

# The Drivers of Foreign Bank Lending in Central and Eastern Europe:

## The Roles of Parent, Subsidiary and Host Market Traits

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*July 2015*

**Abstract:** We examine the drivers of foreign banks' lending patterns in the Central and Eastern European (CEE) region over the past decade. We analyze the relative roles of subsidiary and parent banking group traits in driving foreign bank lending before and during the crisis. The analysis relies on a newly compiled bank-level dataset on Western European banking groups and their CEE subsidiaries, with annual frequency over the 2002-2013 period. We find strong evidence that a bank's non-performing loans ratio significantly lowers lending growth, a result which prevails through the crisis. There is a very strong and sizable positive relationship between the subsidiary's capitalization and lending activity during the crisis period. The subsidiary's parent's profitability encouraged subsidiary lending before the crisis, while lower liquidity of the parent hindered lending during the crisis. The host country's level of external debt acts as a significant deterrent of bank lending.

*Keywords:* Bank lending Flows; Foreign Banking; Financial Crises; Bank-level data; Cross-country analysis

*JEL Codes:* E44; F31; G21; G28

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## Section 1: Introduction

The goal of this paper is to examine the drivers of the lending patterns of foreign banks<sup>3</sup> in the Central and Eastern European (CEE) region over the past decade. The analysis relies on a newly compiled dataset that contains detailed balance sheet and financial performance information on Western European banking groups and their CEE subsidiaries, with annual frequency over the 2002-2013 period. Our main contributions are the parallel analysis of the relative roles of subsidiary and parent banking group traits in driving foreign bank lending, and the study of how these relationships have changed since the onset of the financial crisis relative to the pre-crisis period.

We examine five hypotheses related to the functioning of foreign banks in the CEE region. First, in line with recent policy initiatives we hypothesize that high non-performing loan ratios on banks' books significantly hinder lending activity. Indeed, we find strong evidence that a bank's non-performing loans (NPL) ratio forms a significant obstacle to lending growth, a result which prevails in the crisis period as well. Second, we examine the hypothesis that better capitalization provided substantial support to CEE subsidiaries in their lending activities after the onset of the crisis, while capital played a less important role before the crisis. We see a very strong and sizeable positive relationship between the subsidiary's capitalization and lending activity during the crisis period. This result is in line with Popov and Udell (2012)'s findings, but our study goes further in that we extend the analysis to lending to the whole non-financial sector and we examine a longer time horizon including the crisis years. Our third hypothesis is that the financial and real economic benefits that foreign banks can bring to emerging financial markets depend on the health and characteristics of the parent banking groups. Motivated by Popov and Udell (2012) and De Haas and Lelyveld (2010) who find that parent balance sheet effects can play an important role in subsidiary lending, we include a set of parent banking group characteristics as covariates. We find that the parent group's profitability (as measured by Return on Assets) encourages subsidiary lending before the crisis. Fourth, we study the hypothesis that parent (group) liquidity risk-taking enhances subsidiary lending leading up to the crisis, but such risk-taking in the pre-crisis period translates into reduced lending once the crisis hits. Indeed, we find that lower liquidity of the parent encouraged lending before the crisis, but hindered subsidiary lending during the crisis. These results are in line with Cetorelli and Goldberg (2011), who study U.S. banks' lending abroad to show that parent banks channel funds to and from subsidiaries via internal capital markets in accordance with their liquidity position. These

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<sup>3</sup> We refer to "foreign banks" as those banks with strategic foreign owners.

results are also consistent with the findings of Gianneti and Laeven (2012) and De Haas and Lelyveld (2006), who find that parent banks tend to withdraw funds from subsidiaries abroad during crisis times. Our paper adds to this literature by extending the analysis through 2013 to study the crisis effects on parent groups' role in subsidiary lending. Because most CEE countries were hit by the crisis over the 2008-2009 period, and experienced the crisis effects on lending from then on. Our newly compiled dataset also contains a broad set of bank performance indicators (i.e. profitability, funding risk, credit portfolio and capitalization) both for subsidiaries and their parent companies. Furthermore, our new dataset also allows us to better identify common regional patterns since it covers CEE countries whose banking systems are more homogenous in their evolution and structure than those in previous CEE-focused studies (e.g. Popov and Udell (2012) and De Haas and Lelyveld (2010)).

Our fifth and last hypothesis is that the collective commitment that parent banks made in the context of the Vienna Initiative not only stabilized the liquidity position of CEE subsidiaries (Banai et al. 2010), but also helped mitigate the crisis effect on their lending. To the contrary, we find a very strong and negative crisis effect on CEE lending. This result is in line with the finding of De Haas et al (2012), who show that the subsidiaries of foreign banks reduced their lending early and quickly after the crisis hit. Based on De Haas and Lelyveld (2014), the joint implication of the negative parent balance sheet effects and the quick reduction of subsidiary lending during the crisis is that the parent banks did not provide sufficient support to their CEE subsidiaries during the crisis, leading to a substantial overall reduction in lending activity in these host markets.

### A brief overview of CEE banking

The evolution of banking in the examined countries showed similar characteristics in the aftermath of the collapse of the Soviet Union (the "transition"). In the 1990s, all Central and Eastern European (CEE) countries went through a severe banking crisis (or in some cases two crises) that was in part caused by the legacy of the former economic system, in part by the lack of banking knowledge and in some cases, fraud.

After the worst of the banking crisis was over, CEE countries had to rely on strategic foreign investors to stabilize the banking market. The influx of these foreign investors was important not only because internal savings were relatively low after the transition of the early 1990s, but also because professional experience in banking was essential for long term stability. Some countries, such as Hungary and Estonia, experienced banking crises as early as the 1992-1993 period and saw the influx of foreign banks by the mid-1990s. In others countries, such as Poland, the Czech Republic, Slovakia, Romania and Bulgaria, the government had to resolve significant structural economic problems before the foreign banks became prevalent at the end of the

1990s. In Latvia and Lithuania, lax bank regulation led to a quick build-up of banking, and then pursuant severe banking crises, in the mid-1990s – leading to the sustainable consolidation of the banking system by the end of the decade. In Serbia and Croatia, due to substantial structural and political problems in the 1990s, the evolution of the banking sector into its modern form (characterized by the dominance of foreign banks) did not conclude until the early 2000s. The list of countries and banks covered in the analysis is included in Appendix A. Appendix B contains a detailed discussion of the historical evolution of banking in the CEE countries.

### Some important features of current-day banking in the CEE region

The analysis in this paper builds on three important features of banking in the CEE region. First, we study bank lending because the banking sector is of fundamental importance in financing economic activity in the CEE region. Countries in the CEE region are characterized by under-developed capital markets, which implies that investors and firms can only have access to external funding through the banking system. Studying the aggregate balance sheet of the corporate sector reveals similar features in all CEE countries: equity and bank loans cover almost the entire liability side, while the role of securities is marginal. The strong prevalence of bank financing holds up in the cross-section and over time as well: only one to five percent of liabilities comes from capital markets (Table 2). Moreover, the limited amount of funds from capital markets generally go to the largest companies.<sup>4</sup>

Second, we focus exclusively on the lending activity of the subsidiaries of foreign banking groups, as these foreign banks overwhelmingly dominate the CEE financial markets. While the internationalization of banking has been a common phenomenon since the mid-1990s (Claessens and van Horen, 2014), the rapid pace of foreign bank entry and market build-up in the CEE region is particularly striking. As briefly discussed above and in Appendix B in detail, the evolution of the banking systems in the CEE region followed similar patterns across countries. Specifically, the consolidation and privatization processes in the aftermath of the collapse of the Soviet Union invariably led to the dominance of foreign banking groups. By the onset of the financial crisis in 2008, at least two-thirds of the total assets of these banking systems was in foreign ownership. In some cases this ratio reached above 90 percent. This ownership structure remained effectively unchanged throughout the crisis period. The ownership shares in 2011 are almost the same as those in 2008, as shown by Table 1.

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<sup>4</sup> Intra-company lending (an alternative to bank financing) is an option that is generally only available to bigger, foreign-owned companies.

Third, we rely on cross-country variation in bank-level lending to identify the primary drivers of bank lending. While fast growth of the stock of loans characterized most of the region until the end of 2008, starting with the onset of the real economic effects of the financial crisis in 2009 the CEE countries began to show very different patterns in bank lending activity. On the one hand, in countries such as Poland and Slovakia the growth of credit to the private sector continued (although at a much slower pace). On the other hand, in countries such as Hungary and Latvia the current size of the loan portfolio is far below its former peak in 2008 (Chart 1). The substantial cross-country differences depicted in Chart 1 can be surprising, as countries in the CEE region are generally considered homogenous by foreign investors. In this paper, we shed light on the importance of these cross-country differences by considering the relative roles of subsidiary, banking group and host country macro traits in driving foreign banks' lending in CEE.

The paper proceeds as follows. Section 2 presents the econometric framework and discusses the empirical strategy. Section 3 describes the data sources in detail. Section 4 discusses the results of the estimation. Section 5 concludes. All tables are compiled at the end of the text.

