

UNIVERSITY COLLEGE LONDON

School of Slavonic and Eastern European Studies

CHARLES UNIVERSITY PRAGUE

Faculty of Social Sciences

Institute: Institute of Economic Studies

Master thesis

2017

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School of Slavonic and Eastern European Studies

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF SOCIAL SCIENCES

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**Foreign Banks and Financial Development –
Foreign Bank Lending in CEE Countries**

Master thesis

Prague 2017

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Academic Year: 2016/2017

Word Count: 20,097

Bibliographic note

Köthe, Anja. Foreign Banks and Financial Development – Foreign Bank Lending in CEE Countries. 97 p.
Mater thesis. Charles University, Faculty of Social Sciences, Institute of Economic Studies, Supervisor PhDr.
Michal Hlavacek Ph.D

Abstract

The objective of this paper is to investigate the relation between foreign banks and financial development and to focus on foreign bank lending, in particular. The research focuses on four countries with a high share of foreign banks: Czech Republic, Hungary, Poland and Slovakia. Using a dataset of 122 banks over a 10 year period from 2005 to 2015 a fixed effects panel regression models is used for an empirical analysis. Loan growth as a proxy for lending behaviour and credit stability is used as the dependent variable. The empirical models investigate the determinants of loan growth in foreign and domestic banks as well as the dependence of foreign bank subsidiaries on their parent banks. The regression results indicate that domestic banks are more dependent on local economic conditions and bank performance. Their credit supply depends more on their profitability, loan quality and domestic market share. Foreign bank subsidiaries, in contrast, exhibit greater independence from local economic conditions and also from subsidiary performance indicators such as profitability ratios. Instead their lending behaviour is significantly influenced by the financial characteristics of their parent banks.

Abstrakt

Cílem práce je prozkoumat vztahy mezi zahraničními bankami a finančním rozvojem s důrazem na problem bankovních úvěrů. Výzkum se soustřeďuje na Českou republiku, Maďarsko, Polsko a Slovensko jako na země s vysokou účastí zahraničních bank. V rámci modelu panelové regrese s fixními efekty jsou využita data 122 bank za desetileté období 2005-2015. Růst úvěrů jako proxy úvěrového chování a stability vystupuje jako závislá proměnná. Empirický model zkoumá determinanty úvěrového růstu v domácích a zahraničních bankách stejně jako závislost dceřiných společností na jejich zahraničních mateřských bankách. Výsledky regrese ukazují, že domácí banky jsou více závislé na domácí ekonomické situaci a výkonu bank. Jejich úvěrové zdroje závisejí více na jejich ziskovosti, kvalitě úvěrů a podílu na domácím trhu. Oproti tomu dceřiné společnosti zahraničních bank vykazují větší nezávislost na domácí hospodářské situaci a na indikátorech výkonu dceřiných společností jako je míra ziskovosti. Jejich úvěrové chování je namísto toho významně ovlivňováno finančními charakteristikami jejich mateřských bank.

Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.
2. The author hereby declares that all the sources and literature used have been properly cited.
3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Prague 28 July, 2017

Anja Köthe

Acknowledgments

I would like to thank both my supervisors Dr. Michal Hlavacek at the Institute of Economic Studies at Charles University and Dr. Julia Korosteleva at the School of Slavonic and Eastern European Studies at University College London for their continued support and advice during this dissertation. Moreover, I would like to thank our course coordinator Jiri Vykoukal for his help in the dissertation seminars and for his guidance at Charles University Prague. Finally, I would like to thank my family and friends for just being there.

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Introduction

The liberalization of financial markets in Central and Eastern Europe (CEE) in the early 1990s allowed for the entry of foreign banks who since then have increased their presence at a rapid pace. This process has had a tremendous transformational effect on the financial system of the region. Another key event was the EU accession of various CEE countries at the beginning of the 21st century. In response a new body of economic research emerged that analyzed the effects of financial conversion and spill over effect. Finally, the financial crisis of 2007/08 and the subsequent Euro crisis raised questions about the lending behavior of foreign banks and whether a high foreign bank share leads to an increased vulnerability to trans-border crisis transmissions. Despite a wide range of academic research on the topic, the role of foreign banks in financial development remains controversial and is disputed. Whereas advocates point towards positive spill-over effects such as knowledge transfers and increased transparency in the banking system, opponents fear a crowding out effect that limits domestic credit. Foreign banks might also engage in “cherry-picking” behaviour according to which they only choose the largest and most solvent customers thereby neglecting smaller and medium sized companies which tend to have a more limited access to finance. Foreign banks are, furthermore, accused to be less committed than domestic banks. In times of financial instability and higher volatility or simply general uncertainty they might be more likely to contract their credit or simply close a subsidiary. In other words, foreign banks might exhibit a lower credit stability than domestic banks. However, the opposite case might also ring true. With a strong parent bank from an economically more developed country, a branch in a less developed country might receive funding support from the parent bank in times of financial turmoil which would allow to counteract local economic cycles.

Overall, Latin America, East Asia and the CEE countries have been a popular focus of research towards foreign bank behavior, as these regions are known for having a high share of foreign banks. CEE countries, in particular, provide an excellent context to study the effects of foreign bank ownership and their lending behavior on financial development as they represent an exceptionally high share of the banking sector. In Czech Republic, for example, foreign banks accounted for 92% of the banking sector according to the Czech National Bank (2017). Especially after the Eastern expansion of the EU in the early 2000s various academic researchers have analyzed how the increasing market share of foreign banks and the transition from a monobank system towards a liberalized market economy has affected the economy and financial markets. Now, more than 25 years later, the volatility of the early transition period has subsided. However, new issues, especially with regard to the recent financial crisis and the subsequent Eurozone crisis have been raised. Only few papers have so far analyzed the foreign bank lending behavior during the crisis.

This thesis contributes to the existing literature on foreign bank ownership and financial development in emerging countries. A cross-country analysis is employed to assess aggregated data at the country level as well as at balance sheet data at the bank level. More specifically, a regional focus on CEE countries is applied. The overall research question analyzes whether foreign and domestic banks differ in their lending behaviour and aims to determine the key drivers of loan growth in both types of banks. In order to assess these questions a fixed effects panel regression analysis is conducted with a dataset of 122

banks from Czech Republic, Poland, Hungary and Slovakia over a time period of 10 years from 2005 to 2015.

The paper is structured as follows. After this introduction, the second chapter provides the theoretical framework and economic context of the paper discussing first, previous academic literature on foreign bank behavior, cross border lending, crisis transmission and various dimensions of financial development. The second part of the chapter provides the economic and financial context in the sample countries focusing on the historic development, mode of and motivation for entry of foreign banks, foreign bank origin and current situation with regard to the relevance of foreign banks for the financial markets. The sections focuses on the macro perspective and makes use of country level data. This allows the reader to gain a deeper insight into the similarities and differences of the sampling countries' banking sectors. Specifically, the level of financial development in terms of financial depth, efficiency, stability and access to finance in the sample countries is analyzed. Moreover, the section provides a first basic assessment of how foreign banks have shaped the financial markets in the region and illustrates their significant role not only for the domestic banking sector but also for domestic and international financial markets in the region. The third chapter presents the research questions and hypotheses for the empirical analysis in more detail. The chapter provides an outline of the methodology including the empirical model assessed in Chapter 4 and a discussion of the data sources and variable construction including descriptive statistics of the data set. Chapter 4 provides a description and interpretation of the empirical results. In contrast to the second chapter, Chapter 3 and 4 focus on micro data at the bank level. The paper concludes with a final summary and discussion of the key results.

Chapter I. Theoretical Framework and Economic Context

Dimensions of financial development

Various strands of academic literature have analyzed foreign bank behaviour and different aspects of financial development. Analyzing the effect of foreign banks on financial development, quickly raises one important question – why should we care about financial development at all? Overall, financial development – especially in our chosen region in Central and Eastern Europe - is important for two reasons. First, in the context of financial integration and second, because of its close link with economic development (Liebscher, 2006, Levine et al. 2000). The new EU member countries in Central and Eastern Europe are still in the process of “catching up” economically and financially with their Western and Northern neighbours (Liebscher, 2006). Closing the economic and development gap between the different regions of the European Union will allow for a closer European integration and more equality. Both financial deepening and financial integration can help to close the gap. Foreign banks can play a vital role in enabling a faster financial deepening in the regions by providing higher liquidity and extra funding. Ultimately, this can help the CEE countries to eventually adopt the Euro. Furthermore, there is substantial academic evidence that financial development contributes significantly to economic development and ultimately economic growth and poverty reduction (Levine, 2005; Cihak et al., 2013). Although there remains some ambiguity with respect to the direction of causality, there is nevertheless sufficient empirical evidence that indicates that financial development has a positive effect on economic development.

Although a ubiquitous and widely used phrase financial development remains an abstract and complex term that needs further specification. A recent publication by the World Bank provides some useful guidelines. As such Cihak et al. (2012, 2013) from the World Bank have identified four dimensions of financial development which have subsequently been used to create the World Bank Financial Development Indicators. Moreover, these measures provide a useful categorization for existing literature. (1) Financial depth describes the size of financial institutions and markets and can, for example, be measured by private credit to GDP. (2) Financial access indicates the degree to which individuals can and do use financial institutions and markets. This is among others measured by the number of bank accounts per 1,000 inhabitants or the availability of credit cards and loans. (3) The third indicator captures the efficiency of financial institutions. For this indicator a multitude of measures exists including the costs of intermediating credit, return on assets and return on equity as well as lending-deposit spreads. Finally, there is (4) stability of financial institutions and markets. The most common measure is the banking z-score which measures a bank’s solvency by indicating the probability of default. These four categories allow to capture the multidimensional nature of financial development allowing to compare the level of financial development across countries. If a country scores highly in all four categories of financial development, it is considered to be highly developed financially which would be expected to also have a strong positive effect on economic growth, poverty reduction and, ultimately, economic development. These four

dimensions not only help to clarify the term financial development, but also provide a handy framework for our research.

Having identified four relevant aspects of financial development, it is not too difficult to extend these categories to the financial development impact of foreign banks. In fact, this is exactly what Ralph de Haas (2014) - a leading economist at the European Bank of Reconstruction and Development (EBRD) and an expert on foreign banks in transition countries - does. He makes a similar distinction in his literature review focusing on the three factors "*quantity, efficiency and stability*". Although short of one category - access to finance – this corresponds roughly to the measures chosen by Cihak et al. (2013).

Cross-sectional studies in emerging and low income countries

Although academic research has analyzed the effect of foreign banks across the globe in developed, emerging and developing countries, the literature on emerging and developing countries is particularly relevant to this paper. A common approach are cross-sectional studies using panel data regression models. An IMF paper by Detragiache et al. (2006) analyzed the links between foreign bank penetration and financial development in low income countries around the world. Using both a theoretical model and an empirical approach, they find evidence that credit to the private sector is lower in countries with higher foreign bank penetration and that foreign banks have a less risky loan portfolio. Similarly, a research paper from the European Bank of Reconstruction and Development (EBRD) (Bruno & Hauswald, 2012) came to the conclusion that foreign banks can improve access to credit and increase industry growth. Moreover, foreign bank can be particularly useful during local financial crises when they can provide additional external funding for local companies. Research has identified various positive spill-over effects such as knowledge and technology transfers (Mero & Valentinyi, 2003), greater competition and increased transparency and banking standards (Mero & Valentinyi, 2003, Bruno & Hauswald, 2012). Especially foreign banks from highly developed countries can also help to introduce, implement and enforce higher banking standards such as with regard to transparency and accounting standards. However, there is also evidence of negative effects such as less commitment to the host country which can result in faster credit tightening or even complete withdrawal in times of financial turmoil. Foreign bank might also crowd out local bank lending. Three regions have received particular attention from the academic research community: Latin America, East Asia (Pontines & Siregar, 2014) and Central and Eastern Europe (de Haas et al. 2015, de Haas et al, 2010, Fries & Taci, 2005) as all three regions have an unusually high share of foreign banks when compared to the rest of the world.

Financial depth

Academic evidence with regard to the overall effect of foreign banks on credit supply is still ambiguous. Although a strong foreign bank presence and cross-border banking can increase the availability of credit an important question is whether this kind of lending is as stable as domestic funding, or whether cross-border lending leads to more financial and economic volatility. One might keep in mind that cross-border banking increases the interconnectedness of financial markets and economies which opens up

channels for crisis transmission during financial downturns or a crisis. This is discussed in more detail in the section on financial stability. Another important aspect of financial deepening is financial integration. Since ten new member joined the European Union in 2004, the financial integration of the new member states has been a key objective of the European Central Bank (ECB, 2017). Financial development, especially the development of the banking sector which dominates financial markets in the CEE region, is key for a successful financial integration of the region. However, as observed during the financial crisis in 2007/08 the integration of financial markets also has its downsides as it opens up new channels for crisis transmission via cross-border banking and an increased interdependence and interconnectedness.

Financial efficiency

The socialist banking system before the liberalization process in the early 1990s is often associated with a lack of incentives for banking efficiency, i.e. cost minimization with concurrent profit maximization. Efficiency has been measured both in terms of profits and costs via return on asset, return on equity, the net interest margin and total costs. The entry of foreign banks has often led to efficiency gains in the banking sector exemplified by higher cost efficiencies and empirical evidence indicates that privatized foreign owned banks tend to be more efficient on average than banks with a different ownership structure (Fries & Tadis, 2005). In contrast, state owned banks or privatized domestically owned banks tend to be more cost inefficient. The efficiency gains have been ascribed to cost cutting, improved risk management and choosing more transparent clients (Havrylychuk & Jurzyk, 2010). There is also evidence that foreign banks are often able to expand their market power because of their strong domestic reputation. However, the observation that privatized foreign owned banks tend to be the most cost efficient raised the simple question whether this was due to the fact that these banks are foreign owned or whether foreign shareholders simply engaged in cherry picking behavior choosing to engage only with those banks that were already more cost efficient from the beginning. In other words, were foreign investors subject to selection bias and did they only chose to engage with banks that were already more cost efficient from the beginning. Another aspect is the competition aspect. Foreign banks might lead to an overall increased efficiency in the banking sector due to higher competitive pressure (Bruno & Hauswald, 2014). Moreover, there are voices that argue that the origin of the foreign bank has a significant influence on the overall effect on efficiency. Whereas, a foreign bank from an OECD country is likely to increase efficiency due to advanced technology and management skills, foreign banks from other emerging or developing countries might make little difference. Bonin et al. (2005) found that foreign banks are more cost and profit efficient than domestic state owned and domestic private banks and are also able to provide superior service to local banks. This is partially due to the strategy of international investors to choose more profitable and cost efficient banks in the first place. Another reason is that foreign owned banks collect more deposits and make more loans than domestic banks. Similarly, the foreign bank's home country's economic growth might be a highly relevant factor.

