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# **The effects of foreign and government ownership on bank lending behavior during a crisis in Central and Eastern Europe**

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## **Abstract**

We examine whether foreign-owned and government-owned banks in Central and Eastern Europe reacted differently during a domestic systematic banking crisis and the global financial crisis of 2008. Our panel dataset comprises data on more than 400 banks for the period 1994-2010. Our analysis shows that foreign banks provided credit during domestic banking crises in host countries, while government-owned banks contracted. In contrast, foreign-owned banks reduced their credit base during the global financial crisis, while government-owned banks expanded. Consequently, our results show that foreign-owned banks may contribute to financial stability during domestic crisis episodes, but also increase the risk of importing instability from abroad during a crisis in their home markets. However, government-owned banks may substitute for foreign-owned banks and hinder the transmission of international shocks. Thus, our results indicate that a mixed banking sector consisting of foreign-owned and government-owned banks is most advisable.

*Keywords:* foreign banks, government-owned banks, credit growth, crisis, emerging market

*JEL:* C23, F36, G21, P34

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## **1. Introduction**

The large-scale entry of foreign-owned banks into Central and Eastern Europe (CEE) began with the privatization of government-owned banks in the late 1990s. It resulted in a banking sector of which more than 75% was owned by foreign investors at the beginning of the 2000s (Bonin and Wachtel, 2003). Since that time, the level of foreign ownership remained unchanged in the region, but the share of foreign banks still varies from 30% in Slovenia to 99% in the Baltic States. The remaining domestic banks are mainly government owned, while private domestic banks are small and insignificant in CEE countries (Jackowicz et al., 2012). Until recently, the government-owned banks were considered to be inefficient and were thus seen as a burden for the banking sector (Bonin et al., 2005). During the recent financial crisis of 2008, however, government-owned banks were seen as an important factor in stabilizing the credit level in CEE, as multinational banks scaled down their operations or have withdrawn from host countries due to problems in their home markets (Kowalewski and Rybinski, 2011). However, whether government-owned banks provided stability in CEE countries is still unknown, as the existing research so far concentrated mainly on the credit supply of foreign banks due to its prominent role in CEE, first during domestic crises and lately during the global financial crisis. However, the role of government-owned banks' credit supply during the global financial crisis was largely ignored. Our study attempts to fill this gap and analyse the lending behaviour of government-owned as well as foreign-owned banks during domestic and global financial crises.

In the past, foreign bank entry was seen as a positive development in CEE countries, as earlier empirical evidence suggested that it leads to greater efficiency within the banking sector (Bonin et al., 2005; Drakos, 2003; Fries and Taci, 2005). Additionally, foreign bank entry was associated with better access and cheaper credit. Unite and Sullivan (2003) for Asia and Martinez Peria and Mody (2004) for Latin America documented that foreign banks offered lower spreads and have lower costs than domestic banks. In a cross-country study, Clarke et al. (2006) showed that enterprises in countries with high levels of foreign bank participation tend to rank interest rates and access to long-term loans as lesser constraints on their operations and growth than do enterprises in countries with less foreign bank presence. Moreover, de Haas and van Lelyveld (2006) found that foreign bank subsidiaries of financially strong parent banks did not reduce lending, whereas domestic banks had to do so during domestic banking crises in the CEE countries. They associated this occurrence with internal capital markets of multinational parent banks that provide subsidiaries with capital and liquidity, which stabilized local lending during a crisis in CEE countries. It was assumed, therefore, that high foreign ownership in the banking sector induced efficiency and stability in the financial system in CEE countries.

However, several recent papers indicated that foreign-owned banks may have reduced the credit

availability in CEE countries during the global crisis of 2008 (Allen et al., 2010). Popov and Udell (2012) showed that negative shocks were transmitted from foreign-owned banks to firms in CEE during the global crisis. De Haas and van Lelyveld (2011) confirmed that parent banks were not significant sources of strength to their subsidiaries during the global crisis. They reported that, as a consequence, the slowdown of credit growth of foreign bank subsidiaries was almost three times as fast as domestic banks during the global crisis. However, in their study, they do not distinguish between private and state-owned domestic banks. At the same time, government-owned banks, which are often strongly influenced by political motives, could compensate for the decrease of lending by foreign-owned banks during the crisis of 2008.

In order to study whether foreign-owned and government-owned banks in CEE reacted differently to domestic and global banking crises, we use a unique database on foreign-owned and domestic private and public banks from 10 CEE countries. Our results show that, prior to the financial crisis of 2008, foreign-owned banks were increasing the level of credit in CEE countries. Moreover, our results confirm that the foreign-owned banks were increasing the level of credit during periods of domestic banking crisis in CEE. In contrast, lending of government-owned banks declined prior to the global financial crisis as well as during domestic crisis. In line with our expectations, we document that, during the global financial crisis, government-owned banks increased their lending in CEE countries, while the level of lending of foreign-owned bank decreased. Moreover, we find also some weak evidence that the lending of the private domestic banks declined less than that of foreign banks in CEE countries, which were affected by a domestic banking crisis as a result of the global crisis of 2008. De Haas and van Lelyveld (2006, 2011) found that the credit growth of foreign banks in CEE countries is associated with the present financial position of the parent banks. However, we do not find any evidence that the poor financial performance of the parent banks was directly related to the decline of the lending of its subsidiaries in CEE countries during the financial crisis. We find that a more important determinant of credit growth than parent banks' health is bank-specific characteristics such as deposit levels or liquidity.

This paper contributes to several strands of the existing literature. First, we use a new dataset of foreign and domestic-owned banks that covers a large number of countries from the CEE region. In our study, we are able to control for ownership of all banks in the sector, an ability that facilitates our assessment of the validity of the earlier results using only benchmarks for domestic banks (De Haas and Lelyveld, 2011). Moreover, our dataset enables us to control for ownership of domestically owned and foreign-owned banks. Consequently, we can distinguish between private and state-owned banks, a point that has thus far been ignored in the literature. Additionally, the existing studies assume that foreign subsidiaries are owned by parent banks

which, by using internal capital markets, reallocate capital over different geographical regions on the basis of expected risks and returns. However, in the last decade, a number of foreign banks were opened by non-financial firms, insurance companies, or even individual investors in CEE. In the regression we take into account the differences in the ownership of foreign banks and control for the parent bank situations in the home market. Our results confirm the earlier findings that foreign-owned banks provided stability during domestic banking crises in CEE countries but might also transmit financial shocks that affect their home markets through the lending channel during a crisis. Second, we expand the literature on multinational banking internal capital and lending stability. In contrast to De Haas and Lelyveld (2011), we do not find evidence that the slowdown of credit growth of foreign bank subsidiaries during the crisis of 2008 was strongly related to the parent banks' current financial situation. Moreover, we find some evidence that, if the global crisis resulted in a domestic banking crisis, then the bank-specific characteristics were more important than ownership. Third, we find that the growth of deposits and liquidity was strongly related to the lending stability of banks during a local and global financial crisis. Henceforth, we confirm that the banking funding structure influences lending stability. Consequently, we assume that only those foreign banks that relied more on wholesale funding, including parent bank capital, reduced lending in CEE, which is in line with the findings of Allen et al. (2010) and Ivashina and Scharfstein (2010).

The remainder of the paper is organized as follows. Section 2 reviews the existing literature. Section 3 explains our data and the econometric methodology. Section 4 describes our empirical findings, and Section 5 concludes.

## **2. Motivation and existing literature**

We build our study on three strands of literature. The first strand reviews the existing evidence on a stabilizing effect of foreign banks on the credit supply in host countries during a domestic banking crisis. In Mexico and Argentina, Dages et al. (2000) found that foreign banks reported notable credit growth during domestic crisis periods and thereafter. Soledad et al. (2005) confirmed the results and showed that foreign banks did not reduce their credit supply during adverse economic times in Latin America. Additionally, they found some evidence that foreign banks viewed crisis periods as opportunities to expand in the host countries. De Haas and van Lelyveld (2004) presented similar results for CEE countries. Moreover, in a later paper, de Haas and van Lelyveld (2006) showed that, during crisis periods, domestic banks contract their credit in CEE. In contrast, they found that greenfield foreign banks play a stabilising role by keeping their credit base stable in CEE. These articles lead to the following hypothesis:

**Hypothesis 1:** Foreign banks' credit growth is relatively insensitive or can even expand during host country crisis periods.

According to Goldberg (2009), an explanation for the results can be twofold. First, foreign-owned banks are less reliant on host country funding and more reliant on foreign sources than their domestically owned counterparts are. Consequently, the procyclicality of their supply of loanable funds may be lower, especially during a crisis in the host country. Second, foreign banks may have a different client base than domestically owned banks and hence also an altered loan demand. Jeon et al. (2006) documented that foreign banks, like domestic banks, were procyclical lenders in Korea during the crisis of 1997. They found that, during the Asian crisis, foreign banks did not add significant volatility to the financial system, but its lending reacted to changing conditions in the home country economy. They showed that whether foreign bank operations contributed to financial market stability in Korea depended on the degree of financial market integration between Korea and the home country.