### Empirical Hypotheses

In our paper we focus on the following five hypotheses:

1. *High non-performing loan ratios (NPL) negatively affected the amount of lending in the CEE region.* A high NPL ratio on the bank's balance sheet implies substantial risks on the liquidity and solvency side as well. In addition to the potential losses, high NPLs necessitate additional funding and capital needs, which prohibit lending activity. Management of NPLs also complicates the allocation of resources (e.g. human resources) which makes operation more expensive. Finally, the presence of a high NPL generally translates into increased caution in bank behavior. . Due to these factors, the worsening of the portfolio quality can be a huge burden for the banking system and hinders lending activity. Based on prior crisis experiences, the reduction of NPL ratios in the CEE region became an important policy focus for supranational institutions. As part of the so-called Vienna Initiative, a joint working group was established by the EBRD, IMF, EC, EIB, World Bank and the ECB with a focus on managing high NPL ratios (Vienna Initiative, 2012). Due to the recently renewed policy relevance of high NPLs, we find it important to analyze their economic effects on lending activity.
2. *The capitalization of CEE subsidiaries has become substantially more important since the onset of the financial crisis.* Before the financial crisis, the capitalization of subsidiaries played an insignificant role in asserting the liquidity of subsidiaries, since parent funding guaranteed a certain capital position. After

the onset of the crisis, however, the relative role of local capital conditions became important rather than parent bank capitalization. Both the CEE region's and the parent banks' home countries' banking sectors suffered huge losses in the crisis, making internal capital accumulation impossible. In addition, both investors and regulators expected increasingly higher capital adequacy ratios (CAR). These factors also led parent banking groups to make significant adjustments, which might hinder them from providing capital for their subsidiaries to lend more actively.

3. *The balance sheet conditions of parent banks have an important role in shaping the activities of their CEE subsidiaries.* There is evidence that Western banks transfer banking know-how into less financially developed regions through their subsidiaries, and especially so during the evolution of the host country banking systems (Goldberg, 2007). Therefore, understanding the strength of the relationship between parent banks and their subsidiaries can also shed light on the extent of these positive externalities. We hypothesize that parent banks have an important effect in shaping the activities of subsidiaries in the CEE region. Some anecdotal evidence also suggest that parent banks have strong control of their subsidiaries, and their strategy is to focus on the banking group as a whole unit rather than on individual subsidiaries. These factors imply that parent group performance might have significant effects on subsidiary activities as well.
4. *Parent (group) liquidity risk-taking enhanced subsidiary lending leading up to the crisis, but such risk-taking in the pre-crisis period translated into reduced lending once the crisis hit.* During the Great Moderation, parent groups could easily get ample cheap funding for their expansion both in their home countries and in the CEE region. In this environment, it was possible for banks to grow faster by taking higher liquidity risk. However, these accumulated risks might have negatively affected the activity of bold risk takers during the crisis.
5. *The Vienna Initiative helped maintain the amount of lending in the CEE region, following parent banks' commitment not to withdraw funds.* The key goal of the joint program of several supranational institutions and the important market participants active in the CEE region was safeguarding the financial stability of emerging Europe. As a first step, banks committed to keep their exposure towards the region on a pre-crisis level. This support ensured the stable operation of foreign-owned banks in the region, and also helped to stabilize main financial markets (Banai et al., 2010). There has been limited work on whether this commitment was also sufficient for foreign-owned banks in the region to continue lending, and to support the real economy through their activities.

## Section 2: Econometric Specification

In our econometric specifications, the dependent variable of interest is the annual flow of lending, defined as the annual percentage change in the stock of lending for the given bank-country-year combination. Let  $L_{i,t}^j$  denote the exchange rate-adjusted volume of lending by bank  $j$  to country  $i$  at time  $t$  (where  $t$  denotes the year).<sup>5</sup> Then the dependent variable  $l_{i,t}^j$  is the annual *flow* of lending, defined as follows:

$$(1) \quad l_{i,t}^j = [\ln L_{i,t}^j - \ln L_{i,t-1}^j] * 100$$

Each year, banks convert the foreign currency (FX)-denominated loans into local currency units (LCU) at contemporaneous exchange rates, so that they can report total loan volumes in LCU's. Therefore, an important issue to tackle is the impact of exchange rate movements on the evolution of the stock of loan volumes over time. We adjust for exchange rate movements according to the following convention. First, using data on the share of FX loans in total loans, we calculate the volume of total lending that has been subject to exchange rate movements. Second, we convert this amount into 2013 LCU's using 2013 as the base year (i.e. with 2013 exchange rates, using an exchange rate deflator). This normalized stock of loans is what we call  $L$  in Equation (1) above.<sup>6</sup>

The basic empirical specification takes the following form:

$$(2) \quad l_{i,t}^j = \alpha_1 + \alpha_2 Y_{i,t-1}^j + \alpha_3 X_{i,t}^j + \varepsilon_{i,t}^j$$

In Equation (2),  $Y_{i,t-1}^j$  is the set of subsidiary balance sheet characteristics, containing the following variables: the *Loan to Deposit Ratio* is a lagged measure of the subsidiary's liquidity conditions, *Returns on Assets* is a lagged measure of the subsidiary's profitability, the *Leverage Ratio* is a lagged measure of capitalization, the *Non-performing Loans* is a lagged measure of portfolio quality and *Total Assets* is the log of the subsidiary's lagged total assets. The vector  $X^j$  contains the set of controls such as: a *Merger* dummy to indicate the subsidiary's M&A activity, and the *Crisis* indicator to capture the onset of the financial crisis. A set of bank, host and time fixed effects are included to control for demand-side conditions and changes.

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<sup>5</sup> Exchange rate adjustment is performed in order to control for currency valuation effects, and is done as follows. First, data on the share of CHF and EUR loans for bank  $j$  in country  $i$  are collected. Using this ratios, then the corresponding volumes of FX lending are calculated by multiplying these ratios with the total lending volumes  $L_j$ . Then these imputed FX volumes are converted back to CHF and EUR values at contemporaneous exchange rates, and re-evaluated at end-2013 exchange rates using an exchange rate deflator. This way, the resultant claim values are in real terms and free of exchange rate valuation effects.

<sup>6</sup> Exchange rate adjustment of nominal volumes is important because of the high prevalence of foreign currency-based lending in the CEE region during our sample. In the absence of such adjustments, exchange rate movements may distort the estimation results by causing substantial changes in the nominal value of the loan stock.

Equation (3) is an expanded version of the previous specification, now including a set of parent banking group balance sheet characteristics.

$$(3) \quad l_{i,t}^j = \beta_1 + \beta_2 Y_{i,t-1}^j + \beta_3 Y_{t-1}^{j,g} + \beta_4 X_{i,t}^{j,g} + \varepsilon_{i,t}^{j,g}$$

where in addition to the subsidiary characteristics, the set of variables in  $Y_{t-1}^{j,g}$  contain the parent banking group equivalents of the subsidiary traits described immediately above. The set of controls in  $X_{i,t}^{j,g}$  now contains banking group fixed effects and an indicator for parent M&A activity.

Our third specification adds a set of host country macro effects as well:

$$(4) \quad l_{i,t}^j = \gamma_1 + \gamma_2 Y_{i,t-1}^j + \gamma_3 Y_{t-1}^{j,g} + \gamma_4 X_{i,t}^{j,g} + \gamma_5 H_{i,t-1} + \varepsilon_{i,h,t}^{j,g}$$

where the set of host country macro controls includes: the lagged *Public Debt to GDP* ratio of the host country, the annual *GDP Growth* rate of the host country, the annual *CPI Inflation* rate, and the *Net External Debt to GDP* ratio.

Our last, and most complete, specification incorporates interactions between the subsidiary, parent banking group and host country covariates and the financial *Crisis* dummy<sup>7</sup>:

$$(5) \quad l_{i,t}^j = \delta_1 + C_t \times [\delta_2 Y_{i,t-1}^j + \delta_3 Y_{t-1}^{j,g} + \delta_4 X_{i,t}^{j,g} + \delta_5 H_{i,t-1}] + \varepsilon_{i,h,t}^c$$

In Equation (5),  $C_t$  is the financial crisis dummy variable. The goal of the empirical estimation below is to obtain estimates of the coefficient vectors ( $\alpha$ ;  $\beta$ ;  $\gamma$ ;  $\delta$ ).

### Section 3: Data Description

The subsidiary-specific balance sheet covariates in  $Y_i^j$  are defined as follows. The *Loan to Deposit Ratio* is defined as the stock of *Total Loans* divided by the stock of *Total Deposits*, times 100. *Returns on Assets* captures profitability, and is defined as *Net Returns over Total Assets*, times 100. The *Leverage Ratio* is included as a measure of capitalization, and is defined as *Total Equity* divided by *Total Assets*, times 100. The *Non-performing Loans* is each bank subsidiary's ratio of *Non-performing Loans* to *Total Loans*, times 100. The *Total Assets* variables is defined as the log of the lagged total assets of the subsidiary. Data for these bank-specific covariates are collected from Bankscope and annual reports from individual banks' websites.

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<sup>7</sup> The implication is that in this specification, the coefficients of the model's variables are estimated for the pre-crisis and the crisis periods separately and simultaneously.



The parent banking group-specific covariates in  $Y^{j,g}$  are defined as their subsidiary-level equivalents. Data for these bank-specific covariates are collected from Bankscope and annual reports from individual banks' websites.