Financial stability

Another aspect of financial development is financial stability. In this context financial stability can be analyzed at two different levels. We can think of financial stability at the macro level in terms of the stability of financial markets, the banking sector, aggregated credit supply and growth. However, we might also want to consider stability at the bank level. Definitions of financial stability generally refer to systemic or bank stability in the absence of financial crises as well as to systemic resilience in the face of financial shocks (World Bank, 2017). This includes stable and low price movements and employment rates as well as an efficient resources allocation. Financial instability can be detrimental to trust in the financial system, ultimately resulting in mispriced financial assets, bank runs and hyperinflation. Like the other measure of financial development financial stability is an important prerequisite for economic growth. In the context of foreign banks and financial stability credit stability is of particular interest and relevance. Cross border banking might contribute to a higher volatility of credit supply. Foreign banks are less prone to local capital shocks and recover relatively faster after financial shocks due their possibility of relying on support from a parent bank (Fries & Tadis, 2005). As such they might be less likely to contract credit supply during financial downturns than domestic banks. However, critics have argued that foreign banks can be less committed to their host countries and are more likely to exit in times of economic downturn. A subsidiary or branch, from this point of view, can be regarded as being part of a portfolio of branches of the parent company. As a rational investor the parent bank would allocate its assets to the regions with the highest return and close those branches that prove unprofitable. At the macro level financial stability can be measured by the volatility of aggregated credit supply or credit growth. At the banking level the banking z-score which measures banking solvency has proved a popular measure for banking stability (De Haas & van Lelyveld, 2006, World Bank, 2017).

Access to finance

Companies are likely to profit to varying degrees from a strong foreign bank presence. For large companies the foreign bank presence might open up new funding opportunities and a higher level credit supply that domestic banks cannot afford. In this way, foreign bank might help to open access to highly liquid international financial markets. However, opportunities might look somewhat different for local small and medium sized companies. They tend to have a lower ability to access these additional funds as they lack the transparency of large listed firms. Instead, the traditional way for SME to gain access to funding is via their local reputation and links to local banks. Local and domestic banks in general tend to be more knowledgeable about local businesses and are more likely to have close ties with local businesses. Foreign banks might have the tendency to lend preferably to large firms as opposed to small and medium sized companies. In this way they might be able to afford in cherry-picking behavior which grants preferential treatment to large companies with a strong financial standing, but might neglect local small and medium sized companies. Indeed Gormley (2008) found evidence that local companies have more difficulties to secure loans when the country has a high share of foreign banks.

Other aspects of financial development

However, the effect of foreign banks on financial development and the local economy is not always clear cut. Claessens and van Horen (2014) point out that bank heterogeneity makes it more difficult to discern the real effect as the impact depends also on a number of host country and bank characteristics. Although they found a negative relationship between private credit and foreign bank presence, they point out that the ultimate impact depends on various characteristics concerning both the host country and the bank such as income level, market share and enforcement of contracts. Moreover, Bonin et al. (2005) indicate that differences between foreign and domestic banks might be due to initial take over decisions. In this way, foreign investors engaged in cherry picking behaviour and preferred to acquire domestic banks that were already more efficient and profitable than the average.

Of high relevance are also financial crises. The importance of understanding the impact of global banking and cross-border lending was also highlighted during the recent financial crisis. As a result a new strand of literature has emerged analyzing the effects of financial crises on foreign bank behavior. Although as De Haas (2014) points out many foreign bank impacts were already known before the crisis, the importance of funding structure for lending stability - in addition to ownership structure - was only revealed later. De Haas (2013) has analyzed counter measures that were taken by banks. In his research he focuses specifically on the Vienna Initiative which was an agreement between various major multinational banks who promised to keep their credit supply to certain south Eastern European countries stable. Although both domestic and foreign banks cut their credit supply, international banks that had agreed to the Initiative maintained their level of lending. The authors also analyzed whether this commitment to the Vienna Initiative countries led to shortages in credit supply in other CEE countries. However, they found no such evidence. Therefore, the Vienna Initiative had proven quite successful in preventing a withdrawal of foreign banks and helped to fill a policy void that too often affects foreign bank subsidiaries and branches. As De Haas (2013) points out there is still insufficient supervisory cooperation and integration with regard to these subsidiaries and branches which usually becomes especially obvious during a crisis. Another aspect of financial crises and foreign subsidiaries is the possibility of both contagious and diversifying effects (Derviz, 2006). The interdependence of the lending decision of foreign banks and their subsidiaries can lead to intensified crisis transmission. A struggling parent bank will have less funding available for its subsidiaries and branches and will only be able to offer a reduced safety net. On the other hand, if one country is hit by a local financial crisis, the parent bank can counter local economic cycles by redirecting its funds to support struggling subsidiaries. Choi et al. (2013) investigated foreign bank behaviour during the 2008 and 2009 financial crisis and found that foreign banks reduced their credit supply by more than domestic banks even after controlling for economic characteristics in the host country. However, they found no evidence that the country of origin of the foreign bank played a significant factor. Instead all foreign banks reduced their credit supply to a similar extent. Only countries who participated in the Vienna Initiative did not follow this trend. A research paper by Hills and Hoggarth (2013) from the bank of England clearly outlines cross border bank credit as a contributing factor to the global financial crisis as it amplified crisis transmission. Similar to De Haas (2013) the paper also criticizes the lack of sufficient monitoring of these cross border flows. Finally, the country of origin of the foreign bank subsidiary also plays a significant role (Mehigan, 2016). Foreign banks from advanced economies tend to exhibit higher loan growth than foreign banks from emerging economies. In a similar vein, banking

regulations such as capital regulations in the parent country can also affect loan growth. Mehigan (2016) found that foreign banks from countries with tight capital regulations had lower loan growth before the financial crisis, but experienced a smaller drop in loan growth during the crisis.

Economic and Financial Context in CEE Countries

Foreign bank ownership differs significantly across the globe. Whereas the percentage of foreign bank assets is relatively low in OECD countries – standing at 12% in 2009 – it is significantly higher in Eastern Europe – at 28% in 2009 – and in Latin America at 31% in 2009 (Claessens & Horen, 2014). When examining CEE countries, specifically, an even higher share can be found, accounting often for more than 50 % of banks. The high relative importance of foreign banks for domestic banking sectors in CEE countries makes the Central European region especially appealing for economic research investigating the role of foreign banks. In the following section the role of foreign banks is analyzed from a macroeconomic perspective using primarily aggregated data at the country level. After a brief historic overview and a description of foreign bank entry, we will look at the country specific banking sector characteristics along the four dimensions of financial development identified in the theory section. To put the numbers into perspective data for the Eurozone Area is added for comparison reasons. In a way this also allows to gauge the financial gap between the Euro Area and the CEE region. The data was taken from the World Bank Global Financial Development Database which currently provides data until 2014.

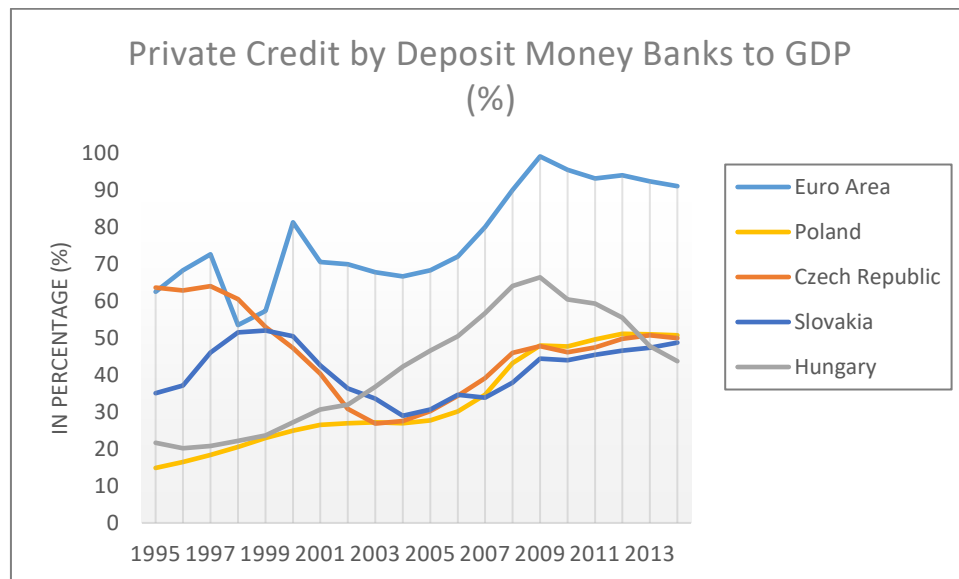
History and mode of entry

The rise of foreign bank presence Central and Eastern Europe can be traced back to the economic liberalization period in the early 1990s after the fall of the Soviet Union. After the fall of the Soviet Union the CEE region experienced unusually high economic and financial volatility due to the transition process. However, by the early 2000s the economies became more stable and several CEE countries began to join the European Union. Most foreign banks had entered by the early 2000s and the economy and financial markets in the region became more stable. Hence, the largest changes took place in the 1990s. Overall, the Central and Eastern European countries have developed to become bank based financial systems similar to the rest of continental Europe and in contrast to the United Kingdom and the United States which are more market based. The transition process of the 1990s is associated with a liberalization of interest rates, a restructuring and privatization of state owned banks, a transfer of financial activities from central banks to state owned and privatized banks and the entry of foreign banks (Fries & Tacis, 2005). As the monobank system was abandoned and the economy moved from a centrally planned economy to a market based economy, especially Western European banks entered the regions and began to open new branches and set up subsidiaries (de Haas, 2014). The motivations for foreign bank entry are diverse. A

key reason for foreign banks from developed Western European countries to enter was, for example, a saturation of home markets (de Haas, 2014). The newly liberalized Eastern European markets offered a vast potential for expansion and financial deepening. The mode of entry as well differed across banks and countries and could have significant consequences for the further operations of the banks. The mode of entry determines, for example, whether or not the banks can fall back on a customer base. This is return has a direct influence on the competitive position of a bank (Claeys & Hainz, 2014). When banks enter through an acquisition they will have an information advantage over banks that enter through greenfield investments. Whereas the former will also have acquired an existing customer base, the latter are in a weaker position since they will have to compete more for new applicants. And due to their information disadvantage and the lack of a known customer base, they are more likely to grant bad loans. The bank will need to take this into account when setting its lending rate. In fact, Claeys & Hainz (2014) found that entry through greenfield investment increases competitions and is associated with lower interest rates. Although banks entering through greenfield investment have to build a new customer base and thus do not have accumulated information about the credit worthiness of old customers, it seems that foreign banks possess a screening advantage due to more advanced technology (Claeys & Hainz, 2014). We continue with analyzing the level of financial development in the four sample countries.

Financial depth

Figure 1. Financial Depth: Private Credit by Deposit Money Banks to GDP (%)

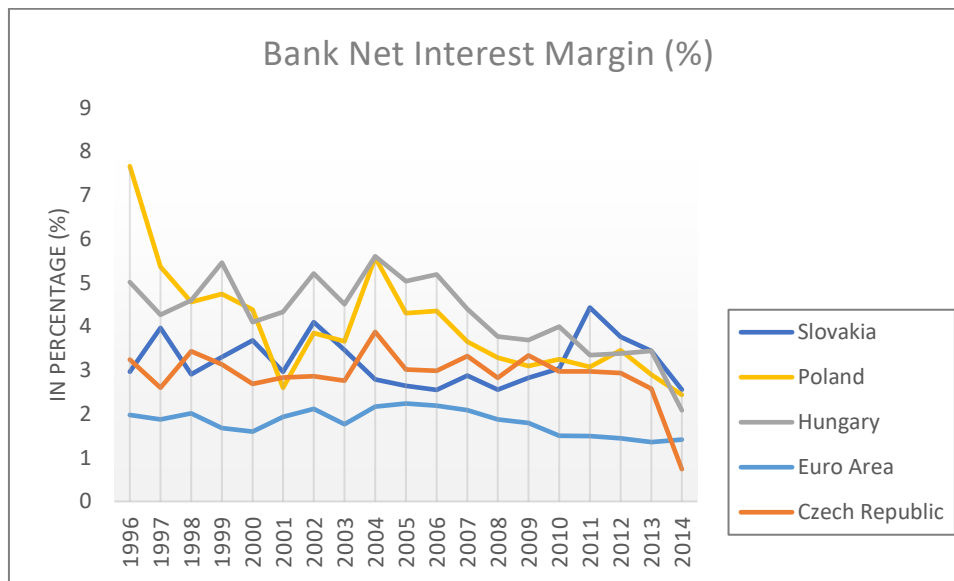


The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. Source: World Bank Global Financial Development Database (2017)

Figure 1 presents private credit by deposit money banks as a percentage of GDP for the selected countries and the Euro area. This indicator can be interpreted as a measure of financial depth which compares the size of banks and other financial institutions to overall economic output (World Bank, 2017). However, this indicator only includes credit provided by money deposit banks and excludes credit provided by governments or government agencies and central banks. Generally a higher ratio indicates more financial depth. However, a high ratio of private credit to GDP is not always beneficial. In fact, some of the countries with the highest ratios – including Spain, Portugal and the United Kingdom – also suffered considerably from the effects of the global financial crisis. Although the data indicates a positive upward trend for the ratio of private credit to GDP for all regions a large gap persists between Euro countries and the CEE countries. Even Slovakia which is the only country out of the four sample countries that adopted the Euro was not successful in closing the gap. All four sample countries have similar private credit to GDP ratio of around 40 % of GDP as compared to approximately 90 % for Euro zone countries. Private credit in Poland, Czech Republic and Slovakia has undergone a similar historic development, only Hungary somewhat defied the trend as it experienced stronger credit growth as a percentage of GDP than the other countries until 2009. After this period Hungary experienced a drop in the private credit by deposit money banks to GDP.

Financial efficiency

Figure 2. Financial Efficiency: Bank Net Interest Margin

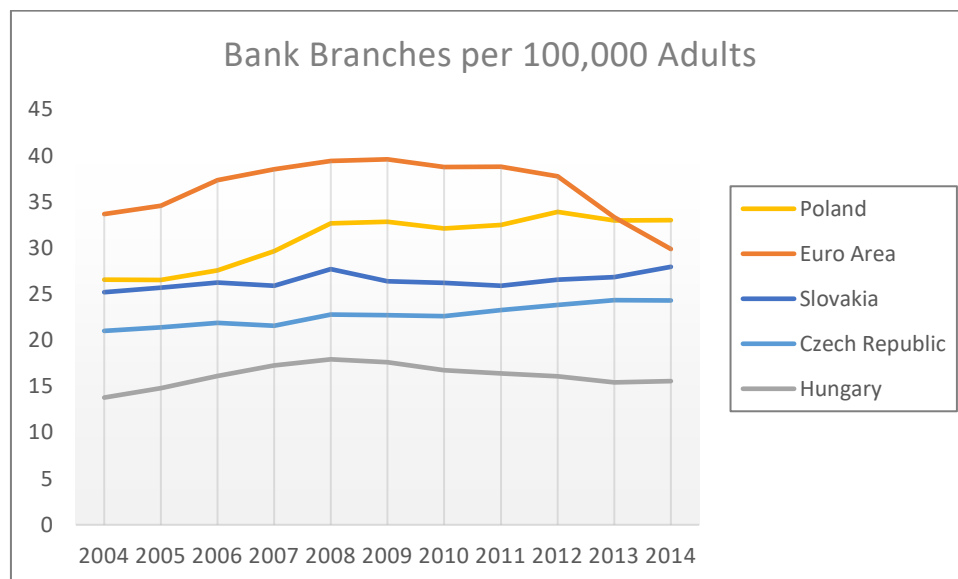


Accounting value of bank's net interest revenue as a share of its average interest-bearing (total earning) assets.
 Source: World Bank Global Financial Development Database (2017)

Figure 2 above shows bank interest margin which can be interpreted as a measure for financial efficiency where higher margins can be understood as a sign of more inefficiency. The indicator compares a bank's investments to its debts. The bank net interest margin equals the investment returns minus interest expenses divided by average earning assets. A negative value indicates weak investment decisions as interest expenses exceed investment returns. Over time, net interest margins fluctuate in all countries, but the Euro Area consistently had the lowest interest margins – at around 2 % - illustrating the banking efficiency gap between the regions. Initially, Poland had one of the highest interest margin at almost 8 % in 1996 indicating rather large inefficiencies during the transition period. However, by 2014 this had decreased to just below 3 %. A similar trend can be observed in Hungary which decreased its bank net interest margin from 5 % to around 2.5 % between 1996 and 2014. Slovakia's interest margin has remained relatively stable until 2010 between 3 % and 4 % when it suddenly increased in 2010 to almost 5 % before falling sharply. Bank net interest margins have followed a similar trend in Czech Republic. Between 1996 and 2012 they fluctuated around 3 %, but then dropped to just around 1 % in 2014 falling even below the level in the Euro Area. As of 2014 Slovakia has the highest bank net interest margin of around 3 % closely followed by Poland and Hungary. All countries experiences a decrease in bank net interest margins after 2012.