Consequently, the first explanation seems to explain more appropriately why foreign-owned banks are insensitive to host-country crisis periods. Hence, the second strand aims at examining how a financial crisis in the home country of the parent bank affects the lending of its foreign subsidiaries in a host country. Peek and Rosengren (1997) investigated how the collapse of asset prices in Japan during the early 1990s affected the operations of Japanese bank subsidiaries abroad. They found that the decline in the parents' risk-based capital ratio translated into a significant decline in total loans by their U.S. subsidiaries. In line with this evidence, de Haas and van Lelyveld (2006) showed that the financial health of the parent bank impacts the ability of subsidiaries to expand credit in CEE countries. In a later paper, de Haas and van Lelyveld (2010) provided additional evidence for the existence of internal capital markets in multinational bank holding companies. They demonstrated that lending by multinational bank subsidiaries depends on the financial strength of the parent bank. On the one hand, the existence of internal capital markets and the parents' support for subsidiaries may explain the insensitivity of foreign banks' lending to crises in the host countries. On the other hand, Cetorelli and Goldberg (2012) showed that parent banks, when hit by a funding shock, reallocate liquidity in the organization according to a locational pecking order. Foreign subsidiaries that were more important for the parent bank were relatively protected from liquidity reallocations, while traditional funding locations were used more extensively to buffer shocks to the parent bank balance sheets. As a result, multinational banks can contribute to international shock transmission to the host countries. De Haas et al. (2012) and Popov and Udell (2012) showed that multinational bank subsidiaries cut lending more than domestic banks in the CEE countries during the global financial crisis of 2008, while Fungáčová et al. (2013) presented similar results for Russia. In addition, Jeon et al. (2013) find evidence that the transmission of financial shocks varied across types of shocks during the financial crisis of 2008. They showed that transmission of the

shock was the strongest among subsidiaries in CEE countries, followed by Asia and Latin America. We formalize these findings in the following hypothesis:

**Hypothesis 2:** Foreign banks' credit growth is negatively related to home country crisis and parent bank financial performance.

The third strand reviews the lending of state-owned banks, which often differs from that of private banks. Dinç (2005) presented evidence that state-owned banks increase their lending during election years relative to private sector banks. In a similar vein, Jackowicz et al. (2012b) found that lending of state-owned banks correlates with the electoral cycle in CEE countries. According to Sapienza (2004), the lending of state-owned banks is mainly driven by political motives, which pursue interests such as enhancing its chances of re-election or avoiding political unrest. Henceforth, the government may use state-owned banks to compensate for market failures and limit a credit contraction during a crisis period. Indeed, Micco and Panizza (2006) found that the lending of state-owned banks is less responsive to macroeconomic shocks than the lending of private banks, both domestically and foreign owned. Recently, Fungáčová et al. (2013) reported in Russia that the credit supply overall diminished during the recent crisis, yet this reduction was greater for foreign banks and lower for state-controlled banks relative to domestic private banks. Allen et al. (2012) found that the largest state-owned and listed Chinese banks have significantly out-performed large non-state-owned banks from other emerging economies before and during the 2007-2009 crisis. Moreover, they documented that this superior performance was not due to less risk-taking by these state-owned banks. Based on this assertion, we build the following hypothesis:

**Hypothesis 3:** Government-owned banks increase credit levels in order to compensate for the decline of foreign bank lending during home crisis periods.

Allen et al. (2010) found that, during the global crisis, the reduction in foreign bank lending was stronger for those that are dependent on the interbank market. Moreover, Dages et al. (2000) reported that domestically owned and foreign-owned banks with low problem loan ratios behave similarly, which suggests that bank health, and not ownership as such, is critical. Similarly, Peek and Rosengren (2000) find that domestic and foreign-owned banks exhibited the same lending behavior during periods of crisis in Latin America during the 1990s. Similarly, Arena et al. (2007) studied the behavior of domestically owned and foreign-owned banks during periods of financial distress in 20 Asian and Latin American countries. The results indicated that domestic and foreign-owned banks behave roughly similarly during a domestic crisis. These findings lead to the following hypothesis:

**Hypothesis 4:** Banks' financial characteristics are more important in determining credit growth

than ownership or parent bank financial performance during a host and home crisis period.

Our paper, which studies banks' different lending behaviour across the ownership dimension, is related to the literature that addresses the effects of foreign bank penetration on credit stability in host countries as well as the internal capital market literature. As shown above, empirical studies have addressed this question with mixed conclusions. Additionally, so far the literature mostly focused on the lending behaviour of foreign banks, yet it is possible that state-owned banks' lending behaviour differs during crisis periods. Hence, our paper examines various roles played by foreign and state-owned banks in providing loans during banking crisis periods.

### **3. Data and methodology**

#### *3.1. Sample*

We construct an unbalanced panel dataset using both bank-level and macroeconomic data. The bank-level data are from Bureau van Dijk's BankScope database. The sample includes domestically owned and foreign-owned commercial banks that were operating in Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia in the period 1994-2010. We examined the ownership structure of all banks in our sample and constructed three ownership dummy variables for each bank in each year. The first ownership dummy (*Foreign*) takes the value of one if the bank is foreign owned and zero for all other banks. We use the definition generally applied in the literature and consider a bank as foreign owned if at least 50% is owned by foreign entities (Claessens et al., 2001). Similarly, the second ownership dummy (*Government*) takes the value of one if more than 50% of the bank is owned by the public sector. The third ownership dummy (*Domestic*) takes the value of one if a private domestic investor owns at least 50% of the bank and zero otherwise. To track ownership and changes therein, we use as our primary source the information available in BankScope. We complement this information with information from several other sources, including individual banks' websites and annual reports, parent companies' websites, a banking regulatory agency, and central bank websites. We were able to obtain ownership information for all the banks in our sample for the entire period in which they were active.

Using these data, we constructed a panel of 4,344 bank-year observations for 416 banks in 11 CEE countries. The sample includes 2,264 bank-year observations for foreign-owned banks, 769 observations for the government-owned banks, and 1,311 observations for banks owned by private domestic investors. The panel of domestic and foreign banks covers 1994-2010 but is unbalanced as we do not have data for all years for each bank. As banks in our sample use different currencies, we convert financial variables into US dollars.

In addition, we used in the regression a subsample that consists only of multinational bank subsidiaries and, following de Haas and van Lelyveld (2010), we controlled for parent banks'



financial health. Using ownership data for the foreign banks, we identified 93 parent banks. The remaining foreign-owned banks in the sample were controlled either by financial companies as insurance and investment funds or non-financial companies as well dispersed shareholders. We find that the number of parent banks controlling more than one or two subsidiaries in CEE countries is relatively small. We retrieved the needed financial data for parent banks again from the BankScope database, and our final sample consists of 1,974 parent-subsidary-year observations, as in some cases the data for the parent banks was missing.

### 3.2. Descriptive statistics

Our dependent variable is the percentage of real growth in total loans ( $\Delta Loans$ ) of bank  $i$  in country  $j$  in year  $t$ . In the regression, we control for the following bank characteristics that may influence a bank's tendency to expand its loan portfolio:  $\Delta Deposits$  (one period lagged growth in total deposits), *Liquidity* (liquid assets to total assets), *Profitability* (return on average assets), *Solvency* (equity to assets), and total bank assets to countries GDP as a measure of *Size*. Additionally, in the regression we employ one period of lag real growth in total loans as an independent variable. In order to control for parent bank characteristics that may determine subsidiaries' loan growth, we include the following bank-specific measures in the regression as independent variables:  $Solvency_p$  (parent equity to assets),  $Profitability_p$  (parent banks return to assets), and  $Size_p$  (parent bank assets to home countries GDP). The definition of all of the variables used in the study is provided in the Appendix.

De Haas and van Lelyveld (2006) reported that an important difference between domestic and foreign-owned banks in CEE countries is the reliance of foreign subsidiaries on the money market. In their opinion, this difference is based on the fact that foreign banks are on average less dependent on local deposits, as they can get financing relatively easily on the money market or from the parent bank. As the global financial crisis resulted in a liquidity crunch in the money markets as well as many parent banks' reports of financial losses, the access to local deposits may strongly determine the future loan growth of foreign as well as domestic banks. Hence, we expect that the credit growth will be strongly influenced by the growth of deposits.

The existing results showed that banks can resort to liquid assets to finance their lending, and hence more liquid banks tend to increase their credit at faster rates (Jeon et al., 2013). Additionally, Peek and Rosengren (1997) found that better capitalized banks facilitate faster loan growth. However, less liquid banks or undercapitalized banks can be prone to moral hazard and rapidly expanding lending (Black and Strahan, 2002). Kishan and Opiela (2000) also found that the effects of monetary policy on bank loans depend on bank capitalization and size. They showed that undercapitalized and small banks are more responsive to monetary shocks than well-

capitalized and large banks, respectively. As a result, the expected sign of the coefficients for these variables is therefore indeterminate.