The vector of host country macro traits  $H_i$  includes the following variables. *Long-term Bond Yield* is included as a measure of country risk.<sup>8</sup> The annual *GDP growth* rate, measured as the annual percentage change in real *Gross Domestic Product*, are standard measures of economic and financial activity, respectively. The annual *CPI Inflation* is the annual percent change in the host country's Consumer Price Index. *Public Debt to GDP* ratio measures the overall indebtedness of the public sector, and as such is an indicator of the degree of sovereign risk. Similarly, the *Net External Debt to GDP* ratio is a measure of the country's indebtedness to the rest of the world. Data on these macro variables are collected from the Economist Intelligence Unit's Country Data-base.

The controls in  $X^{j,g}$  are as follows. The variable *Merger* is defined to take on a value of 1 if the subsidiary has engaged in any M&A activity in the previous period, and 0 otherwise. This dummy variable is included to capture the balance sheet 'jump' that may result from such mergers. The group-level *Group Merger* variable is defined similarly. The *Crisis* dummy is included to capture the regime change that has characterized banking since the onset of the euro-wide financial crisis in 2009. As such, this indicator variable is defined to take on a value of 1 in years starting with 2009, and 0 for periods before then. Time, subsidiary, parent banking group and country-level fixed effects are also included in the analysis, as shown in the results tables at the end of the text. Robust standard errors are reported. Tables 3 through 5 describe the variables in detail. Table 3 gives detailed descriptions of the model's variables, Table 4 presents summary statistics, and Table 5 shows the correlation matrix of our variables.

#### **Section 4. Discussion of Estimation Results**

Tables 6 through 9 display the results of our estimations. Table 6 describes results of regressions that include bank (subsidiary-level) characteristics only (in addition to various sets of fixed effects). Table 7 describes the estimation results once banking group-specific variables are added to the regressions as well. Table 8 then expands Table 7's specifications by adding host country macro variables to the regressions. Lastly, Table 9 examines the financial crisis effects on bank lending by interacting each variable in the Table 8 specifications

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<sup>8</sup> We use the long-term bond yield instead of the CDS spread because CDS markets are characteristically under-developed in the CEE region – especially so during the first half of our sample period.

with the crisis dummy variable. The first three subsections of this section focus on the results in Tables 6 through 8, while the last subsection explores the role of the financial crisis (Table 9).

### The Role of Bank (Subsidiary-level) Characteristics

We can strongly confirm our hypothesis that the burden of a high non-performing loan portfolio significantly hinders lending. Among the set of bank (subsidiary-level) characteristics, the non-performing loan ratio (NPL) has the strongest explanatory power in all cases (consistently significant at the 1 percent level). In all specifications, NPL has a significant negative effect on lending activity. The impact of a one percentage point increase in the one-year lagged NPL ratio of the CEE subsidiary of a foreign bank ranges from a 0.869 percent decline (in column 2 of Table 7) to a 1.337 percent decline (in column 4 of Table 8) in annual loan growth. Given that the median annual loan growth rate is 11.78 percent and the average is 16.82 percent, these effects are economically significant. The findings are in line with our expectations. The NPL ratio contains wide spread information on the health of a bank. A high NPL ratio has consequences for the bank's profitability, capital position and liquidity position at the same time. In addition to these direct effects, high NPL ratios can also alter bank behavior by increasing banks' risk aversion and motivating more cautious lending policies. This indirect behavioral effect is another channel through which high NPL ratios may negatively impact lending. . From the onset of the crisis, many countries (not only in the CEE region) took steps to help banks decrease their NPL ratios, because they found that a high NPL is a big burden which hinders the recovery of lending.<sup>9</sup>

Total asset size (in logs) has a significant negative effect on lending in almost every specification. Focusing on the significant coefficients only, a one percent increase in lagged total assets translates into anywhere from 1.779 lower (in column 1 of Table 8) to as much as 22.228 percent lower (in column 4 of Table 7) annual lending growth. A probable reason for this finding is that a given nominal value of issued loans corresponds to a higher annual growth rate for smaller banks who have a lower base of loan stocks to grow from. Since in our sample we focus on the important foreign-owned banks of the region, we do not think that there are big differences between banks in terms of their market power. It is also important to keep in mind that our sample starts in 2002. In most cases the transition of the banking system had just concluded by 2002, which is when the fast growth of loan portfolios began. As a result, the early years in our sample are characterized by higher loan growth rates and smaller bank sizes.

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<sup>9</sup> For instance, the members of the Vienna Initiative formed a working group to solve the problems of NPL.

## The Role of Banking Group Characteristics

Given the importance of Western banks in transferring know-how into less financially developed regions, one of our hypotheses is that parent bank traits have an important effect in shaping the activities of subsidiaries in the CEE region. Therefore, we include a set of parent bank characteristics in this next stage of our analysis. Two group characteristics that have consistent significant effects in our analysis are the group NPL and the group loan-to-deposit (LDR) ratios. Focusing on the significant results only, the impact of a one percentage point increase in the NPL of the banking group ranges from 0.692 (column 3 of Table 7) to 0.917 (column 4 of Table 8) percentage point increases in lending flows. The comparable impact of the group LDR ratio, on the other hand, ranges from 0.106 (column 1 of Table 7) to 0.139 (column 1 of Table 8). Again, given that the median and mean annual growth rate of lending are 11.78 and 16.82, respectively, these effects are non-trivial. The positive signs on these variables imply that the lending capacity of the banking group does not have a limiting impact on their subsidiaries' activities. There are two possible explanations for this result. First, the NPL and the loan-to-deposit ratio contain information not only on the lending capacity or ability of the bank, but also on the bank's risk appetite. Higher initial NPL or loan-to-deposit ratios are the results of previous risk taking activities, which can also explain the higher pace of lending. The second explanation supplements the first one. The positive signs on the NPL and loan-to-deposit ratios might be driven by the first (pre-crisis) part of the sample. Indeed, Table 9 reveals that the size and significance of the group NPL and LDR effects vary across the crisis and non-crisis periods – a finding that is explored in more detail below. In particular, these results on the role of the group LDR confirm our hypothesis that parent (group) liquidity risk-taking enhanced subsidiary lending leading up to the crisis, but such risk-taking in the pre-crisis period translated into reduced lending once the crisis hit.

## The Role of Host Country (Macro) Characteristics

One of our testable hypotheses is that the Vienna Initiative helped maintain the amount of lending in the CEE region, following the Western banking groups' commitment not to withdraw funds from the CEE region. However, we find that the strongest and most consistent result in our extended specification is that the financial crisis had a significant negative level effect on bank lending even after we control for all other important subsidiary, parent and macro characteristics. These findings are consistent with the onset of a crisis-induced regime change in bank behavior that previous literature has pointed to (Giannetti and Laeven, 2012; Temesvary, 2014). The crisis effects are consistently significant at the 1 percent level, with magnitudes ranging from -11.822 (column 4 of Table 6) to -22.225 (in column 3 of Table 8). Since the median and mean annual

loan growth rates are 11.78 percent and 16.82 percent, respectively, these crisis effects are economically significant. Even though there were substantial cross-country differences in the post-crisis lending trends in our sample, an important common feature is that the post-crisis growth of lending could not reach the level which characterized these countries before the onset of the crisis. Our results on the quick and substantial reduction in the lending of foreign subsidiaries during the crisis is in line with the results of De Haas et al (2012). Based on De Haas and Lelyveld (2014), the joint implication of the strong crisis effect result and the negative impact of parent liquidity conditions is that parent banks did not help their subsidiaries withstand the crisis in their host markets. This result motivates us to further study the effects of the financial crisis, as discussed below.

Interestingly, the country characteristics which show up most significantly in our specifications in Table 8 are those that pertain to the host country's level of debt. Three explanatory variables are significant: the long-term bond yield, the net external debt and the public debt levels of the recipient countries. A one percentage point increase in the one-year lagged long-term bond yield of the foreign subsidiary's host country corresponds to a range of 1.440 to 1.762 decline in annual lending growth. A one percentage point increase in the lagged external debt to GDP ratio of the host country corresponds to 0.245 decline in lending growth, while a comparable increase in the public debt to GDP ratio increases lending by a range of 0.194 to 0.363 percent. A technical explanation for this result is that there is no substantial cross-country variation in this variable in the sample. Most of the countries in the region (with the exception of Hungary) have relatively low public debt. For this reason, the public debt to GDP ratio may not be important in the assessment of the riskiness of these recipient countries (again, with the exception of Hungary). Long-term bond yields and external debt to GDP, which are more descriptive of the riskiness of a country, both enter with significant negative signs. These two measures contain a broad set of information on the overall performance of the macro-economy of a recipient country. External debt, in particular, aggregates the indebtedness of various sectors of a country's economy, and as such it can serve as a more precise indicator of the potential funding problems of a country.

### The Role of the Financial Crisis

The financial crisis significantly affected the behavior of the banks and the macro-economies of the countries in our sample. Previous literature has established a significant crisis level effect on subsidiary lending (De Haas et al, 2012; De Haas and Lelyveld, 2014). However, there is evidence to suggest that not only did lending fall across the board, but the way in which bank traits affected lending behavior also changed during the crisis

(Temesvary, 2014). We contribute to the literature by incorporating an analysis of these “slope” effects, i.e. how the roles of parent and subsidiary characteristics in lending changed during the financial crisis. We do so by interacting the set of explanatory variables discussed above with the crisis dummy. The results are described in Table 9.