Access to finance

Figure 3. Access to Finance: Number of Commercial Bank Branches per 100,000 Adults



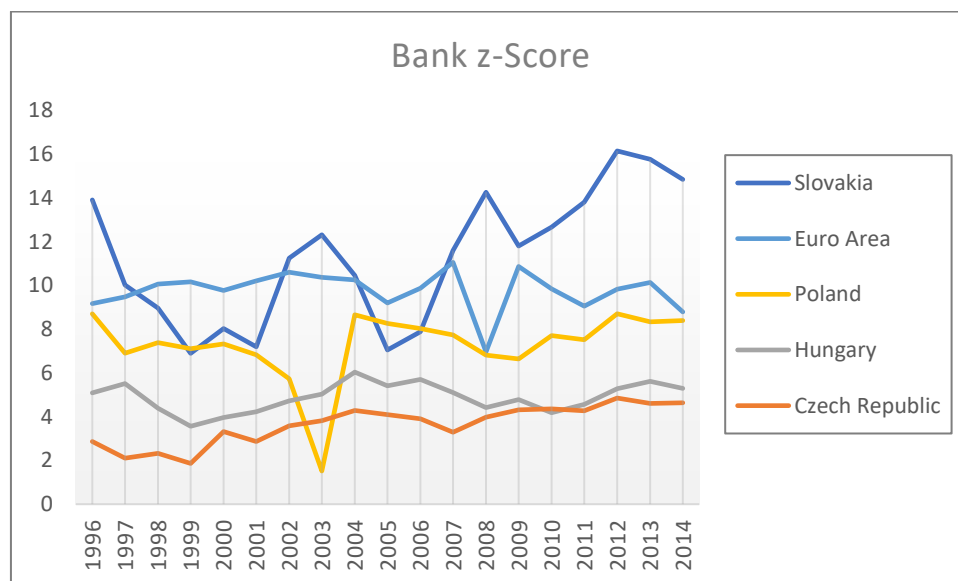
Number of commercial bank branches per 100,000 adults.
Source: World Bank Global Financial Development Database (2017)

To measure access to finance in a country the number of commercial bank branches per 100,000 adults is a useful and convenient tool. This measure captures the financial infrastructure in a country and whether the population has access to bank branches or not. However, it does not reveal anything about

how services are used or the share of the population that actually uses the bank branches. This could be better captured by the number of bank accounts or credit card in the population. Nevertheless, Figure 3 presents the number of bank branches per 100,000 adults for the sample countries. Overall, the data remains fairly constant over time with only slow and minor changes. This makes intuitively sense as we would not have expected the number of bank branches or the population size to fluctuate widely. As expected the Euro Area offers the best access to finance with around 35 to 40 bank branches per 100,000 adults between 2004 and 2012. After this period the number begins to decline which might be due to the increasing popularity of online and mobile banking which does not require physical bank branches. No such trend can be observed in any of the sample countries. On the contrary, between 2004 and 2014 Poland increased the number of bank branches per 100,000 adults from around 25 to over 30 surpassing even the number for the Euro Area. According to this financial measure access to finance is lowest in Hungary with an average of approximately 15 bank branches per 100,000 adults. Czech Republic and Slovakia have an average number of bank branches of 23 and 26, respectively, for 2014.

Financial stability

Figure 4. Financial Stability: Bank z-Score



The bank z-score captures the probability of default of a country's commercial banking system. The z-score compares the buffer of a country's commercial banking system (capitalization and returns) with the volatility of those returns. Source: World Bank Global Financial Development Database (2017)

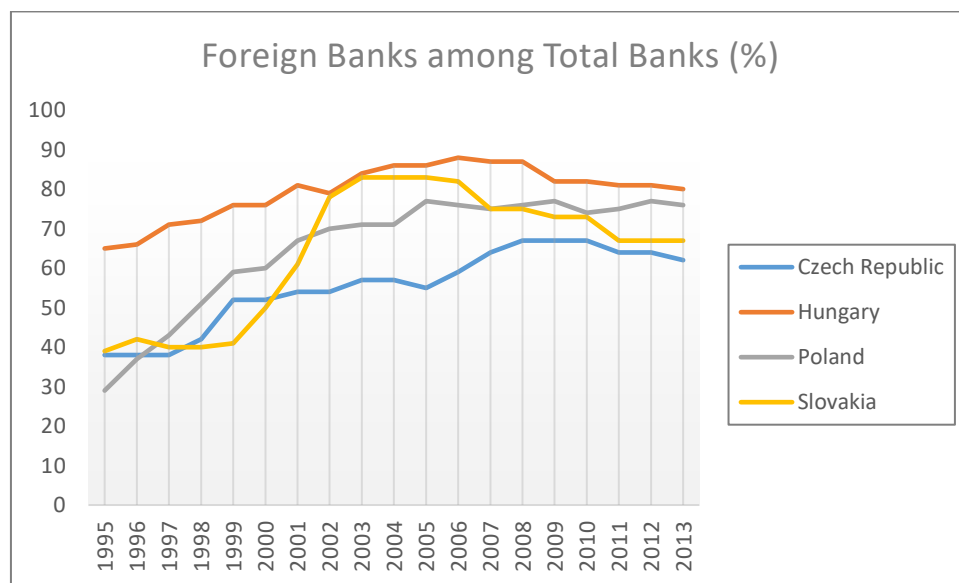
In order to measure financial stability in the banking sector and in financial institutions we use the bank z-score which estimates the probability of default. An estimate of the Bank z-score can be obtained by dividing the sum of the return on assets and equity over assets by the standard deviation of the return on assets. A higher bank-z score implies a lower risk of default and higher solvency. The data for the four

sample countries is presented in Figure 4. The picture is overall rather mixed. As of 2014 Slovakia has the highest bank z-score of around 15 followed by the Euro Area, Poland, Hungary and Czech Republic. This indicates that Slovakia has a relatively stable bank system when compared to the other sample countries and the Euro Area. It is interesting to note that Slovakia's financial stability as expressed through the bank z-score also exceeds the estimated financial stability in the Euro are. Whereas the bank z-score is rather stable in Hungary and Poland, it is more volatile in Slovakia and Poland. In 2003 Poland experienced a large drop in its score which fell from around 6 to around 2.

Foreign bank presence

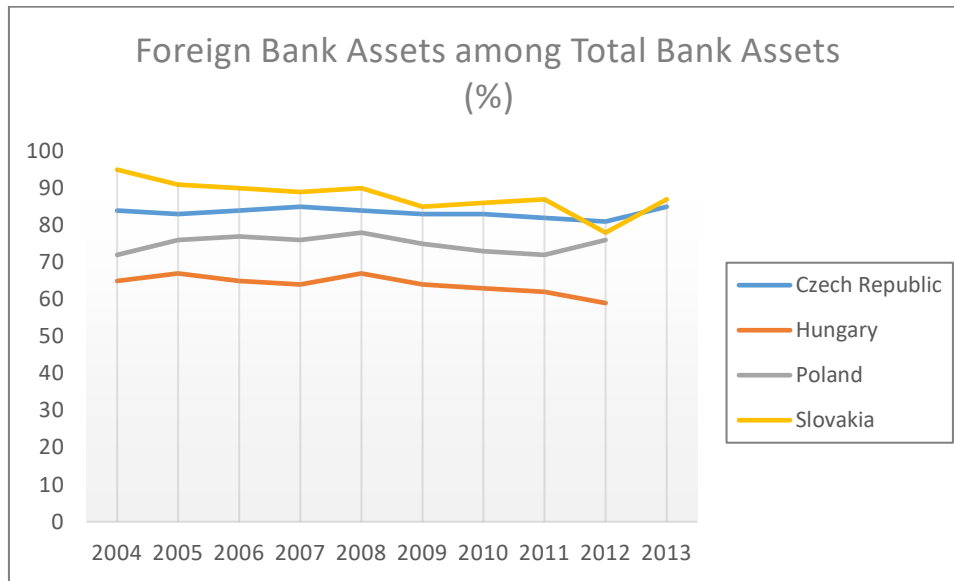
Foreign banks clearly play a significant role in the financial sector of the CEE region. However, the question of how to define a foreign banks remains. The question is non-trivial: many banks in the CEE region are characterized by a complex ownership structure. The World Bank (2017) defines a foreign bank as a bank for which more than 50 % of shares are held by foreigners. The most highly represented foreign banks are from OECD Eurozone countries. Foreign bank penetration can be measured in different ways. In the following we look at the number of foreign banks as a percentage of total banks in a country's bank sector in Figure 5. Then we also examine the proportion of foreign bank assets to total bank assets in a country in Figure 6. Comparing these two different way of measuring foreign bank penetration allows to, moreover, analyze whether foreign bank assets are proportional to their relative number in a country.

Figure 5. Foreign Banks among Total Banks (%)



The graph shows the earliest and most recent data available from the World Bank. Percentage of the number of foreign owned banks to total banks in an economy. A foreign owned bank is a bank where 50% of the shares or more are held by foreigners. Source: Global Financial Development Database (GFDD), World Bank (2016)

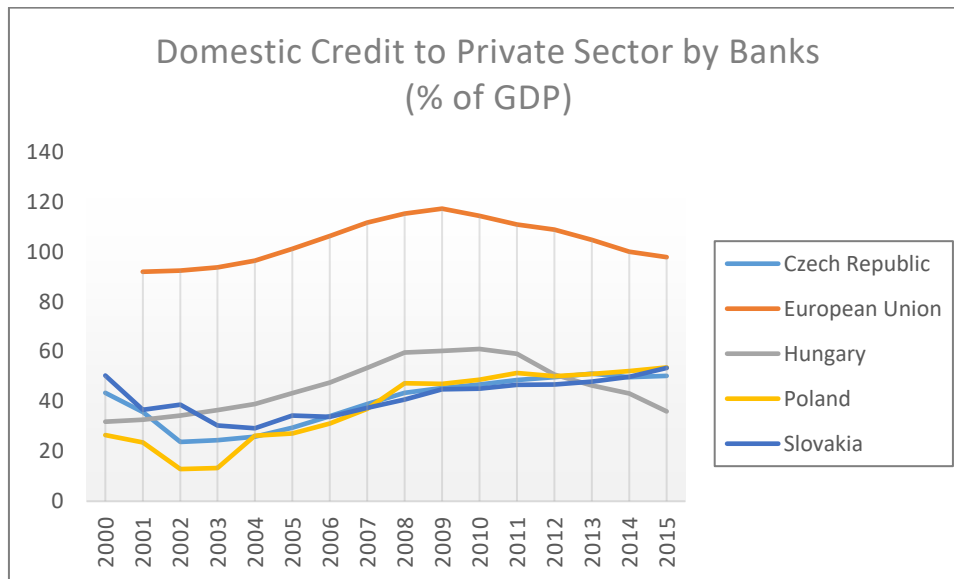
Figure 6. Foreign Bank Assets among Total Bank Assets (%)



The graph shows the earliest and most recent data available from the World Bank. Percentage of bank assets that are held by foreign banks. A foreign bank is a bank where 50% or more of its shares are held by foreigners. Source: Global Financial Development Database (GFDD), World Bank (2016)

Comparing Figures 5 and 6 for foreign bank presence we can see that the banking sectors of all four countries are dominated by foreign banks. In all four sample countries foreign banks account for more than 60 % of banks. The picture is similar in terms of total bank assets. Foreign banks also account for the majority of bank assets with a share between 60 % and 90 % in the sample countries. This share is especially high in Slovakia where foreign bank assets account for more than 90 % of bank assets. The largest increase in foreign banks was experienced between the privatization process in the early 1990s and the early 2000s. After this period the banking sector composition has remained more stable. Interestingly, foreign bank assets account for a larger share of bank assets than their mere number of foreign banks would suggest. In other words, foreign banks do not only account for more than 50% of all banks in the sample countries, but also account for a disproportionately large share of banking assets relative to their number. For example, in 2013 foreign banks accounted for 62% of all banks in Czech Republic, but held 85% of all banking assets. The only country with a different trend is Hungary where foreign banks account for more than 70% of all banks but hold less than 70% of all banking assets. Nevertheless the numbers indicate a clear dominance of foreign banks in the sample countries. This would be in line with observations made by Bonin et al. (2005) that foreign banks tend to provide more loans than domestic banks and also hold larger deposits.