In the literature, the mentioned bank-specific characteristics are found to be important determinants of banks' lending behaviour, but the affiliation with a parent bank could also affect foreign banks' credit supply. Houston and James (1998) show that the loan growth of banks affiliated with a multi-bank holding company is less sensitive to their cash flow, liquidity, and capital positions than in the case of unaffiliated banks. Houston and James (1998) documented that affiliated banks are more responsive to local market conditions than their unaffiliated counterparts. Based on those results, the researchers suggested that affiliated banks are willing to lend in local markets as long as the opportunities are there. Recently, de Haas and van Lelyveld (2011) and Jeon et al. (2013) presented that the financial situation and lending behaviour of foreign subsidiaries are strongly influenced by the financial situation of the parent banks. Thus, the impact of parent banks on foreign bank subsidiaries during a domestic or global crisis is ambiguous.

Table 1 presents summary statistics and correlation coefficients for the main variables across domestic and foreign banks in CEE and the parent banks. The descriptive statistics show that deposits were growing faster than loans in the years 1994-2010, yet the data presents large variability. We find also large variability in the profitability of the banks in CEE countries. Moreover, parent banks are characterised by significantly lower profitability and solvency than the domestically owned and foreign-owned banks. As expected, we find that the parent banks are significantly larger than domestically owned and foreign-owned banks.

Panel B of Table 1 shows the correlations of the main variables used in our study. The results overall make good economic sense. We find that deposits' growth and profitability are positively and statistically correlated with banks' loan growth. In contrast, liquidity and size are negatively and statistically significantly correlated with credit growth. Finally, parent banks' profitability is positively related to bank's loan growth, while solvency is negatively related to it.

[Table 1]

Table 2 disaggregates bank characteristics by ownership and shows that the variability among domestically owned and foreign-owned banks is statistically significant for the main variables. Additionally, we divided our sample in order to establish whether foreign-owned and domestically owned banks behaved differently prior to and after the financial crisis of 2008.

Panel A shows that the variability among domestically owned and foreign-owned banks is statistically significant for the main variables during the years 1994-2010. In this period, foreign banks provided significantly more loans than domestic banks. In contrast, domestic banks were more liquid and had significantly higher equity ratios than foreign-owned banks did. We find

that the differences in profitability and deposits growth are not statistically significant between those two groups of banks. These findings, however, confirm the need to control for these bank characteristics in our estimations.

Panel B shows that, prior to the crisis, credit growth in CEE countries was mainly driven by the foreign banks. The difference between the domestically owned and foreign-owned banks is significant at the 1% level. While the domestic banks were able to attract more deposits, the differences between them and foreign-owned banks is again not statistically significant. Again we find that foreign-owned banks prior to the crisis had significantly higher leverage and lower liquidity levels than domestic banks.

Panel C documents that, due to the global crisis, the situation in the CEE countries changed significantly. In the crisis period of 2008-2010, domestic banks reported higher real loan growth than foreign banks, yet the difference is not statistically significant. In line with previous findings, domestic banks had lower leverage ratios and a higher level of liquidity than foreign-owned banks during the crisis. In contrast to the pervious results, we find the deposit growth was higher in foreign-owned banks than in the domestic banks during the crisis, but the differences are not statistically significant. Additionally, we find that domestic banks were significantly smaller than the foreign banks during the crisis period. Finally, in opposition to the previous results, we find also that the domestic banks showed higher profitability than the foreign-owned banks, yet again the difference is not significant.

[Table 2]

### 3.2 Methodology

The relationship between loan growth, bank-specific characteristics, and crisis is evaluated using the following specification:

$$\Delta L_{i,t} = \alpha_{i,t} + \beta_0 B_{i,t} + \beta_1 H_{i,t} + \beta_2 P_{i,t} + \beta_3 Crisis_{i,t} + \varepsilon_{i,t} \quad (1)$$

where the dependent variable is the real credit growth of bank  $i$  in year  $t$ ;  $B_{i,t}$  represents variables controlling for characteristic of banks  $i$ , including lagged credit growth, and an ownership dummy variable for foreign and government-owned banks;  $H_{i,t}$  is set of host-country macroeconomic variables;  $C_{i,t}$  refers to a crisis dummy. When we use the subsample of multinational bank subsidiaries,  $P_{i,t}$  represents variables controlling for parent bank characteristics.

We employ country GDP growth and inflation rate as country macroeconomic variables reflecting the attractiveness of expanding credit in CEE country. Albertazzi and Gambacorta (2009) show that the economic cycle influences banks' profits through net interest income (via lending activity) and loan loss provisions (via credit portfolio quality). We expect therefore that

banks are positively and relatively strongly related to countries' GDP growth. We are aware that, to identify credit supply during a banking crisis, while appropriately controlling for demand conditions, we need to employ more reliable measures, yet such indicators are difficult to find. Henceforth, we interpret *GDP growth* only as a rough proxy for loan demand condition in a CEE country. We assume a negative sign for the variable *Inflation* as higher inflation tends to reflect unstable macroeconomic conditions in the CEE country. Moreover, Boyd et al. (2001) show that inflation may worsen market friction and force banks to ration credits.

We include a crisis dummy, *Crisis*, which takes on the value of one for years in which the host (or home) country experienced a systematic banking crisis. We identify the years of the domestic systematic banking crisis in a particular country using the Laeven and Valencia (2012) database. Furthermore, we employ a crisis dummy for global financial crisis in the years 2008-2010. Additionally, in the regressions we observe the interaction between the ownership variables and the crisis dummies.

As foreign banks' subsidiaries are often financially supported and may use bank crises in the host country to increase their market position, we anticipate a positive coefficient for the interaction term between *Crisis<sub>d</sub>* dummy for domestic crisis and *Foreign*. In contrast, we expect a negative coefficient for the interaction term between *Crisis<sub>g</sub>* dummy for global crisis and *Foreign*, as foreign subsidiaries could not rely on parent bank support and were often cut off from the internal and external interbank market. Moreover, we expect a negative sign for the global banking crisis dummy *Crisis<sub>g</sub>* as banks, regardless of their ownership structure, had to slow credit growth during the crisis as a result of the increasing risk. However, we assume that the government-owned banks increased their lending during the global crisis in order to stabilize the economy. Consequently, we anticipate a positive coefficient for the interaction term between *Crisis<sub>g</sub>* dummy for global crisis and *Government*. While our prediction about the lending behaviour of government-owned banks during domestic crisis is ambiguous, we employ three estimation methods for the panel regression: fixed effects, random effects, and a dynamic GMM panel estimator. We employ the fixed effects estimation based on Hausmann's test, but it may not be appropriate for our analysis, as the interesting variables are bank ownership dummies, which tend to remain stable in countries. Although they do change over time, the variations are not significant enough to be significant. Fixed-effect estimation, however, requires significant within-group variations in the independent variable so as to generate a consistent and efficient estimator (Wooldridge, 2002). Henceforth, the fixed-effect estimator is prone to give us an imprecise coefficient on bank ownership variables. Moreover, fixed effects can aggravate the problem of multicollinearity (Baltagi, 2005). Therefore, we employ additionally a random-effect model for estimation. Furthermore, we employ the GMM System estimator, since lagged credit

growth may be correlated with the panel-level effects, and therefore there is a risk that our estimator is inconsistent (Nickell, 1981). The appropriateness of the set of instruments is formally evaluated by the Sargan test of over-identifying restrictions and the Arellano-Bond test for error autocorrelation. We compute the Sargan test using the two-step GMM System estimator (Arellano and Bond, 1991). Additionally, when we employ the subsample of multinational banks subsidiaries in the regressions, we correct for the small sample error (Roodman, 2009). For all models discussed in the following subsection, the Sargan test and the Arellano–Bond AR(2) tests show that our instruments are appropriate and no second-order serial correlation is detected, respectively. In all regressions, the independent variables are jointly significant at levels below 1%. Hence, we do not make additional comments on those aspects of the estimates.

## **4. Results**

### *4.1. Baseline results*

In Table 3 we present the baseline results on determinants of bank lending in CEE countries during the years 1996-2010. The results confirm that deposits' growth is positively correlated with credit growth. The coefficient for deposit growth is positive and significant in all the regressions at 1% level. Moreover, the coefficient for profitability is positive and also highly significant in all regressions. In contrast, we find that the coefficient for liquidity is negative and significant, which could mean that more conservative banks grow more slowly.

In specifications (4)-(6) we include the ownership dummies and find that foreign banks supply more loans than government-owned banks. The coefficient for *Government* dummy is negative, yet insignificant. In contrast, we find that the coefficient for *Foreign* dummy is positive and significant in two specifications. Henceforth, our results confirm that foreign-owned banks fuelled the credit growth in the CEE countries.

