	Share of branches of foreign owned banks in a locality where parent bank sets targets in terms of credit growth and/or market share	0-1	BEPS II/BEEPS
Average parent funding management	Average score of foreign owned branches in a locality of an index of whether parent bank operates a centralized treasury, parent bank funding is important determinant of credit growth and parent bank typically provides sufficient funding to meet growth targets	0-3	BEPS II/BEEPS
Share cheap funding	Share of branches of foreign owned banks in a locality where parent banks provided cheap funding in 2007 and/or 2011	0-1	BEPS II/BEEPS

Share parent credit risk management	Share of branches of foreign owned banks in a locality where the parent bank is important in shaping credit risk assessment of clients and credit risk portfolio management	0-1	BEPS II/BEEPS
Share parent tier 1 capital	Locality-specific indicator of banks' tier 1 capital ratio weighted by the number of branches a bank has in the locality	%	BEPS II/BEEPS

Note: Variable sources: BEPS II: Banking Environment and Performance Survey undertaken by the EBRD and the European Banking Center in 2012; GFDD: Global Financial Development Database 2013 provided by the World Bank; Barth, Caprio, Levine: World Bank Surveys on Bank Regulation indicators from 1999, 2003, 2007 and 2011 (see also Barth, Caprio and Levine 2006, 2008: *Rethinking bank regulation: Till angels govern*); BEEPS: Business Environment and Enterprise Performance Survey administered by the EBRD and World Bank in 2008

Appendix 2. Correlation Matrix

This table presents correlation coefficients of the internal capital market characteristics and the 2001-07 average host and home country characteristics that are used in the regressions in Table 2. See Appendix 1 for definitions and sources of all variables. ***, **, * denote significance at the 1, 5, and 10% level.

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1] Parent steering	1										
[2] Parent funding management	0.219**	1									
[3] Cheap funding	0.117	0.387***	1								
[4] Parent credit risk management	0.102	0.147	0.0175	1							
[5] 2001-07 average overall net interest margin host	0.193*	0.107	0.191*	0.107	1						
[6] 2001-07 average bank concentration 3 host	0.0213	-0.162*	-0.178*	0.0722	-0.379***	1					
[7] 2001-07 average real GDP host	-0.306***	-0.144	-0.0963	-0.255**	-0.233**	0.0820	1				
[8] 2001-07 average real GDP growth	-0.0698	0.0179	0.0143	0.113	-0.0673	0.126	-0.346***	1			
[9] 2001-07 average entry requirements host	0.299***	-0.0655	0.0811	0.213**	0.435***	0.126	-0.604***	0.443***	1		
[10] Perceived foreign competition host	0.117	0.102	0.243**	-0.00572	0.253**	-0.209**	-0.228**	0.0361	0.109	1	
[11] 2001-07 average restrictions on bank activities home	0.0948	0.0303	0.0706	-0.0547	0.0641	0.0479	-0.101	0.202**	0.177*	0.111	1
[12] 2001-07 average supervisory power home	0.163*	-0.187*	-0.131	0.139	0.218**	-0.107	-0.138	-0.118	0.114	0.0651	-0.0276

Appendix 3. Parent Banks in the Sample

This table lists the names of parent banks in our sample as well as the number of subsidiaries and countries in which they operate. The table also indicates the country in which the parent bank is located (home country).

Parent bank	Number of sub-sidiaries	Coun-tries of operation	Home country
AB Parex Bankas	1	1	LV
ALLIANZ SE	1	1	DE
AXA	1	1	BE
Allied Irish Banks (AIB)	1	1	IE
Alpha Bank AE	4	5	GR
BANCO COMERCIAL PORTUGUÊS	1	2	PT
BANK DNB NORD A/S	2	3	NO
BANK LEUMI LE ISRAEL BM	1	1	IL
BAUSPARKASSE WUESTENROT	1	2	DE
BAWAG PSK GROUp	1	1	AT
BKS Bank AG	1	3	AT
BNP Paribas	3	4	FR
Banco Popolare	1	2	IT
Bank of Moscow	1	2	RU
Bayerische Landesbank	1	3	DE
CITIGROUP INC	6	5	US
Commerzbank AG	1	2	DE
Credit Agricole	2	3	FR
DANSKE BANK A/S	4	2	DK
DZ Bank	1	1	DE
Demir-Halk Bank	1	1	NL
Deutsche Bank AG	2	7	DE
DnB ASA	1	1	NO
EFG EUROBANK ERGASIAS	3	5	GR
Emporiki Bank	2	3	GR
Erste Group Bank AG	6	8	AT
Fiba Holding AS	1	1	TR
HANWHA BANK ZRT	1	1	HU
HSBC HOLDINGS PLC	1	2	GB
Hypo Alpe-Adria Bank	5	4	AT
ICB Financial Group Holdings	1	1	CH
ING Group	2	3	NL
Intesa Sanpaolo	8	8	IT
Islamic Development Bank in Saudi Arabia	1	1	SA
KBC Group	7	6	BE
KOMERCIJALNA BANKA A.D. BEOGRAD	1	1	RS

MARFIN POPULAR BANK	2	4	CY
MKB BANK ZRT	2	1	HU
NLB DD-NOVA LJUBLJANSKA BANKA D.D.	5	3	SI
National Bank of Greece	5	6	GR
Nordea Bank AB (publ)	1	3	SE
Nova Kreditna Banka Maribor d.d.	1	1	SI
OTP Bank Plc	5	6	HU
PIVDENNYI JOINT	1	2	UA
Piraeus Bank SA	4	4	GR
Portigon AG / WestLB AG	1	1	DE
ProCredit Holding AG	6	7	DE
RABOBANK NEDERLAND-RABOBANK GROUP	1	1	NL
RAIFFEISEN ZENTRALBANK OESTERREICH AG -	12	11	AT
RBS Group	1	2	GB
SKANDINAVISKA ENSKILDA BANKEN (SEB)	3	4	SE
SMP Bank, Limited Liability Company-Comm	1	2	RU
STEIERMARKISCHE BANK UND SPARKASSEN AG	2	1	AT
Société Générale	10	10	FR
Svenska Handelsbanken	1	1	SE
Swedbank AB	3	4	SE
T.C. Ziraat Bank, Turkey	2	2	TR
Tecnicredito SGPS S	1	3	PT
Turkiye Garanti Bankasi A.S.	1	1	TR
UniCredit SpA	12	12	IT
VENETO BANCA HOLDING	2	4	IT
Volksbanken Verbund	7	9	AT