Figure 7. Domestic Credit to Private Sector by Banks as Percentage of GDP



Domestic credit to private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit taking corporations except central banks), such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises. The World Bank uses the median for aggregated data at the country level. Source: World Bank Development Indicators (2017)

Figure 7. above shows how domestic credit has developed in our group of selected countries in the CEE region. The large gap between the CEE countries and the European Union is immediately obvious. We can also clearly see an increase in domestic credit provided by banks to the private sector as a percentage of GDP for Poland. There seems to have been a strong decline in the early 2000s and again a downward trend in Slovenia and Hungary after 2011. Czech Republic, Slovakia and Hungary stand in 2015 almost at the same ratio as in 2000. After an initial decline in the early 2000 it took several years until these countries reached the same ratio again (as only the ratio to GDP is depicted this does not necessarily say anything about domestic credit per se, but only in relation to GDP, this could be due to a rapid increase in GDP not matched by a proportionate credit growth or a decline in domestic credit). Most CEE sample countries managed to increase domestic credit to private sector between 2000 and 2015 within the span of 15 years. However, despite the growth trend in domestic credit the sample countries still lag far behind the European Union average. Whereas most CEE countries have reached a percentage of more than 50 % of GDP by 2015 – with the exception of Hungary which experienced a downward trend after 2010 and sees a decline to merely 36 %, the European Union average stood at almost 100 % (97 %) in 2015 despite a downward trend after 2009. Based on this data from the World Bank, none of the CEE countries saw a contraction in domestic credit to private sector as percentage of GDP during the financial crisis in 2007/08 or thereafter (except again for Hungary). Here the CEE countries seem to defy the European Union trend of a decline after 2010 which coincides with the Euro crisis. Interestingly, the Euro countries average (not depicted due to insufficient data) is almost 10 percentage points lower than the European Union average

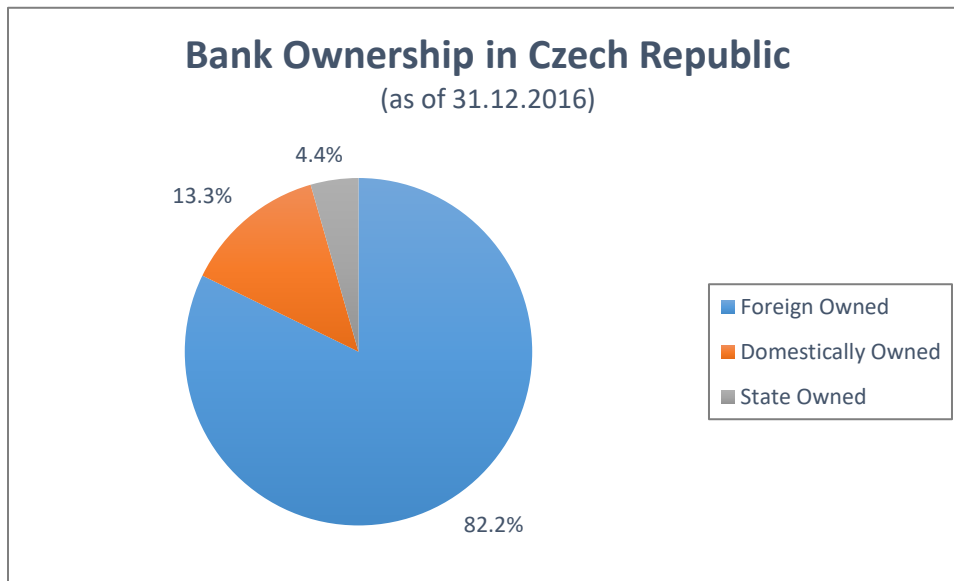
in 2015. Overall, the credit supply to the private sector increased only moderately after an initial decrease in the early 2000s indicating a rather slow financial development.

Example: Czech Republic

Next, we exemplarily analyze the banking sector of one of the sample countries – the Czech Republic - in more detail. Total bank assets in Czech Republic at the end of 2016 amounted to around 220.57 billion Euro¹ (CNB, 2017). At this time 45 banks and foreign branches were operating in Czech Republic. Out of these around 82.2 % are foreign owned, 13.3 % are domestically owned and 4.4 % are controlled by the state (CNB, 2017) as is illustrated in Figure 8 below. Similar to other transition economies the Czech banking sector used to be dominated by state-owned banks until the market liberalization in the 1990s. As a response to the liberalization process the number of banking licenses rose quickly and reached its peak in 1995 when 54 banks were operating in the country. However, a high share of corporate non-performing loans caused a banking crisis in the late 1990s which lowered the number of active banks. Moreover, the four largest banks changed ownership and fell under the control of foreign investors. In recent years the number of active banks has stabilized, although the share of foreign owned banks remains high. The Bank of International Settlement (BIS) has compiled the Consolidated Banking Statistics (CBS) that allow to investigate the exposures of internationally active banks to different countries worldwide. Moreover, it allows to investigate the dependence of our sample countries on foreign bank creditors (BSI, 2017). On an immediate counterparty basis total international claims by foreign banks on counterparties resident in Czech Republic amounted to USD 181,964 million in the third quarter of 2016 (BIS, 2017). The majority of which – standing at around 76 % - was local claims. In other words, the majority of international claims on Czech Republic does not occur via cross-border lending – this account for only around 24 % of international claims – but is made via foreign banks who have entered the domestic market and make the claim through a subsidiary or a local branch.

¹ For the currency conversion from Czech koruna to Euro, the exchange rate on 31.12.2016 was used (0.0370 EUR = 1 CZK) as stated by the European Central Bank (ECB).

Figure 8. Bank Ownership Structure in Czech Republic



Source: Czech National Bank, data as of 31 December, 2016

Chapter II. Data and Methodology

Research Question

In the previous chapter we analyzed trends in financial development at the macroeconomic level and explored characteristics of the banking sectors in the sample countries, especially with regard to foreign banks. This allowed a first insight into how foreign banks are linked to financial development and illustrated their particular relevance to the CEE region, where they hold an unusually high share of market power when compared to the rest of the world. In this way, the region provides an excellent case study for the research question. The overarching focus of this dissertation lies on how foreign banks impact financial development. Specifically, lending stability in terms of credit growth is analyzed. First, it is established whether foreign and domestic banks differ in their lending behaviour and, second if this is indeed the case, how and why they differ. Answering this question provides further insight into whether foreign banks can contribute to financial stability by providing a more stable credit supply or whether they can have a destabilizing effect by propagating external shocks. The question is highly relevant in light of the recent global financial crisis where international bank linkages facilitated a transmission of the crisis across borders. Countries - not only in the CEE region - have opened their banking sectors to international investors and need to understand whether this constitutes a viable economic model that enables financial development and ensures stability in the financial sector. As banking sectors around the world are becoming increasingly interconnected and interdependent, the relation of foreign bank subsidiaries and their international parents raises questions about their potential for transmitting shocks.

The following two chapters analyze these questions empirically. For a structured approach as to how and why foreign and domestic banks might differ in their lending choices the empirical analysis is built along a series of sub questions where both bank specific and macroeconomic factors as well as the parent-subsidary relationship are assessed. Specifically, we investigate how credit growth of foreign and domestic banks is affected by bank specific characteristics such as profitability, loan quality, solvency, liquidity and funding structure. In terms of macroeconomic factors, we explore whether the two groups of banks have different dependencies on and react differently to local economic developments such as changes in GDP growth and inflation. Do domestic banks, for example, suffer more from a drop in local credit demand than foreign banks? As the financial crisis and the European debt crisis fall into the time frame of our research, we include the sub question of whether the crises has had the same effect on both types of banks. Finally, focusing on foreign banks only, we are interested in how their lending behaviour is determined by their international parent bank. This means we look at potential spill-over effects and financial contagion across borders. Both the financial standing of the parent bank with regard to the bank specific characteristics mentioned above as well as macroeconomic developments in the home country may play a significant role. Although legally independent, foreign bank subsidiaries might profit from the existence of bank internal capital markets which would allow them access to additional funds and other support from their parent banks. However, this mechanism might be not be a one-way road. A parent bank in financial distress - such

as through a decline in loan quality - will be less able to provide additional liquidity in the internal market thereby directly limiting the resources available to its subsidiaries. In this way, the parent bank may play an active part in determining the credit supply and growth of its subsidiaries. Moreover, previous research indicates that the country of origin of the parent bank may have a significant impact.

Hypotheses

There is a number of reasons why lending behaviour is likely to differ between foreign and domestic banks. International banks have a wider range of lending choices than domestic banks and in this way operate more diversified international loan portfolios. This can help to diversify risks and reduces the dependence on a single economy or market. Foreign bank subsidiaries can profit from this arrangement through the use of additional funding sources from their parent bank via a bank internal capital market that is not available to domestic banks. We would expect this to be reflected in the extent to which foreign and domestic banks are dependent on local economic developments including local credit demand. Due to the option of foreign banks to fall back on funding from their parent banks during local financial downturns, we would expect them to be less dependent on economic developments in their respective host country. In essence, parent banks can serve as a safety net that absorbs and compensates certain losses in its subsidiary. The mechanism should be similar for bank specific characteristics such as loan quality. A foreign bank that experiences a high share of non-performing loans in the short-term might receive support from its stronger parent bank. It would thus be better able to deal with a decline in loan quality and profitability than a domestic bank in the same situation. In this way, the greater access to funding resources of foreign banks would be expected to give them greater freedom in their lending choices. Conversely, domestic banks are expected to be more dependent on domestic economic conditions and, therefore, also more likely to expand and contract their credit supply in line with domestic economic conditions and local demand. In other words, they are expected to exhibit more pro-cyclical behaviour.

However, the effect of the global financial crisis in 2008 and 2009 on the credit growth of foreign and domestic banks might prove to be more ambiguous. Derviz and Podpiera (2006) pointed out that lending decisions of foreign banks can be influenced by both “contagion” and “diversification”. Either of these effects might have been dominant for our sample countries. If contagion from parent bank to subsidiary was dominant, then the subsidiary should have contracted its credit growth in line with that of its parent. A downgrade in the credit rating of the parent bank, for example, might affect the perception of its subsidiary as well. In this case, foreign banks would have suffered in two ways during the crisis. First, directly because of the economic effects of the crisis in their host country such as through a drop in credit demand or loan quality and second, indirectly because of contagion from their parent bank. A second potential scenario would be a dominant diversification effect. In this scenario credit growth of parent and subsidiary do not move in par, but in opposite directions. In line with the theory of portfolio optimization, capital flows to where it yields the highest return. Hence, subsidiaries outperforming their parent bank during the crisis years could have been regarded as safe havens and experienced an increased inflow of

funds. In this scenario foreign banks could have contracted their loan growth by less than their domestic counterparts as international banks tried to reduce their risk exposures and redirected their capital.

The potential contagion or diversification effects that foreign subsidiaries are exposed to through their parent banks implies a not insignificant role that parent banks play in the determination of their subsidiary's credit stability and growth. This would be a dependency irrelevant to non-affiliated domestic banks and would be a possible explanation for differences. A central role plays the existence of bank internal capital markets which can direct additional funds from parent to subsidiary or enable the transmission of financial shocks in either bank. Therefore, we would expect parent bank characteristics such as high liquidity, profitability, loan growth and loan quality to have a significant positive effect on their subsidiaries. Moreover, credit growth in the subsidiaries is likely to not only be affected by the financial standing of their parent but also by the economic conditions in their parent's home country. A home country in economic decline with a dwindling demand for credit, should have a negative effect on the loan growth of the parent bank and through contagion also on the subsidiary bank. If this was true, then the parent's country of origin should be a significant factor. In fact, Mehigan (2016) found evidence that foreign banks from advanced economies exhibit higher loan growth than foreign banks from emerging or developing countries. Foreign banks whose home country is a strong and stable economy might therefore have advantages over a subsidiary with an economically weak or unstable home country. There might also be various positive regulatory, managerial and procedural benefits that a subsidiary from an advanced country might have over one from a developing country. However, the focus of this dissertation lies on purely financial and economic factors and ignores softer or legal factors that will be left for future research. Overall, the option of foreign banks to access additional funding from their parent bank as well as the additional exposure to risks associated with their international parent, are likely to be the key cause for differences in lending behaviour of foreign and domestic banks.

Data Sources

The empirical part of this dissertation uses financial data derived from bank balance sheets along with macroeconomic data at the country level. The main source for bank level data is Fitch and Bureau van Dijk's Bankscope Database. Unfortunately, the database was discontinued in January 2017 and replaced by Orbis Bank Focus which, although similar, covers less data and has a shorter time frame. The data used in this dissertation was taken from a Bankscope CD with data until August 2016 kindly provided by the Institute of Economic Studies at Charles University Prague. The global Bankscope database contains information on around 29,000 public and private banks worldwide. Provided are financial details on balance sheet, income and cash flow statement items as well as various financial ratios already calculated by the operators. Of particular interest for this research were profitability, solvency and liquidity ratios as well as loan quality, funding structure and bank size indicators. Due to the large number of variables on offer, we could choose from a range of options for each variable used. Furthermore, there is data on ownership structure including shareholders and the global ultimate owner for foreign banks. Using search function filters allows to create specified dataset such as, for example, country lists of foreign banks. A

country filter allowed to directly filter for the sample countries. Data coverage reaches back up to 16 years, albeit with often significant gaps. Moreover, the database offers internal tools for data analysis and data presentation. It has been widely used in the academic research community and is unique in its scope and data coverage for bank level data. However, a significant number of observations is missing and several banks do not have any data entries at all.

The bank level data from Bankscope is supplemented with macroeconomic variables from the World Bank Development Indicators. These development indicators offer annual data on a range of different economic, environmental, political and social factors for countries around the world. Data coverage begins in 1960 and ends in 2016 and is usually updated on a quarterly basis. The database also provides estimates at the national, regional and global level. It is one of the most comprehensive databases in this field with data from officially recognized international sources. For this research country data on economic growth and inflation to capture macroeconomic developments is used. In contrast to Bankscope, the data derived from the World Bank Development Indicators is complete for the sample countries with no missing observations. The data taken from both the World Bank and Bankscope is denominated in US dollar to allow for a comparison between the banks across countries and currencies. Both sources were used to obtain a first dataset of 192 active foreign, domestic-private and domestic-state owned banks for a timeframe of 10 years from 2005 until 2015. Data before that, especially in the 1990s, is subject to greater volatility because of the aftermath of the liberalization process (as well as higher inaccuracies in data management) and was therefore not included. Included in the dataset are, however, the year of the global financial crisis 2008 and 2009. Banks that are no longer in operation were automatically excluded from the dataset. A detailed description of how the data was prepared and cleaned is given in the next section.

Data Preparation and Description

The panel dataset created for the analysis is unbalanced with a large number of missing observations. Hence, a first step after downloading the data is dropping banks that have no or less than two years of consecutive observations. This significantly reduces the original dataset from 192 banks to 122 banks². Next, foreign banks are identified via Bankscope. However, the database only defines foreign bank subsidiaries as foreign banks disregarding foreign bank branches. Therefore, banks defined as domestic were checked manually for their ownership and if necessary were assigned into another category. This was for the largest part done through publicly available information on the banks' websites. A foreign bank dummy is used to divide the dataset into two subset for foreign and domestic banks. In order to match the data of the parent bank to its subsidiary, the variable "Global Ultimate Owner" is used to identify the parent bank. For banks which had to be checked manually this was again done via the banks' website or via publicly available information in Bloomberg. Afterwards, profitability, loan quality, solvency, liquidity and funding structure indicators for the parent bank are identified in Bankscope, downloaded and

² A complete list of banks included in the final dataset can be found in table A.5 in the appendix.

matched with their respective subsidiary. We thus use the same variables as for the subsidiary except for market share. Again banks with less than two observations are excluded. This reduced the sample size further as observations for the parent banks were often either missing or the parent bank was not listed on Bankscope. In a next step the data is formatted to fit the requirements of Stata. Bankscope provides annual data on a variable as separate variables, e.g. Net Interest Margin 2015, Net Interest Margin 2014 etc. Hence, the data is merged and reshaped to obtain a format suitable for a panel analysis in Stata. Finally, it is necessary to check for outliers as these can potentially affect the regression results. Eventually we arrive at our complete dataset.