Specifications (7)-(9) show the results for the subsample of multinational bank subsidiaries. The results for the foreign bank subsidiaries are similar to the full sample. We find that deposits' growth and profitability are positively correlated with loan growth, while the coefficient for subsidiaries' liquidity is negative and significant again. Hence, the results show that multinational bank subsidiaries' lending is determined by the same bank-specific factors as for all the foreign banks and state-owned banks. Additionally, we find only weak evidence that the parent banks' characteristics determine the lending growth of the subsidiaries in CEE. Only the coefficient for parent bank liquidity is positive and significant, but just in two specifications and at the 10% level. Thus, the results provide weak evidence that foreign subsidiaries of parent banks with higher level of liquidity are more prone to aggressive lending abroad.

The coefficients for the macroeconomic control variables are in line with our expectations. We

find that economic growth is positively and statistically correlated with loan growth. In contrast, the coefficient for inflation is negative and significant in all specifications.

[Table 3]

#### 4.2. Domestic banking crisis

Table 4 shows the determinants of bank lending during a domestic systematic banking crisis in CEE countries. In order to control for the domestic systematic banking crisis, we include a dummy  $Crisis_d$  that takes the value 1 for the years of systematic banking crisis in a particular CEE country and zero otherwise.

The coefficients for banks' specific characteristics are in line with our main results. The coefficients for deposits' growth and profitability are again positive and statistically significant, while the coefficient for liquidity is negative and statistically significant. The ownership dummy for government-owned banks is again insignificant, and for foreign-owned banks it is positive but statistically significant only in two specifications.

In line with the expectation, the crisis dummy is negative, but only significant in two specifications. One explanation why the credit level did not decline significantly in CEE countries during a domestic banking crisis is that the loan supply was stabilized by foreign banks. We test Hypothesis 1 formally and observe the interaction between the crisis dummy with the ownership variables. Specifications 7-9 show that the interaction term between  $Crisis_d$  and  $Foreign$  is positive and significant in all specifications at 1%. Henceforth, the results confirm the existing results and document that foreign-owned banks stabilize lending during domestic crisis in CEE countries. We find that the coefficient for the interaction term between  $Crisis_d$  and  $Government$  is negative, but insignificant. Hence, we do not find any evidence that government-owned banks reduced lending during domestic banking crises. However, we may assume that the state-owned banks' credit level deteriorated due to the problems in the economy and the weak support of the government.

The macroeconomic control variables are consistent with the prior findings. In all specifications, the coefficient for economic growth is positive and statistically significant, while the coefficient for inflation is negative and remains significant in all specifications.

[Table 4]

In Table 5 we present the results for the subsample of the multinational bank subsidiaries. As above, we find that bank deposits' growth and profitability are positively correlated with loan growth. In contrast, the coefficient for liquidity is again negative and significant. In line with previous results, we find only weak evidence that parent characteristics determine loan growth of multinational bank subsidiaries. The coefficient for solvency is positive and statistically significant, but only in two specifications.

As expected, the coefficient for domestic systematic banks crisis is positively correlated with multinational bank lending, but it is insignificant. Henceforth, the results document that foreign banks' lending is not affected by local banking crisis in a particular host country. Moreover, we observe the interaction between the *Crisis<sub>d</sub>* dummy with the parent-bank-specific variables and find that none of the coefficients for the interaction terms is statistically significant. Therefore, we assume that multinational bank subsidiaries that increased lending were not especially supported by their parent banks during domestic banking crises in CEE countries.

The macroeconomic control variables are again consistent with the main results. In all specifications, the coefficient for economic growth is positive and statistically significant, while the coefficient for inflation is negative and also statistically significant.

[Table 5]

#### 4.3. Global banking crisis

In Table 6 we present the results for the determinants of bank lending in CEE countries during the global financial crisis of 2008. In order to control for the recent financial crisis, we include a dummy variable, *Crisis<sub>g</sub>*, which takes the value of 1 for the years 2008-2010 and zero otherwise.

In line with the main results, we find that deposits' growth and profitability are positively and significantly associated with loan growth. In contrast, we find again that liquidity is negatively associated with banks' loan growth. Similarly, the coefficient for foreign ownership is positive and significant in almost all specifications, while the coefficient for state ownership is negative but insignificant. Henceforth, the results show again that foreign banks increased their lending during the period of investigation. As before, we find that the dummy, *Crisis<sub>g</sub>* is negatively related to bank lending, but the coefficient is significant only in two specifications.

We again interact the global crisis dummy with the ownership variables. In contrast to the previous results, we find that the coefficient for the interaction dummy *Crisis<sub>g</sub>* and *Foreign* is negative and statistically significant in all specifications at least at the 5% level. Consequently, we do find that Hypothesis 2 is supported as foreign banks decreased their lending in CEE countries during the financial crisis of 2008. In contrast, we find that the interaction dummies *Crisis<sub>g</sub>* and *Government* are positive and statistically significant in two specifications at least at the 5% level. The results support Hypothesis 3, as we find evidence that the government-owned banks substituted the loan supply for foreign-owned subsidiaries during the global financial crisis. We may assume that, in the CEE countries where government-owned banks still have a significant market share in some of the banking sectors, the financial crisis was less severe, as they hampered the decline of lending by foreign banks, which were affected by the crisis through their parent companies. The existence of the substitution effect confirms the coefficient for the dummy *Crisis<sub>g</sub>*, which is negative but statistically significant only in two of the nine

specifications at the 5% level, while, the macroeconomic control variables are again similar to those in Table 3.

[Table 6]

The results in Table 7 document that foreign banks, which are strongly affected by the global crisis, are those owned by the multinational banks. In contrast to the results in Table 6, we find that the coefficient for the dummy  $Crisis_g$  is negative and highly statistically significant in all specifications. However, when we interact the crisis dummy with the parent-specific variables, none is statistically significant. Hence, the results show that multinational banks' subsidiaries reduced credit growth regardless of the financial standing of their parent bank during the financial crisis of 2008. Moreover, we find that the level of reduction of credit growth is mainly associated with the current financial situation of the foreign subsidiary as the coefficient for deposits' growth is positive and significant in almost all the specifications at the 1% level. Moreover, the coefficient for profitability is positive and significant in almost all specifications, while the coefficients for liquidity are negative and significant. Henceforth, the results confirm that multinational banks' foreign subsidiaries lending was rather associated with its current financial situation than its parent banks during the global crisis.

The results support Hypothesis 4, which states that the bank-specific characteristics are more important than parent bank health during home crisis periods. Allen et al. (2011) presented evidence that some foreign subsidiaries supported their parent banks during a global crisis. The financial transfers from subsidiaries to parent banks may explain the significant decline of lending of the foreign subsidiaries during the crisis.

[Table 7]

#### 4.4. Domestic and global banking crisis

In the last regressions, we decided to employ a  $Crisis_{d,g}$  dummy that takes the value of one if the particular country experienced a domestic systematic banking crisis during the global financial crisis of 2008. Controlling for host and home crisis periods at the same time enables us to determine whether banks' financial characteristics are more important in determining credit growth than ownership or parent bank health during a crisis period.

The results in Table 8 are in line with our previous finding that shows that credit growth is positively associated with deposits' growth and the profitability of banks. In contrast, the results show again that the banks' liquidity is negatively associated with banks' loan growth. As previously, the coefficient for the foreign ownership of banks is positive and statistically significant in the fixed and random effects models, while the coefficient for the government ownership of banks is negative but insignificant. Henceforth, the results indicate again that foreign-owned banks significantly increased lending in CEE countries prior to the crisis.



In contrast to the previous results, we find that the coefficient for  $Crisis_{d,g}$  is positive and statistically significant. At the same time, the coefficients for the interaction  $Crisis_{d,g}$  and  $Foreign$  as well  $Crisis_{d,g}$  and  $Government$  are insignificant. Those results support Hypothesis 4 that states that the banks' characteristics are more important in explaining the level of credit supply during a financial crisis. However, another explanation for our results may be that, during a domestic systematic banking crisis in the period of the global financial crisis, both foreign-owned and government-owned banks had to decrease lending, but for different reasons. As a result, only domestic private banks were able to sustain or even increase relatively the level of lending, and therefore the coefficient for crisis is positive, while the interaction dummies are negative but insignificant. Again, we find that the control variables are consistent with those in Table 3.

[Table 8]

Table 9 shows the results of the determinant of credit growth of multinational bank subsidiaries during a domestic systematic banking crisis in the period of the financial crisis of 2008. The results confirm that foreign bank subsidiaries' credit growth is strongly associated with bank-specific characteristics, as coefficients for deposit growth, profitability, and liquidity are positive and statistically significant. In contrast to the previous results, the coefficient for  $Crisis_{d,g}$  is positive but statistically significant only in two specifications. We may assume, henceforth, that the multinational bank subsidiaries' lending decline was relatively lower than for other banks during the domestic systematic banking crisis in the period of the financial crisis.