The subsidiary-specific non-performing loan ratio (NPL) remains significant in all the specifications. Irrespective of whether we focus on the crisis or non-crisis subsample, NPL has a consistent significant negative effect on lending activity. While in the non-crisis period, the impact of a one percentage point increase in NPL on lending growth ranged from -0.949 to -1.105, these effects declined somewhat in magnitude during the crisis, ranging from -0.608 to -1.116. These effects are economically significant. It is important to note that there is great variation in NPL across time periods, countries and banks. While the crisis negatively affected the loan portfolio across the board, in some countries the NPL ratio had returned to pre-crisis levels by the end of our sample (e.g. in Slovakia or the Czech Republic it is around 4 percent) while in others it is still very high (e.g. in Hungary it is close to 20 percent). Depending on the business model of banks, the NPL ratio can differ significantly within the same country as well (e.g. it is generally higher for banks with higher exposure to the construction sector). Lastly, the evolution of NPL also shows variation. Some banks started the new millennium with a clean portfolio, and significant worsening could be observed only from 2009. However, others still had a bad “legacy” of loans at the start of our sample period. The combined implication of these facts is that the strong and consistent significance of NPL can be attributed to structural characteristics, and does not result from some idiosyncratic feature of the sample.

As described above, we hypothesized that subsidiary capitalization played no role in the pre-crisis era, since parent funding guaranteed a certain capital position. After the onset of the crisis, however, the relative role of local capital conditions became important as opposed to parent bank capitalization. The solvency position of banks became a crucial issue at the onset of the crisis, and many regulatory actions were taken to strengthen banks’ capitalization. We are able to confirm this hypothesis on the changing role of subsidiary capitalization. Our results show that banks’ capital position has had a positive effect on lending since the onset of crisis (since 2009), while before the crisis the capital ratio (capital divided by total assets) had no significant effect on lending. A one percentage point increase in the lagged capital to asset ratio of subsidiaries corresponds to a 1.640 to 2.403 percent increase in annual lending growth in the post-2009 period. The implication is that better lending ability of banks translates into higher lending activity. This result is in line with the findings of Popov and Udell (2012), who show that banking clients have less access to loans when banks experience a decline in capital ratios.

It is interesting that the negative relationship between bank (asset) size and lending was more prevalent before the crisis. While the pre-crisis negative impact of asset size is strongly significant across the specifications, the post-crisis impact is significant in only two of the five specifications. This finding supports the idea that the significance of bank size may be driven by technical reasons. A given nominal value of issued loans corresponds to a higher yearly percentage change for smaller banks who have a smaller loan base to begin with. Since the bank privatization process had just ended by the start of the new millennium, many banks began with a relatively low asset size at the start of our sample before they went through a period of high growth. In summary, the strong effects of bank-specific variables on lending suggest that supply-side factors play an important role in lending dynamics.

Looking at the role of banking group traits, Table 9 reveals that the Loan to deposit ratio (LDR) is significant in most specifications, albeit with some variation. In some of the regressions, LDR has a significant positive effect on lending in the pre-crisis period only – with marginal effects ranging from 0.151 to 0.180. A potential interpretation is that banking groups which took higher liquidity risks in the pre-crisis period lent more through their subsidiaries as well. In other specifications, the LDR has a significant negative effect on lending during the crisis period – with marginal effects ranging from -0.058 to -0.067. The implication is that the worsening of a given banking group's funding position significantly reduced the lending activity of its subsidiaries as well. These results are in line with our expectations. Higher risk-taking by banking groups before the crisis negatively affected their foreign subsidiaries in the crisis. Our results on the negative impact of parent liquidity shocks on subsidiary lending are in line with most previous papers (Popov and Udell, 2012; Cetorelli and Goldberg, 2011; De Haas and Lelyveld, 2006, 2010, 2014; Giannetti and Laeven, 2012).

The Return on Assets ratio (ROA) of banking groups enters the regressions with a significant and positive sign in the pre-crisis period, with magnitudes ranging from 14.936 to 18.455. These effects are economically and statistically highly significant. There are two potential explanations for this result. First, in normal (non-crisis) times, higher returns widen the room for a greater scale and scope of activities. During the crisis, however, other considerations came to the forefront. Banks' decision makers became substantially more risk-averse during the crisis, and in many cases their ability to lend worsened significantly. A second possible explanation pertains to the risk-taking behavior of bank managers. To the extent that there were big cross-sectional differences in managers' risk-taking and hence banks' ROA before the crisis, our result simply reflects the fact that banks with more risk-tolerant managers issued more loans during that time. The higher risk taking explanation is also supported by the result that banking group NPL had a positive effect on lending before the crisis in two out of the five specifications.

Lastly, our results indicate that country characteristics were not important in shaping the lending activity of foreign-owned banks in the pre-crisis period. A country's Net External Debt to GDP ratio is the only macro characteristic that enters with a significant effect in our Table 9 specifications. This variable had a significant negative effect on lending, but only during the crisis period – with marginal effects ranging in magnitude from -0.268 to -0.328. There are two potential explanations for the finding that external indebtedness of host countries has had a negative effect on the evolution of bank lending since the onset of the crisis. First, countries with high levels of external debt found balance sheet adjustments inevitable. Second, if the banking groups in our sample decided to shift their focus to countries with lower external imbalances, the significant result on this variable could be capturing the unobservable country traits that caused banks' cross-sectional shift of focus.

### Robustness checks

*Newey-West standard errors.* We also estimated each regression using the Newey-West autocorrelation-corrected robust standard errors, with one-year lags. The results obtained with and without explicit auto-correlation correction are very similar. Both the significance levels and the signs are the same for our key explanatory variables. Auto-correlation does not appear to be a pervasive problem in our estimates, as would also be suggested by the first-differenced nature of our variables.

*Arellano – Bond dynamic panel estimation.* Although we don't find potential auto-correlation problematic, as a robustness check some of our models are estimated with Arellano – Bond method as well. The results are generally in line with the results obtained from the comparable specifications estimated using the panel methods described above.

### Policy conclusions

Our findings have several policy implications. First, our finding that high NPL ratios significantly hinder lending suggests that the acceleration of the cleaning up of bank balance sheets is essential in countries with portfolio quality problems. This is particularly important since economic recovery is more fragile and takes longer in the absence of a well-functioning banking system. The Vienna Initiative (2012) provides a broad summary on potential tools to help in the clean-up of impaired portfolios. Their main recommendations are based on the current regulatory environment of the region. They suggest steps like removing tax impediments, enhancing personal insolvency laws and removing regulatory obstacles like restrictions on the repossession of collateral. In addition to these passive measures, active intervention (such as the establishment of asset management companies) may have faster and more significant effects.<sup>10</sup>

Second, our findings that parent group traits have a significant role in their subsidiaries' lending activity, and that this role has changed during the financial crisis, have policy relevance as well. An implication of our finding that higher risk

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<sup>10</sup> However, in many cases such companies merely act as transfers from tax payers to bond holders, as pointed out by Stiglitz (2009).

taking by parent banking groups ahead of a crisis may lead to greater declines in the lending of their subsidiaries during the crisis suggests that parent bank information should be included in the calculation of optimal loan-to-GDP ratios. This implication is particularly important given that the implementation of a countercyclical capital buffer (BCBS 2010) is one of the most important topics in bank regulation for several years to come. The main methodological support for the usage of this regulation will be the loan-to-GDP gap. Our finding suggests that policy-makers should consider including some parent group information in their calculation of the loan-to-GDP gap in countries where foreign banks play a dominant role.

Finally, in light of our evidence of the significant role of parent groups in the lending dynamics of their subsidiaries, closer cooperation between the supervisory authorities of the parent banks' and subsidiaries' countries is essential. Although the establishment of the Single Supervisory Mechanism of the European Union represents a move away from country-level supervision, it is still not clear how host countries' interests will be represented in the supervisory decisions regarding banking groups active in the CEE region. The active involvement of host country decision makers should become an important part of the supervisory process.

## **Section 5: Summary and Conclusion**

In this paper we studied the determinants of the lending trends of foreign banks in the Central and Eastern European (CEE) region since the early 2000s. Our analysis has utilized a newly compiled dataset that contains detailed balance sheet and income data on Western European banking groups and their CEE subsidiaries, with annual frequency over the 2002-2013 period. Using this dataset, we have been able to identify the relative importance of the subsidiaries' and their parent banking groups' balance sheet traits, as well as the macro characteristics of the host countries, in shaping the trends of foreign bank lending in the CEE region.

Our paper contributes to the existing literature in two ways. First, using our unique dataset we are able to simultaneously examine the role of parent banking group traits and subsidiary characteristics in driving CEE lending growth. We show that both are important: the efficiency, liquidity and profitability conditions of both the subsidiary and its parent banking group have strong effects on lending growth. Second, we examine how the onset of the financial crisis has affected the relationship between bank traits and lending. This feature goes beyond the existing literature that has identified only a level effect of the crisis on lending. Indeed, we find substantial differences in how subsidiary and banking group traits affect CEE lending after the onset of the crisis relative to the pre-crisis period. For instance, we find that it is only after the crisis hits that the liquidity problems of parent banks have negative impacts on subsidiaries, and that strongly capitalized subsidiaries lend more. These patterns are not present in the pre-crisis period. Overall, our results support the conclusion of the previous literature that parent banks with relatively bad funding positions did not support the lending activity



of their subsidiaries during the crisis period, which resulted in a substantial decline of foreign bank lending in the CEE region (De Haas and Lelyveld, 2014).