Tables 1 provides an overview of the distribution of foreign and domestic banks in the dataset. The second and third columns show the distribution of banks in the complete dataset by country both in absolute and relative terms. As was to be expected most of the banks in the dataset are from Poland which out of the four countries has the largest banking sector. Less represented are banks from Hungary (18%) and Slovakia (13%). This simply due to the relative smaller size of the banking sector in the countries. Moreover, the table illustrates the shares of foreign and domestic banks in the dataset. Most foreign banks are from Czech Republic (37%) followed by Poland (35%). The reverse rank order might be due to some selection bias as Poland has less data availability than Czech Republic and more foreign banks had to be eliminated. Overall, the full dataset is comprised of 74.6% foreign and 25.4% domestic banks.

Table 1. Number of Banks per Country

Country	Total		Foreign		Domestic	
	Frequency	%	Frequency	%	Frequency	%
Czech Republic	39	32.0%	34	37.4%	5	16.1%
Hungary	23	18.9%	12	13.2%	11	35.5%
Poland	44	36.1%	32	35.2%	12	38.7%
Slovakia	16	13.1%	13	14.3%	3	9.7%
Total	122	100%	91	100.0%	31	100%

Source: Bankscope (2016)

Table 2. below indicates the share of foreign and domestic banks in the sample countries in the dataset. Czech Republic has the highest share of foreign banks with 87.2% followed by Slovakia with 81.3% and Poland with 72.7%. Hungary has the smallest share of foreign banks in the dataset with 52.2%. In order to verify the data and estimate its representativeness for the sample region, it is cross-checked with the information provided by central banks and other national authorities³. Overall, the table indicates that the relative country ranking in terms of foreign bank share is the same. Although not all banks are included in

³ For reference see also Chapter 2

the final dataset due to limited data availability, the proportion of foreign and domestic banks is similar to the numbers provided by the central banks and should thus be representative of the banking sectors in the sample countries.

Table 2. Full Dataset: Share of Foreign Banks per Country

Country	Foreign Banks	
	Frequency	%
Czech Republic	34	87.2%
Hungary	12	52.2%
Poland	32	72.7%
Slovakia	13	81.3%

Source: Bankscope (2016)

The bank specific indicators present the largest group of variables. Gross annual loan growth in percentage is used as the dependent variable. In contrast to absolute loan volume it allows a better comparison across banks of varying sizes as it describes credit development in relative terms. The variable has proved highly significant in similar research (de Haas, 2013) and is, furthermore, a relevant indicator for lending stability. Net interest margin expressed in percentage is used as an indicator for bank profitability. The net interest margin measures performance by comparing interest earned with interest paid. A positive value thus indicates successful investment decisions that resulted in an interest earned that exceeds interest paid on debt/expenses. For loan quality we use the share of non-performing loans to gross loans. Impaired loans are defined as loans that are more than 90 days overdue and have a high probability of default. This ratio is backward looking. We choose the equity to total assets ratio presented in percentage as a measure of solvency. The ratio describes the percentage of total assets that is covered by shareholders' total equity. It can also be interpreted in terms of leverage. A higher value indicates a higher degree of leverage. Alternatively, we could have taken equity over net loans as de Haas et al. (2013), but we found data availability to be better for our ratio. To measure liquidity the ratio of liquid assets to total bank assets is used, where total bank assets refers to the sum of deposit and short-term funding. Relative market share is calculated as bank assets over total bank assets in the host country.

The macroeconomic variables annual GDP growth and inflation are used as proxies for credit demand and were downloaded from the World Bank Development Indicators. They were then matched with the banks' respective home and host country. Annual percentage GDP growth is expressed in terms of market prices based on constant local currency where aggregates are based on constant 2010 US Dollars (World Bank, 2017). The variable represents the growth in the sum of gross value added by all producers resident in the economy. Inflation is measured in terms of the consumer price index and describes the

annual percentage change in the cost to the average consumer of acquiring a basket of goods and services (World Bank, 2017). No changes including lags or logarithms were used.

The first dummy variable created is the crisis dummy variable which controls for the effects of the global financial crisis. This allows to explore whether the financial crisis had a significant impact of bank lending behavior and also whether domestic and foreign banks were affected differently. The dummy variable takes the value 1 for the crisis years 2008 and 2009 and 0 for all other years. As it is time-variant it can be included in the fixed-effects model. A second dummy was created for the European debt crisis. The variable takes the value 1 for the years 2011 and 2012 and zero for all other years. As can be seen later in Figure 10. loan growth experienced two large declines during the sample period in the chosen dummy variable years thereby justifying the use of dummy variables to analyze the effects of the two interlinked crises.

Bankscope provides the option to identify foreign banks in its database. In the first instance (using the complete dataset), this identification was used to create a dummy variable that assumes the variable 1 if a bank is foreign owned and 0 if it is domestically owned. However, Bankscope defines foreign banks as banks with a foreign ownership share of more than 50.01% and only identifies foreign subsidiaries while neglecting foreign bank branches. Therefore, banks were also checked manually. In the second instance (using a subset with only foreign banks of the complete dataset), we create dummy variables for foreign banks' parent banks depending on their country of origin. Although there is no universal rule of how a foreign bank is defined, this paper follows the definition of the ECB, the World Bank and Bankscope. We define a foreign bank as one where more than 50 % of owned by foreign investors.

Table 3. provides basic descriptive statistics for the bank-specific and macroeconomic variables for the whole dataset excluding the dummy variables. The second column labeled observations describes the data availability for each variable during the sample period. Generally, data availability is quite good for the macroeconomic variables but less so for the bank specific variables. Especially for loan quality and funding structure a high number of observations is missing. The first row present the descriptive statistics for the dependent variable. Overall, average loan growth has been quite high at approximately 14.7 %. But it also has a high standard deviation of around 36.3 percentage points capturing the wide spread of data where we have a minimum of -100 % and a maximum of almost 400 %. This indicates a lot of fluctuations in loan growth during the sample period which is potentially due to the financial crisis. Liquidity and funding structure as well have a high standard deviation. The average net interest margin stands at around 2.8 % with a standard deviation of 3.6 %. Minimum and maximum values are relatively extreme at -35.1 % and 22.5 %. Funding structure as well as is characterized by a large standard deviation of 127.2 compared to a mean of 101.4 %. The large standard deviations point towards a high variation between banks and possibly across countries.

Table 3. Descriptive Statistics of all non-binary Variables

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Loan Growth (%)	902	14.629	36.297	-100	396.690
Net Interest Margin (%)	1,011	2.763	3.560	-35.120	22.523
Non Performing Loans (%)	601	8.392	6.985	0	53.290
Equity (%)	1,015	9.355	8.561	-24.944	91.831
Liquidity (%)	999	26.534	46.020	0.117	734.933
Funding Structure (%)	818	101.389	127.218	0.130	988.885
GDP Growth* (%)	1,342	2.927	3.082	-6.564	10.800
Inflation (%)	1,342	2.501	1.913	-0.991	7.935

* GDP Growth refers to GDP growth in the four sample countries

Source: Bankscope (2016)

It is useful to analyze the dependent variable loan growth in more detail. Figure X. below indicates differences in the descriptive statistics of the variable across the four sample countries. The mean shows some relatively minor variations with Poland as the strongest economy also experiencing the highest loan growth on average with 18.5%. The standard deviation indicates much greater differences in variation between countries. According to the data, the variation in loan growth in Hungary (44.3) is twice as large as in Slovakia (22.1). As we will later see this is likely to be due to the fact that Hungary suffered the most during the financial crisis and experienced the largest economic downturn (EEAG, 2012). After borrowing heavily in foreign currency the country came under pressure when its own currency the Forinth depreciated. This foreign currency crisis further exacerbated the situation and forced Hungary to ask the International Monetary Fund and the European Union for a bail out (Fairclough, 2011). The difficult economic circumstances directly affected loan growth within the country. Hence, the high variation seems plausible. In contrast, Slovakia which has the lowest average loan growth at 11.7% also has the most stable credit growth with the lowest standard deviation. The number of observations for each country corresponds to the relative size of their banking sector as measured by the number of banks. Overall, 902 observations are available to be included in the regression.

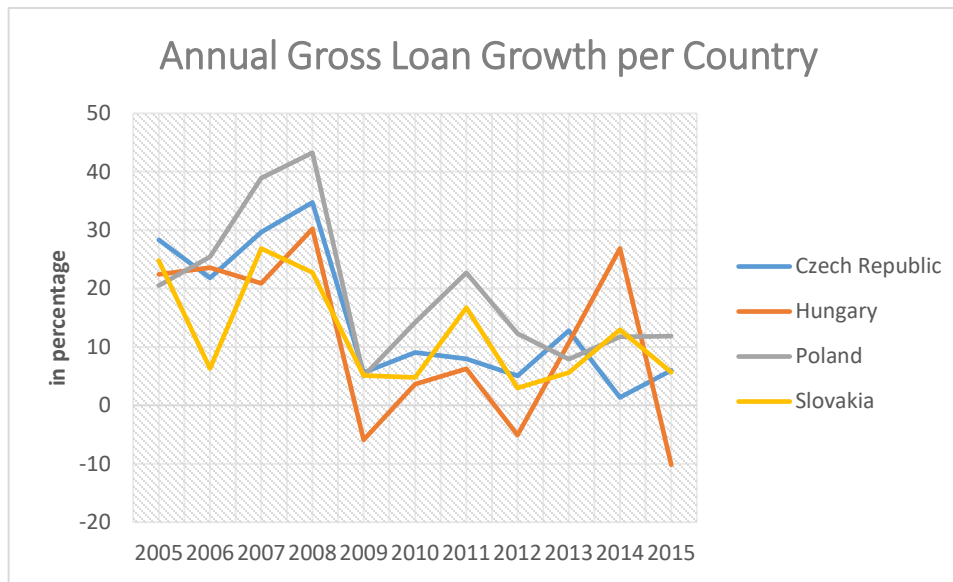
Table 4. Descriptive Statistics of Loan Growth for the Sample Countries

Country	Summary of Loan Growth		
	Mean	Std. Dev.	Frequency
Czech Republic	13.83251	32.54786	255
Hungary	11.301863	44.299586	204
Poland	18.543962	37.706669	318
Slovakia	11.72432	22.093567	125
Total	14.629036	36.296975	902

Source: *Bankscope (2016)*

The great variation in standard deviation across countries points towards certain country specific characteristics that might be relevant for the regression. For a more detailed analysis of how loan growth has developed in the sample countries over time, figure 9 plots the historical development from 2005 until 2015. All four countries experienced increasing loan growth before the onset of the financial crisis in 2008. With the beginning of the crisis, however, credit growth declined sharply, turning even negative for Hungary. Indeed, in line with the descriptive statistics above Hungary was subject to the greatest volatility and experienced the largest drop in credit growth. This seems plausible as Hungary was also the country that was hit hardest by the financial crisis (EEAG, 2012). This was partially due to its high government debt when compared to the rest of the region, but also due to various structural weaknesses including a high dependency on exports. Moreover, it reflects the countries high exposure to foreign currency loans which – due to a depreciation of its own domestic currency – the country was struggling to repay. As a result the economy suffered and loan growth declines as well as demand dropped. From 2009 loan growth began to recover but remained instable, especially in Hungary which suffered again from negative loan growth in 2012 and 2015. The volatility in loan growth can be found both within and between countries. However, overall the countries seem to move somewhat in par in terms of credit growth exhibiting similar trends over time, such as a built up before, a decline during and a recovery after the financial crisis as well as another decline, albeit smaller, when concern rose during the European debt crisis in 2011. This would justify the use of two sets of dummy variables to control for the effects of the two events. The fact that Hungary experienced the financial crisis more severely than the other countries, might point towards country-specific effects that can impact the results of a simple pooled regression. A fixed effect model would account for country specific effects that do not otherwise enter the regression model.

Figure 9. Annual Gross Loan Growth per Country



The data describes loan growth in the sample countries Czech Republic, Hungary, Poland and Slovakia. Source: Bankscope (2016)

Highly relevant for the research question is of course how the descriptive statistics for loan growth differ for foreign and domestic banks. This is presented in Table 5. below. As stated earlier the sample size is much larger for foreign than for domestic banks resulting in an uneven distribution of observations. Interestingly, the mean is almost identical for the two groups – 14.7 % for domestic and 14.6 % for foreign banks. However, there is an obvious difference in standard deviations. Foreign banks appear to exhibit a much more stable credit growth (33.6) whereas domestic banks show more volatility (44.2). This might also be a first indication that foreign and domestic banks were affected differently by the crises. However, we need to analyze the data in more detail before we can draw such conclusions. This is in line with the fact that both the overall minimum and maximum of the dataset can be found among the domestic banks.

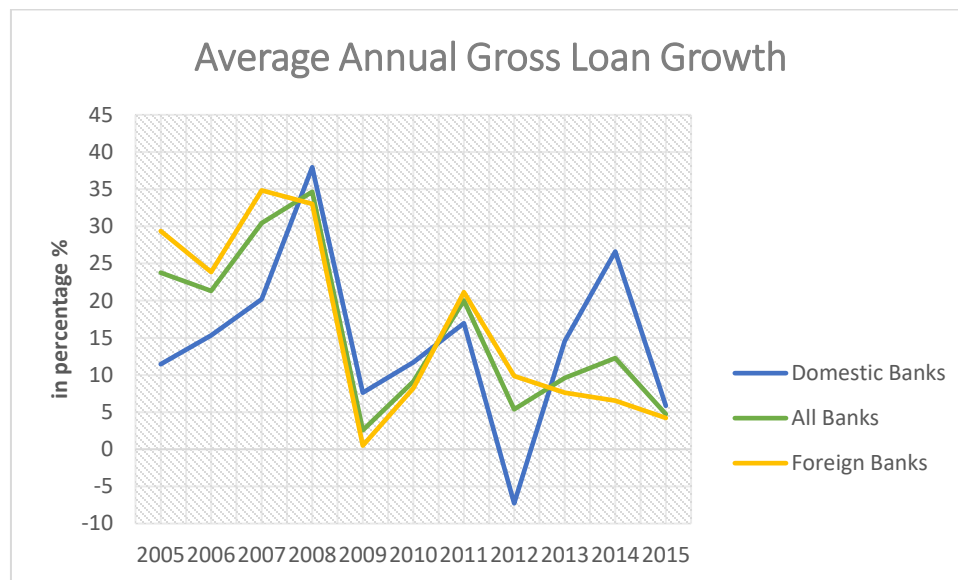
Table 5. Descriptive Statistics of Loan Growth for Domestic and Foreign Banks

	Observations	Mean	Std. Dev.	Minimum	Maximum
Domestic Banks	210	14.668	44.202	-100	396.690
Foreign Banks	692	14.617	33.570	-97.920	385.880
Combined	902	14.629	36.297	-100	396.690

Following this we compare trends in credit growth over time. Figure 10 below plots the average annual gross loan growth in percentage from 2005 until 2015 for foreign, domestic and all banks together. First of all, we can discern similar trends for both foreign and domestic banks. Both experienced a rise in credit growth in the built-up to the financial crisis followed by a sharp drop between 2008 and 2009. Although the average loan growth remained positive it came close to zero and foreign banks experienced

a sharper decline than domestic banks. However, the intensification of the European Debt Crisis around 2011 seems to have been felt harder by domestic banks which suffered much more in terms of credit growth than foreign banks, but also experienced a faster recovery whereas foreign banks remained on a declining path. It is especially before the financial crisis and after 2011 that the graph shows some differences between the groups. The higher volatility of domestic banks described above seems to mostly occur between 2011 and 2015 when the European debt crisis intensified.