In line with the previous results, we do not find strong evidence that parent banks' characteristics are associated with subsidiaries' credit growth. Only the coefficient for parent banks' solvency is positive, but is only statistically significant in two specifications at the 10% level. However, in contrast to the other results, the interaction terms  $Crisis_{d,g}$  and  $Size_{parent}$  are negative and statistically significant in two specifications. Hence, the results show that subsidiaries of smaller multinational banks were more likely to reduce credit growth during a domestic crisis in the period of the global financial crisis.

In contrast to the previous results, the coefficient for inflation is only statistically significant in two of the specifications, but its sign remains unchanged, while the coefficient for GDP growth remains positive and highly statistically significant in all specifications.

[Table 9]

## 5. Conclusions

The recent literature has investigated foreign banks' lending activities during the global financial crisis and previously during crisis periods in host countries. This paper extends the question, asking if ownership determines banks' behaviour during domestic and global crises. If so, is

there a difference between government-owned versus foreign-owned banks' reactions to banking crises? In our investigation, we specifically concentrate on loan growth and domestic and global financial crisis. To carry out our analysis, we utilize financial and ownership data on all commercial banks from 11 CEE countries over the period of 1994-2010.

Our results can be summarized as follows. We observe that domestic and global banking crisis significantly affect government-owned and foreign-owned bank lending behaviour. During domestic banking crises in CEE countries, foreign-owned banks' credit levels remained constant or even increased. In contrast, we find weak evidence that the government-owned banks' lending declined during the domestic crisis. This decline can be attributed to the worsening situation of the state, which was strongly affected by the domestic crisis. In contrast, we find that, during the global financial crisis, the lending of foreign-owned banks declined. However, we do not find conclusive evidence that parent banks' financial situation determines foreign subsidiaries' lending, as claimed in earlier research. In line with our expectations, however, we find that the government-owned banks' lending increased during the global financial crisis of 2008. Consequently, the government-owned banks compensated for the decline of foreign-owned banks and provided stability to the financial systems in CEE during the financial crisis of 2008.

Nevertheless, we find that, during periods when the domestic banking sector was affected by the global financial crisis of 2008, the lending of government-owned banks also declined. However, we find some weak evidence that domestic private banks compensated for this downturn. Moreover, the decline in lending of government-owned banks relative to foreign banks subsidiaries was larger. As a result, we find that domestic private and foreign-owned banks also provided financial stability in some of the CEE countries during the recent financial crisis. Finally, we find that the bank-specific characteristics are more important than ownership in explaining the supply of credit during a financial crisis. In periods of simultaneous host and home financial crisis, only the bank characteristics of profitability, liquidity, and deposit growth were important in explaining the lending behaviour in CEE countries.

Our results are quite important from a policy point of view, as we show that a mixed composition within the banking sector is advisable, consisting of government-owned, private domestic, and foreign-owned banks. In addition, we find that bank-specific characteristics are important in explaining credit growth during periods of financial troubles. Henceforth, supervisory organizations should not only concentrate on keeping a mixed-ownership structure of the banking sector, but also control the financial situation of the domestic and foreign banks in the sector.

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## Appendix

### Explanatory variables and their definitions

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Variable	Definition
$\Delta$ Loans	Real growth rate of loans from non-financial entities
$\Delta$ Deposits	Real growth rate of deposits from non-financial entities
Liquidity	Liquid assets over total assets
Profitability	Ratio of gross profit to total assets
Solvency	Ratio of equity capital to total assets
Size	Ratio of a given bank's assets and the GDP of the country in which the bank is licensed
Government	Binary variable identifying banks that were directly or indirectly controlled by the government in a given year
Foreign	Binary variable identifying banks that were owned by foreign investors in a given year
Profitability	Ratio of gross profit to total assets calculated for parent banks
Solvency	Ratio of equity capital to total assets calculated for parent banks
Size	Ratio of a given parent bank's assets and the GDP of the country in which the bank is licensed
Crisis <sub>d</sub>	Binary variable equal to one for the years of systemic banking crisis in a particular country and zero otherwise.
Crisis <sub>g</sub>	Binary variable equal to one for the years 2008-2010 and zero otherwise.
Crisis <sub>d,g</sub>	Binary variable equal to one if there was a systemic banking crisis in a particular country during the years 2008-2010 and zero otherwise.
GDP Growth	Real GDP growth
Inflation	Log of Consumer Price Index

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Table 1  
Descriptive Statistics and Correlations

	$\Delta$ Loans	$\Delta$ Deposits	Liquidity	Profitability	Solvency	Size	Profitability <sub>parent</sub>	Solvency <sub>parent</sub>	Size <sub>parent</sub>
Panel A: Descriptive Statistics									
Mean	0.213	0.273	0.154	0.012	0.146	0.031	0.002	0.056	0.143
Std. Dev.	0.411	0.427	0.136	0.030	0.134	0.055	0.010	0.040	0.232
Obs.	3626	3370	3600	3822	4253	3995	4342	1974	4230
Panel B: Pairwise Correlations (N= 2318)									
$\Delta$ Loans	1								
$\Delta$ Deposits	0.472 <sup>***</sup>	1							
Liquidity	-0.110 <sup>***</sup>	-0.080 <sup>***</sup>	1						
Profitability	0.175 <sup>***</sup>	0.184 <sup>***</sup>	0.006	1					
Solvency	0.019	-0.031 <sup>*</sup>	-0.108 <sup>***</sup>	0.109 <sup>***</sup>	1				
Size	-0.067 <sup>***</sup>	-0.079 <sup>***</sup>	0.112 <sup>***</sup>	0.008	-0.202 <sup>***</sup>	1			
Profitability <sub>parent</sub>	0.035 <sup>**</sup>	0.022	-0.065 <sup>***</sup>	0.000	-0.054 <sup>***</sup>	0.014	1		
Solvency <sub>parent</sub>	-0.047 <sup>*</sup>	-0.018	-0.135 <sup>***</sup>	0.028	0.187 <sup>***</sup>	-0.036	0.210 <sup>***</sup>	1	
Size <sub>parent</sub>	-0.009	-0.057 <sup>***</sup>	-0.014	-0.021	-0.170 <sup>***</sup>	0.217 <sup>***</sup>	0.164 <sup>***</sup>	-0.248 <sup>***</sup>	1

\*\*\*, \*\* and \* indicate significance at 1%, 5%, and 10% levels, respectively.

Table 2

Means difference test between variables of domestic banks and foreign-owned banks

	Domestic		Foreign		difference	t-value
	Mean	N	Mean	N		
Panel A: Sample Period 1994-2010						
$\Delta$ Loans	0.188	1692	0.235	1934	-0.466	-3.412
$\Delta$ Deposits	0.283	1592	0.265	1778	0.018	1.254
Liquidity	0.170	1704	0.140	1896	0.030	6.585
Profitability	0.125	1777	0.011	2045	0.001	1.054
Solvency	0.161	2033	0.132	2220	0.029	7.140
Size	0.030	1958	0.033	2037	-0.004	-2.054
Panel B: Sample Period 1994-2007						
$\Delta$ Loans	0.205	1480	0.287	1494	-0.8214	-5.236
$\Delta$ Deposits	0.300	1461	0.291	1492	0.009	0.560
Liquidity	0.171	1561	0.140	1598	0.031	6.400
Profitability	0.137	1556	0.141	1582	-0.000	-0.415
Solvency	0.163	1806	0.136	1752	0.027	5.894
Size	0.029	1740	0.029	1588	-0.000	-0.007
Panel C: Sample Period 2008-2010						
$\Delta$ Loans	0.071	212	0.057	440	0.014	0.650
$\Delta$ Deposits	0.095	131	0.127	286	-0.032	-0.930
Liquidity	0.158	143	0.138	298	0.020	1.332
Profitability	0.003	221	0.002	463	0.002	0.769
Solvency	0.141	227	0.115	468	0.026	3.036
Size	0.035	218	0.049	449	-0.013	-2.574