We can draw three important policy conclusions from our results. First, the purging of bank balance sheets of non-performing loans through regulatory and policy intervention is an essential step towards resuming normal lending activity. Second, the implication of our result that parent group characteristics play an important role in their subsidiaries' lending dynamics is that these traits should be included in the calculation of optimal loan-to-GDP gaps. Third, this special role of parent group traits in host country lending also highlights the importance of closer cooperation between the countries of parent banks and their foreign subsidiaries.

Some important extensions remain, pending data availability. First, it would be instructive to examine the trends studied in this paper using higher frequency (quarterly, or monthly) data on bank balance sheet conditions and lending. The gain in time-series variation (which would be particularly valuable in the crisis analysis) may reveal some additional important features. Second, it would be very interesting to carry out the same analysis using data on parent banking groups and their subsidiaries from other regions of the world as well. Comparing the behavior of foreign banks across regions (for instance, that of Western European banks in the CEE region with the behavior of U.S. bank subsidiaries in the Latin American countries) would make for some very instructive and important comparative analysis from a policy-making perspective.

**Acknowledgements:** The authors would like to thank Iman van Lelyveld, Peter Csoka, Julia Kiraly, Zsuzsanna Hosszu, Bence Mero, the participants of the Monetary Policy Workshop of the Istanbul School of Central Banking at Izmir and colleagues at the Departments of Economics at Hamilton College and Cornell University, as well as at the Financial System Analysis Directorate of the Magyar Nemzeti Bank for useful comments and suggestions.

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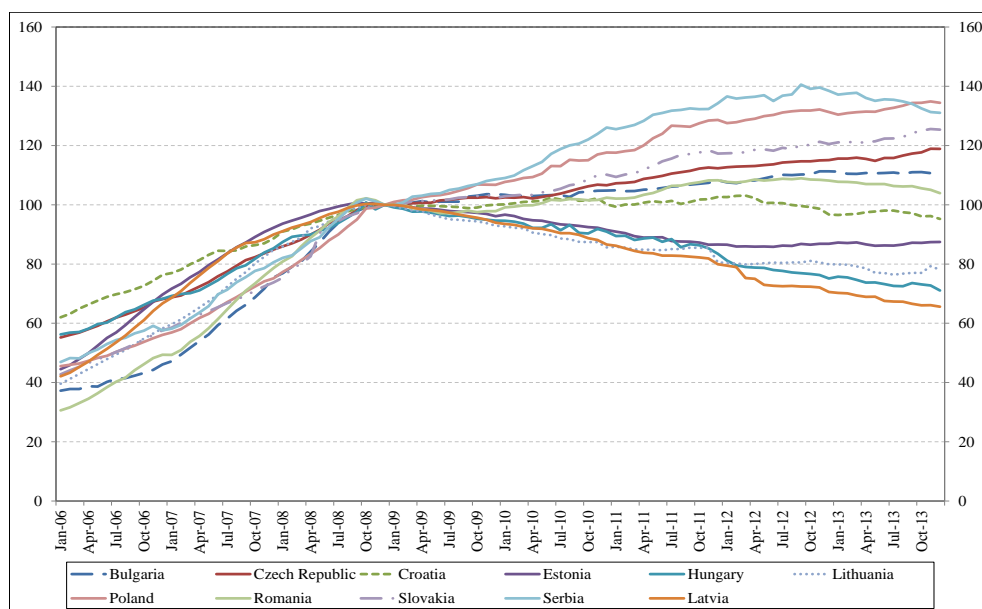
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## Figures

Figure 1: Lending dynamics in the CEE region (31 December 2008 = 100, exchange rate adjusted)



## Tables

Table 1: Proportion of foreign-owned banks in each banking systems based on total assets (%)

	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Croatia	Poland	Romania	Slovak Republic	Serbia
2008	80	84	99	67	66	93	90	72	89	92	73
2011	77	83	94	66	65	90	91	69	82	92	74

Source: World Bank, IMF (2013), MNB, NBS

Table 2: Proportion of securities issued on the liability side of the corporate sector in CEE countries (%)

	Bulgaria	Czech Republic	Croatia	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovakia	Serbia
2012	N/A	4.11	3.71	2.48	1.19	0.14	0.07	2.90	0.07	0.53	N/A
Average of 2002-2013	N/A	2.63	2.18	1.77	0.78	0.40	0.21	2.32	5.50	1.24	N/A

Source: national central banks

Table 3: Description of Variables and Data Sources.

VARIABLE NAME	DESCRIPTION	DATA SOURCES
<i>Subsidiary Characteristics</i>		
Annual Lending Flows	Annual Percentage Change in Subsidiary's Stock of Loans	
Leverage Ratio	Subsidiary's Total Capital to Total Assets ratio	
Loan to Deposit Ratio	Subsidiary's Total Loans to Total Deposits ratio	Bankscope and Central Bank Websites
Non-performing Loans Ratio	Subsidiary's Non-performing Loans to Total Loans ratio	
Return on Assets	Subsidiary's Return on Assets, lagged on year	
Total Assets, logs	Subsidiary's Total Assets, log of	
<i>Group Characteristics</i>		
Group Leverage Ratio	Parent group's Total Capital to Total Assets ratio	
Group Loan to Deposit Ratio	Parent Group's Total Loans to Total Deposits ratio	
Group Non-performing Loans Ratio	Parent Group's Non-performing Loans to Total Loans ratio	Bankscope and Central Bank Websites
Group Return on Assets	Host Country's Public Debt to GDP ratio	
Group Total Assets, logs	Parent Group's Total Assets, log of	
<i>Country Characteristics</i>		
Public Debt to GDP Ratio	Host Country's Public Debt to GDP ratio	
Annual GDP Growth	Host Country's Annual GDP Growth rate	
Long-term Yield	Host Country's Long-term Bond Yield	Economist Intelligence Unit
Net External Debt to GDP	Host Country's Net External Debt to GDP ratio	
CPI Inflation	Host Country's Annual CPI Inflation	
Merger	Dummy variable to indicate merger activity of the subsidiary	Takes on value of 1 if merger occurs, 0 otherwise
Group Merger	Dummy variable to indicate merger activity of the Parent Group	Takes on value of 1 if group merger occurs, 0 otherwise
Crisis	Dummy variable to indicate onset of financial crisis	Takes on value of 1 starting in 2009, 0 otherwise

Table 4: Summary Statistics of Variables

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	min	p25	p50	p75	Max	mean	s.d.	N
Group Total Assets, logs	7.903	11.58	12.56	13.74	15.08	12.49	1.45	713
Year	2,002	2,005	2,008	2,011	2,013	2,008	3.45	816
Public Debt to GDP Ratio	3.650	26.72	36.44	48.20	82.16	38.04	17.96	780
CPI Inflation	-1.130	2.30	3.92	6.33	22.16	4.97	4.012	780
Annual GDP Growth	-17.70	1.10	3.94	5.72	10.99	3.13	4.40	780
Long-term Yield	2.110	4.45	5.32	6.910	14	5.76	1.99	577
Net External Debt to GDP	5.050	27.64	46.03	65	135.5	49.87	27.86	762
Group Loan to Deposit Ratio	61.79	108.80	131.0	159.8	468.8	145.7	56.73	768
Group Non-performing Loans Ratio	0.120	2.32	4.40	7.68	44.86	5.90	5.88	717
Group Return on Assets	-10.83	0.21	0.53	0.87	4.429	0.45	1.086	775
Total Assets, logs	4.607	8.07	9.45	10.91	13.85	9.58	1.87	707
Annual Lending Flows	-137.8	0.006	11.78	28.66	182.1	16.82	27.71	634
Crisis	0	0	0	1	1	0.42	0.49	816
Leverage Ratio	-2.476	7.45	9.69	12.60	35.20	10.79	4.87	699
Group Leverage Ratio	-3.774	4.00	5.46	6.77	13.95	5.43	2.14	774
Loan to Deposit Ratio	17.42	82.43	109.0	139.6	584.9	124.4	74.40	635
Non-performing Loans Ratio	0.0659	2.69	5.23	10.73	35.60	7.60	6.73	503
Return on Assets	-14.31	0.73	1.28	1.86	5.22	1.08	1.81	634
Merger	0	0	0	0	1	0.081	0.27	816
Group Merger	0	0	0	0	1	0.13	0.34	816