Figure 10. Average Annual Gross Loan Growth for Foreign, Domestic and all Banks



Source: Bankscope (2016)

The dataset has a number of limitations. First, it suffers from a large number of missing observations which reduces the final dataset. Second, the number of domestic banks is quite small when compared to the number of foreign banks. This might be problematic when running the regressions for the domestic subset. Moreover, it limits the option to run separate regressions for each country to analyze country specific effects as the sample sizes would simply be too small. Finally, as the dataset is limited to four countries results might be limited to these countries and one needs to be clear about the representativeness for other countries before drawing wider conclusions.

Methodology and Model

This dissertation employs a cross-country panel regression analysis focusing on the Visegrad countries in the CEE region: Czech Republic, Hungary, Poland and Slovakia. As demonstrated in Chapter II, the four countries of choice have a similar economic and financial make up as well close geographic proximity. A similar level of economic development as well as data availability played another role. All have an exceptionally high share of foreign bank assets. For the empirical analysis financial and economic data is taken from the sources outlined in the previous section. The software package Stata 14.0 is used for the statistical analysis. The focus of the analysis lies on credit stability as the one aspect of financial development that is possible to analyze both at the aggregated macro and micro level. The analysis is run in several steps. First, we test for statistically significant differences in the mean of credit growth for foreign and domestic banks by conducting a t-test. Then we analyze the factors influencing credit stability in more detail by running several regressions – both in terms of macroeconomic and bank specific characteristics. In a first step, the complete dataset of both foreign and domestic banks is used to identify the drivers of bank lending behaviour. In a second step, we divide the original dataset into two subsets comprised only of foreign and domestic banks, respectively. In a third step, we only focus on the dataset containing foreign banks and explore the relation between subsidiary and parent bank. We investigate how subsidiaries are affected by the financial characteristics of their parent bank and economic development in their parent bank's home country.

The research questions are assessed empirically via a fixed effects panel regression model. Using a fixed effects model seems plausible as time invariant differences between the banks and countries are likely to exist. That is, it seems highly likely that the unobserved effects that describe differences between banks and countries are non-random. A fixed effects model allows to control for these time invariant bank and country specific characteristics that might otherwise not be accounted for. In this way, fixed effects can help to avoid the problem of unobserved heterogeneity bias. Similar research in the past has also repeatedly found fixed effects to be the most suitable model⁴. Nevertheless, we run a formal Hausman test to confirm that a fixed effects is more appropriate than a random effects model and to choose the most efficient model with consistent results. The Hausman test is a commonly accepted formal test to choose between fixed and random effects. The significant p-value ($0.0012 < 0.05$) indicates that the coefficients of the efficient random effects estimator are not the same as the coefficients for the consistent fixed effects estimator. Therefore, a fixed effects model is more appropriate⁵. Hence, we can use the command *xtreg* with fixed effects in Stata. Moreover, we run a simple OLS regression with bank dummies to confirm the results and compare model results.

⁴ See for example de Haas (2013) etc. Interestingly, De Haas and van Lelyveld (2003) used both a simple OLS and a random effects model to estimate credit/deposit growth. Other researchers have made use of stochastic frontier model. However, unfortunately this exceeds the empirical expertise of the author and it needs to be left for future research to explore more complex alternative models.

⁵ See Table A.1 in the appendix for the results of the Hausman test.

Eventually we arrive at the following bank-level fixed effect model for the econometric analysis:

Fixed-Effects Model:

$$(1) \text{ Loan Growth}_{i,t} = \beta_0 + \beta_1 \text{ Bank}_{i,t} + \beta_2 \text{ Host}_{i,t} + \beta_3 \text{ DCrisis}_{i,t} + \mu_{i,t} + \varepsilon_{i,t}$$

$$(2) \text{ Loan Growth}_{i,t} = \beta_0 + \beta_1 \text{ Bank}_{i,t} + \beta_2 \text{ Host}_{i,t} + \beta_3 \text{ Home}_{i,t} + \beta_4 \text{ Parent}_{i,t} + \mu_{i,t} + \varepsilon_{i,t}$$

Annual gross loan growth i at time t is used as the dependent variable in the model. *Bank* refers to a vector of bank specific variables including profitability, loan quality, solvency, liquidity, funding structure and market share, while *Host* and *Home* refer to the macroeconomic variables economic growth and inflation in the host and home country, respectively. *DCrisis* links to the global financial crisis dummy and the European Debt Crisis dummy both of which take a value of one for the crisis years and zero for all other years. β_0 describes the constant and $\mu_{i,t}$ refers to the fixed effects whereas $\varepsilon_{i,t}$ describes the error term. Because all time-invariant variables are already included in the fixed effects, all of the variables presented above are time-variant. Therefore, it is also not possible to run a fixed effects model with time invariant dummy variables such as a time-invariant ownership dummy variable to test for differences between foreign and domestic banks. Instead, the dataset is split into foreign and domestic banks in order to test the two groups separately. A further split based on the host country allows to test for country-specific effects. Model (1) is run with the full dataset and for the two subsets. Model (2) is only run for the foreign banks subset with the key difference being that Model (2) includes variables for the foreign bank's home country and the parent bank specific variables described by the vector *Parent*.

Before continuing with the regressions it is important to analyze the data visually and with regard to heteroscedasticity, autocorrelation and multicollinearity. This clarifies whether the regression model and the variables need adjustments. Figure 11 a) and b) depicts the heterogeneity of the dependent variable loan growth for domestic and foreign banks⁶. Some heteroscedasticity can be observed for both groups of banks meaning that the variance of the error terms is not constant. Figure 12. a) and b) shows the heterogeneity of loan growth across years. Again some heteroscedasticity is present, but to a much small extent than for entities. This serves as further justification for using an entity but not necessarily time fixed effects model. It supports the results of the formal Hausman test.

⁶ See table A.2 in the appendix for heterogeneity for the full data set including foreign and domestic banks

Figure 11. Heterogeneity of Loan Growth across Banks, 2005 – 2015

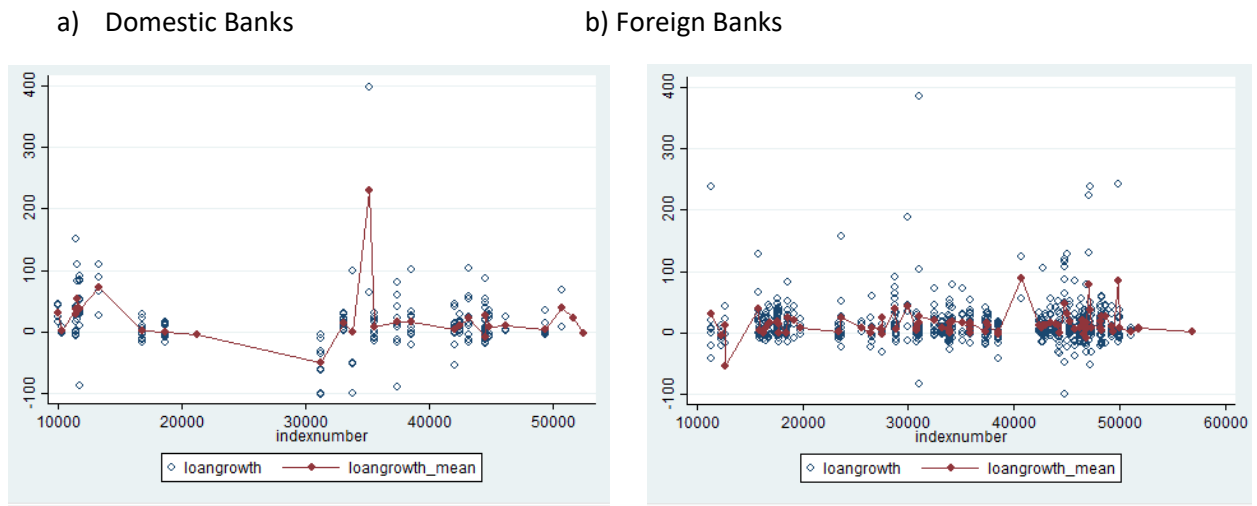
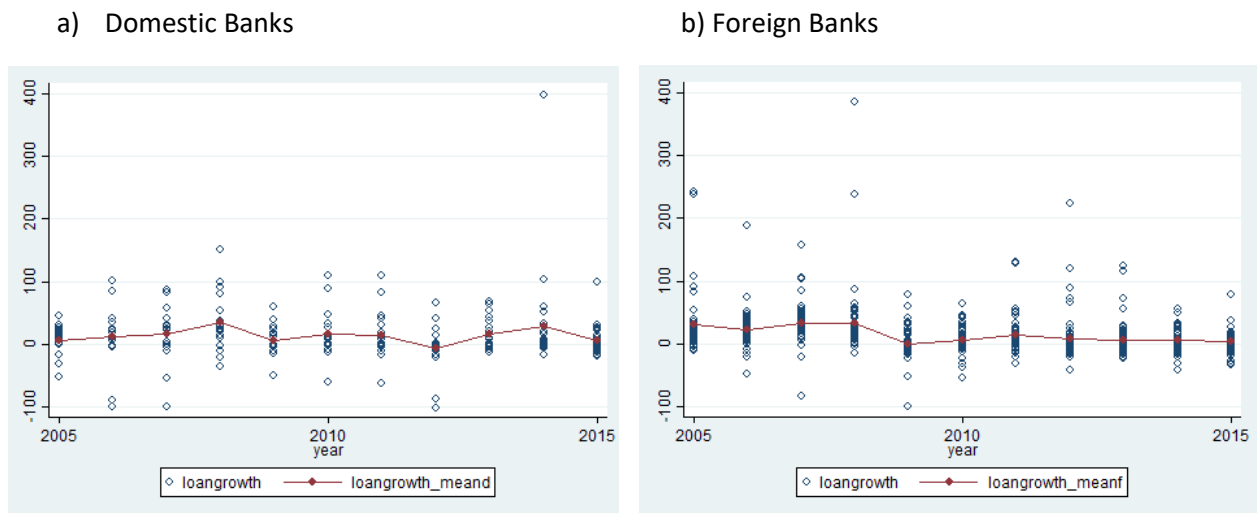


Figure 12. Heterogeneity of Loan Growth across Years, 2005 – 2015



The dependent variable was also checked for autocorrelation in the first three lags. However, as Table 6. shows the lags of loan growth are not strongly correlated indicating that autocorrelation should not be of concern in the regression analysis.

Table 6. Autocorrelation in Loan Growth

	Loan Growth	L. Loan Growth	L2. Loan Growth	L3. Loan Growth
Loan Growth	1.0000			
L. Loan Growth	0.1222	1.0000		
L2. Loan Growth	0.0822	0.1573	1.0000	
L3. Loan Growth	0.1247	0.0923	0.1824	1.0000

Furthermore, we test for multicollinearity which occurs when several predictor variables are strongly correlated which could negatively affect the accuracy of the regression coefficients. Tables 7 and 8 present correlation matrices for the variables of domestic and foreign banks, respectively. First of all, it can be noted that none of the variables has a strong correlation with another – all correlation coefficients remain under 0.5. Hence, multicollinearity should not be an issue. With regard to the regression model the correlations of the dependent variable are particularly interesting to analyze. It can be noted that net interest margin and the share of non-performing loans have very similar correlations with loan growth for foreign and domestic banks. As was to be expected a higher net interest margin, which can be interpreted as higher profitability, is positively correlated with higher loan growth. Conversely, a high share of non-performing loans is negatively correlated with loan growth. For the equity structure we can observe a negative relationship with loan growth. The relationship of the liquidity indicator with loan growth seems to be more ambiguous with different signs for the two groups of banks. Similarly, the market share shows almost no correlation with loan growth for foreign banks but a stronger positive relationship for domestic banks. Funding structure, GDP and inflation are observed to have positive relations with loan growth.

Table 7. Domestic Banks: Correlation Matrix

Domestic	Loan Growth	NIM	NPL	Equity	Liquidity	Funding	Mkt Share	GDP	Inflation
Loan Growth	1.0000								
NIM	0.1173	1.0000							
NPL	-0.3194	-0.1058	1.0000						
Equity	-0.0396	0.1002	0.3772	1.0000					
Liquidity	-0.1766	-0.2650	0.2094	0.0412	1.0000				
Funding	0.1766	-0.2817	-0.1475	0.0066	0.1010	1.0000			
Mkt Share	0.2230	0.0036	0.1300	0.1853	0.0611	0.0819	1.0000		
GDP	0.1824	-0.0755	-0.0518	0.1214	-0.1960	-0.2046	0.0161	1.0000	
Inflation	0.0206	0.2146	-0.1359	-0.1977	-0.0061	0.1096	-0.0959	-0.2809	1.0000

Table 8. Foreign Banks: Correlation Matrix

Foreign	Loan Growth	NIM	NPL	Equity	Liquidity	Funding	Mkt Share	GDP	Inflation
Loan Growth	1.0000								
NIM	0.1389	1.0000							
NPL	-0.3064	0.2234	1.0000						
Equity	-0.0983	0.2462	0.0904	1.0000					
Liquidity	0.0664	-0.1369	0.0177	-0.0450	1.0000				
Funding	0.0694	0.1248	0.1007	0.0425	-0.0703	1.0000			
Mkt Share	-0.0009	0.0436	0.1822	-0.0205	-0.0470	0.1393	1.0000		
GDP	0.2315	-0.0157	-0.1684	0.0128	0.1108	-0.0433	-0.0408	1.0000	
Inflation	0.1591	0.0577	-0.0160	-0.0998	-0.0021	0.0889	0.1677	-0.0325	1.0000

Chapter III. Empirical Results and Interpretation

In the following sections the empirical results of the panel regressions are presented and discussed. However, before running the regressions conducting a t-test is useful to test for statistically significant differences in loan growth of foreign and domestic banks. The test allows to find out whether the mean of a variable – here loan growth - is the same for two unrelated groups – here foreign and domestic banks. In other words, it tests whether the difference between the means of the two groups is different from zero. The large p-values indicate no significant difference in the means of the two groups of banks with regard to loan growth⁷. Moreover, referring back to Table 10. *Average Annual Gross Loan Growth for Foreign, Domestic and all Banks*, the graph showed only minor differences in credit growth between foreign and domestic banks. Furthermore, the descriptive statistics for the dependent variable in the previous chapter indicated almost identical means. However, we could observe large differences in standard deviations and also some differences in the correlation matrices. Hence, the almost identical mean does not necessarily imply that no differences exist in the lending behaviour of the two groups of banks. Continuing with the regression analyses allows to investigate the drivers of the banks' lending behaviour in more detail.