Table 3  
Determinants of bank lending in Central European countries

	FE	RE	GMM	FE	RE	GMM	FE	RE	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta$ Loans	-0.004 (0.020)	0.034 (0.022)	0.116*** (0.026)	-0.010 (0.020)	0.031 (0.022)	0.114*** (0.026)	-0.057* (0.030)	0.067** (0.034)	0.072** (0.036)
$\Delta$ Deposit	0.433*** (0.034)	0.447*** (0.028)	0.428*** (0.037)	0.428*** (0.034)	0.445*** (0.028)	0.427*** (0.037)	0.490*** (0.044)	0.523*** (0.038)	0.479*** (0.049)
Liquidity	-0.327*** (0.101)	-0.219*** (0.070)	-0.286*** (0.076)	-0.326*** (0.102)	-0.214*** (0.070)	-0.280*** (0.077)	-0.341** (0.138)	-0.032 (0.066)	-0.177** (0.086)
Profitability	2.333*** (0.427)	2.202*** (0.368)	1.540*** (0.337)	2.360*** (0.429)	2.188*** (0.371)	1.526*** (0.339)	1.459** (0.637)	0.822 (0.502)	0.683 (0.558)
Solvency	-0.044 (0.160)	-0.140 (0.142)	-0.139 (0.102)	-0.083 (0.159)	-0.131 (0.143)	-0.129 (0.106)	0.040 (0.364)	0.017 (0.234)	0.040 (0.211)
Size	-0.430 (0.323)	-0.210 (0.134)	-0.045 (0.097)	-0.393 (0.297)	-0.216 (0.138)	-0.055 (0.098)	0.394 (0.398)	-0.126 (0.147)	0.059 (0.145)
Government				-0.034 (0.037)	-0.005 (0.028)	0.001 (0.021)			
Foreign				0.072** (0.035)	0.037* (0.021)	0.021 (0.016)			
Profitability <sub>parent</sub>							-2.340* (1.207)	-0.452 (0.645)	-0.814 (0.812)
Solvency <sub>parent</sub>							4.813* (2.563)	2.231 (1.818)	3.949* (2.198)
Size <sub>parent</sub>							0.037 (0.104)	-0.025 (0.038)	-0.040 (0.047)
GDP growth	1.424***	1.313***	1.102***	1.444***	1.330***	1.112***	1.032***	0.810***	0.758**

Inflation	(0.230)	(0.252)	(0.257)	(0.229)	(0.253)	(0.258)	(0.345)	(0.299)	(0.326)
	-0.191***	-0.179***	-0.183***	-0.186***	-0.177***	-0.182***	-1.283***	-1.082***	-1.320***
Constant	(0.036)	(0.025)	(0.021)	(0.035)	(0.025)	(0.021)	(0.362)	(0.316)	(0.333)
	0.146**	0.151**	0.141***	0.110**	0.147**	0.127***	0.664***	0.277*	0.205***
Year dummy	(0.058)	(0.067)	(0.035)	(0.047)	(0.068)	(0.038)	(0.148)	(0.143)	(0.074)
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Obs.	2387	2387	2387	2387	2387	2387	1092	1092	1092
R <sup>2</sup> <sub>overall</sub>	0.366	0.386		0.359	0.387		0.394	0.489	
R <sup>2</sup> <sub>between</sub>	0.347	0.406		0.319	0.397		0.270	0.603	
R <sup>2</sup> <sub>within</sub>	0.353	0.350		0.357	0.353		0.460	0.436	
Hausman	0.000			0.000			0.000		
AR2			0.111			0.113			0.544
Hansen J			0.166			0.174			0.406

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.

Table 4

## Determinants of government and foreign bank lending during domestic banking crisis

	FE	RE	GMM	FE	RE	GMM	FE	RE	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta$ Loans	-0.004 (0.020)	0.034 (0.022)	0.114*** (0.026)	-0.010 (0.020)	0.031 (0.022)	0.113*** (0.026)	-0.009 (0.020)	0.032 (0.022)	0.115*** (0.026)
$\Delta$ Deposit	0.433*** (0.034)	0.447*** (0.028)	0.427*** (0.037)	0.428*** (0.034)	0.445*** (0.028)	0.426*** (0.037)	0.428*** (0.034)	0.446*** (0.028)	0.427*** (0.037)
Liquidity	-0.327*** (0.101)	-0.219*** (0.070)	-0.289*** (0.076)	-0.327*** (0.102)	-0.214*** (0.070)	-0.283*** (0.077)	-0.337*** (0.100)	-0.217*** (0.069)	-0.286*** (0.076)
Profitability	2.334*** (0.428)	2.198*** (0.367)	1.540*** (0.336)	2.360*** (0.430)	2.184*** (0.370)	1.529*** (0.339)	2.280*** (0.426)	2.079*** (0.365)	1.463*** (0.337)
Solvency	-0.045 (0.158)	-0.141 (0.142)	-0.145 (0.102)	-0.082 (0.158)	-0.132 (0.143)	-0.136 (0.105)	-0.053 (0.157)	-0.119 (0.140)	-0.128 (0.102)
Size	-0.428 (0.324)	-0.207 (0.134)	-0.041 (0.097)	-0.393 (0.299)	-0.214 (0.137)	-0.053 (0.099)	-0.408 (0.307)	-0.182 (0.137)	-0.016 (0.099)
Government				-0.034 (0.037)	-0.005 (0.028)	0.003 (0.021)	-0.026 (0.041)	0.005 (0.030)	0.010 (0.023)
Foreign				0.072** (0.036)	0.037* (0.021)	0.021 (0.016)	0.055 (0.036)	0.018 (0.021)	0.003 (0.017)
Crisis <sub>d</sub>	-0.004 (0.026)	-0.010 (0.024)	-0.044 (0.027)	0.001 (0.026)	-0.008 (0.024)	-0.044 (0.027)	-0.061* (0.037)	-0.066 (0.041)	-0.116*** (0.039)
Government x Crisis <sub>d</sub>							0.016 (0.050)	-0.012 (0.053)	0.013 (0.053)
Foreign x Crisis <sub>d</sub>							0.125*** (0.045)	0.134*** (0.048)	0.153*** (0.046)
GDP growth	1.406***	1.269***	0.949***	1.450***	1.295***	0.960***	1.460***	1.318***	0.960***

Inflation	(0.243) -0.190***	(0.270) -0.179***	(0.282) -0.180***	(0.244) -0.187***	(0.270) -0.177***	(0.283) -0.179***	(0.249) -0.181***	(0.270) -0.168***	(0.284) -0.173***
Constant	(0.036) 0.147**	(0.025) -0.233***	(0.022) 0.138***	(0.035) 0.111**	(0.025) 0.149**	(0.022) 0.124***	(0.035) 0.120**	(0.025) 0.149**	(0.022) 0.132***
Year dummy	(0.058) Yes	(0.086) Yes	(0.035) Yes	(0.047) Yes	(0.068) Yes	(0.038) Yes	(0.047) Yes	(0.067) Yes	(0.038) Yes
Country dummy	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Obs.	2387	2387	2387	2387	2387	2387	2387	2387	2387
R <sup>2</sup> <sub>overall</sub>	0.366	0.386		0.359	0.386		0.363	0.391	
R <sup>2</sup> <sub>between</sub>	0.348	0.407		0.318	0.397		0.329	0.413	
R <sup>2</sup> <sub>within</sub>	0.353	0.350		0.357	0.352		0.359	0.355	
Hausman	0.426			0.000			0.000		
AR2			0.118			0.119			0.115
Hansen J			0.184			0.193			0.203

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.

Table 5

## Determinants of foreign bank subsidiaries lending during domestic banking crisis

	FE	RE	GMM	FE	RE	GMM
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta$ Loans	-0.056 <sup>*</sup> (0.030)	0.068 <sup>**</sup> (0.034)	0.073 <sup>**</sup> (0.036)	-0.054 <sup>*</sup> (0.030)	0.067 <sup>**</sup> (0.034)	0.072 <sup>*</sup> (0.037)
$\Delta$ Deposit	0.492 <sup>***</sup> (0.044)	0.524 <sup>***</sup> (0.038)	0.480 <sup>***</sup> (0.049)	0.493 <sup>***</sup> (0.044)	0.524 <sup>***</sup> (0.038)	0.481 <sup>***</sup> (0.049)
Liquidity	-0.343 <sup>**</sup> (0.135)	-0.025 (0.066)	-0.171 <sup>**</sup> (0.086)	-0.352 <sup>**</sup> (0.135)	-0.026 (0.066)	-0.170 <sup>**</sup> (0.086)
Profitability	1.386 <sup>**</sup> (0.636)	0.780 (0.501)	0.666 (0.555)	1.353 <sup>**</sup> (0.656)	0.780 (0.502)	0.692 (0.558)
Solvency	0.079 (0.361)	0.037 (0.233)	0.059 (0.211)	0.050 (0.366)	0.045 (0.234)	0.056 (0.214)
Size	0.345 (0.419)	-0.129 (0.148)	0.053 (0.145)	0.352 (0.420)	-0.121 (0.148)	0.057 (0.148)
Crisis <sub>d</sub>	0.043 (0.037)	0.049 (0.034)	0.044 (0.035)	0.056 (0.124)	0.014 (0.089)	0.056 (0.087)
Profitability <sub>parent</sub>	-2.265 <sup>*</sup> (1.207)	-0.452 (0.640)	-0.817 (0.810)	-1.970 (1.321)	-0.693 (0.744)	-0.882 (0.986)
Solvency <sub>parent</sub>	4.760 <sup>*</sup> (2.539)	2.312 (1.792)	4.006 <sup>*</sup> (2.189)	3.367 (2.429)	2.872 (2.110)	3.992 (2.533)
Size <sub>parent</sub>	0.039 (0.105)	-0.019 (0.038)	-0.034 (0.047)	0.025 (0.105)	-0.017 (0.040)	-0.025 (0.048)
Profitability <sub>parent</sub> x Crisis <sub>d</sub>				-1.521 (2.707)	0.923 (1.443)	0.266 (1.413)
Solvency <sub>parent</sub> x Crisis <sub>d</sub>				9.630 (6.788)	-1.375 (3.188)	0.405 (4.198)
Size <sub>parent</sub> x Crisis <sub>d</sub>				0.096 (0.106)	-0.017 (0.111)	-0.098 (0.096)
GDP growth	1.179 <sup>***</sup> (0.353)	1.004 <sup>***</sup> (0.314)	0.866 <sup>**</sup> (0.347)	1.140 <sup>***</sup> (0.319)	1.062 <sup>***</sup> (0.314)	0.836 <sup>**</sup> (0.342)
Inflation	-1.265 <sup>***</sup> (0.364)	-1.057 <sup>***</sup> (0.316)	-1.278 <sup>***</sup> (0.336)	-1.291 <sup>***</sup> (0.362)	-1.062 <sup>***</sup> (0.316)	-1.279 <sup>***</sup> (0.338)
Constant	0.631 <sup>***</sup> (0.151)	0.261 <sup>*</sup> (0.142)	0.201 <sup>***</sup> (0.074)	0.637 <sup>***</sup> (0.156)	0.265 <sup>*</sup> (0.143)	0.200 <sup>**</sup> (0.081)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	No	Yes	Yes	No	Yes	Yes
Obs.	1092	1092	1092	1092	1092	1092
R <sup>2</sup> <sub>overall</sub>	0.398	0.489		0.388	0.490	
R <sup>2</sup> <sub>between</sub>	0.286	0.610		0.226	0.620	
R <sup>2</sup> <sub>within</sub>	0.461	0.43		0.464	0.436	
Hausman	0.000				0.000	
AR2			0.493			0.518
Hansen J			0.399			0.454