Table 5: Correlation Matrix

	Leverage Ratio	Loan to Deposit Ratio	Non-performing Loans	Return On Assets	Total Assets, logs	Group Leverage Ratio	Group Loan to Deposit Ratio	Group NPL Ratio	Group Return On Assets	Group Total Assets, logs	Public Debt to GDP Ratio	GDP Growth	Long-term Yield	Net External Debt to GDP	CPI Inflation	Merger	Group Merger	Crisis
Leverage Ratio	1																	
Loan to Deposit Ratio	-0.12	1																
Non-performing Loans Ratio	0.14	0.09	1															
Return on Assets	0.16	-0.31	-0.52	1														
Total Assets, logs	0.2	-0.26	0.04	0.12	1													
Group Leverage Ratio	0.07	-0.13	0	0.09	0	1												
Group Loan to Deposit Ratio	0.06	0.41	-0.01	-0.09	-0.09	-0.35	1											
Group Non-performing Loans Ratio	0.33	0	0.38	-0.07	0.17	0.02	0.12	1										
Group Return on Assets	-0.17	-0.12	-0.24	0.12	-0.11	0.52	-0.3	-0.48	1									
Group Total Assets, logs	-0.08	0.19	-0.09	0.02	0	-0.4	0.13	-0.23	-0.21	1								
Public Debt to GDP Ratio	-0.01	-0.14	0.3	-0.17	-0.05	0.12	-0.21	0.22	-0.07	-0.15	1							
GDP Growth	-0.11	-0.14	-0.37	0.31	-0.15	-0.14	-0.01	-0.34	0.25	-0.04	-0.27	1						
Long-term Yield	-0.12	0.29	0.27	-0.38	-0.25	0.04	0.09	0.08	-0.12	-0.02	0.32	-0.57	1					
Net External Debt to GDP	0	0.45	0.2	-0.21	-0.35	0.1	0.16	0.09	-0.1	0.26	0.22	-0.4	0.41	1				
CPI Inflation	0.28	0.09	-0.21	0.1	-0.12	-0.02	0.03	-0.09	0.1	-0.12	-0.02	0.33	0	-0.05	1			
Merger	0.14	0.06	0	0.04	0.07	0.17	-0.01	0.19	-0.08	0.25	0.03	-0.06	0.02	0.04	0.03	1		
Group Merger	0.16	-0.01	-0.03	0.06	0.06	0.21	-0.04	0.22	-0.08	0.3	0.09	-0.07	0	0.07	-0.03	0.76	1	
Crisis	0.21	0.19	0.33	-0.13	0.25	0.12	0.07	0.45	-0.36	0.18	0.16	-0.61	0.24	0.41	-0.31	0.16	0.14	1

Table 6: Impact of Subsidiary Characteristics on Annual Lending Flows across Subsidiaries' Host Countries

Annual Lending Flows (%)	(1)	(2)	(3)	(4)
<i>Subsidiary Traits</i>				
Leverage Ratio (t-1)	0.86 (0.22)***	0.37 (0.40)	0.41 (0.43)	0.28 (0.47)
Loan to Deposit Ratio (t-1)	-0.08 (0.01)***	-0.04 (0.02)**	-0.05 (0.03)	-0.01 (0.04)
Non-performing Loans Ratio (t-1)	-0.94 (0.14)***	-0.92 (0.14)***	-1.03 (0.14)***	-1.07 (0.15)***
Return on Assets (t-1)	-0.50 (0.78)	-0.12 (0.79)	-0.26 (0.69)	-0.28 (0.68)
Total Assets, logs (t-1)	-0.87 (0.61)	-5.08 (1.75)***	-7.33 (1.94)***	-18.19 (4.14)***
Merger	9.98 (4.36)**	0.33 (4.22)	9.37 (4.20)**	20.86 (8.29)**
Crisis	-21.60 (1.99)***	-18.54 (2.16)***	-16.85 (1.91)***	-11.82 (2.04)***
Constant	38.51 (9.15)***	74.81 (15.71)***	90.20 (18.41)***	218.37 (43.07)***
Group fixed effects	Yes	No	Yes	No
Host fixed effects	No	Yes	Yes	No
Subsidiary fixed effects	No	No	No	Yes
$R^2$	0.46	0.44	0.51	0.55
Observations	488	488	488	488

This table depicts the impact of subsidiary characteristics on subsidiaries' annual lending flows in their host countries. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and subsidiary and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.



Table 7: Impact of Subsidiary and Parent Banking Group Characteristics on Subsidiaries' Annual Lending Flows, across Subsidiaries' Host Countries

Annual Lending Flows (%)	(1)	(2)	(3)	(4)
<i>Subsidiary Traits</i>				
Leverage Ratio (t-1)	0.89 (0.25)***	0.28 (0.48)	0.28 (0.47)	-0.16 (0.60)
Loan to Deposit Ratio (t-1)	-0.07 (0.01)***	-0.03 (0.02)*	-0.04 (0.03)	0.01 (0.05)
Non-performing Loans Ratio (t-1)	-0.89 (0.16)***	-0.87 (0.17)***	-1.01 (0.16)***	-1.08 (0.17)***
Return on Assets (t-1)	-0.07 (0.90)	0.14 (0.87)	0.11 (0.78)	0.18 (0.75)
Total Assets, logs (t-1)	-0.59 (0.61)	-4.76 (1.74)***	-6.86 (2.18)***	-22.23 (6.91)***
Merger	9.19 (4.35)**	0.87 (4.39)	6.95 (4.00)*	17.27 (9.90)*
<i>Banking Group Traits</i>				
Group Leverage Ratio (t-1)	-0.39 (0.68)	0.37 (0.52)	-0.13 (0.61)	0.21 (0.56)
Group Loan to Deposit Ratio (t-1)	0.11 (0.06)*	0.01 (0.03)	0.06 (0.06)	-0.01 (0.06)
Group Non-performing Loans Ratio (t-1)	0.42 (0.42)	0.09 (0.36)	0.69 (0.37)*	0.86 (0.38)**
Group Return on Assets (t-1)	1.02 (0.72)	-0.33 (0.63)	0.85 (0.70)	0.53 (0.69)
Group Total Assets, logs (t-1)	-8.94 (3.91)**	0.57 (0.96)	-3.49 (3.72)	6.12 (5.76)
Group Merger	10.97 (5.06)**	-2.11 (3.37)	12.34 (4.97)**	6.64 (6.59)
Crisis	-20.74 (2.314)***	-19.51 (2.17)***	-18.85 (2.26)***	-15.12 (2.18)***
Constant	122.88 (44.11)***	62.91 (22.64)***	116.23 (39.58)***	187.11 (44.52)***
Group fixed effects	Yes	No	Yes	No
Host fixed effects	No	Yes	Yes	No
Subsidiary fixed effects	No	No	No	Yes
$R^2$	0.48	0.44	0.52	0.57
Observations	469	469	469	469

This table depicts the impact of subsidiary and parent banking group characteristics on subsidiaries' annual lending flows in their host countries. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and subsidiary and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 %, \*\* at the 5 %, and \*\*\* at the 1 % level.

Table 8: Impact of Subsidiary, Parent Banking Group and Host Country Macro Characteristics on Annual Lending Flows, across Subsidiaries' Host Countries

Annual Lending Flows (%)	(1)	(2)	(3)	(4)
<i>Subsidiary Characteristics</i>				
Leverage Ratio (t-1)	0.90 (0.71)	0.34 (0.68)	0.31 (0.73)	-0.21 (0.82)
Loan to Deposit Ratio (t-1)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.04)	0.03 (0.05)
Non-performing Loans Ratio (t-1)	-0.92 (0.18)***	-1.05 (0.21)***	-1.21 (0.21)***	-1.34 (0.21)***
Return on Assets (t-1)	0.41 (0.93)	-0.18 (0.84)	0.13 (0.83)	0.16 (0.83)
Total Assets, logs (t-1)	-1.78 (0.82)**	-3.07 (2.21)	-6.58 (3.14)**	-21.60 (9.16)**
Merger	10.10 (6.02)*	3.60 (6.19)	11.39 (5.72)**	17.66 (11.88)
<i>Parent Banking Group Traits</i>				
Group Leverage Ratio (t-1)	-0.35 (0.91)	0.41 (0.66)	-0.22 (0.83)	-0.10 (0.79)
Group Loan to Deposit Ratio (t-1)	0.14 (0.08)*	0.02 (0.03)	0.12 (0.07)*	0.04 (0.07)
Non-performing Loans Ratio (t-1)	0.63 (0.53)	0.19 (0.46)	0.72 (0.49)	0.92 (0.49)*
Group Return on Assets (t-1)	1.53 (0.76)**	-0.11 (0.69)	1.09 (0.75)	0.87 (0.75)
Group Total Assets, logs (t-1)	-4.63 (4.32)	0.85 (1.31)	-1.32 (4.62)	7.58 (7.06)
Group Merger	14.10 (6.14)**	-5.55 (4.46)	10.92 (6.41)*	5.37 (9.53)

This table depicts the impact of subsidiary and parent banking group characteristics on subsidiaries' annual lending flows in their host countries. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and subsidiary and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.

Table 8 continued: Impact of Subsidiary, Parent Banking Group and Host Country Macro Characteristics on Annual Lending Flows, across Subsidiaries' Host Countries

Annual Lending Flows (%)	(1)	(2)	(3)	(4)
<i>Host Country Macro Traits</i>				
Public Debt to GDP	0.19	0.24	0.36	0.35
GDP Ratio (t-1)	(0.09)**	(0.19)	(0.17)**	(0.18)**
Annual GDP Growth (t-1)	-0.25	-0.16	-0.30	-0.32
	(0.29)	(0.28)	(0.28)	(0.28)
Long-term Yield (t-1)	-0.35	-1.76	-1.22	-1.44
	(0.52)	(0.70)**	(0.75)	(0.75)*
Net External Debt to GDP (t-1)	-0.25	-0.12	-0.13	0.01
	(0.08)***	(0.11)	(0.12)	(0.14)
CPI Inflation (t-1)	0.34	-0.17	-0.01	0.25
	(0.65)	(0.54)	(0.50)	(0.48)
Crisis	-20.20	-21.02	-22.23	-19.05
	(3.26)***	(3.35)***	(3.88)***	(3.51)***
Constant	75.24	54.75	81.98	153.39
	(46.81)	(29.07)*	(46.61)*	(61.01)**
Group fixed effects	Yes	No	Yes	No
Host fixed effects	No	Yes	Yes	No
Subsidiary fixed effects	No	No	No	Yes
$R^2$	0.51	0.45	0.55	0.58
Observations	371	371	371	371

This table depicts the impact of subsidiary and parent banking group characteristics on subsidiaries' annual lending flows in their host countries. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and subsidiary and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.