Foreign and domestic banks

In the first round of regression we use the basic model to run three regressions. First, for the complete dataset and then for the two subsets of foreign and domestic banks only. In a second step, we split the original dataset into two subsets for foreign and domestic banks, respectively. Table 9 presents the first round of regressions. The table shows the regression coefficient for each variable with the standard error in brackets below it. The stars indicate the level of statistical significance. The first three columns present the results for the regressions run with the complete dataset. Columns four and five then present the regressions for foreign banks only. The last two columns show results for domestic banks. The last two rows present the number of observations for each regression and the R-squared. For each of the groups regressions are first run without and then with both crisis dummy variables. On average, we have around 7.4 observations for the foreign bank dataset and 6.2 observations for the domestic bank dataset indicating that the foreign banks have a better data availability which could result in some form of selection bias. The between groups r squared is much larger than the within group r squared for all models. This indicates that the chosen variables rather account for differences in loan growth between banks than for the variance in loan growth that a single bank is subject to over time. Whereas the former stands at around 0.3 in all models it is less than 0.1 for within group differences.

⁷ The results of the t-test can be found in Table A. 4 in the appendix.

The results of the fixed effects regression for the complete dataset indicate that all chosen explanatory variables are important determinants of loan growth. With the exception of the inflation rate which is statistically significant at the 10 % level, all variables are significant at the 5 % level. The persistence of the signs across the models – a pooled regression and the fixed effects model - indicates relatively robust and stable results. As expected the net interest margin – chosen to represent the profitability of the banks - has a rather strong and positive effect on loan growth whereas the share of non-performing loans, used to measure loan quality, negatively impacts loan growth. The larger coefficient of the net interest margin indicates that it has a stronger effect on loan growth than the loan quality. Hence, profitability seems to be a stronger driver of loan growth than loan quality in the full data set. Both liquidity and funding structure have a positive effect on loan growth. Market share seems to have the strongest effect on loan growth indicating that larger banks are also more successful at growing their loan supply. As for the macroeconomic variables, both economic growth and inflation have a positive impact on loan growth which makes intuitively sense. As the local economy expands loan growth increases with the rise in credit demand.

Adding the crises dummies does not result in any major changes in either the significance level or the regression coefficients. However, interestingly the financial crisis dummy for 2008 and 2009 has a positive coefficient indicating an increase in loan growth. This is rather counterintuitive and needs to be examined further. The dummy variable for the European debt crisis, however, indicates a negative relationship as expected and agrees with the observations we made in figures 9 and 10. However, neither of the crisis dummies is significant at the 10 % level. The effects of the crisis might already have been captured by the credit demand proxy GDP growth.

Comparing the regressions for foreign and domestic banks a number of differences stand out. Noticeably, the explanatory variables remain significant for foreign banks but turn insignificant for the domestic dataset. Only the net interest margin and loan quality seem to be significant variables for domestic bank loan growth. Moreover, regression coefficients differ between the two bank groups. Profitability and market power have a larger impact on the loan growth of domestic banks than on foreign banks. This would indicate that domestic banks are more dependent on the domestic market which seems intuitive as the domestic market is their key and primary market. Foreign banks, on the other hand, operate in multiple countries and are therefore more independent from the market share in just one country. Moreover, even if the profitability of a subsidiary is low, the bank might nevertheless receive support from its parent banks, again illustrating the relative independence of foreign bank subsidiaries from local conditions. However, funding structure and liquidity have stronger effects on foreign banks. Funding structure has a positive effect on loan growth for foreign banks, but a negative effect on loan growth for domestic banks. However, when comparing the regression coefficients domestic banks exhibit a more pro-cyclical behavior as their loan growth expands more in line with local economic growth. If we interpret annual host GDP growth as a proxy for credit demand, then we find that domestic banks appear to be more dependent on domestic credit demand than foreign banks. An obvious explanation for this would be that foreign bank subsidiaries can potentially access parent bank-funds and are thus less dependent on domestic credit demand as also outlined in the hypotheses. In a similar vein, loan quality has a stronger effect on domestic than foreign banks. As expected we find an overall significant negative effect of a high share of non-performing loans on credit growth as expected. The importance of loan

quality for loan growth seems to be slightly higher for domestic than for foreign banks who are more likely to fall back on their parent banks' funding facilities.

The 2008/09 financial crisis dummy is somewhat of a surprise. Based on the credit growth graph in the previous chapter, we would have expected the financial crisis dummy to have a negative effect on both foreign and domestic banks as annual gross loan growth made a large dip during the crisis years 2008 and 2009. Yet, we only find a negative coefficient for domestic banks. For foreign banks the crises years seem to have had a positive effect. A possible explanation might be that the reasons for the decline in credit growth during the financial crisis does not lie with the banks per se and was thus not due to a crisis in the financial markets in the region. Instead, the decline in credit growth might have been due to a decrease in credit demand as expressed by GDP growth. In this way, the decline in GDP growth might have had a stronger effect than banking sector characteristics or developments in the financial markets. This would render the crisis coefficient positive as banks might have actively tried to increase their credit. It might be only positive for foreign banks because they – again – could rely on additional funding from their parent banks. This might indicate that the region was perceived as a safe haven for investments during the financial crisis. And as a result international banks in the region were able to expand their credit supply. It also helps to explain the positive coefficient for model (2). As the number of foreign banks is larger in the sample their effect seems to dominate the results of the complete sample. The effect of the European debt crisis dummy, however, is unambiguous and led to a decrease in loan growth for both foreign and domestic banks. The dummy is thus consistent across all regressions. However, the larger coefficient for domestic banks indicates that they suffered to a greater extent than the foreign banks. Again we can link this to the greater range of options available to international banks. However, the crisis dummy variables are not significant at the 10% level. This might be because effects of the crises are already sufficiently captured by the economic growth variable, the inflation variable and the liquidity variable. Adding the crisis dummies also leads to a major change in the liquidity coefficient for foreign banks. No such change can be observed for domestic banks. Instead, we can observe a change in the inflation coefficient which increases when adding the dummy variables.

Table 9. Regression Output 1

	(1) All Banks OLS b/se	(2) All Banks FE b/se	(3) All Banks FE b/se	(4) Foreign FE b/se	(5) Foreign FE b/se	(6) Domestic FE b/se	(7) Domestic FE b/se
NIM	3.07714*** (0.657930)	9.747061*** (1.487263)	9.81125*** (-1.283826)	8.83331*** (1.653639)	8.89848*** (1.659054)	11.1468*** (3.483261)	10.7271*** (3.467546)
NPL	-1.12779*** (0.160446)	-1.34603*** (0.194026)	-1.28383*** (0.2027509)	-1.31068*** (0.2196287)	-1.26779*** (0.229466)	-1.47181*** (0.4182946)	-1.1238*** (0.4359716)
Equity	-0.2314698 (0.2043139)	-0.640319** (0.2730745)	-0.643415** (0.2734225)	-0.90377*** 0.3106656)	-0.90386*** (0.311466)	-0.0317722 (0.5998953)	0.1307285 (0.610242)
Liquidity	0.0905447 (0.0555974)	0.176031*** (0.0675014)	0.171930** (0.0676535)	0.193379** (0.0834069)	0.7880325** (0.0838767)	0.1085069 (0.1215487)	0.0866473 (0.1215311)
Funding	0.027174*** 0.009267	0.034051** (0.0157407)	0.035359** (0.0158086)	0.062680*** (0.0834069)	0.06449*** (0.0203276)	-0.0047522 (0.0273968)	-0.0122168 (0.0276013)
Mkt Share	5.221836 (4.047044)	13.25589** (5.772881)	12.6377** (5.805501)	10.6489* (6.29569)	10.13648 (6.350835)	20.87627 (14.47172)	19.35295 (14.41553)
GDPhost	1.61205*** (0.3318546)	1.27095*** (0.298429)	1.31246*** (0.3618295)	1.24936*** (0.319825)	1.32753*** (0.397328)	1.375075 (0.8494502)	1.097517 (0.9544732)
Inflation	1.13936** (0.540374)	0.87989* (6.308539)	1.014471 (0.6823704)	1.23585** (0.5539514)	1.22181 (0.7627499)	0.3444343 (1.260982)	2.137751 (1.691952)
Crisis							
08/09	-	-	1.210018 (3.244719)	-	1.603521 (3.593389)	-	-5.179599 (7.927703)
11/12	-	-	-1.979627 (2.798198)	-	-0.9454118 (3.116132)	-	-11.69155 (6/691443)
Constant	0.9408978 (3.685265)	-18.1765*** (6.308539)	-18.815*** (6.356745)	-16.9571** (6.996882)	-17.6085** (7.063805)	-17.6947 (15.11196)	-18.74541 (15.08487)
Obs	505	505	505	405	405	100	100
R-sqr		0.3110	0.3131	0.3298	0.3310	0.3123	0.3401

* p < 0.1 **p < 0.05 ***p < 0.01

The relation between parent bank and subsidiary

Next, we run a second round of regressions this time focusing on the relationship between foreign bank subsidiaries and their parent banks. Results can be found in Table 10. As we matched the data of subsidiary and parent earlier we can now run a regression where both set of variables are included in order to investigate the influence of specific parent bank characteristics on the lending behaviour of their subsidiary. As before a fixed effects panel regression model is used. Results of the regressions are presented in Table 10 below depicting the regression coefficient, standard error and significance level of each variable. The parent bank variables are indicated with a small letter “p”. Overall, we have a smaller number of total observations (296) which was to be expected as data for the parent banks is also incomplete. A full list of all parent banks included in the regression can be found in the appendix in table A.6. In total 40 parent banks were included, but it needs to be kept in mind that some parent banks have more than one subsidiary in the sample countries. Due to the large number of variables we obtain a large r-squared of 0.5979. A first analysis of the results indicate that sign and strength of the bank specific variables of the subsidiary do not change too much when compared with the previous regressions. Profitability, liquidity and market share continue to have a positive effect on loan growth whereas poor loan quality and high equity are more detrimental to loan growth. As for financial characteristics of the parent bank, loan growth is the only significant variable at the 5% level. The positive coefficient indicates that the loan growth in the subsidiary increases with loan growth in the parent bank. Hence, there are signs for positive spill-over effects. Interestingly though, the parent coefficients for the net interest margin and liquidity are negative indicating potentially a divergent trend. As the profitability of the parent bank suffers and liquidity decreases, assets might flow to subsidiaries to counteract the trend and to diversify. This would be in line with the theory that assets flow to where they yield the highest return. Meanwhile, loan quality seems to have a contagious effect as a higher share of non-performing loans in the parent bank leads to lower loan growth in the subsidiary. This might once again indicate the presence of bank internal capital markets. If the parent banks struggles with its own loan quality, less funds are available for subsidiaries thereby reducing loan growth. As in the previous regressions higher economic growth, as expressed through positive GDP growth, increases loan growth. This is the case for both economic growth in the host and the parent bank home country. However, the higher coefficient for GDP growth in the parent home country indicates that the home effect is stronger and likely functions through the parent bank. This, again, points towards contagion between parent and subsidiary and illustrates the relative independence of foreign bank subsidiaries on local economic conditions. However, the variables for GDP growth are not significant at the 10% level in this regression. Finally, the inflation coefficient for the host country remains positive, albeit insignificant at the 10% level.

Table 10. Regression output: the impact of parent bank financial characteristics on their subsidiaries

	Foreign Banks FE b/se		Foreign Banks FE b/se
subsidiary	parent		
NIM	11.01536*** (1.772888)	p_NIM	-0.2464881 (1.311382)
NPL	-1.134566*** (0.3275098)	p_NPL	-0.5336516 (0.3985065)
Equity	-0.1412389 (0.2752664)	p_Equity	-0.0141208 (0.4032855)
Liquidity	0.0591447 (0.0882011)	p_Liquidity	-0.048615 (0.0806196)
Funding	-0.0032286 (0.012934)	p_Funding	0.0246334 (0.0553755)
Mkt Share	10.98961 (7.765885)	p_Loangrowth	0.1725103** (0.0851668)
GDPhost	0.3708116 (0.0.5071865)		
GDPhome	0.8158752 (0.5959076)		
Inflation	1.14494 (0.7005124)		
Constant	-21.49435** (10.55211)		
Obs	296		
R-sqr	0.5979		

* p < 0.1

**p < 0.05

***p < 0.01

Conclusion

The goal of this dissertation was to shed some light on the relationship between foreign banks and financial development in the CEE region with a specific focus on bank lending behavior in Czech Republic, Hungary Slovakia and Poland. The results contribute to a growing body of research into financial development and foreign banks in emerging countries. With the help of a panel data regression model we analyzed the determinants of bank lending behaviour and the key drivers for credit growth – or decline – in foreign and domestic banks. In a second step, the impact of international parent bank financial characteristics on the lending growth of their subsidiaries was assessed to investigate potential contagious effects.

Although the descriptive statistics and the results of the comparative t-test indicate no statistically significant difference in the mean of loan growth for foreign and domestic banks, there are nevertheless some differences in the lending behaviour of the two bank groups with regard to the drivers of loan growth and their reaction to financial crises. Overall, the empirical results indicate that foreign bank subsidiaries exhibit more freedom in their lending choices, whereas domestic banks are more dependent on local economic developments and behave more pro-cyclical expanding their loan supply more in line with local economic growth and credit demand. Overall, loan growth tends to be more stable for foreign than domestic banks. Furthermore, empirical evidence indicates that the lending behaviour of foreign subsidiaries is significantly influenced by the loan growth of their parent bank. The regression output provided sufficient evidence for a significant positive cross-border effect. Although not statistically significant, low loan quality, liquidity and profitability in the parent bank also reduced loan growth in the subsidiary. Moreover, foreign bank subsidiaries appear to be more dependent on economic conditions in their parent banks' home country. In other words, high economic growth in the parent bank home country increases loan growth in the subsidiary by more than the same level of economic growth in the subsidiary's host country. This illustrates the relative independence of foreign bank subsidiaries which potentially allows them to act countercyclical to local economic conditions. However, on the downside foreign bank subsidiaries can amplify negative spill over effects as they, in contrast to domestic banks, depend on their respective international parent bank. Hence, if the parent bank comes under financial pressure the subsidiaries might suffer as well leading to potential financial contagion during a financial crisis. A takeaway lesson for policy makers would be that foreign bank presence can help to counter the effects of local economic downturns provided their parent bank is in good financial standing. As domestic banks cut their credit expansion, foreign banks can to a certain extent cushion the effects with the support of their parent bank.

A limitation of the research lies in the availability of data. Although the database Bankscope provides bank level data a large share of data is missing. As we split the original data set into two sub sets this naturally decreased the sample size. Moreover, due to the already relatively small size of the banking sectors in the sample countries a country level analysis in which the countries are analyzed separately was not possible. A potential solution might be to increase the number of sample countries. However, due to the economic and historical heterogeneity of the region this was not done. This paper has specifically

analyzed lending behaviour of foreign bank subsidiaries in the form of credit growth. For future research it would be interesting further investigate the role of parent bank origin. As we established that a good financial health of the parent bank is beneficial for the loan growth of the subsidiary there are likely to be difference. Moreover, an exploration of additional variables can confirm results presented in this paper. In this way, it might be interesting to not only investigate loan supply and growth but also lending condition in the form of interest rates and spreads and the extent to which they are determined by foreign bank parents. This paper also neglected the role of exchange rates and currency union membership. Slovakia adopted the Euro in 2009 and Czech Republic's exchange rate was fixed to the Euro until recently this year. These could be potentially relevant factors. From a methodological point of view more complex empirical model, such as for example a dynamic GMM model could be used.