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.

Table 6

Determinants of government and foreign bank lending during global financial crisis

	FE	RE	GMM	FE	RE	GMM	FE	RE	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta$ Loans	-0.004 (0.020)	0.034 (0.022)	0.116*** (0.026)	-0.010 (0.020)	0.031 (0.022)	0.114*** (0.026)	-0.010 (0.020)	0.031 (0.022)	0.113*** (0.025)
$\Delta$ Deposit	0.433*** (0.034)	0.447*** (0.028)	0.428*** (0.037)	0.428*** (0.034)	0.445*** (0.028)	0.427*** (0.037)	0.428*** (0.034)	0.445*** (0.028)	0.426*** (0.037)
Liquidity	-0.327*** (0.101)	-0.219*** (0.070)	-0.286*** (0.076)	-0.326*** (0.102)	-0.214*** (0.070)	-0.280*** (0.077)	-0.330*** (0.102)	-0.216*** (0.069)	-0.285*** (0.076)
Profitability	2.333*** (0.427)	2.202*** (0.368)	1.540*** (0.337)	2.360*** (0.429)	2.188*** (0.371)	1.526*** (0.339)	2.357*** (0.430)	2.175*** (0.370)	1.520*** (0.340)
Solvency	-0.044 (0.160)	-0.140 (0.142)	-0.139 (0.102)	-0.083 (0.159)	-0.131 (0.143)	-0.129 (0.106)	-0.068 (0.164)	-0.142 (0.142)	-0.144 (0.105)
Size	-0.430 (0.323)	-0.210 (0.134)	-0.045 (0.097)	-0.393 (0.297)	-0.216 (0.138)	-0.055 (0.098)	-0.368 (0.289)	-0.201 (0.138)	-0.040 (0.097)
Government				-0.034 (0.037)	-0.005 (0.028)	0.001 (0.021)	-0.030 (0.038)	-0.012 (0.029)	-0.010 (0.022)
Foreign				0.072** (0.035)	0.037* (0.021)	0.021 (0.016)	0.085** (0.037)	0.048** (0.023)	0.032* (0.018)
Crisis <sub>g</sub>	-0.065 (0.050)	0.011 (0.056)	-0.095** (0.045)	-0.116** (0.054)	-0.079 (0.050)	-0.094** (0.045)	-0.084 (0.055)	-0.059 (0.052)	-0.063 (0.048)
Government x Crisis <sub>g</sub>							0.109 (0.071)	0.126** (0.059)	0.139*** (0.053)
Foreign x Crisis <sub>g</sub>							-0.073*** (0.028)	-0.061** (0.027)	-0.067** (0.027)
GDP growth	1.424***	1.313***	1.102***	1.444***	1.330***	1.112***	1.440***	1.321***	1.103***

Inflation	(0.230) -0.191***	(0.252) -0.179***	(0.257) -0.183***	(0.229) -0.186***	(0.253) -0.177***	(0.258) -0.182***	(0.223) -0.187***	(0.253) -0.177***	(0.253) -0.182***
Constant	(0.036) 0.146**	(0.025) 0.151**	(0.021) 0.236***	(0.035) 0.154**	(0.025) 0.147**	(0.021) 0.221***	(0.035) 0.149**	(0.025) 0.150**	(0.021) 0.218***
Year dummy	(0.058) Yes	(0.067) Yes	(0.041) Yes	(0.061) Yes	(0.068) Yes	(0.044) Yes	(0.062) Yes	(0.068) Yes	(0.045) Yes
Country dummy	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Obs.	2387	2387	2387	2387	2387	2387	2387	2387	2387
R <sup>2</sup> <sub>overall</sub>	0.366	0.386		0.359	0.387		0.363	0.390	
R <sup>2</sup> <sub>between</sub>	0.347	0.406		0.319	0.396		0.320	0.397	
R <sup>2</sup> <sub>within</sub>	0.353	0.350		0.359	0.352		0.360	0.356	
Hausman	0.000			0.000			0.000		
AR2			0.111			0.113			0.114
Hansen J			0.166			0.174			0.207

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.



Table 7

## Determinants of foreign bank subsidiaries lending during global financial crisis

	FE (1)	RE (2)	GMM (3)	FE (4)	RE (5)	GMM (6)
$\Delta$ Loans	-0.057 <sup>*</sup> (0.030)	0.067 <sup>**</sup> (0.034)	0.072 <sup>**</sup> (0.036)	-0.058 <sup>*</sup> (0.030)	0.067 <sup>**</sup> (0.034)	0.071 <sup>*</sup> (0.036)
$\Delta$ Deposit	0.490 <sup>***</sup> (0.044)	0.523 <sup>***</sup> (0.038)	0.479 <sup>***</sup> (0.049)	0.489 <sup>***</sup> (0.044)	0.523 <sup>***</sup> (0.038)	0.478 <sup>***</sup> (0.049)
Liquidity	-0.341 <sup>**</sup> (0.138)	-0.032 (0.066)	-0.177 <sup>**</sup> (0.086)	-0.342 <sup>**</sup> (0.138)	-0.033 (0.066)	-0.176 <sup>**</sup> (0.087)
Profitability	1.459 <sup>**</sup> (0.637)	0.822 (0.502)	0.683 (0.558)	1.506 <sup>**</sup> (0.624)	0.819 (0.502)	0.689 (0.558)
Solvency	0.040 (0.364)	0.017 (0.234)	0.040 (0.211)	0.020 (0.364)	0.016 (0.234)	0.033 (0.212)
Size	0.394 (0.398)	-0.126 (0.147)	0.059 (0.145)	0.383 (0.399)	-0.127 (0.147)	0.055 (0.144)
Crisis <sub>g</sub>	-0.469 <sup>***</sup> (0.126)	-0.306 <sup>***</sup> (0.110)	-0.161 <sup>***</sup> (0.058)	-0.443 <sup>***</sup> (0.158)	-0.319 <sup>**</sup> (0.134)	-0.213 <sup>*</sup> (0.115)
Profitability <sub>parent</sub>	-2.340 <sup>*</sup> (1.207)	-0.452 (0.645)	-0.814 (0.812)	-2.199 (1.358)	-0.757 (0.939)	-1.197 (1.225)
Solvency <sub>parent</sub>	4.813 <sup>*</sup> (2.563)	2.231 (1.818)	3.949 <sup>*</sup> (2.198)	5.655 <sup>*</sup> (3.144)	4.211 (2.829)	5.856 <sup>*</sup> (3.300)
Size <sub>parent</sub>	0.037 (0.104)	-0.025 (0.038)	-0.040 (0.047)	0.028 (0.107)	-0.027 (0.044)	-0.048 (0.055)
Profitability <sub>parent</sub> x Crisis <sub>g</sub>				-0.491 (1.658)	0.315 (1.184)	0.764 (1.390)
Solvency <sub>parent</sub> x Crisis <sub>g</sub>				-2.222 (4.108)	-4.136 (3.278)	-4.254 (3.711)
Size <sub>parent</sub> x Crisis <sub>g</sub>				0.018 (0.094)	0.007 (0.072)	0.038 (0.084)
GDP growth	1.032 <sup>***</sup> (0.345)	0.810 <sup>***</sup> (0.299)	0.758 <sup>**</sup> (0.326)	0.980 <sup>***</sup> (0.308)	0.783 <sup>***</sup> (0.278)	0.741 <sup>**</sup> (0.313)
Inflation	-1.283 <sup>***</sup> (0.362)	-1.082 <sup>***</sup> (0.316)	-1.320 <sup>***</sup> (0.333)	-1.309 <sup>***</sup> (0.364)	-1.101 <sup>***</sup> (0.318)	-1.331 <sup>***</sup> (0.334)
Constant	0.664 <sup>***</sup> (0.148)	0.475 <sup>***</sup> (0.125)	0.366 <sup>***</sup> (0.079)	0.664 <sup>***</sup> (0.149)	0.484 <sup>***</sup> (0.127)	0.379 <sup>***</sup> (0.090)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	No	Yes	Yes	No	Yes	Yes
Obs.	1092	1092	1092	1092	1092	1092
R <sup>2</sup> <sub>overall</sub>	0.394	0.488		0.395	0.490	
R <sup>2</sup> <sub>between</sub>	0.270	0.603		0.273	0.614	
R <sup>2</sup> <sub>within</sub>	0.460	0.436		0.461	0.437	
Hausman	0.000			0.000		
AR2			0.544			0.526
Hansen J			0.406			0.429

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.