Table 9: Impact of Subsidiary, Parent Banking Group and Host Country Macro Characteristics during the Financial Crisis and Normal Times, across Subsidiaries' Host Countries

Annual Lending Flows (%)	Period of Analysis	(1)	(2)	(3)	(4)	(5)
<i>Subsidiary Traits</i>						
Leverage Ratio (t-1)	Non-crisis	0.46 (1.16)	0.45 (1.22)	-0.15 (1.22)	-0.06 (1.27)	-0.69 (1.31)
	Crisis	1.83 (0.99)*	2.40 (1.10)**	1.68 (0.89)*	1.64 (0.85)*	1.09 (1.03)
Loan to Deposit Ratio (t-1)	Non-crisis	0.003 (0.03)	-0.02 (0.03)	-0.02 (0.04)	-0.01 (0.04)	0.02 (0.05)
	Crisis	0.03 (0.03)	0.01 (0.04)	0.02 (0.03)	0.001 (0.05)	0.02 (0.06)
Non-performing Loans Ratio (t-1)	Non-crisis	-0.96 (0.32)***	-0.95 (0.32)***	-1.11 (0.31)***	-1.08 (0.35)***	-1.01 (0.37)***
	Crisis	-0.62 (0.24)**	-0.69 (0.24)***	-0.61 (0.33)*	-0.81 (0.29)***	-1.12 (0.32)***
Return on Assets (t-1)	Non-crisis	1.02 (2.38)	1.25 (2.43)	1.60 (2.01)	2.28 (1.91)	2.73 (1.66)
	Crisis	-0.63 (0.68)	-0.40 (0.72)	-0.64 (0.76)	-0.32 (0.93)	-0.54 (1.07)
Total Assets, logs (t-1)	Non-crisis	-3.00 (0.87)***	-2.89 (1.02)***	-5.25 (2.11)**	-8.15 (2.91)***	-22.78 (8.85)**
	Crisis	-1.36 (1.01)	-1.07 (1.07)	-3.79 (2.52)	-6.94 (3.06)**	-23.08 (9.49)**
Merger	Non-crisis	20.21 (16.08)	25.58 (16.17)	19.57 (16.18)	24.94 (15.88)	27.41 (16.62)
	Crisis	-0.04 (5.98)	1.49 (5.86)	-2.41 (5.51)	3.06 (3.84)	16.10 (10.89)

This table depicts the impact of subsidiary, parent banking group and subsidiaries' host countries' macro characteristics on subsidiaries' annual lending flows in their host countries during the financial crisis period and normal (non-crisis) times. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.

Table 9 continued: Impact of Subsidiary, Parent Banking Group and Host Country Macro Characteristics during the Financial Crisis and Normal Times, across Subsidiaries' Host Countries

Annual Lending Flows (%)	Period of Analysis	(1)	(2)	(3)	(4)	(5)
<i>Banking Group Traits</i>						
Group Leverage Ratio (t-1)	Non-crisis	-1.75 (1.78)	-1.94 (1.83)	-1.69 (1.80)	-2.09 (1.77)	-2.82 (1.83)
	Crisis	-0.40 (0.79)	-0.29 (1.01)	-0.17 (0.76)	0.05 (0.93)	0.57 (0.92)
Group Loan to Deposit Ratio (t-1)	Non-crisis	0.05 (0.04)	0.18 (0.08)**	0.04 (0.04)	0.15 (0.07)**	0.08 (0.07)
	Crisis	-0.07 (0.03)**	0.05 (0.07)	-0.06 (0.03)*	0.04 (0.07)	0.01 (0.07)
Group Non-performing Loans Ratio (t-1)	Non-crisis	-0.04 (0.86)	2.42 (1.13)**	0.27 (0.90)	2.22 (1.14)*	1.80 (1.19)
	Crisis	0.09 (0.58)	0.22 (0.64)	-0.07 (0.59)	0.44 (0.55)	0.73 (0.56)
Group Return on Assets (t-1)	Non-crisis	14.94 (6.14)**	17.50 (6.27)***	14.14 (6.11)**	17.30 (5.91)***	18.46 (6.28)***
	Crisis	0.31 (0.58)	1.04 (0.81)	0.09 (0.54)	0.62 (0.74)	0.14 (0.76)
Group Total Assets, logs (t-1)	Non-crisis	3.00 (1.68)*	-3.64 (4.44)	3.08 (2.11)	-0.57 (4.39)	6.48 (6.24)
	Crisis	0.58 (1.45)	-6.44 (4.56)	0.76 (1.44)	-2.29 (4.53)	6.18 (6.99)
Group Merger	Non-crisis	-6.29 (6.35)	8.94 (8.03)	-6.48 (7.04)	7.66 (8.52)	4.86 (10.39)
	Crisis	-5.96 (6.10)	18.77 (8.95)**	-4.26 (5.73)	15.33 (9.51)	-2.04 (14.65)

This table depicts the impact of subsidiary, parent banking group and subsidiaries' host countries' macro characteristics on subsidiaries' annual lending flows in their host countries during the financial crisis period and normal (non-crisis) times. The dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.

Table 9 continued: Impact of Subsidiary, Parent Banking Group and Host Country Macro Characteristics during the Financial Crisis and Normal Times, across Subsidiaries' Host Countries

Annual Lending Flows (%)	Period of Analysis	(1)	(2)	(3)	(4)	(5)
Public Debt to GDP (t-1)	Non-crisis	0.08 (0.15)	0.17 (0.16)	0.15 (0.27)	0.21 (0.23)	0.31 (0.24)
	Crisis	0.21 (0.13)	0.23 (0.15)	0.27 (0.22)	0.19 (0.24)	0.22 (0.27)
Annual GDP Growth (t-1)	Non-crisis	0.96 (0.99)	0.44 (0.92)	1.14 (1.05)	0.60 (0.98)	1.03 (0.99)
	Crisis	-0.34 (0.41)	-0.40 (0.43)	-0.49 (0.34)	-0.37 (0.32)	-0.35 (0.33)
Long-term Yield (t-1)	Non-crisis	-0.64 (2.14)	-1.53 (2.02)	-0.57 (2.20)	-1.13 (2.01)	-1.94 (1.99)
	Crisis	0.35 (0.64)	0.42 (0.68)	-0.30 (0.85)	0.13 (0.94)	-0.08 (0.92)
Net External Debt to GDP Ratio (t-1)	Non-crisis	-0.17 (0.12)	-0.15 (0.13)	-0.07 (0.18)	-0.10 (0.16)	0.03 (0.17)
	Crisis	-0.33 (0.11)***	-0.31 (0.12)**	-0.27 (0.16)*	-0.20 (0.18)	-0.12 (0.20)
CPI Inflation (t-1)	Non-crisis	-1.34 (0.78)*	-0.94 (0.81)	-1.29 (0.87)	-0.72 (0.86)	-0.02 (0.84)
	Crisis	0.14 (1.24)	0.22 (1.32)	0.24 (1.16)	0.06 (1.05)	-0.18 (1.05)
Constant		11.18 (22.22)	66.27 (49.85)	31.61 (33.07)	69.46 (49.23)	164.01 (67.13)**
Group fixed effects		No	Yes	No	Yes	No
Host fixed effects		No	No	Yes	Yes	No
Subsidiary fixed effects		No	No	No	No	Yes
$R^2$		0.52	0.57	0.53	0.59	0.62
$N$		371	371	371	371	371

This table depicts the impact of subsidiary, parent banking group and subsidiaries' host countries' macro characteristics on subsidiaries' annual lending flows in their host countries during the financial crisis period and normal (non-crisis) times. The

dependent variable is defined as the annual percent change in the subsidiary's stock of loans (the annual difference of the natural logarithm of loan stocks, multiplied by 100). The coefficients indicate the percent change in annual lending flows induced by a one unit change in the explanatory variable. Host country (subsidiary location) and banking group fixed effects are included as shown. Robust standard errors are reported. \* indicates significance at the 10 percent level, \*\* at the 5 percent level, and \*\*\* at the 1 percent level.

## **Appendix A**

The list of host (recipient) countries included in the analysis consists of: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Serbia, Slovakia. The list of source countries (locations of headquarters of bank groups) are: Austria, Belgium; Denmark, France, Germany, Greece, Hungary; Ireland, Italy, Netherlands, Norway, Portugal, Spain; Sweden, United States.