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Appendix

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Appendix A.1 Stata output: Hausman Test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
nim	9.747061	4.610691	5.13637	1.162769
npl	-1.346025	-1.341342	-.0046828	.0773555
equity	-.6403198	-.5033539	-.1369659	.153675
liquidity	.176031	.1575211	.0185099	.0287359
funding	.0340514	.0283048	.0057467	.0109689
mktshare	13.25589	9.175714	4.080174	2.812503
gdphost	1.270948	1.373242	-.1022948	.0345537
inflation	.8798999	1.170163	-.2902626	.1034613

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

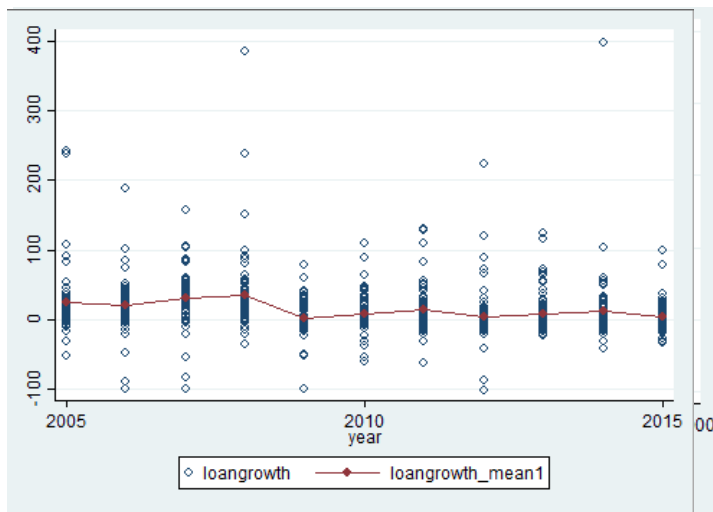
Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 25.76
 Prob>chi2 = 0.0012
 (V_b-V_B is not positive definite)

The Hausman Test is used to choose between a fixed effects and a random effects model. The significant p-value (0.0012 < 0.05) indicates that a fixed effects model is more appropriate.

Appendix A.2 Heteroscedasticity: all banks

Heteroscedasticity: All banks



Appendix A.3 Autocorrelation test for the dependent variable loan growth

	Loan Growth	L. Loan Growth	L2. Loan Growth	L3. Loan Growth
Loan Growth	1.0000			
L. Loan Growth	0.1222	1.0000		
L2. Loan Growth	0.0822	0.1573	1.0000	
L3. Loan Growth	0.1247	0.0923	0.1824	1.0000

Appendix A.4 Stata output: t-test

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	210	14.66833	3.050207	44.2017	8.655217	20.68145
1	692	14.61711	1.276123	33.56955	12.11157	17.12265
combined	902	14.62904	1.208557	36.29698	12.25712	17.00095
diff		.0512236	2.861225		-5.564227	5.666674

diff = mean(0) - mean(1) t = 0.0179
 Ho: diff = 0 degrees of freedom = 900

 Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
 Pr(T < t) = 0.5071 Pr(|T| > |t|) = 0.9857 Pr(T > t) = 0.4929

This t-test tests for significant differences in the means of loan growth for foreign and domestic banks. The bank type is indicated by a dummy variable (found in the column 'Group') which takes the value 0 for domestic and 1 for foreign banks. The high p-values do not provide enough evidence to reject the null hypothesis of no significant difference in means.

Appendix A.5 List of Banks

#	Bankname	Country	Specialization	Foreign*
1	AIG Bank Polska SA	PL	Commercial banks	1
2	Air Bank as	CZ	Commercial banks	0
3	Alior Bank Spółka Akcyjna	PL	Commercial banks	0
4	Bank BGZ BNP Paribas SA	PL	Cooperative banks	1
5	Bank BPH SA	PL	Commercial banks	1
6	Bank Gospodarstwa Krajowego-National Economy Bank	PL	Specialized governmental credit institutions	0
7	Bank Handlowy w Warszawie S.A.	PL	Commercial banks	1
8	Bank Millennium	PL	Commercial banks	1
9	Bank Ochrony Srodowiska SA - BOS SA- Bank Ochrony Srodowiska Capital Group	PL	Commercial banks	0
10	Bank Pocztowy SA	PL	Commercial banks	0
11	Bank Polska Kasa Opieki SA-Bank Pekao SA	PL	Commercial banks	1
12	Bank Polskiej Spoldzielczosci SA	PL	Commercial banks	1
13	Bank Zachodni WBK S.A.	PL	Commercial banks	1
14	Bank of Hungarian Savings Cooperatives Limited-Magyar Takarekszövetkezeti Bank Rt - TAKAREKBANK	HU	Commercial banks	0
15	Bank of Tokyo - Mitsubishi UFJ (Polska) S.A.	PL	Commercial banks	1
16	Brokerjet Ceske Sporitelny, A.S.	CZ	Securities firms	1
17	Budapest Bank Nyrt-Budapest Hitel-és Fejlesztési Bank Nyrt	HU	Commercial banks	0
18	CIB Bank Ltd-CIB Bank Zrt	HU	Commercial banks	1
19	CSOB Leasing, A.S. CZ	CZ	Finance companies	1
20	CSOB Leasing, A.S. SK	CZ	Finance companies	1
21	Calyon Bank S.A., organizacni slozka	CZ	Commercial banks	1
22	Ceska Sporitelna a.s.	CZ	Commercial banks	1
23	Ceskomoravska Stavebni Sporitelna as-CMSS as	CZ	Commercial banks	1

24	Ceskomoravská Zaruční a Rozvojová Banka a.s.-Czech Moravian Guarantee and Development Bank	CZ	Commercial banks	0
25	Ceskoslovenská Obchodní Banka A.S.-CSOB	CZ	Commercial banks	1
26	Ceskoslovenská obchodní banka CSOB	SK	Commercial banks	1
27	Citibank Europe Plc, pobočka zahraniční banky	SK	Commercial banks	1
28	Commerzbank Zrt	HU	Commercial banks	1
29	Credit Agricole Bank Polska SA	PL	Bank holdings & Holding companies	1
30	Credit Agricole Polska Group	PL	Commercial banks	1
31	Czech Export Bank-Ceska Exportní Banka	CZ	Specialized governmental credit institutions	0
32	Czech National Bank-Ceska Narodní Banka	CZ	Central banks	0
33	DNB Bank Polska SA	PL	Commercial banks	1
34	DZ Bank Polska SA	PL	Commercial banks	1
35	Deutsche Bank Polska S.A.	PL	Commercial banks	1
36	Deutsche Leasing CR, spol. s r.o.	CZ	Finance companies	1
37	Diakhitel Kozpont ZRT.	HU	Commercial banks	0
38	Equa Bank a.s	CZ	Commercial banks	1
39	Erste Bank Hungary ZRT	HU	Commercial banks	1
40	Euro Bank SA	PL	Commercial banks	1
41	Europejski Fundusz Leasingowy SA-EFL SA	PL	Finance companies	1
42	Expobank CZ a.s.	CZ	Commercial banks	1
43	FHB Kereskedelmi Bank Zrt	HU	Commercial banks	0
44	FHB Mortgage Bank Plc-FHB Jelzálogbank Nyrt.	HU	Real Estate & Mortgage banks	0
45	FM Bank PBP SA	PL	Commercial banks	1
46	Factoring Ceske Sporitelny, a.s.	CZ	Investment banks	1
47	Factoring KB, a.s.	CZ	Finance companies	1
48	Fio Banka A.S.	CZ	Specialized governmental credit institutions	0
49	Fundamenta-Lakaskassza Zrt	HU	Real Estate & Mortgage banks	1
50	GE Money Leasing SRO	CZ	Finance companies	1

51	Getin Holding SA	PL	Bank holdings & Holding companies	0
52	Getin Noble Bank SA	PL	Commercial banks	0
53	Granit Bank Zrt	HU	Commercial banks	1
54	HSBC Bank Polska SA	PL	Commercial banks	1
55	Hungarian Export-Import Bank Private Ltd	HU	Specialized governmental credit institutions	0
56	Hypotecni banka a.s.	CZ	Commercial banks	1
57	ING Bank Slaski S.A. - Capital Group	PL	Commercial banks	1
58	ING Commercial Finance Polska SA	PL	Investment banks	1
59	Idea Bank S.A.	PL	Commercial banks	0
60	J & T BANKA, a.s.	SK	Commercial banks	0
61	J&T Banka as	CZ	Commercial banks	1
62	J&T Finance Group SE	CZ	Bank holdings & Holding companies	1
63	K&H Bank Zrt	HU	Commercial banks	1
64	KDB Bank Europe Ltd	HU	Commercial banks	1
65	Keler Rt - Központi Elzamolohaz es Ertektar (Budapest) Zrt-Central Clearing House and Depository (Budapest) Ltd	HU	Investment banks	0
66	Komerčni Banka	CZ	Commercial banks	1
67	Komerčni Banka Bratislava a.s.	SK	Commercial banks	1
68	Krajowa Spoldzielcza Kasa Oszczednosciowo-Kredytow	PL	Investment banks	0
69	Lombard Pénzügyi és Lizing Zartkörüen Muködo Reszvenytarsasag-Lombard Financial and Leasing Private Limited Company	HU	Finance companies	1
70	MBank Hipoteczny SA	PL	Commercial banks	1
71	MFB Hungarian Development Bank Private Limited Company	HU	Specialized governmental credit institutions	0
72	MKB Bank Zrt	HU	Commercial banks	1
73	Meritum Bank ICB SA	PL	Commercial banks	0
74	Modra pyramida stavebni sporitelna as	CZ	Commercial banks	1
75	Moneta Money Bank, A.S	CZ	Commercial banks	1

76	Narodna Banka Slovenska-National Bank of Slovakia	SK	Central banks	0
77	Narodowy Bank Polski-National Bank of Poland	PL	Central banks	0
78	National Bank of Hungary ZRT-Magyar Nemzeti Bank	HU	Central banks	0
79	Nordea Bank Polska SA	PL	Commercial banks	1
80	OTP Bank Plc	HU	Commercial banks	0
81	OTP Banka Slovensko, as	SK	Commercial banks	1
82	OTP Mortgage Bank-OTP Jelzalogbank Rt	HU	Real Estate & Mortgage banks	0
83	PPF banka a.s.	CZ	Commercial banks	1
84	Patria Finance	CZ	Investment banks	1
85	Pekao Bank Hipoteczny Sa	PL	Commercial banks	1
86	Plus Bank SA	PL	Commercial banks	1
87	Podkarpacki Bank Spółdzielczy	PL	Commercial banks	0
88	Post Bank JSC-Postova Banka, A.S.	SK	Commercial banks	1
89	Powszechna Kasa Oszczednosci Bank Polski SA - PKO BP SA	PL	Savings banks	0
90	Prima banka Slovensko a.s.	SK	Commercial banks	1
91	Privatbanka, as	SK	Commercial banks	1
92	Prva Stavebna Sporitelna as-First Building Savings Bank	SK	Savings banks	1
93	RBS Bank (Polska) SA	PL	Commercial banks	1
94	RCI Financial Services Sro	CZ	Finance companies	1
95	Raiffeisen Bank Polska SA	PL	Commercial banks	1
96	Raiffeisen Bank Zrt	HU	Commercial banks	1
97	Raiffeisen Leasing Polska SA	PL	Finance companies	1
98	Raiffeisen stavební sporitelna AS	CZ	Commercial banks	1
99	Raiffeisenbank akciova spolecnost	CZ	Cooperative banks	1
100	SGB Bank SA	PL	Commercial banks	1
101	Santander Consumer Bank SA	PL	Commercial banks	1
102	Sberbank CZ as	CZ	Cooperative banks	1
103	Sberbank Magyarorszagi ZRT	HU	Cooperative banks	1

104	Sberbank Slovensko, as	SK	Commercial banks	1
105	Scania Finance Czech Republic SPOL, SRO	CZ	Finance companies	1
106	Slovenska Zarucna a rozvojova banka spu- Slovak Guarantee and Development Bank	SK	Specialized governmental credit institutions	0
107	Slovenska sporitel'na as-Slovak Savings Bank	SK	Savings banks	1
108	Stavební Sporitelna České Sporitelny as	CZ	Commercial banks	1
109	Tatra Banka a.s.	SK	Commercial banks	1
110	Toyota Financial Services Czech S.R.O.	CZ	Finance companies	1
111	Transfinance a.s.	CZ	Investment banks	1
112	UniCredit Bank Hungary Zrt	HU	Commercial banks	1
113	Unicredit Bank Czech Republic and Slovakia AS	CZ	Commercial banks	1
114	Unicredit Leasing CZ, AS	CZ	Finance companies	1
115	Volkswagen Bank Polska	PL	Commercial banks	1
116	Vseobecna Uverova Banka a.s.	SK	Commercial banks	1
117	WOOD & Company Financial Services, a.s.	CZ	Finance companies	1
118	Wuestenrot hypotecni banka as	CZ	Real Estate & Mortgage banks	1
119	Wüstenrot - stavebni sporitelna AS	CZ	Real Estate & Mortgage banks	1
120	Wüstenrot Stavebná sporitel'na as	SK	Real Estate & Mortgage banks	1
121	mBank SA	PL	Commercial banks	1
122	mLeasing SP. Z.O.O.	PL	Finance companies	1
	<p><i>*The dummy variable takes the values 0 for domestic banks and 1 for foreign banks.</i> <i>Source: Bankscope (2016), bank websites</i></p>			

Appendix A.6 List of Parent Banks

#	Bankname
1	Mitsubishi UFJ Financial Group Inc-Kabushiki Kaisha Mitsubishi UFJ Financial Group
2	HSBC Holdings Plc
3	BNP Paribas
4	Deutsche Bank AG
5	Citigroup Inc
6	Banco Santander SA
7	Société Générale SA
8	ING Groep NV
9	Intesa Sanpaolo
10	Commerzbank AG
11	General Electric Capital Corporation-GE Capital
12	Intesa Sanpaolo
13	DZ Bank AG-Deutsche Zentral-Genossenschaftsbank
14	UniCredit Bank AG
15	General Electric Capital Corporation-GE Capital
16	DnB ASA
17	KBC Groep NV/ KBC Groupe SA-KBC Group
18	Erste Group Bank AG
19	Raiffeisen Landesbanken Holding GmbH
20	Ford Motor Credit Company LLC
21	Toyota Motor Credit Corporation
22	Banco Comercial Português, SA-Millennium bcp
23	Erste Group Bank AG
24	Bank Polska Kasa Opieki SA-Bank Pekao SA
25	RCI Banque SA
26	OTP Bank Plc
27	Mercedes-Benz Bank AG
28	FCA Bank SPA
29	Deutsche Sparkassen Leasing AG & Co KG
30	J&T Finance Group SE
31	Alior Bank Spółka Akcyjna
32	Raiffeisen Bausparkasse GmbH-Raiffeisen Wohn Bausparen
33	MKB Bank Zrt
34	Moneta Money Bank, A.S
35	Bank Polskiej Spoldzielczosci SA
36	SGB Bank SA
37	International Personal Finance Plc

38	Capital Bank - Grawe Gruppe AG
39	Plus Bank SA
40	Peugeot Finance International NV