Table 8

Determinants of government and foreign bank lending during a domestic and global banking crisis

	FE	RE	GMM	FE	RE	GMM	FE	RE	GMM
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$\Delta$ Loans	-0.004 (0.020)	0.034 (0.022)	0.115*** (0.026)	-0.010 (0.020)	0.030 (0.022)	0.113*** (0.026)	-0.011 (0.020)	0.031 (0.022)	0.113*** (0.026)
$\Delta$ Deposit	0.432*** (0.034)	0.446*** (0.028)	0.428*** (0.036)	0.427*** (0.034)	0.444*** (0.028)	0.427*** (0.036)	0.427*** (0.034)	0.444*** (0.028)	0.427*** (0.037)
Liquidity	-0.324*** (0.101)	-0.217*** (0.069)	-0.286*** (0.075)	-0.324*** (0.102)	-0.212*** (0.069)	-0.280*** (0.076)	-0.324*** (0.102)	-0.209*** (0.069)	-0.278*** (0.076)
Profitability	2.329*** (0.427)	2.188*** (0.366)	1.536*** (0.337)	2.357*** (0.429)	2.174*** (0.369)	1.522*** (0.339)	2.364*** (0.430)	2.172*** (0.369)	1.523*** (0.339)
Solvency	-0.046 (0.160)	-0.138 (0.142)	-0.137 (0.102)	-0.085 (0.159)	-0.129 (0.143)	-0.126 (0.106)	-0.087 (0.160)	-0.128 (0.143)	-0.125 (0.106)
Size	-0.441 (0.325)	-0.220* (0.133)	-0.049 (0.096)	-0.404 (0.298)	-0.226* (0.137)	-0.059 (0.098)	-0.411 (0.298)	-0.227* (0.137)	-0.058 (0.098)
Government				-0.034 (0.037)	-0.006 (0.028)	0.000 (0.021)	-0.032 (0.038)	-0.007 (0.028)	-0.002 (0.021)
Foreign				0.072** (0.036)	0.037* (0.021)	0.021 (0.016)	0.075** (0.036)	0.037* (0.022)	0.020 (0.017)
Crisis <sub>d,g</sub>	0.042 (0.032)	0.080** (0.035)	0.072** (0.030)	0.043 (0.032)	0.082** (0.035)	0.073** (0.030)	0.062* (0.036)	0.075* (0.042)	0.057* (0.033)
Government x Crisis <sub>d,g</sub>							0.069 (0.053)	0.097 (0.071)	0.101 (0.066)
Foreign x Crisis <sub>d,g</sub>							-0.050 (0.055)	0.000 (0.053)	0.014 (0.035)
GDP growth	1.519***	1.495***	1.242***	1.543***	1.518***	1.254***	1.530***	1.513***	1.250***

Inflation	(0.235) -0.190***	(0.277) -0.177***	(0.278) -0.182***	(0.234) -0.186***	(0.277) -0.175***	(0.278) -0.181***	(0.231) -0.186***	(0.277) -0.175***	(0.278) -0.181***
Constant	(0.036) 0.141**	(0.025) 0.142**	(0.021) 0.137***	(0.035) 0.109**	(0.025) 0.138**	(0.021) 0.123***	(0.035) 0.106**	(0.025) 0.138**	(0.021) 0.123***
Year dummy	(0.058) Yes	(0.067) Yes	(0.035) Yes	(0.047) Yes	(0.068) Yes	(0.037) Yes	(0.047) Yes	(0.068) Yes	(0.038) Yes
Country dummy	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Obs.	2387	2387	2387	2387	2387	2387	2387	2387	2387
R <sup>2</sup> <sub>overall</sub>	0.367	0.387		0.360	0.388		0.360	0.389	
R <sup>2</sup> <sub>between</sub>	0.349	0.412		0.321	0.403		0.320	0.403	
R <sup>2</sup> <sub>within</sub>	0.353	0.350		0.357	0.352		0.357	0.352	
Hausman	0.000			0.000			0.000		
AR2			0.106			0.107			0.108
Hansen J			0.140			0.146			0.146

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.

Table 9

Determinants of foreign bank subsidiaries lending during domestic and global banking crisis

	FE (1)	RE (2)	GMM (3)	FE (4)	RE (5)	GMM (6)
$\Delta$ Loans	-0.057* (0.030)	0.067** (0.034)	0.071* (0.036)	-0.055* (0.030)	0.065* (0.034)	0.070* (0.036)
$\Delta$ Deposit	0.490*** (0.044)	0.523*** (0.038)	0.479*** (0.049)	0.493*** (0.044)	0.522*** (0.038)	0.478*** (0.049)
Liquidity	-0.340** (0.136)	-0.037 (0.065)	-0.180** (0.085)	-0.362*** (0.135)	-0.045 (0.067)	-0.188** (0.084)
Profitability	1.457** (0.636)	0.812 (0.500)	0.693 (0.556)	1.338** (0.665)	0.803 (0.502)	0.683 (0.559)
Solvency	0.049 (0.363)	0.028 (0.233)	0.046 (0.211)	0.066 (0.357)	0.034 (0.234)	0.048 (0.213)
Size	0.392 (0.400)	-0.124 (0.146)	0.058 (0.144)	0.395 (0.396)	-0.120 (0.146)	0.067 (0.144)
Crisis <sub>d,g</sub>	0.034 (0.056)	0.086 (0.052)	0.046 (0.043)	0.420 (0.298)	0.248** (0.114)	0.307* (0.178)
Profitability <sub>parent</sub>	-2.345* (1.206)	-0.508 (0.643)	-0.826 (0.814)	-2.044 (1.259)	-0.615 (0.726)	-0.764 (0.980)
Solvency <sub>parent</sub>	4.772* (2.569)	2.366 (1.777)	3.944* (2.183)	3.498 (2.355)	2.805 (2.025)	3.802 (2.468)
Size <sub>parent</sub>	0.039 (0.104)	-0.021 (0.038)	-0.038 (0.046)	0.043 (0.105)	-0.013 (0.039)	-0.025 (0.047)
Profitability <sub>parent</sub> x Crisis <sub>d,g</sub>				-5.417 (3.930)	-1.045 (1.516)	-1.910 (1.807)
Solvency <sub>parent</sub> x Crisis <sub>d,g</sub>				17.984 (11.527)	-1.456 (3.554)	0.662 (5.309)
Size <sub>parent</sub> x Crisis <sub>d,g</sub>				-0.226 (0.257)	-0.275* (0.145)	-0.385** (0.184)
GDP growth	-1.284*** (0.363)	-1.086*** (0.316)	-1.318*** (0.333)	-1.358*** (0.360)	-1.088*** (0.315)	-1.321*** (0.331)
Inflation	0.034 (0.056)	0.086 (0.052)	0.046 (0.043)	0.420 (0.298)	0.248** (0.114)	0.307* (0.178)
Constant	0.659*** (0.147)	0.267* (0.143)	0.202*** (0.074)	0.670*** (0.148)	0.274* (0.144)	0.191** (0.081)
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	No	Yes	Yes	No	Yes	Yes
Obs.	1092	1092	1092	1092	1092	1092
R <sup>2</sup> <sub>overall</sub>	0.395	0.489		0.373	0.490	
R <sup>2</sup> <sub>between</sub>	0.276	0.612		0.173	0.621	
R <sup>2</sup> <sub>within</sub>	0.460	0.436		0.465	0.436	
Hausman	0.000			0.000		
AR2			0.531			0.550
Hansen J			0.394			0.420

Robust standard errors are in parentheses and \*\*\*, \*\*, \* correspond to the 1%, 5%, and 10% level of significance, respectively.