The list of banks included in the analysis are: KBC Group (Belgium); Erste Group (Austria); Societe Generale (France); Unikredit (Italy); Raiffeisen Group (Austria); Intesa Sanpaolo (Italy); Volksbank (Austria); ING (Netherlands); Alpha Bank (Greece); OTP Bank (Hungary); National Bank of Greece (Greece); EFG Eurobank (Greece); Commerzbank (Germany); Allied Irish Bank (Ireland); Banco Comercial Portugese (Portugal); Swedbank (Sweden); SEB Bank (Sweden); Danske Bank (Denmark); DnB Bank (Norway); Hypo Alpe Adria Bank (Austria); Bayerische LB (Germany); Bank Austria AG (Austria); Sanpaolo (Italy); HVB Bank (Germany); Raiffeisen Zentralbank (Austria); Santander (Spain);

## **Appendix B. Overview of banking in the CEE region**

The evolution of banking in the examined countries showed similar characteristics in the aftermath of the collapse of the Soviet Union (the 'transition'). In the 1990s, all Central and Eastern European (CEE) countries went through a severe banking crisis that was in part caused by legacy of the former economic system, in part by the lack of banking knowledge and in some cases, fraud. After the worst of the banking crisis was over, these countries had to rely on strategic foreign investors to stabilize the banking market. The influx of these foreign investors was important not only because internal savings were relatively low after the transition of the early 1990s, but also because professional experience in banking was essential for long term stability. In the following paragraphs, we briefly describe the post-Soviet Union transition of the banking system in the CEE region.

Hungary and Estonia were pioneers in the region's banking evolution, as these countries had already gone through banking crises over the 1992-1993 period. In Hungary, the aggregate Return on Equity (ROE) was minus 103 percent in 1993. While many primarily foreign-owned banks (mainly green-field investments) survived years of transformational crisis without major losses, certain Hungarian banks suffered losses amounting to several times their capital. Several factors contributed to the default of these Hungarian banks: the very poor quality portfolios inherited from the previous system,



expansionary lending policy, and so on. As a result of the downturn in the corporate sector (caused in part by the introduction of a very strict bankruptcy law), bank loans became nearly worthless: in 1993, 47 percent of corporate debt was doubtful or bad. As part of a bank consolidation program introduced in 1994, the state recapitalised its banks and strived to normalize portfolios. After the consolidation had concluded, the state tried to find strategic foreign investors who had the banking knowledge to operate these institutions safely in the long run. As result, by the mid-1990s the Hungarian banking system had come to be dominated by foreign-owned banks (Banai et al. 2010).

The Estonian banking sector collapsed as early as 1992. The country had very specific problems: a new Estonian banking system and some banks from the Soviet Union had developed parallel to each other. As a result, after the collapse of the Soviet Union it was not clear who was responsible for the supervision and regulation of some of these banks. At the same time, banking regulation was almost non-existent in the country, and the minimum capital required for establishing a new bank was extremely low (partly due to the high inflation rates). The standards for starting a new bank were extremely low, and as a result, many new financial institutions appeared. During the years of 1991-1992, thirty new commercial banks were opened (Korhonen 1996). This boom in banking activity, combined with the lack of regulation and knowledge, resulted in a banking crisis in 1992-1993. During the crisis, more than half of the existing banks had to close their doors. Some of them merged with other institutions, while others simply went out of business. Estonia granted permission to some foreign banks to open a branch in 1994. By the onset of the Asian financial crisis, almost half of the Estonian banking sector had become foreign-owned. The Asian and the Russian crises of the late 1990s were a big test for the stability of the banking system in all of the Baltic countries. Most of the Estonian banks survived the contagion, but some further consolidation was triggered by these crises: two big Scandinavian bank (Swedbank and SEB) acquired the biggest Estonian banks, and foreign banks became dominant in the country.

Most non-Baltic CEE countries had experiences similar to the Hungarian case described above, while other Baltic countries followed the Estonian pattern. An important deviation is that the war in the former Yugoslavia caused some delays in the evolution of banking in Croatia and Serbia. In general, the standards for banking market entry were relatively low in the CEE region, which contributed to the substantial wave of entry by foreign banks. However, banking markets remained quite monopolistic in the immediate aftermath of the political and economic transition. This lack of

competition was particularly beneficial to banks which had already built substantial market share by the time of the 'transition', while at the same time the lax regulatory framework helped conceal inherited ailments. Over time, however, the problems which eventually led to banking crises in the region gradually came to light (Banai et al. 2010).

In the case of Poland, the foundation for the privatization of Polish banks was established by a program introduced in 1993. The state had to recapitalize several major banks over the 1993-1996 period. The privatization program was unsuccessful for a long time, as a large portion of state-owned banks could not be sold. The ratio of foreign ownership was still very low in the middle of the decade. Despite the delay, by the early 2000s over two-thirds of the banking system was in foreign ownership. The Polish national bank PKO was the only big bank which did not get a strategic foreign owner. Moreover, the Polish state still owns a substantial portion of this bank's shares (Banai et al., 2010).

In the Czech Republic, where the so-called 'voucher privatization' hindered the appearance of prudent owners, several financial institutions went bankrupt in the 1994-1996 period. In the middle of the 1990s, the ratio of foreign ownership in the banking system was still insignificant. Due to the voucher privatisation, the state had to maintain its presence in the banking sector for a long time in order to ensure operability, given the large number of small shareholders. The four largest banks were nationalized in 1997 and 1998. In the 2000-2001 period, two large banks also required state intervention before they were taken over by foreign investors. Even though this continued state presence delayed the arrival of foreign investors, by 2001 the Czech banking system was predominantly foreign-owned as well.

Privatization with compensation stocks in Slovakia was implemented in several waves, ending in 1995. In the following years, however, the banking system encountered severe difficulties. Several large banks required state help between 1997 and 2000. This period ended with a consolidation program designed in cooperation with the World Bank, which recapitalized strained banks and sold them to foreign investors (Barisitz, 2008). Due to the reform of the banking system, the ratio of foreign ownership in banking exceeded 90 percent by 2002.

In Bulgaria and Romania, the privatization of the banking system started as late as the end of the 1990s, due to the economic difficulties following the transition. In Bulgaria, several financial institutions went bankrupt over the 1996-1997 period, and the financial crisis soon spread to the real

economy. The pursuant consolidation program brought an increase in foreign ownership in banking. Privatization more or less came to a close in 2003. The closing move was the sale of DSK Bank, the largest bank in 2003 (the investor was OTP Group).

Romania also experienced a severe banking crisis in the second half of the 1990s (1997-1999). The first large privatization deal was carried out in 1999 (Barisitz, 2008). Just as in Hungary, the inherent problems of the banking system could only be solved with the aid of state intervention. The middle of the 1990s saw a significant worsening of bank portfolios; the solution took the form of bank consolidation program (Várhegyi, 2001). The last big step in the evolution of the Romanian banking system was the sale of Banca Comerciala Romana, in which the largest Romanian bank was acquired by Erste Bank. As a result, foreign ownership rose to above 80 percent.

The build-up of banking activity took longer in Latvia and Lithuania than in Estonia. Similar to the Estonian case, these two countries were characterized by the very lax regulation and supervision of banks. Over the course of just a few years, the number of banks became extremely large relative to the size of the economy. This phenomenon was especially true for Latvia. Not surprisingly, that country suffered the most severe crisis among the Baltic states. Both the Latvian and Lithuanian banking sectors collapsed in 1995 (Korhonen, 1996). Similar to the Estonian case, the consolidation process was somewhat aided along by the Asian and Russian crises. Big Scandinavian banks eventually gained dominance by the end of the 1990s.

The economies and banking systems of Croatia and Serbia had somewhat different evolution paths after the transition than the other countries in the region. The political events of the 1990s hindered the development of these two countries. After the end of military confrontation, the Croatian government first tried to stabilize the banking system around 1993-1995. The bank rehabilitation act was enacted in 1994, and four big troubled banks were selected for rehabilitation. Through this program the management was replaced and the banks were recapitalized. From the mid-1990s, the increase in lending activity was partly fuelled by foreign currency savings. Due to the savings in foreign currency, the open FX position of the banking system became increasingly high. This risk materialized during the international financial crisis of the late 1990s. Some small and medium-sized banks had to exit the market, while others were part of M&A transactions. Most banks saw an increase in foreign strategic ownership after these transactions. As a consequence, the number of

banks decreased significantly. The consolidation process had concluded by the early 2000s. Over 90 percent of the banking system (based on balance sheet total) was foreign-owned by 2002 (Barisitz, 2008).

The evolution of the Serbian banking system took longer. Over the past two decades, the legal name and borders of the country changed numerous times. The inherent instability hindered the smooth transition of the banking system as well. The Serbian banking system remained quite stagnant until the early 2000s. Most of the historically dominant banks suffered because of frozen assets and liabilities. The Serbian authorities started to rejuvenate the banking system in 2001, and they achieved the fastest progress in the CEE region by implementing ambitious restructuring measures (Barisitz, 2008). In the first round of reforms, 19 smaller banks were closed, followed by the liquidation of four out of the five biggest banks in 2001. The following year, the state tried to compensate the depositors and clean up the balance sheet of the banking system. As a result, the ratio of the banking system's balance sheet to GDP had fallen from 127 percent to 36 percent by the end of 2002. The regulatory and supervisory power of the central bank was also strengthened during this time. These actions laid the foundation for the long-term successful operation of the banking system. Finally, the majority of the banking system was sold for to foreign strategic investors over the 2004-2005 period. By the end of 2005, two-thirds of the banking sector was in foreign hands (Barisitz, 2008).

